INSECTS OF MICRONESIA
Dermaptera

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INTRODUCTION

The most recent attempt to bring together all records of Dermaptera from the Pacific area is that of Hincks (1938, Fed. Malay States Mus., J. 18: 299–318), who included all records from the Pacific area from the Bismarck Archipelago and the Solomon Islands, south to New Caledonia, Australia, and New Zealand, north to Micronesia, and eastwards to include all the islands of the Pacific ocean as far east as the Galapagos Islands. In that paper 2 species, *Nesogaster aculeatus* (Bormans) and *Chelisoches morio* (Fabricius) are recorded from Micronesia. The Dermaptera collected by Professor Esaki's Micronesian Expeditions in 1936–1939 were studied by Menozzi (1941, Mushi 13:73–80), and these included a further 6 species. The only subsequent papers including records of Dermaptera from Micronesia, of which the present author is aware, are those of Rehn (1946, Acad.Nat.Sci.Philad., Proc. 98:219–239); (1949, Ent.Soc.Am.,Trans. 74:165–171); and (1949, Ent. Soc.Am.,Trans. 75:109–111). The total of species from Micronesia recorded in all these publications is 12, of which 1, *Labia dubronyi* Hebard, is thought to be an error.

Through the kindness of Dr. J. Linsley Gressitt, the present author has had the opportunity to examine a collection of 1581 specimens of Dermaptera from Micronesia, and including specimens from the Bernice P. Bishop Museum, the Field Natural History Museum, the Pacific Science Board, and the United States National Museum. The total of species represented in the collection is 24, of which 6 are new and are described, together with 2 new subspecies.

Following the scope of this series, the present paper includes all necessary keys, so that the species now recorded from Micronesia can be adequately determined. Figures of all the species are given, either figures of the whole insect, or figures of the forceps, male genitalia, or other taxonomic characters. The figures of Micronesian species have been drawn from Micronesian specimens, using a binocular microscope with squared eyepieces. The degree

of enlargment varies but no scale is indicated in the figures since the lengths of the body and forceps are given for all the species.

With some exceptions, 2 sets of characters are usually used in the keys—(1) primary characters, which are applicable to Dermaptera from all Regions, and (2) secondary characters which in general only apply to the Micronesian fauna. The primary characters come first in each couplet, and each is separated by a semi-colon, whilst the end of the primary characters is indicated by a full stop. Following the full stop are the secondary characters, which are also separated by semi-colons. The use of these two sets of characters means that the Micronesian species can be more easily determined, whilst the basic and general differences between the genera and higher categories are also given. The exceptions are the additional key to the Micronesian Carcinophorinae; the keys to species; and some parts of the larval keys. The extent to which the larval keys are applicable are noted at the end of each key.

It is at present generally impossible to determine the larvae to species, but in the limited fauna of Micronesia the larvae of some species can be accurately named, and the present larval keys are the first to be published. It is hoped that further larval keys can be constructed when more immature stages of the various species are available.

The types of the new species are deposited in the Bernice P. Bishop Museum; the Field Natural History Museum; and the United States National Museum, except for a few paratypes which have been retained in the Manchester Museum.

The present collection is so large, and the material has been collected over such a wide area of Micronesia that it presents an excellent picture of the Dermaptera fauna and its distribution amongst the islands. It is to the work of the many collectors who have assembled the material, often under considerable difficulties, that the value of the present work is due, and an added value are the notes on many of the specimens giving the actual habitat in which they were found.

My sincere thanks are due to Dr.J.Linsley Gressitt, who has arranged and co-ordinated the distribution of the specimens to the various institutions, and to whom I owe the privilege and opportunity of studying the collection.

BIOLOGY

The Dermaptera form a small and inconspicuous order, and very few species are of economic interest, which may account partly for the lack of studies on their life history. Since earwigs exhibit the uncommon feature

of maternal care, however, the study of their life histories should have a wider interest than the size of the order would suggest, and it is this feature which has received most attention in the past. Beier (1959, in Bronn, Klassen und Ordnungen des Tierreichs. 5, part 3:455–585) gives an excellent summary of the known biology, and it appears likely that the life history of earwigs follow similar patterns.

The white eggs, which are large for the size of the insect, are laid in a batch in a dark, moist, situation, such as beneath the bark of trees, under stones, in the basal leaves of plants, or in burrows or holes in the soil. The number of eggs varies, from 44–70 in *Anisolabis littorea* White, 60–70 in *Labidura riparia* (Pallas), 21–80 in *Forficula auricularia* Linnaeus, 40–60 in *Chelisoches morio* (Fabricius), and 15–27 in *Marava arachidis* (Yersin). The last species is apparently ovo-viviparous, the larva being assisted to escape from the eggshell by the female immediately after the egg is laid. Earwigs are strongly thigmotactic, and the choice of a nest depends largely on the presence of tactile contact between the earwig and the enclosing soil or other material; humidity also is important. The excavation of the nest arouses a defence mechanism on the part of the female so that she will attack any moving object which may come near to the nest; the male, if present, is also ejected. The laying of the first egg brings into operation 2 other essential responses —(1) licking the eggs, and (2) collecting the eggs in a heap if these are scattered. The effect of the licking is to remove fungal spores or other extraneous matter from the eggshells, and the eggs soon become mouldy if removed from the female. The first 2 ecdyses may take place in the nest when the larvae are still gregarious, but sooner or later the female dies and the larvae disperse. The maternal care for the eggs may be prolonged if fresh eggs are substituted after the hatching of the original eggs, but this care can be lost if the eggs are removed from the female and no substitute is supplied. If the eggs are returned within a few days the female will accept them, but if their return is delayed the female eats them. There is a transitional period in which the fate of the eggs is undecided, and the female may either commence to lick them or may eat them. The maternal care of earwigs thus depends on a succession of stimuli and the appropriate responses commencing on the excavation or preparation of the nest and the laying of the first egg, of which the licking plays an integral part.

The larvae usually pass through 4 instars before becoming adult, so there are 4 ecdyses after hatching from the egg, but in *Anisolabis* there are 5. The period of immaturity from hatching to the last ecdysis varies in different species and also varies with temperature, this period having been

recorded as about 100 days in *Labidura riparia*, 40–44 days in *Marava arachidis*, and 165 days in *Anisolabis littorea*. In *Forficula auricularia* the period varies from 42–49 days at a temperature of 25 °C., to 80–98 days at a temperature of 15 °C.

Most adult earwigs seem to be nocturnal, hiding by day in dark sheltered situations, preferably in narrow crevices. They emerge at night to feed, and are probably generally omnivorous, although certain species seem to be predominately carnivorous, whilst both saprophagous and vegetarian habits have also been recorded. A few species are known to fly readily, mainly the smaller species of the Labiidae, but flight in earwigs is not often recorded, probably due to their nocturnal habits, and the shortness of the flights. *Chelisoches morio* is diurnal, however, and flies readily. Earwigs are also attracted to light, and a number of the present records are due to this method of collecting. Some of these specimens have flown to the light but some are without wings and have evidently crawled to the light or into the trap. Earwigs are capable of climbing to a considerable height on rough surfaces, as the present records from the crowns of palms indicate.

The mating period may be prolonged and that of different species occupies different times of the year, even in the north temperate zone, and a period of time may elapse between mating and the laying of the eggs.

ZOOGEOGRAPHY

Dermaptera are essentially tropical or subtropical insects, and the order reaches its maximum richness in the humid tropical forests of the World. Apart from a few cosmopolitan species the distribution of each species tends to be restricted so that each faunal Region has its own endemic species, whilst the distribution of these is often further restricted within a Region. Since Dermaptera are sedentary insects, and flight is not important in extending the distribution of a species, an account of the distribution of species and higher categories is useful in zoogeographical studies.

Dermaptera are mainly continental insects, and islands tend to have a poor fauna, unless the islands are large and well forested or are close to continental areas. The Dermaptera fauna of islands consists of three main groups —(1) endemic species, (2) species common to neighbouring continental countries, (3) cosmopolitan species. Adventive species or stragglers from other Regions may also occur. The endemic species may represent relict forms, or they may have developed from a single or successive invasions from neighbouring countries; the second group tends to be more

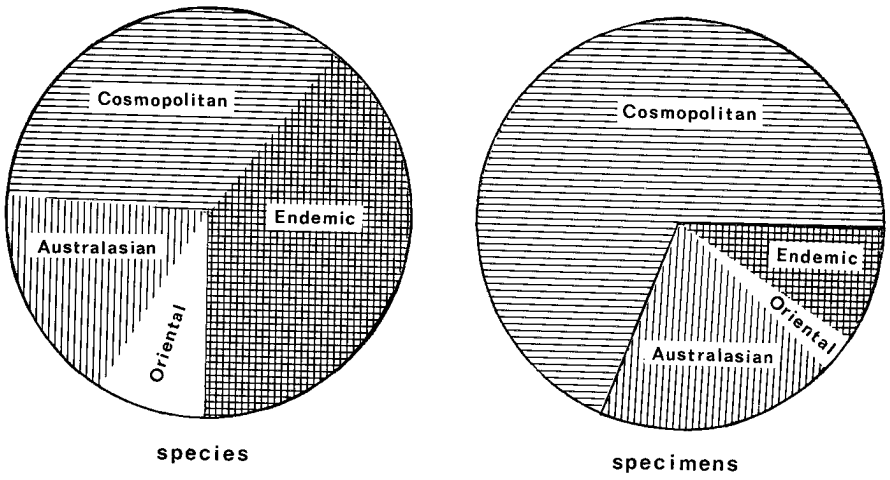
dominant on continental islands than on oceanic islands, whilst the cosmopolitan species may be equally dominant on both continental and on oceanic islands, and may supplant any endemic species. Cosmopolitan species may form the entire population of oceanic islands.

A comparison of the proportion of endemic, cosmopolitan, Australasian, and Oriental species of the Solomon Islands and of Micronesia (fig. 1) shows that the Solomon Islands have a higher proportion of endemic species, more Australasian species, and fewer cosmopolitan species than Micronesia. The higher proportion of endemic species is partly due to the larger sizes of the islands and the more extensive forests, whilst the greater influence of the Australasian fauna is explained by the proximity of the Solomon Islands to New Guinea. In general these differences reflect the differences between continental islands and oceanic islands.

Such differences are greatly increased if the actual number of specimens of the species are considered. Although the proportion of endemic species of Micronesia appears to be large (40%), the numbers of specimens of these species constitute no more than 9% of the total (fig. 1), whilst although the percentage of the cosmopolitan species (32%) is less than that of the endemic species, the numbers of specimens of the cosmopolitan species represent 70% of the total number. In spite of the smaller number of the cosmopolitan species, therefore, these insects are clearly the dominant group in Micronesia.

In contrast the numbers of endemic species in the Solomon Islands examined recently (Brindle, 1970, Pacific Insects, 12 (3): 641–700) show that these insects form a higher proportion of the population of these islands (50%), whilst the proportion of the cosmopolitan species form only 18%. The latter are more important than the latter figure would suggest, since nearly 40% of the total specimens are of cosmopolitan species, and about 30% are of endemic species. The numbers of both the Australasian species and the Australasian specimens in the collection from the Solomon Islands are about 25% of the total, whilst the number of Oriental species and specimens are small. Although in both Micronesia and the Solomon Islands the specimens of the cosmopolitan species form a larger part of the population than the number of these species would suggest, the endemic species of the Solomon Islands are much more important in the fauna of these islands than they are in Micronesia. (fig. 1).

The percentage of specimens of cosmopolitan species in the collection from Micronesia is large, but the greatest number of these belong to two species, *Chelisoches morio* and *Labia curvicauda*, each of which accounts for about one quarter of the total number of specimens, i.e., 350 or more of



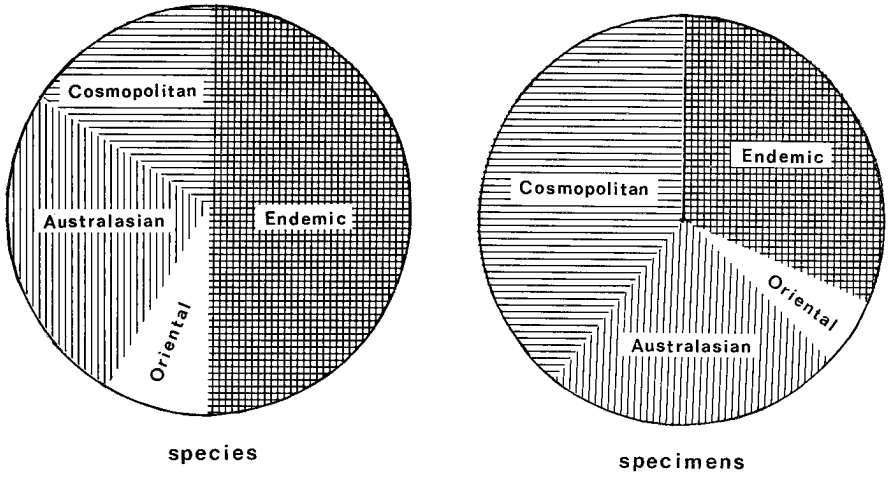
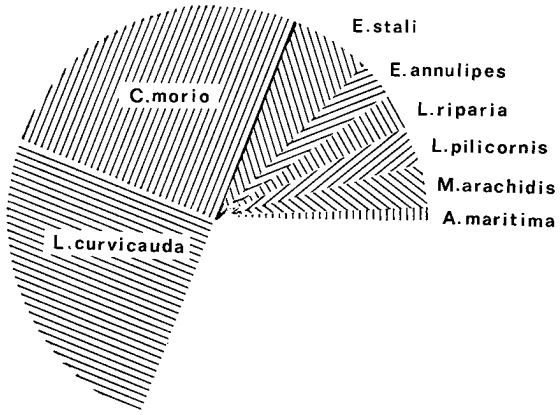


FIGURE 1. Proportions of the numbers of species, and of specimens, of the endemic, cosmopolitan, Australasian, and Oriental species recorded from Micronesia and from the Solomon Islands.



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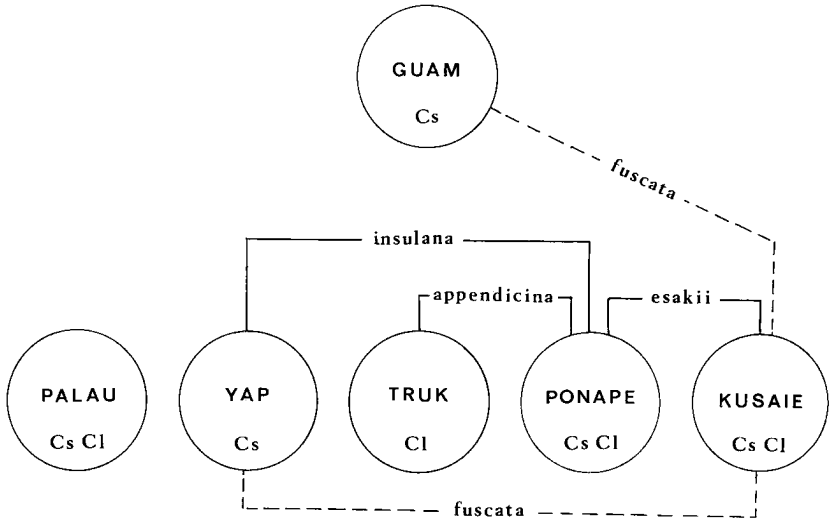

b

FIGURE 2. a-b. a: Proportion of numbers of specimens of the cosmopolitan species from Micronesia. b: relationships of endemic species of the Caroline Islands and Mariana Islands (Cs—*Chaetospania* species; Cl—*Chaetolabia* species). (full lines indicate species: broken lines indicate subspecies).

to the northern and eastern parts of Micronesia the fauna becomes increasingly impoverished.* From the present records the fauna appears to have entered Micronesia by way of the Palau Islands, and then extended eastwards through the Caroline Islands and northwards to the Marianas. Ponape, however, has a richer fauna than would be expected on this hypothesis, and the apparent isolation of the Palau Islands with regard to some of the endemic species is interesting (fig. 2b).

The distribution of the species amongst the islands is summarized below, with notes on the fauna of the island groups.

Islands	total species	cosmopolitan species	endemic species	Australasian species	Oriental species
Volcano	2	2			
Bonin	3	3			
S. Mariana	10	6	2*	2	
Palau	17	7	3	5	2
Yap	10	6	2*	2	
Caroline Atolls	3	3			
Truk	8	6	1	1	
Ponape	12	6	4	2	
Kusaie	8	4	2	2	
Marshall	7	7			
Gilbert	4	4			
Wake	4	4			

* = includes one subspecies

Volcano and Bonin Islands: These have a poor fauna composed entirely of cosmopolitan species.

Mariana Islands: The few specimens from the northern Marianas were immature, but all are Carcinophoridae. The southern Marianas have a fairly rich fauna, with 2 endemic species, 1 of which is not recorded elsewhere, whilst the other is a subspecies of *Chaetospania fuscata* from Kusaie.

Palau: These have the richest fauna in number of species, but there are only 3 endemic species. These islands evidently form the way of entry of the Australasian species, since all are recorded here and 3 are not found elsewhere. The 4 specimens referred to Oriental species also occur in these islands only. A notable feature is that the 3 endemic species are also not recorded elsewhere, but 2 of these are congeneric with species from the Caroline Islands, whilst the third is congeneric with species in the Bismarck Archipelago, New Guinea, and the Solomon Islands.

*The impoverishment of the fauna to the northern and eastern part of Micronesia, however, may also be associated with the less suitable habitats; atolls tend to have a very poor fauna and this accounts for the poor fauna of the Caroline Atolls in contrast to the much richer fauna of the larger Caroline Islands.

Yap: This has a fairly rich fauna, with 2 endemic species or subspecies, 1 species being also recorded from Ponape, and the second is a subspecies of *Chaetospania fuscata* from Kusaie (fig. 2b).

Caroline Atolls: Only 3 cosmopolitan species, possibly indicating that the islands are not suitable for many species.

Truk: This has 1 endemic species (*Chaetolabia appendicina*) which is not in the present material from Truk, but is recorded by Menozzi (1941), and which also occurs on Ponape.

Ponape: This has the second highest total of species, but has the highest total of endemic species. One of these is not found elsewhere, in Micronesia, whilst the other 3 are shared with other islands of the Caroline group (fig. 2b). The endemic species not found elsewhere is *Chaetospania ponapensis*, which is closely related to *C. fuscata* from Kusaie.

Kusaie: This has the same total of species as Truk, but has fewer cosmopolitan species; it has 2 endemic species, *Chaetospania fuscata* which is represented by subspecies on Yap and Guam, and *Chaetolabia esakii* which also occurs on Ponape.

Marshall Islands: The fauna is entirely cosmopolitan, but the number of these species is high and only equalled by the Palau Islands.

Gilbert and Wake Islands: A poor fauna, composed entirely of cosmopolitan species.

Although the genus *Chaetolabia* is erected for Micronesian species, it is not thought that this genus is endemic. Apart from *Labia bihastata* Borg, from Africa, similar species are nearly certain to occur in the Papuan Region. The record of *L. bihastata* from New Britain by Ramamurthi (1967, Ent. Medd. 35: 244) probably refers to a species similar to *esakii*, since *bihastata* is apparently confined to West Africa. It is also thought that the Hawaiian species of *Labia* are referable to *Chaetolabia*.

The connections of some endemic species between the Caroline and the Mariana Islands is shown in fig. 2b. *Chaetolabia* and *Chaetospania* are now recorded from Palau, Ponape, and Kusaie, but only *Chaetospania* is yet known from Yap and only *Chaetolabia* from Truk. This anomaly may be altered by future collecting. *Chaetospania fuscata yapensis* from Yap is closely similar to *C. fuscata fuscata* from Kusaie, whilst *C. fuscata clavata* from Guam is more clearly separable, a feature which could be expected in view of the wider separation of the latter. However the *Chaetospania* species on Ponape, *C. ponapensis*, whilst evidently closely related to *fuscata*, is clearly specifically distinct on male characters, although the female is much less distinctive. Why such a deviation of *Chaetospania* has occurred between the males on

genitalia mounts of the same species since they are not fixed in position. Consequently variation in the appearance of the genitalia must be expected, but the parameres are generally stable in shape. The genitalia lie below the last free sternite and are exposed if this is lifted; the parameres are directed posteriorly.

External taxonomic characters include the relative lengths and shapes of the antennal segments; the shape of the head and size of the eyes; the shape and size of the pronotum; the presence or absence of elytra or wings; some details of the legs and abdomen; and the structure of the forceps and pygidia, these being of more importance in males than in the females, since those of the latter sex are usually more or less similar in structure in allied species or genera. The lengths of the body and the forceps are given in the present paper for all the species, but these lengths refer to the majority of dried specimens examined; in some specimens the abdomen is more contracted, whilst in spirit specimens the abdomen is distended, so that both these will vary from the normal. Since males usually form the most certain records, the sexes and numbers of specimens are given for all species except for *Labia curvicauda* and *Chelisoches morio*, for which records are so numerous that such details seem to be unnecessary; in 2 forms of *morio*, however, the sexes and numbers are also given.

IDENTIFICATION OF LARVAE

Since the determination of female specimens of Dermaptera may be difficult, that of immature specimens is generally impossible, except when these are accompanied by adults. Almost no taxonomic work on the larvae has been done, and no keys have been published, but it has been evident for some time that the larvae can be determined down to various categories, at least to families, and often to genera. The limited fauna of Micronesia offers a good opportunity to present the available details. About 20% of the present specimens are immature, and a study of these has shown that all can be separated into their respective families, some can be named to genera, and a relatively high proportion can be named to species. This high proportion, however, results from the predominance of such species as *Chelisoches morio*, whose larvae are distinctive, and the actual number of species whose larvae can be named with accuracy is small. The larval key to families is useful in the Micronesian fauna, for the Labiduridae is represented only by 1 species, and the Chelisochidae is represented only by 3 species. Since these latter are separable on the shape of the pronota, the Micronesian species of both these families can be named to species. The larvae of the Carcinophoridae

and Labiidae are more difficult to separate beyond families. In some species the particular instar of the larva can also be determined, but the reliability of this differs in different species.

The larvae of Dermaptera, in common with the other Exopterygote orders, resemble their parents in general appearance, but there are a number of differences and these often concern the structures which are of taxonomic importance in the adult. The relative lengths of the antennal segments and their number differ, whilst elytra and wings are, of course, absent, or the latter represented by rudiments in the later instars. The forceps of the larvae are more or less simple, and may resemble those of the adult female, especially in the Carcinophoridae.

The following notes on the taxonomic characters which are of use for determining the particular instar, or determining the family, genera, or possibly species, of the larvae, are based on the few species whose life history is known or in which the separation of the various instars has been investigated, so they must be regarded as provisional.

Antennae: The antennal segments of Dermaptera are normally counted from the antennal bases, so that segment 1 is the scape and the second the pedicel, whilst the distal segments, from and including the third, form the flagellum. In the adults segment 1 is always broader and often longer than any of the others, whilst segment 2 is invariably very short, and often transverse. Segment 3 is of particular interest since it is this segment which divides during larval life to form additional segments, the distal segments gradually becoming more distal as more antennal segments are formed. The number of antennal segments varies in different instars, the first instar having the least and the adult the most segments, and the number of the segments forms a guide to the particular instar. This is more reliable in some species, e.g. *Chelisoches morio*, than in others, e.g. *Anisolabis littorea*. In view of its function, the term "meriston" has been applied to segment 3 of the antennae of the larvae by various authors.

Although segment 3 is usually constant in length in the adult, and its length is of taxonomic value, occasional specimens are found in which segment 3 of 1 antenna is shorter than that of the other; in these specimens it seems that there has been an incomplete division or an extra division, which has affected 1 antenna only. In *Anisolabis littorea*, according to Giles (1952, Roy. Ent.Soc.London ser.A, 27: 91–98) the antennae are frequently broken during both larval and adult life so that there is a large variation in the number of segments. The actual number of segments is not used to a great extent in the taxonomy of the adults since these are so frequently broken in both

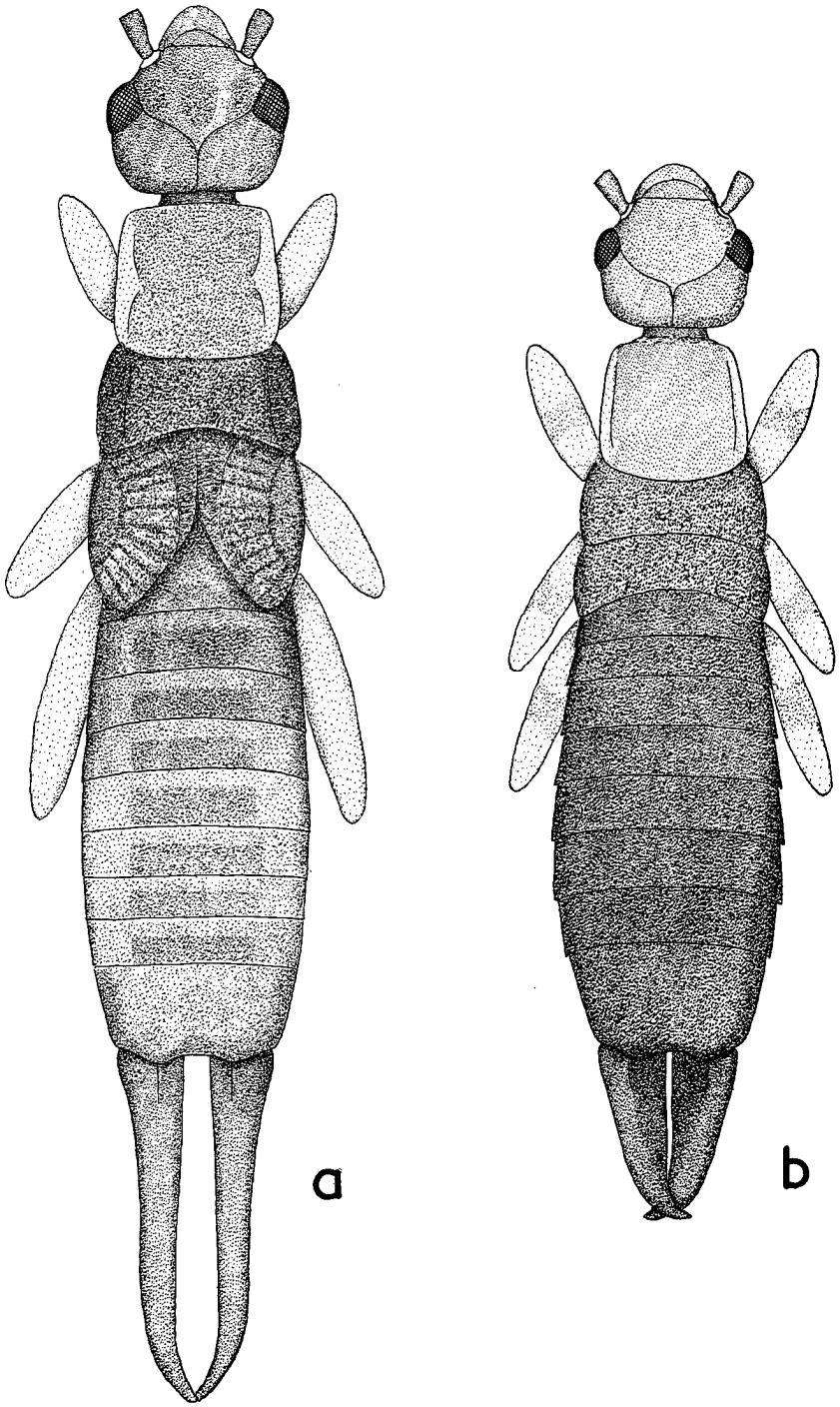

FIGURE 3. Fourth instar larvae: **a,** *Labidura riparia;* **b,** *Euborellia annulipes.*

dried and spirit specimens.

Head: The growth of the head seems to be a useful method of separating the instars, and Giles (ibid) found that the width of the head capsule of *Anisolabis littorea* is more reliable in separating the instars than the number of antennal segments, since these are so variable in this species. The size of the eyes is a character which separates the larvae of *Marava* and *Spongovostox* from those of *Labia*, *Chaetolabia*, and other genera, but the eyes vary in size in some specimens of *Marava* from other Regions.

Thorax: The shape of the pronotum does not appear to change significantly during larval life, so this is a character which can be used to name the species or genera; it is used to separate the 3 genera of Micronesian Chelisochidae in the present paper. The elytra, if developed in the adult, only appear in the adult stage, but rudiments can be noted below the mesonotum in the final instar. If wings are present in the adult, the posterior margin of the metanotum may be produced backwards in the third instar, but the wing sheaths only become large in the fourth instar, where they form plate-like structures on which the rudiments of the venation are visible.

Legs: The structure of tarsal segment 2 is diagnostic of the Chelisochidae and Forficulidae, both as adults and in most larval instars. In the former segment 2 is prolonged beneath 3, the distal, segment, as a narrow lobe (fig. 20d), whilst in the Forficulidae segment 2 is flattened and more or less bilobed or cordiform in shape. The relative lengths of the legs usually separates the Brachylabiinae from the Carcinophorinae, whilst the femora are usually much more strongly broadened in the Labiidae than in other families.

Abdomen: The shape of this may be useful; it is distinctly fusiform in the Brachylabiinae but depressed in most larvae; the tergites are generally much less strongly punctured in the larvae than in adults of the same species, whilst the number of visible tergites is often 9 in the larva and 10 in adults (males).

Forceps: These are represented by segmented cerci in the larvae of Diplatyidae and Karschiellinae (Pygidicranidae) but in most larvae the forceps are unsegmented and simple, and may resemble those of the adult female. The inner margin of each branch may be serrated, but the characteristic form of the male forceps of many species only appears after the final ecdysis. The pygidium is visible in many larvae, and this may be simple, or, especially in the final instar, may resemble that of the adult.

The keys to larvae, together with the notes, in the present paper, are largely based on a study of the present material, and a study of other larvae in the Manchester Museum. The keys include a key to families; a key to subfamilies of Carcinophoridae and Labiidae, and a key to the

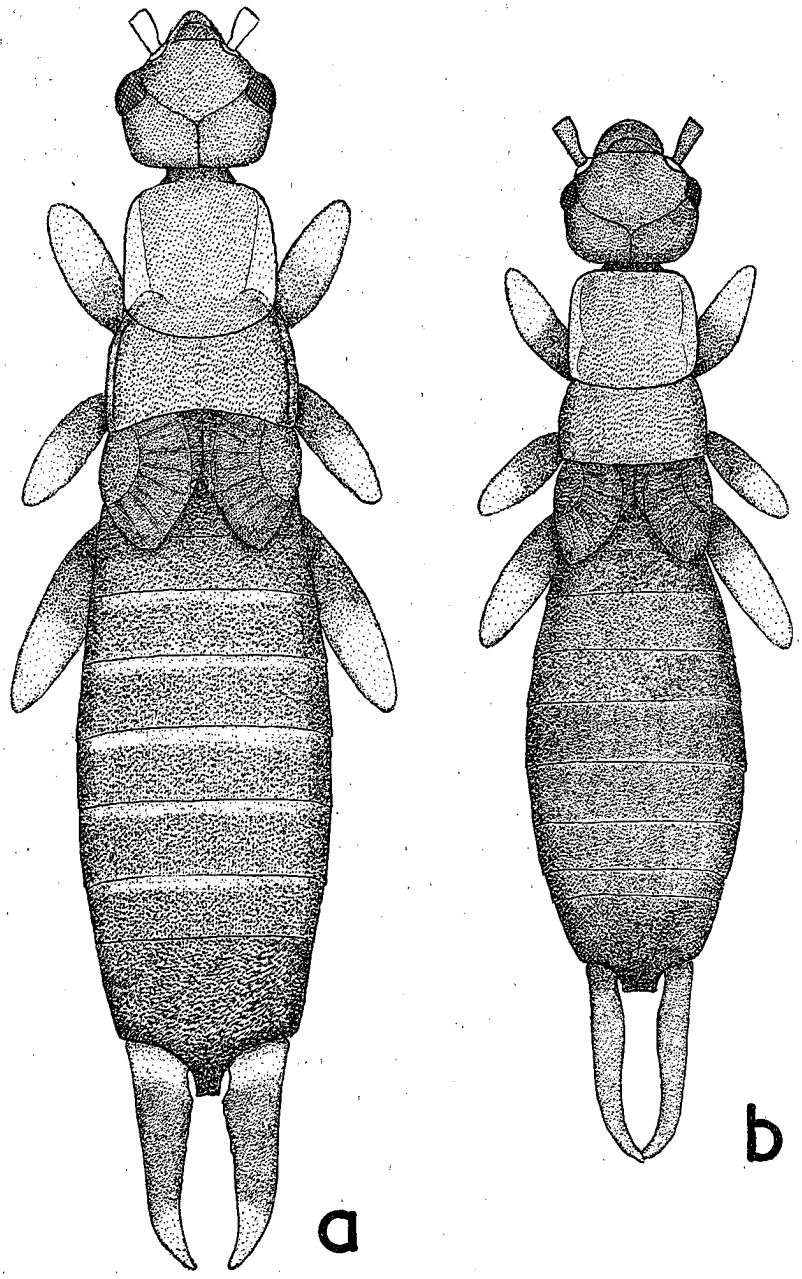

FIGURE 4. Fourth instar larvae: **a,** *Nesogaster aculeatus;* **b,** *Labia curvicauda.*

genera of Chelisochidae. Notes on the identification of some other larvae are included in the notes on species. In addition the number of antennal segments and the lengths of the body and forceps for 5 species of Micronesian Dermaptera are given for each instar and the adult, as a means of separating the instars in these species. The species are *Euborellia annulipes; Labidura riparia; Labia curvicauda; Marava arachidis;* and *Chelisoches morio.*

SYSTEMATICS

Key to Families of Micronesian Dermaptera

1. Male genitalia consisting of 2 penes, united at the base, and with 2 distal lobes (figs. 5b, 5f, 6c-e, 9b); elytra and wings often completely absent, but rudimentary elytra may be present, and less commonly both elytra and wings are fully developed; pygidium of both sexes almost always small and inconspicuous; branches of forceps of both sexes with inner margins usually smooth or only weakly dentated, or with inner teeth.....2

   Male genitalia consisting of a single penis, and with a single median distal lobe (figs. 16a-f, 18b, 19c, 20b); elytra and wings usually fully developed, wings occasionally not visible or absent, but elytra always present; pygidia sometimes large and conspicuous; branches of forceps of both sexes often with inner margins dentated or with inner teeth.....3

2(1). Virga of ♂ genitalia narrow, without a sinuous inner tube, and without a basal vesicle, sometimes the virga is not visible (figs. 5b, 5f, 6c-e); elytra and wings often completely absent, or elytra rudimentary, rarely elytra and wings are fully developed; ♂ and ♀ forceps with short branches, those of ♂ more strongly curved than those of ♀ and often asymmetrical, branches of both sexes not widely separated at the bases (figs. 5a, 5e, 6a). Elytra, when present, smooth and shining, without lateral longitudinal ridges.....**Carcinophoridae**

   Virga of ♂ genitalia broad, with a sinuous inner tube, and with a basal vesicle (fig. 9b); elytra always present and wings usually visible; ♂ forceps with branches widely separated at base, branches long and only slightly curved, and symmetrical (fig. 9a); ♀ forceps with branches almost straight, contiguous, and shorter than those of ♂ (fig. 9c). Elytra almost rugose, each elytron with a lateral longitudinal ridge ..... **Labiduridae**

3(1). Tarsal segment 2 simple; ♂ genitalia with a prominent virga, which often has associated denticulated areas or sclerites, but without paired dark sclerites arising near the base of the virga (figs. 16a-f); smaller species generally; pygidium often large and conspicuous, especially in the ♂♂; occiput behind eyes not inflated..... ..... **Labiidae**

   Tarsal segment 2 prolonged beneath 3, the distal segment, as a narrow lobe (fig. 20d); ♂ genitalia with a prominent virga from the base of which arises paired dark sclerites (figs. 18b, 19c, 20b); larger species; pygidium small in both sexes; occiput behind eyes inflated, especially in ♂♂.....**Chelisochidae**

Key to Larvae of Families of Micronesian Dermaptera

1. Tarsal segment 2 prolonged into a narrow lobe beneath 3, the distal segment (fig. 20d); usually blackish or mainly blackish species, occasionally reddish **Chelisochidae**
   Tarsal segment 2 simple.....2
2(1). Antennal segments more numerous, never less than 15, and most instars with 20 or more; eyes rather large; forceps relatively very long, branches more or less simple (fig. 3a), and as long as abdomen in earlier instars; general color yellowish-brown or brown, marked with brown or dark brown; abdominal tergites relatively strongly punctured and pubescent.....**Labiduridae**
   Antennal segments less numerous, usually less than 15 and always less than 20 in all instars; forceps with branches comparatively much shorter, branches more or less simple; abdominal tergites usually smooth or only finely punctured or pubescent 3
3(2). Forceps with branches more slender, inner margin of each branch often dentated, and branches usually much wider apart, not completely contiguous and with a pygidium visible between the bases of the branches (figs. 4a-b); antennal segments usually more elongated, basal segments, except for second, longer than broad; fourth instar almost always with plate-like wing sheaths (figs. 4a-b).....**Labiidae**
   Forceps with branches shorter and broader, inner margin usually smooth or almost so, branches contiguous, and pygidium not visible (fig. 3b); antennal segments usually shorter, basal segments quadrate or transverse, occasionally longer; fourth instar almost always without wing sheaths (fig. 3b)...**Carcinophoridae**

The characters for the Chelisochidae are generally applicable, and all the Micronesian larvae of this family have wing sheaths in the fourth instar. Those for the Labiduridae apply to *Labidura riparia* and not necessarily to other species of the family; all the Micronesian specimens of this species examined have wings, so that wing sheaths will be present in all larvae of the fourth instar. The characters for the Labiidae are generally applicable but caution should be used when these are applied to a wider fauna, and the characters for the Carcinophoridae are also generally applicable but subject to revision or extension. In general the Labiidae includes the fully winged and smaller species, whilst the Carcinophoridae consists of typically apterous and larger species, so that the presence or absence of wing sheaths will separate the fourth instar larvae in most cases. A minority of the Labiidae have no wings and a relatively few species of the Carcinophoridae have wings.

Family CARCINOPHORIDAE

Key to Micronesian Subfamilies of Carcinophoridae

1. Antennal segment 1 shorter than the distance between the antennal bases (figs. 5a, 6a); antennal segments more slender and elongated, basal segments quadrate or longer than broad; legs relatively shorter, apex of hind tarsus not usually reaching apex of abdomen; abdomen depressed, not fusiform in shape; forceps of both sexes

trigonal at base, cylindrical distally, branches often contiguous especially in ♀ (figs. 5a, 5e, 6a). Cuticle shining, not strongly punctured; elytra and wings usually completely absent, or elytra rudimentary and wings absent in 1 species, and elytra and wings fully developed in another species.....**Carcinophorinae**

Antennal segment 1 longer than the distance between the antennal bases (fig. 8); antennal segments broad and short, some basal segments transverse; legs relatively longer, apex of hind tarsus reaching apex of abdomen; abdomen fusiform in shape, not depressed; forceps of both sexes cylindrical throughout, branches contiguous or separated. Cuticle dull, strongly punctured; elytra and wings always completely absent ..... **Brachylabiinae**

Key to Larvae of Micronesian Subfamilies of Carcinophoridae

1. Antennal segment 1 shorter than the distance between the antennal bases; legs relatively shorter, apex of hind tarsus not reaching apex of abdomen; abdomen depressed, often wider medially, not fusiform in shape.....**Carcinophorinae**

Antennal segment 1 longer than the distance between the antennal bases; legs relatively longer, apex of hind tarsus reaching apex of abdomen; abdomen fusiform in shape, cylindrical, narrowed both anteriorly and posteriorly.....**Brachylabiinae**

Subfamily CARCINOPHORINAE

This is the largest subfamily of Carcinophoridae and consists of dark colored earwigs, typically completely apterous, although rudimentary or short elytra may be present, and more rarely both elytra and wings are fully developed. The development of these organs are usually constant in any 1 species, but there are certain species which have 2 forms, 1 in which the elytra are short and the wings absent, and another in which the elytra and wings are both fully developed. These species are not recorded from Micronesia. There are comparatively few reliable external characters suitable for taxonomy, and both the classification and taxonomy is mainly based on the male genitalia. Since any external characters also tend to occur in the males only, the determination of female specimens is often difficult, and females are usually determined by association with males.

Key to Micronesian Genera of Carcinophorinae

1. Parameres of ♂ genitalia short and broad, more or less as broad as long; virga not visible, but each distal lobe has well defined denticulated pads (fig. 6e). Elytra and wings completely absent, or elytra represented by lateral flaps, or, in one species, elytra and wings both fully developed.....**Euborellia**

Parameres of ♂ genitalia much longer than broad; virga visible or not, but distal lobes without well defined denticulated pads (figs. 5b, 5f, 6c, 6d). Elytra and wings always completely absent.....2

2(1). Parameres of ♂ genitalia broader; virga not visible but distal lobes with ill-defined small denticulated areas (figs. 5b, 5f); abdomen of ♂ evenly widened distally, last tergite wider than median tergites (fig. 5a); forceps of both sexes with symmetrical

branches (figs. 5a, 5e). Distal antennal segments strongly narrowed to bases (fig. 5d); smaller species, body length 7.5–9 mm.....**Gonolabis**

Parameres of ♂ genitalia narrower; virga often visible and distal lobes without denticulated areas or with these faintly indicated (figs. 6c, 6d); abdomen of ♂ widest medially, last tergite narrower than median tergites usually (fig. 6a); forceps of ♂ often with asymmetrical branches (fig. 6a). Distal antennal segments strongly narrowed to bases or almost cylindrical (figs. 7a-b); smaller species, body length 6–7 mm., or larger, body length 16 mm or more.....**Anisolabis**

In a small fauna, such as that now recorded from Micronesia, more use can be made of external characters, and this allows females to be determined. The key below includes all genera and species of Micronesian Carcinophorinae, but is not applicable to a wider fauna.

Key to Genera and Species of Micronesian Carcinophorinae

1. Elytra and wings fully developed.....**4. Euborellia femoralis**
   Elytra rudimentary or absent; wings absent.....2
2(1). Distal antennal segments cylindrical or almost so (fig. 7a); larger species, body length 16 mm or more; ♂ forceps strongly asymmetrical; legs unicolorous yellow.....**5. Anisolabis maritima**
   Distal antennal segments narrowed to bases, not cylindrical (figs. 5d, 7b-d); smaller species, body length less than 12 mm.....3
3(2). Distal antennal segments relatively shorter and more broad, widest part of each segment nearer the tip (fig. 7c-d).....4
   Distal antennal segments relatively longer, and more slender, widest part of each segment well before the tip (figs. 5d, 7b).....5
4(3). Distal antennal segments slightly rounded at sides (fig. 7d); elytra represented by small lateral flaps on the mesonotum (fig. 6f).....**2. Euborellia stali**
   Distal antennal segments more curved (fig. 7c); elytra completely absent .....**3. Euborellia annulipes**
5(3). Distal antennal segments more strongly narrowed to bases (fig. 5d); abdomen of ♂ evenly widened to last tergite; ♂ forceps with branches wide apart and symmetrical (fig. 5a).....**1. Gonolabis insulana**
   Distal antennal segments less strongly narrowed to bases (fig. 7b); abdomen of ♂ widest medially; ♂ forceps with branches closer together and slightly asymmetrical (fig. 6a).....**6. Anisolabis minutissima**

Genus **Gonolabis** Burr

Gonolabis Burr, 1900, Ent. Soc. Belg., Ann. **44:** 48 (type species: *Anisolabis javana* Bormans, 1883, Ent. Soc. Belg., Ann. **27:** 63, ♂, Java).

This genus is closely related to the genus *Anisolabis*, of which *Gonolabis* is sometimes considered as a subgenus. However the present concept of *Anisolabis* is unwieldy, and most of the species referred to *Gonolabis* appear to form a homogenous unit, the exact limits of which are not yet clearly defined. The main external character is in the shape of the male abdomen, which is evenly widened distally, so that the last tergite is the largest, a feature

which also occurs in such an unrelated genus as *Esphalmenus* Burr (Pygidicranidae). The male genitalia of few species of *Gonolabis* have been adequately studied, but those of *insulana* are very similar to those of *electa*. On the other hand, the parameres of *oblita* Burr, as figured in Burr (1915, Roy. Micr. Soc., J. 1915, pl. XII, fig. 7) are short and almost quadrate. The male forceps of *Gonolabis* are short and symmetrical, a feature which also occurs in *Esphalmenus*, but is not typical of *Anisolabis*. It is clear that *Gonolabis* although correctly placed in the Carcinophorinae, has differences worthy of generic rank, but the species now included in the genus at present may be subject to later modifications.

DISTRIBUTION: Oriental and Australasian Regions. From India and Ceylon eastwards to the Philippine Islands and New Guinea. Not previously known from Micronesia.

1. Gonolabis insulana Brindle, n. sp. (fig. 5 a-e)

Dark reddish-brown; legs yellowish-brown, femora darker on basal half or more; cuticle shining, that of head and thoracic nota impunctate and glabrous, that of posterior abdominal tergites punctured.

MALE (fig. 5a): *Head:* Transverse, tumid, sutures visible, depressed slightly on frons between the antennal bases, lateral margins rounded and curving smoothly into slightly concave posterior margin. Eyes small. Antennal segment 1 shorter than the distance between the antennal bases, segment 2 transverse, segment 3, 2.5 × as long as broad, segment 4 almost quadrate, 5 longer than 4; segments 2 and 3 cylindrical, segment 4 slightly narrowed to base, segment 5 more narrowed and distal segments elongated, slender, strongly narrowed to bases, widest part of each segment about 1/3 from apex (fig. 5d).

Thorax: Pronotum transverse, wider posteriorly, lateral margins straight, posterior margin slightly convex; mesonotum transverse, metanotum shorter and with posterior margin concave. Legs relatively long, femora broad, those of anterior pair broader than those of posterior 4 legs; femora and tibiae with sparse short and long stiff hairs, tarsus with numerous short ventral hairs.

Abdomen: Depressed, evenly widened to the last tergite; basal tergites impunctate, other tergites, except for last, punctured, the distal tergites more strongly punctured, punctures on tergite 9 separated by their own diameter on disc but more widely separated laterally; all tergites glabrous, and lateral posterior margins of tergites evenly rounded, not acute nor rugose. Last tergite transverse, depressed medially and with a median longitudinal furrow, posterior margin depressed between the bases of the forceps; cuticle of last tergite almost impunctate. Penultimate sternite transverse, without ridges, triangular, sides slightly concave and apex broad and excised medially (fig. 5c). Each branch of forceps short, trigonal at base, cylindrical distally, sharply curved; widest at base and narrowed distally, inner margin almost smooth. Genitalia with 2 narrow penes, united basally, virga not visible but distal lobes with faint small areas of denticulations; parameres relatively broad, more strongly sclerotized on external margins (fig. 5b).

FEMALE: Similar to ♂ but abdomen widest medially; abdominal tergites less strongly punctured; each branch of forceps nearly straight, broader and more trigonal at base, narrower and cylindrical distally, inner margin almost smooth (fig. 5e).

Length of body 7.5–9 mm., forceps 1.25–1.75 mm.

genitalia are short and broad, and in which the distal lobes of the genitalia (= praeputial sacs of Burr, 1915) have denticulated pads. This amendment resulted in the inclusion in the genus of species in which the elytra and wings are completely absent; those in which the elytra are rudimentary and the wings are absent; and those which have fully developed elytra and wings. In spite of these differences in external characters, the genus forms a homogenous unit which is well defined. The species of *Euborellia* are relatively small, the head is tumid and often narrowed behind the eyes, the pronotum is usually large, often wider posteriorly, with all the margins more or less straight, or only weakly convex; the abdomen is generally smooth or only finely punctured and the branches of the male forceps are much less strongly asymmetrical than in many species of *Anisolabis*, the branches being only slightly more curved than in the female, the latter having almost straight and contiguous branches. The differences between the male genitalia of *Euborellia* and *Anisolabis* are distinctive, those of *Euborellia moesta*, the type species, being similar to those of *annulipes* (fig. 6e), whilst those of *Anisolabis maritima*, the type species, are figured in fig. 6d.

In spite of the amendment of Burr (1915) some subsequent authors have retained the species *annulipes* in *Anisolabis*, but this is not correct.

DISTRIBUTION: In all faunal Regions, but best represented in the Ethiopian and Oriental Regions.

Key to Micronesian Species of Euborellia

1. Elytra and wings fully developed.....**4. femoralis**
   Elytra rudimentary or absent; wings absent.....2
2(1). Elytra represented by small elliptical flaps which are firmly adherent to the cuticle on each side of the mesonotum (fig. 6f); distal antennal segments less rounded at sides (fig. 7d); ♂ parameres evenly rounded externally; smaller and more slender species, mainly shining black..... **2. stali**
   Elytra completely absent; distal antennal segments with sides curved (fig. 7c); ♂ parameres with a blunt external angle (fig. 6e); larger and broader species, blackish or dark reddish to yellowish-brown.....**3. annulipes**

2. Euborellia stali (Dohrn) (figs. 6f, 7d)

Forcinella stali Dohrn, 1864, Stett. Ent. Zeitung, **25:** 286 (♀ holotype, Java; Stockholm Museum).

Euborellia stali: Burr, 1911, Gen. Insect. **122:** 31.

Euborellia plebeja: Rehn, 1949, Ent. Soc. Am., Trans. **75:** 109 (Guam).

A slender, rather small species, but somewhat variable in size; shining black; antennae dark brown or brown, basal segments yellow and one or more distal segments whitish; pronotum with sides yellow; legs yellow, femora dark brown at bases. Length of body 8–11 mm., forceps 1–1.5 mm.

DISTRIBUTION: Cosmopolitan. Mainly circumtropical, and recorded

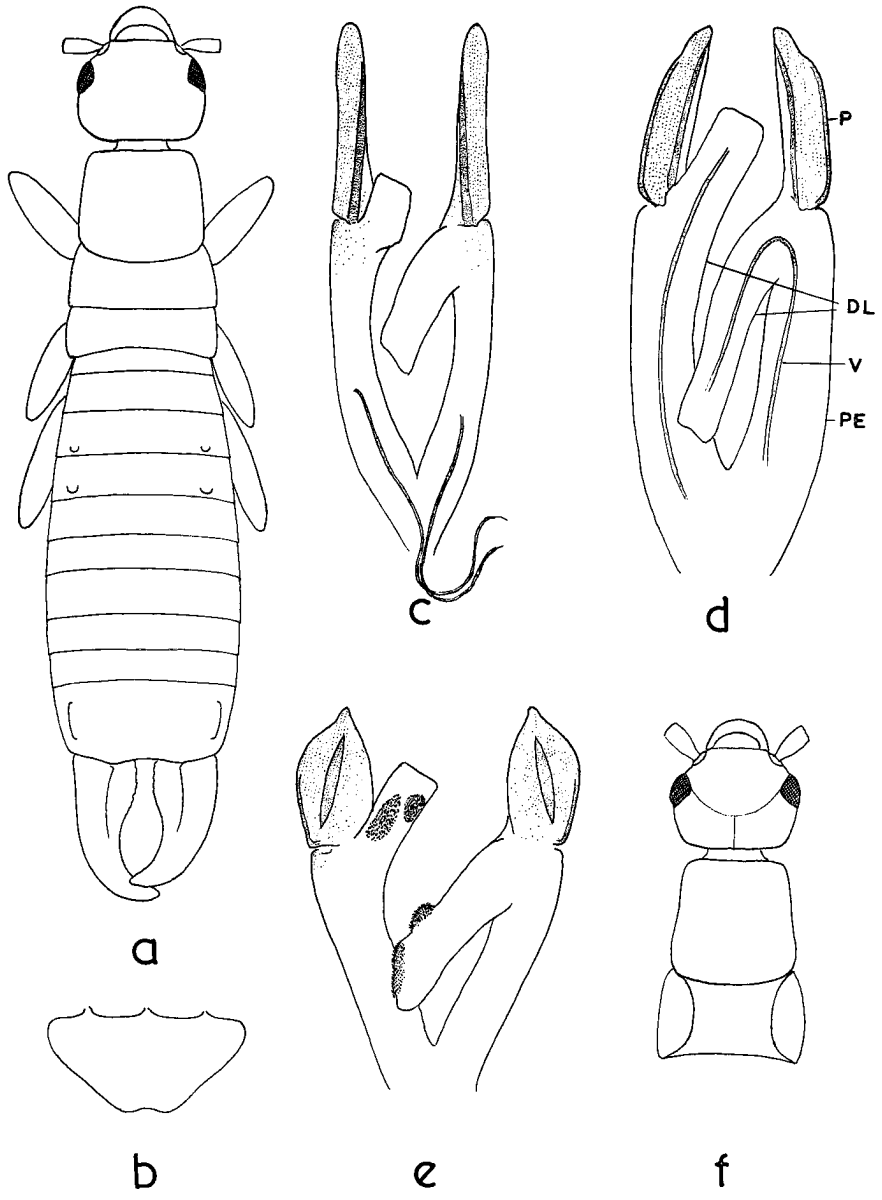

FIGURE 6. *Anisolabis minutissima*. a-c, male: **a,** dorsal view; **b,** penultimate sternite; **c,** genitalia. *A. maritima*. **d,** male genitalia. *Euborellia annulipes*. **e,** male genitalia. *E. stali*. **f,** head, pronotum, and elytra. (DL = distal lobe; P = paramere; Pe = penis; V = virga).

♂ forceps with branches strongly asymmetrical, the right branch more curved than the left; parameres of ♂ genitalia long, distinctly narrowed before apex (fig. 6d) ..... **5. maritima**

Smaller species, body length 6–7 mm; distal antennal segments strongly narrowed to bases (fig. 7b); legs yellow, femora partly dark brown; abdominal tergites punctured and pubescent; ♂ forceps not strongly asymmetrical; parameres of ♂ genitalia long, evenly rounded distally (fig. 6c)..... **6. minutissima**

5. Anisolabis maritima (Bonelli) (figs. 6d, 7a)

Forficula maritima Bonelli, in Gene, 1832, Sic. Regno Lomb-Venet, Ann. **2:** 221 (syntypes, Mediterranean Region; location unknown).

Anisolabis maritima: Burr, 1911, Gen. Insect. **122:**29.—Rehn, 1949, Ent. Soc. Am., Trans. **74:** 165 (Caroline Atolls).

More or less uniformly colored, usually blackish but sometimes reddish or yellowish-brown; antennae dark brown or brown, unicolorous; legs uniformly yellow, rarely slightly darkened. Length of body 16–18 mm., forceps 2.5–3.5 mm.

DISTRIBUTION: Cosmopolitan. Recorded from various parts of the Palaearctic, Neotropical, Nearctic, Ethiopian, and Oriental Regions. Previously recorded in the Pacific from the Caroline Atolls, Fiji, Samoa, Cook Islands, Society Islands, and possibly from Laysan.

BONIN IS. CHICHI JIMA: 1 ♀, Sakaiura, Jun. 1949, Mead; 2 larvae, Tatsumi, Apr. 1958, Snyder.

MARSHALL IS. KWAJALEIN: 1 ♂, 1 ♀, Mar. 1953, Clagg. JALUIT: 1 ♀, Apr. 1938, McCall.

Recorded from under coral.

This species is mainly coastal, and occurs under debris, seaweed, etc., on beaches or in mangrove swamps; records inland from mountains need checking since the present name has been applied to more than 1 species in the past.

6. Anisolabis minutissima Brindle, n. sp. (figs. 6 a-c, 7b)

Blackish, shining; antennae brown; legs yellowish, femora darkened on basal half or more.

MALE (fig. 6a): *Head: Transverse,* tumid, sutures not visible; frons slightly depressed, lateral margins of head rounded and curving smoothly into posterior margin, the latter almost straight. Eyes small. Antennal segment 1 shorter than the distance between the antennal bases, segment 2 transverse, segment 3, 2 × as long as broad, and subequal in length to 5, segment 4 slightly shorter; distal segments elongated, narrow, strongly narrowed to bases, widest part of each segment about 1/3 from apex (fig. 7b).

Thorax: Pronotum transverse, slightly wider posteriorly, all margins straight or almost so; mesonotum and metanotum transverse, the latter with posterior margin concave. Head and thoracic nota impunctate, smooth and glabrous. Legs typical of genus, femora broadened, especially those of anterior pair; femora and tibiae with sparse long and short stiff yellow hairs; tarsi relatively short, segments with numerous short yellow hairs.

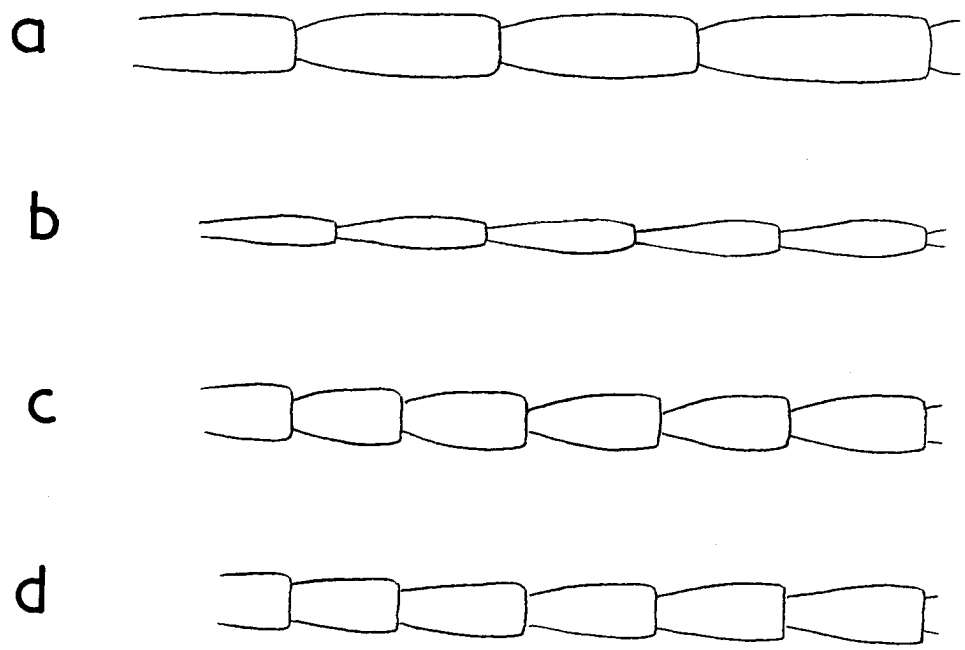

FIGURE 7. Distal antennal segments. a-d: **a,** *Anisolabis maritima;* **b,** A. *minutissima;* **c,** *Euborellia annulipes;* **d,** *E. stali.*

Abdomen: Depressed, narrowed towards base, tergites 1–9 finely punctured and pubescent, hairs short, sparse and yellow; lateral tubercles on tergite 3 small, those on 4 rather large; tergites 2–5 each with 2 small tubercles near posterior margin, 1 tubercle towards each lateral margin, the tubercle bearing a long stiff hair, these tubercles on tergite 4 placed just medially to the lateral tubercles. Tergites 7–9 striato-rugose laterally, and each with a short lateral ridge on each side, the lateral ridge well defined but only present on posterior half of tergites, tergite 6 with a much shorter ridge on each side. Last tergite transverse, with scattered punctures and with a median longitudinal furrow; distal 1/3 of tergite depressed between the bases of the forceps; towards each lateral margin is a prominent longitudinal ridge, the ends rounded, and the ridge tilted laterally. Penultimate sternite transverse, basically triangular, posterior margin slightly excised (fig. 6b). Each branch of forceps trigonal at base, cylindrical distally, strongly curved apically, inner margin almost smooth, branches asymmetrical but not strongly so (fig. 6a). Genitalia with 2 basal penes, united basally, virga not visible in each distal lobe; each paramere long, narrow, parallel-sided or nearly so, sclerotized longitudinally near inner margin, and rounded at apex (fig. 6c).

FEMALE: similar to ♂; abdomen more finely punctured; last tergite transverse, narrower than that of ♂, and without the dorsolateral ridges; tergites 7–9 without lateral ridges; each branch of forceps trigonal at base, cylindrical distally, almost straight, curved only slightly at apex, branches contiguous, inner margins smooth.

Length of body 6 mm, forceps 1 mm.

Holotype, ♂ (US 71556), Palau, Peleliu, Jan. 1948, Dybas; allotype, ♀ (FM), same data.

DISTRIBUTION: Western Caroline Islands (Palau).

A. minutissima belongs to a small, mainly Papuan group of the genus, and including *bifida* Brindle, *horvathi* Burr, and *verhoeffi* Zacher; all are small in size, measuring from between 6–8 mm in body length. These species, together with *minutissima*, may be separated as follows:–

1. Abdominal tergites 6–9 each with a lateral longitudinal ridge on each side in ♂.....2
   Abdominal tergites 7–8 or 7–9 each with a lateral longitudinal ridge on each side in ♂...3

2(1). Penultimate sternite of ♂ with posterior margin concave. Bismarck Archipelago ..... **verhoeffi**
   Penultimate sternite of ♂ with posterior margin slightly excised at apex.....**minutissima**

3(1). Abdominal tergites 7–8 of ♂ each with a lateral longitudinal ridge on each side; penultimate sternite of ♂ with a deep concavity on posterior margin flanked with two pointed lobes. New Guinea.....**horvathi**
   Abdominal tergites 7–9 of ♂ each with a lateral longitudinal ridge on each side; penultimate sternite of ♂ with apex bifid. Solomon Islands.....**bifida**

Subfamily Brachylabiinae

A relatively small subfamily at present, but it is probably much richer in species than those described. These species are mainly larger in size, and recently more small or very small species have been found. They appear to occur widely in litter, or in rotten wood, debris, in forests, and the greater use of the Berlese or Tullgren funnels to obtain small Arthropods from soil and litter seems to be bringing these small species to notice. The species of the subfamily are usually readily recognizable by their fusiform bodies, their long legs, and the long antennal segment 1; the other segments often being unusually thick.

Genus **Brachylabis** Dohrn

Brachylabis Dohrn, 1864, Stett. Ent. Zeitung **25:** 292 [no type species designated by author; type species: *Forficula chilensis* Blanchard in Gay, 1851, Hist. Phys. Chile, Zool. **6:** 10 (sex ?, Chile), by designation of Kirby, 1891, Linn. Soc., J. **25:** 518].

No adequate description of this genus is possible since the type species is known only from the original description, which is inadequate for present purposes. Pending a revision of the World species the present author has described all new species of the subfamily under the present genus.

DISTRIBUTION: Neotropical, Ethiopian, Oriental, and Australasian Regions.

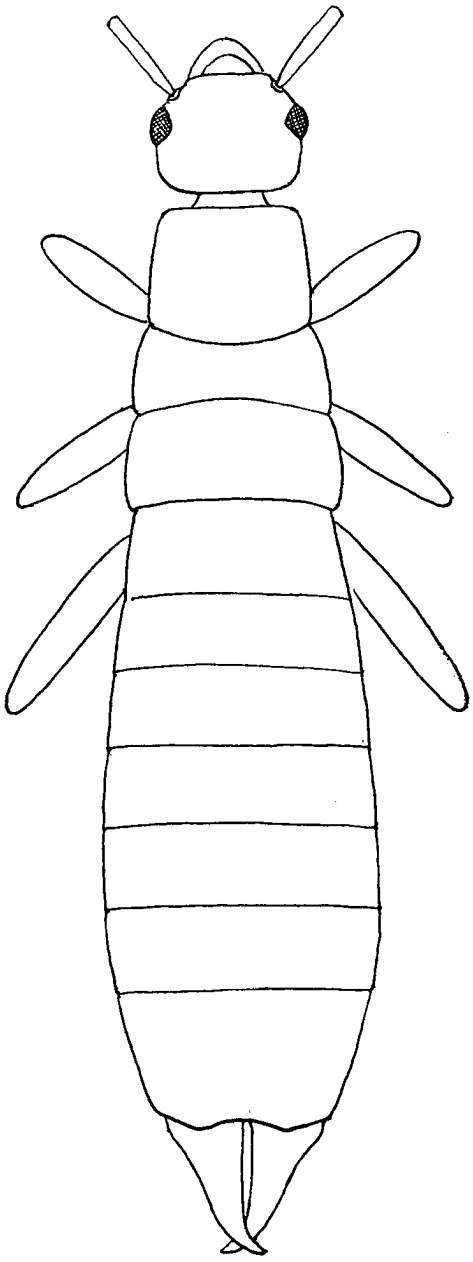

FIGURE 8. *Brachylabis greensladei*, female, dorsal view.

7. Brachylabis greensladei Brindle (fig. 8)

Brachylabis greensladei Brindle, 1970, Pacific Insects **12**(3): 659 (Solomon Islands; ♂ holotype, ♀ allotype, ♂ and ♀ paratypes, British Museum (Nat. Hist) and Bishop Museum).

Blackish-brown; antennae dark brown, 2 distal segments whitish; femora dark brown basally, brown distally; tibiae brown, tarsi yellowishbrown. Cuticle strongly punctured and pubescent, almost rugose. Length of body 5–6.5 mm, forceps .5 mm.

DISTRIBUTION: Only previously recorded from the Solomon Islands.

PALAU. BABELTHUAP: 1 ♀, Dec. 1947, in wooded valley, S.W. of Ulimang, under dead bark, Dybas. GARAKAYO: 1 ♀, Aug. 1945, sifting leaf litter, Dybas.

In addition 1 larva from Babelthuap, E. Ngatpang, Dec., 1952, Berlese funnel, J.L. Gressitt, has been returned determined as *Brachylabis*, immature, but is almost certainly the present species.

Both specimens recorded above are females, so that no comparison between the genitalia is possible, but both specimens agree with the present species in external characters.

FAMILY LABIDURIDAE

Only 1 of the 3 subfamilies is represented in Micronesia.

SUBFAMILY LABIDURINAE

Mainly Old World in distribution, the genera extending from Africa through South East Asia and the Sunda Islands to New Guinea and Australia. One genus is represented in Micronesia.

Genus **Labidura** Leach

Labidura Leach, 1815, Edin. Encycl. **9**(1): 48 (type: *Forficula riparia* Pallas, 1773, Reise Russ. Reichs **2:** 727, sex ? Siberia).

8. Labidura riparia (Pallas) (figs. 3a, 9 a-c)

Forficula riparia Pallas, 1773, Reise Russ. Reichs **2:** 727 (? sex, Siberia; location unknown).

Labidura riparia: Burr, 1911, Gen. Insect. **122:** 37—Rehn, 1949, Ent. Soc. Am., Trans. **74:** 166 (Eniwetok).

Yellowish to reddish-brown, sometimes blackish; antennae yellowish-brown; legs yellow. Variable in color. The lighter forms are more variegated in color, with the elytra, except the sutural margins, darker brown, and the disc of the abdominal tergites may be much darker than the lateral parts of the tergites. Elytra almost rugose, each elytron with a well marked lateral longitudinal ridge; last tergite produced above the base of each branch of the forceps and this projection may be blackish. In some Micronesian male specimens, there are 2

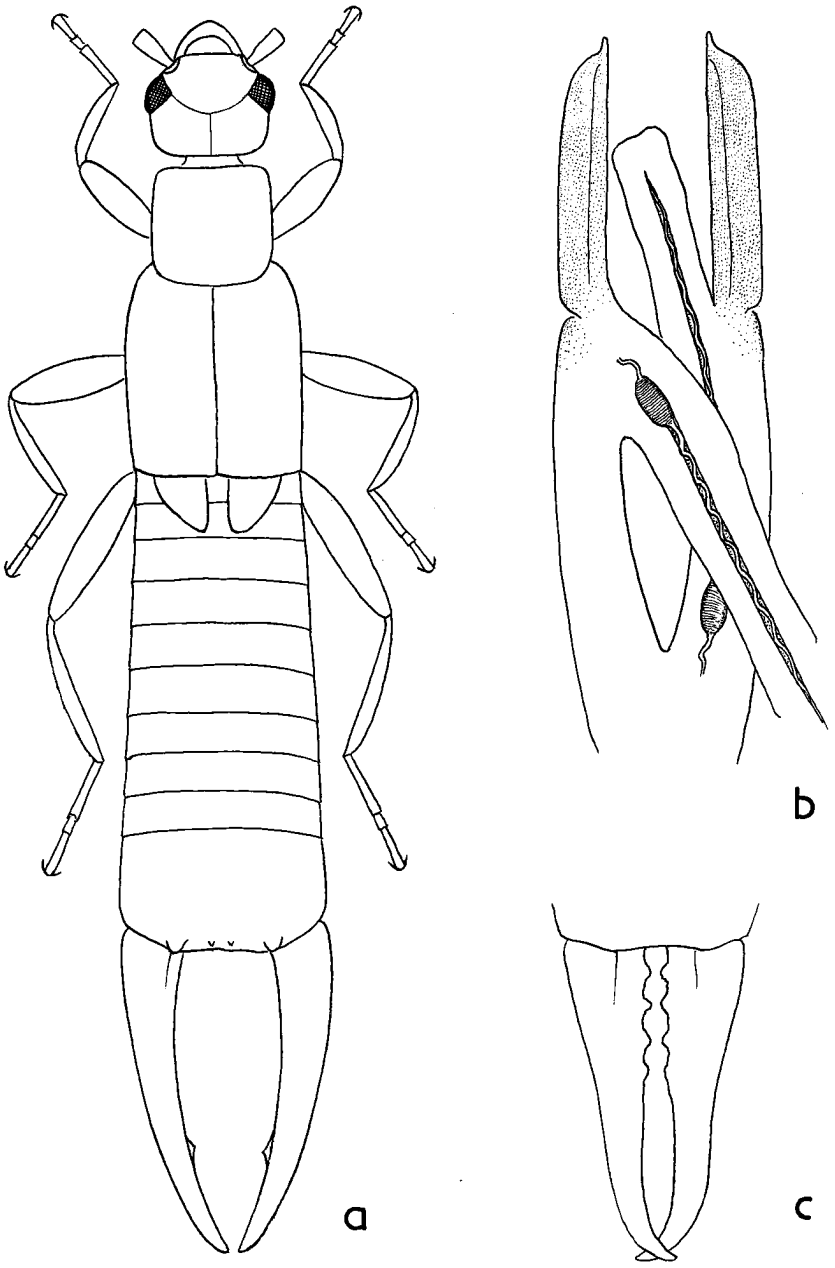

FIGURE 9. *Labidura riparia*. a-b, male: **a,** dorsal view; **b,** genitalia. **c,** female forceps.

small teeth medially near the posterior margin of the last tergite, but these are absent in most of the specimens; the branches of the male forceps usually have an inner tooth (fig. 9a) but this is absent in a minority of small Micronesian males, and in these specimens there are several small teeth along the ventral inner margin. Length of body 14–26 mm, forceps 5–10 mm (males), 3.5–5 mm (females).

DISTRIBUTION: Cosmopolitan. In all faunal regions, and on many isolated oceanic islands; generally more characteristic of sandy areas, particularly near rivers or lakes, or along beaches. Previously recorded in the Pacific from the Marshall Islands, Samoa, possibly Fiji, and Hawaii.

S. MARIANA IS. SAIPAN: 1 ♂, Laulau Bay, under debris on beach, Dec. 1944, Dybas.

PALAU. PELELIU: 4 ♂♂, 7 ♀♀, Aug.-Sep. 1945, Baker, Dybas, Hagen. ANGAUR: 1 ♂, 1 ♀, 1 larva, Aug. 1945, Dybas.

TRUK. MOEN: 2 ♂♂, 6 ♀♀, Mar. 1949, Potts. TOL: 1 ♂, Aug. 1945, in light trap, Gressitt.

PONAPE: 1 ♀, Colonia, Jun.-Sep. 1950, Adams.

MARSHALL IS. ENIWETOK: 1 ♂, May 1946, Townes; 1 ♀, Jan. 1951, Oshiro. Engebi: 1 ♂, May 1946, Townes; 1 ♀, Jan. 1951, Oshiro. KWAJALEIN: 2 ♂♂, 1 ♀, 1 larva, Aug. 1946, Townes; 1 ♂, Mar. 1953, Clagg. Ebeye: 5 ♂♂, 8 ♀♀, Aug-Sep. 1944, Wallace. JALUIT: 1 ♀, May 1958, Gressitt.

WAKE: 1 ♀, Nov. 1947, Martin.

Recorded in light traps and under debris on beaches.

The larvae are distinctive by their size, by the comparatively long forceps, and by the color (fig. 3a) as well as the long antennae. Although the color varies there is usually a similar type of pattern present. The instars can be approximately separated as follows:–

	Instar 1	Instar 2	Instar 3	Instar 4	Adult
Number of antennal segments	15	20	25	28	30 or more
Length of body (mm)	3–5	5–8	8–10	11–15	14–26
Length of forceps (mm)	1.25	2.5	3.5	4.5 (males, those of females rather less).	5 or more

LABIIDAE

One of the largest families of the order, and containing mainly smaller species; it is comparatively well represented in Micronesia.

KEY TO MICRONESIAN SUBFAMILIES OF LABIIDAE

1. Each elytron with a well marked lateral longitudinal ridge; shining or brightly shining species; antennae with segment 3 longer than 5; antennal segments strongly narrowed to bases; ♂ pygidium very long, narrowed distally, each branch

of ♂ forceps with an inner ridge or an inner tooth; each branch of ♀ forceps short, inner margin of each branch excavated at base and dorsal surface with a horizontal dorso-median toothed process near base; elytra short and wings absent or concealed or elytra and wings fully developed.....**Nesogastrinae**

Elytra without lateral longitudinal ridges.....2

2(1). Body flattened; head flat, posterior margin deeply concave. Antennal segment 1 unusually thick and long; pronotum longer than broad, narrowed anteriorly, lateral margins sinuate and posterior margin strongly convex; eyes very small; elytra and wings fully developed; pygidium of both sexes short.....**Sparattinae**

Body normally convex; head depressed in some genera, but posterior margin not so deeply concave. Antennal segment 1 not unusually thick and long; pronotum differently shaped; eyes small or large; elytra and wings fully developed or not; pygidium sometimes large, especially in ♂♂.....3

3(2). Antennal segment 3 shorter than 5; eyes usually small; elytra typically punctured and pubescent. Not brightly shining species; wings, if present, unicolorous; antennal segments cylindrical or moniliform.....**Labiinae**

Antennal segment 3 longer than 5; eyes large; elytra typically smooth and glabrous. Usually brightly shining or shining species; wings, when present, dark brown or blackish, and yellow or white at bases; antennal segments often moniliform .....**Spongiphorinae**

Key to Larvae of Micronesian Subfamilies of Labiidae

1. Mesonotum with lateral margins forming a distinct explanate rim (fig. 4a); usually dark brown in color, antennal segments dark medially, pale in color at apices and bases, forceps often lighter in color at bases.....**Nesogastrinae**

Mesonotum without a distinct explanate margin on each side.....2

2(1). Eyes large, as long as length of head behind eyes.....**Spongiphorinae**

Eyes small, almost always smaller than length of head behind eyes.....3

3(2). Body flattened; head flat and relatively large; eyes very small.....**Sparattinae**

Body not flattened; head more or less convex and relatively smaller; eyes small, occasionally larger (fig. 4b).....**Labiinae**

Subfamily Nesogastrinae

A well defined subfamily which includes 1 genus only.

Genus **Nesogaster** Verhoeff

Nesogaster Verhoeff, 1902, Zool. Anz. **1902:** 191 [type: *Nesogaster fruhstorferi* Verhoeff, 1902, Zool. Anz. **1902:**191 (♂ and ♀ syntypes, Celebes) = *Labia dolicha* Burr, 1897, Ann. Mag. nat. Hist. (7) **16:** 495, ♂ type, Celebes].

Nesogastrella Verhoeff, 1902, Zool. Anz., **1902:**192 (type: *Nesogastrella ruficeps* Verhoeff, 1902, Zool. Anz. **1902:** 192 (♀ type, Borneo).

Superficially similar to the genus *Marava*, but *Marava* lacks the lateral ridges on the elytra which is characteristic of *Nesogaster*. Most species of this genus form a homogenous group, although the Australian species seem to be less typical.

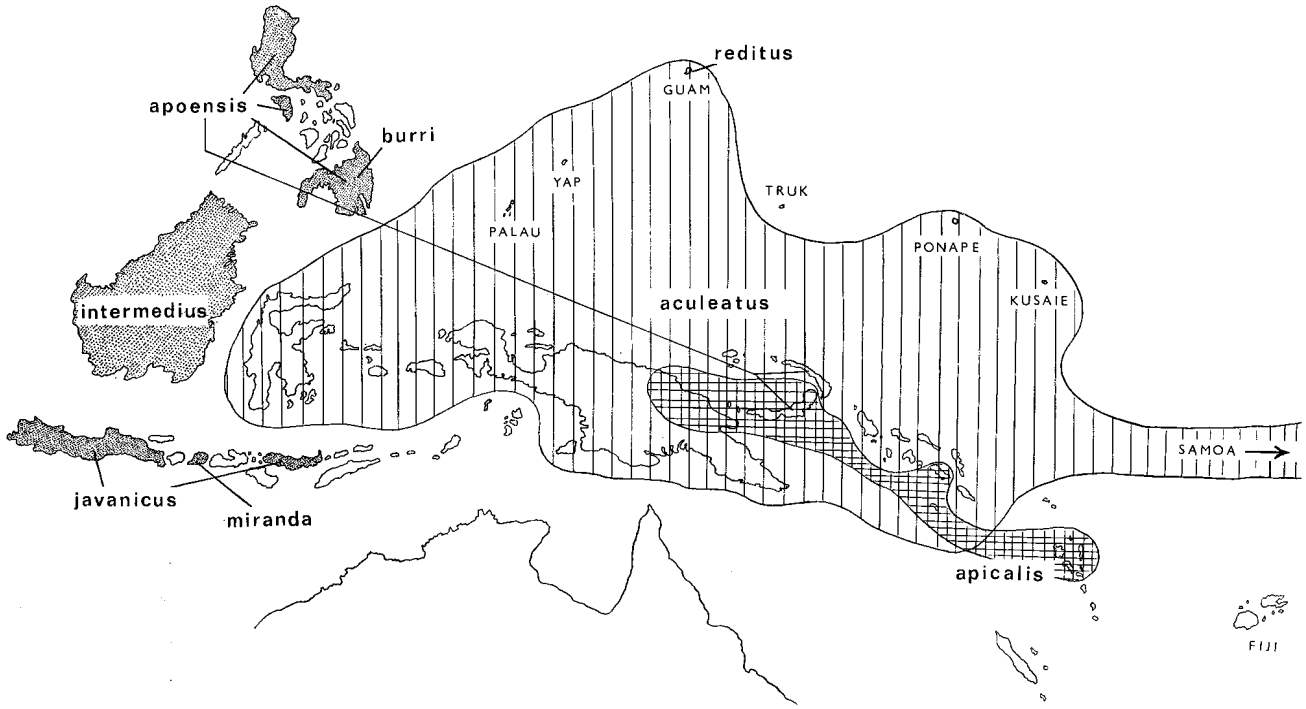

FIGURE 11. Distribution of the *Nesogaster aculeatus* complex.

If the occurrence of *N. apoensis* in the Bismarck Archipelago is omitted, then the distribution of the *aculeatus* complex shows that whilst *aculeatus* occupies the central area, the other species occur only at the extremities of this area, and each of these species has a restricted distribution. This would indicate that forms of *aculeatus* have developed at the extremities of the distribution and that these forms have now developed into separate subspecies or species. No male specimens from Samoa have been available and the female specimens from these islands examined are indistinguishable from normal *aculeatus*, but from the present known distribution of the complex male specimens from Samoa should show differences to normal *aculeatus* since the Samoan population is well separated from the main distribution of *aculeatus*.

N. aculeatus exists in 2 forms; in 1 the elytra and wings are fully developed, whilst in the second the elytra are short and the wings are absent or concealed. All the other 7 species have short elytra and are without visible wings. These species also are more or less unicolorous brown or darker, whilst *aculeatus*, in its brightest form has a contrasting coloration, mainly blackish, and parts with a metallic sheen, contrasting with the partially yellow legs, the multi-colored antennae, and the head, which is often reddish. The only distinguishing external structures are those of the male forceps and pygidia, and on this basis, *intermedius* from Borneo is closely related to *aculeatus*, but the pygidium of the former species is shorter, and the inner tooth on each branch of the forceps is nearer the base (fig. 10d), but the length of the pygidium varies in *aculeatus*. Both *apicalis* and *reditus* are also closely related to *aculeatus;* in *apicalis* (fig. 10g) the inner tooth on each branch of the forceps is replaced by a double-toothed projection on a longitudinal ridge, whilst in *reditus* (fig. 10h) the inner tooth is replaced by a longitudinal serrated ridge. Both these species co-exist with *aculeatus,* the distribution of *apicalis* overlapping that of *aculeatus* to a considerable extent (fig. 11).

Both *apoensis* and *miranda* differ from *aculeatus* in having the basal broadened part of the branches of the forceps extensive, and forming an inner flange of which the margin approximates to the margin of the pygidium, and the latter tapers gradually (figs. 10a, 10b). Small specimens of *apoensis* may resemble those of *aculeatus* in being brightly coloured, but *miranda* is rather large and unicolorous. *N. javanicus* (fig. 10i) differs in having the distal part of each branch of the forceps strongly curved, but the extent of this and the length of the pygidium varies, whilst *N. burri* is distinctive in having almost simple branches to the forceps (fig. 10c). The latter is montane, recorded between 1770—1830 m on Mindanao, but it co-exists with *apoensis* since both these species were found on Mount Apo.

N. aculeatus is available in some numbers, but there are too few specimens

darker than *reditus*, characters which agree with *aculeatus* and not with *reditus*. Furthermore there is 1 specimen from Guam which has fully developed elytra and wings, and this form only occurs in *aculeatus;* 2 larvae also have wing sheaths and these should be absent in *reditus* larvae. The specimens have been carefully examined but I cannot refer them to any other species than *aculeatus*, but the sexes are given since the males are the most satisfactory records.

The larva of this species (fig. 4a) is distinguishable by the explanate margin to the mesonotum, a feature which becomes the elytral ridge in the adult, and by the pale bases to the branches of the forceps. The larva of *reditus* will be similar, but the branches should be uniformly dark.

Subfamily Sparattinae

This subfamily includes only 1 Old World genus.

Genus **Auchenomus** Karsch

Auchenomus Karsch, 1886, Berl. Ent. Zeitschr. **20:** 89 (type: *Auchenomus longiforceps* Karsch, 1886, Berl. Ent. Zeitschr. **20:** 89, ♂, Madagascar).

Two specimens of this genus are in the present material, but both are females. The male forceps are the most useful external taxonomic character, so that the determination of the present specimens must be provisional. The specimens have been compared to a number of Indo-Australian species, and agree most closely with females of *javanus* from the Philippine Islands. They also resemble females of *Auchenomus variabilis* Brindle from the Solomon Islands, but differ in the shape of the pronotum, which in *variabilis* is less elongated and is narrowed posteriorly; in the present specimens the pronotum is longer and narrowed anteriorly, the lateral margins being sinuate (fig. 17f). The male forceps of *javanus* (fig. 17e) show similar characteristics to those of *variabilis*, in having the base strongly broadened and with rounded inner teeth, but the forceps of *javanus* are much longer than those of *variabilis*.

DISTRIBUTION: Malaysia, Java, Sumatra, Philippine Islands, New Guinea, but the specimens from the latter island may be distinct.

11. Auchenomus javanus (Bormans) (figs. 16e, 17e-f)

Platylabia javanus Bormans, 1883, Ent. Soc. Belg., Ann. **27:** 65 (♂ holotype, Java; Vienna Museum).

Auchenomus javanus: Burr, 1911, Gen. Insect. **122:** 59.

Head, elytra, and wings blackish; anterior part of elytra and pronotum reddish-yellow; legs reddish-yellow; abdomen dark red. Genitalia of ♂ with long parameres, which are pointed distally, and with a long and convoluted virga (fig. 16e). ♂ forceps with each branch arcuate, basal part wider and with inner projections (fig. 17e). ♀ (fig. 17f) with each branch of the forceps almost straight, inner margin crenulated; pygidium transverse,

dorsal part with 2 small tubercles. These tubercles, however, are not restricted to any one species and occur in the ♀♀ of several allied species. Length of body 9–10 mm., forceps 2 mm.

PALAU. BABELTHUAP: 2 ♀♀, Ulimang, Dec. 1947, Dybas.

One of the females is generally darker than the other, and the elytra is scarcely lighter anteriorly.

SUBFAMILY LABIINAE

Although the type species of the genus *Labia* and that of the genus *Chaetospania*, are separable on well defined differences, these differences become less marked in some Oriental and Australasian species, and it may be possible to assign such a species equally well to either genus. In particular the Micronesian species *Labia esakii* and *Labia appendicina* strongly resemble species of *Chaetospania* in the form of the female forceps, and in having the forceps of both sexes strongly setulose. They have, however, a tumid head and both this and the pronotum is glabrous and impunctate, both characters not typical of *Chaetospania*. *Labia bihastata* Borg, and possibly both *Labia dubronyi* Hebard and *Labia swezeyi* Hebard, from Hawaii are congeneric with *esakii* and *appendicina*. The retention of these last 2 species in *Labia* is undesirable since it is difficult to define *Labia* satisfactorily; similarly they cannot be satisfactorily placed in *Chaetospania*. In order that both these genera can be defined adequately, a new genus is proposed for *esakii* and *appendicina;* 1 new species is also congeneric with these species. Including the new genus, 3 genera are recorded from Micronesia.

KEY TO MICRONESIAN GENERA OF LABIINAE

1. Branches of forceps of both sexes not strongly setulose; those of ♂ without a ventral inner flange, and those of ♀ narrowed from base, and with inner margin never strongly dentated nor crenulated.....**Labia**

   Branches of forceps of both sexes strongly setulose; those of ♂ with or without a ventral inner flange, and those of ♀ not narrowed from base, and inner margin with at least a ventral inner flange, the margins of which is strongly dentated or crenulated. 2

2(1). Head transverse, depressed, both head and pronotum usually punctured and pubescent; branches of forceps of both sexes usually with a ventral inner flange but without a dorsal inner flange, or this weakly indicated.....**Chaetospania**

   Head less transverse, or quadrate, tumid, not depressed, both head and pronotum glabrous and impunctate; branches of forceps of ♂ simple or almost so, those of ♀ with both a ventral and a dorsal inner dentated or crenulated flange ..**Chaetolabia**

Genus **Chaetospania** Karsch

Chaetospania Karsch, 1886, Berl. Ent. Zeitschr. **30:** 87 (type: *Chaetospania*

inornata Karsch, 1886, Berl. Ent. Zeitschr. **30:** 88, ♂, Madagascar).

The only previous record of this genus from the Pacific appears to be that of *Chaetospania stoneri* Caudell from Fiji, in which each branch of the male forceps has a large inner tooth and the pygidium is large and of a somewhat distinctive shape (fig. 12f).

The species of this genus in the present collection are separable into 3 species and 2 subspecies, all of which are new. *C. nigritula* is a rather distinctive species, apparently closely related to *C. thoracica* (Dohrn) and *C. nigriceps* (Kirby), but the other species are more closely related between themselves. *C. ponapensis* has the male forceps of a distinctive shape, but the female is similar to those of the other species. The distribution of *C. fuscata* and its subspecies has some interesting features. The larger species is *fuscata*, which is described from a series from Kusaie, and this is almost identical with its subspecies *yapensis* from Yap; it is more clearly separable from its other subspecies, *clavata* from Guam. This similarity of the species from Yap (fig. 13a-b) and Kusaie (fig. 13c-d) is interesting since no *Chaetospania* is recorded from Truk, and the genus is represented on Ponape by *C. ponapensis* (fig. 13g-i); this latter species could be derived from *fuscata*, but if so the male forceps are considerably modified. The relationships of the *Chaetospania* species *fuscata* and its subspecies between the islands is shown in figure 2b.

Key to Micronesian Species of Chaetospania

1. Black, including most of legs; ♂ pygidium elongated, longer than broad, and with apex produced (fig. 12c); forceps of ♀ with inner margin of each branch not strongly crenulated, narrower for basal 1/4, dorsal ridge not more prominent at base (fig. 12e).....**12. nigritula**

   Dark brown or lighter in color, legs dark brown or yellowish; ♂ pygidium short and broad, apex not produced; forceps of ♀ with inner margin of each branch strongly crenulated or not, but with dorsal ridge more prominent at base, and raised into a semi-circular longitudinal ridge.....2

2(1). Male pygidium strongly narrowed distally, and longer than broad; basal widened part of each branch of ♂ forceps broader but shorter, not extending for basal 2/3 (fig. 13g-h); ♀ pygidium with lateral margins sinuate (fig. 13i).....**14. ponapensis**

   Male pygidium only slightly narrowed distally or parallel-sided, quadrate or transverse; basal widened part of each branch of ♂ forceps narrower but extending for basal 2/3 or more; ♀ pygidium with lateral margins concave or convex, rarely sinuate.....3

3(2). Antennal segments almost clavate (fig. 13j); each branch of ♂ forceps more slender, pygidium transverse (fig. 13e); branches of ♀ forceps with inner margin not strongly crenulated; pygidium with lateral margins concave (fig. 13f) .....**13b. fuscata clavata**

   Antennal segments not clavate, only slightly narrowed basally (fig. 13k).....4

4(3). Branches of ♂ forceps relatively short and broad; pygidium transverse (fig. 13a);

♀ forceps with inner margin of each branch not strongly crenulated; pygidium with lateral margins rounded (fig. 13b).....**13a. fuscata yapensis**

Branches of ♂ forceps relatively longer and more slender; pygidium quadrate (fig. 13c); ♀ forceps with inner margin of each branch very strongly crenulated; pygidium with lateral margins concave (fig. 13d).....**13. fuscata fuscata**

12. Chaetospania nigritula Brindle, n. sp. (figs. 12c, e)

Black, only slightly shining; antennae dark brown; legs dark brown, femora blackish. Cuticle punctured and pubescent, 1 black hair arising from each puncture; cuticle of head and pronotum finely punctured and pubescent, punctures of elytra and wings larger but more widely spaced, and separated by more than their own diameter; median abdominal tergites more finely punctured, and the punctures closer, posterior margins of abdominal tergites with isolated long stiff hairs; forceps with more numerous long stiff hairs.

MALE: *Head:* Transverse, depressed, sides rounded, posterior margin concave; eyes small; antennal segment 1 as long as the distance between the antennal bases, segment 2 transverse, segment 3, 1.5 × as long as broad, 4 subequal in length to 3, segment 5, 2 × as long as broad at widest part; distal segments elongated, each segment 3 × as long as broad, and strongly narrowed to base, all segments pubescent, hairs short and yellowish.

Thorax: Pronotum slightly narrowed posteriorly, almost quadrate, sides straight, posterior margin weakly convex. Elytra relatively short, longer than pronotum (ratio of length of pronotum to elytra = 2.25: 3); wings long, almost as long as pronotum; legs short, femora strongly broadened.

Abdomen: Long, parallel-sided for most part but narrower towards base, lateral tubercles on tergite 4 faintly indicated; last tergite transverse, almost smooth, posterior margin produced above the base of each branch of the forceps, and concave medially, the median part with 2 or 3 ill-defined and short longitudinal ridges near posterior margin. Each branch of forceps trigonal at base, dorsal surface flattened, external margin narrow, internal margin wide, forming a ventral and a dorsal inner edge, the ventral edge widened before midpoint to form a sinuate flange, ending in a tooth; the branch narrows distally and becomes cylindrical, with the apex curved medially; pygidium longer than broad, basically rectangular, posterior margin slightly wider and with a median projection (fig. 12c). Penultimate sternite broad, postero-lateral angles oblique, and curving into the almost straight posterior margin.

FEMALE: Similar to ♂; last tergite transverse, posterior margin between bases of the forceps forming a horizontal thickened rim; each branch of forceps trigonal basally but dorsal edge displaced from inner margin so that it is median in position; ventral edge with a crenulated flange medially, distal part of branch cylindrical, and apex curved medially; pygidium short, broad, transverse, posterior margin wider and slightly concave (fig. 12e). Penultimate sternite broad, evenly rounded posteriorly.

Length: body 7–7.5 mm, forceps 2 mm (♂), 1.75 mm (♀).

Holotype, ♂ (CAS) Palau, Ngergoi (Garakayo I.), 9 m, 8 Aug. 1945, Hagen; allotype, ♀ (CAS), same data. Paratype ♂ (Bishop), same data.

This species is similar to *C. thoracica* (Dohrn) and *C. nigriceps* (Kirby) especially in the form of the male pygidium, but is distinct by the almost entirely blackish color, the other 2 species having a reddish abdomen. Each branch of the male forceps of *nigriceps* has a large inner tooth (fig. 12b),

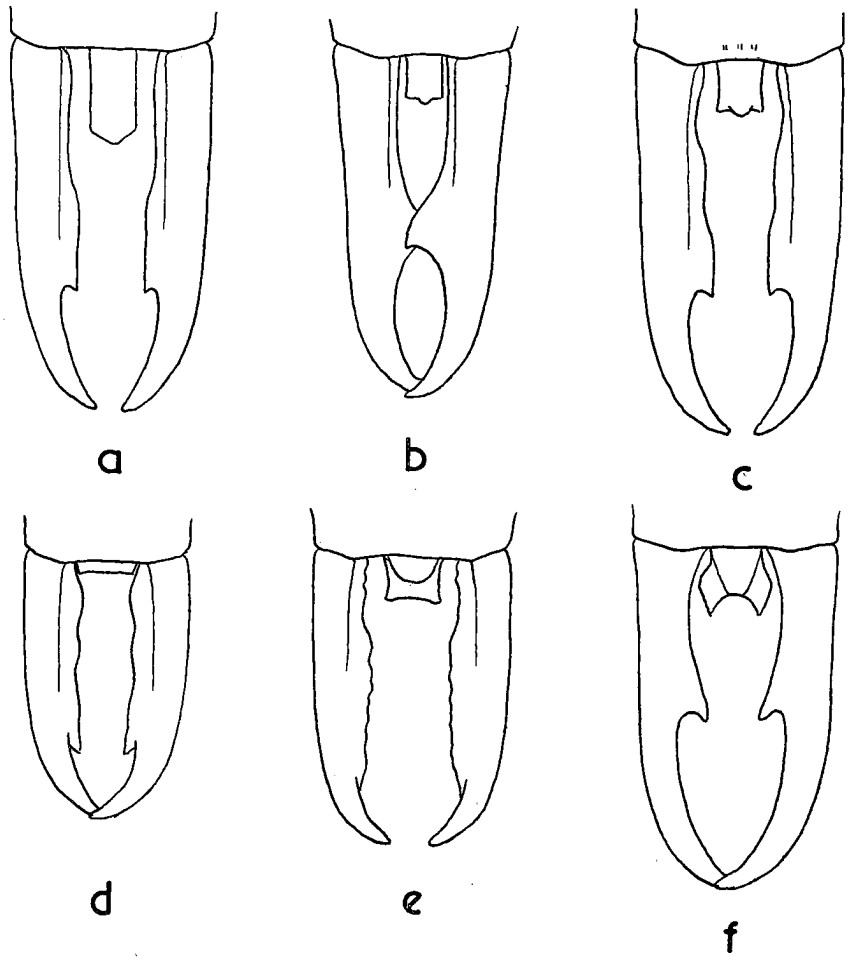

FIGURE 12. Forceps of Chaetospania. a-f: **a,** *C. thoracica,* male; **b,** *C. nigriceps,* male; **c,** C. *nigritula,* male; **d,** *C. thoracica,* female; **e,** *C. nigritula,* female; **f,** *C. stoneri,* male.

whilst the male pygidium of *thoracica* (fig. 12a) is longer than that of *nigritula* (fig. 12c); the female pygidium of *thoracica* (fig. 12d) is more transverse than that of *nigritula* (fig. 12e).

13. Chaetospania fuscata Brindle, n. sp. (figs. 13c-d, k)

Dark brown, slightly shining; antennae dark brown, basal segments yellowish; elytra slightly paler in color than the wings; legs dark brown, some tarsal segments paler; abdomen with a slightly reddish tinge. Cuticle punctured and pubescent, that of head and pronotum, and abdominal tergites, more finely punctured than that of elytra and wings.

MALE. *Head:* Transverse. depressed, occiput behind eyes slightly swollen, sides rounded, posterior margin concave; eyes small; antennal segment 1 longer than the distance between the antennal bases, segment 2 transverse, segment 3, 2 × as long as broad, 4 equal in length

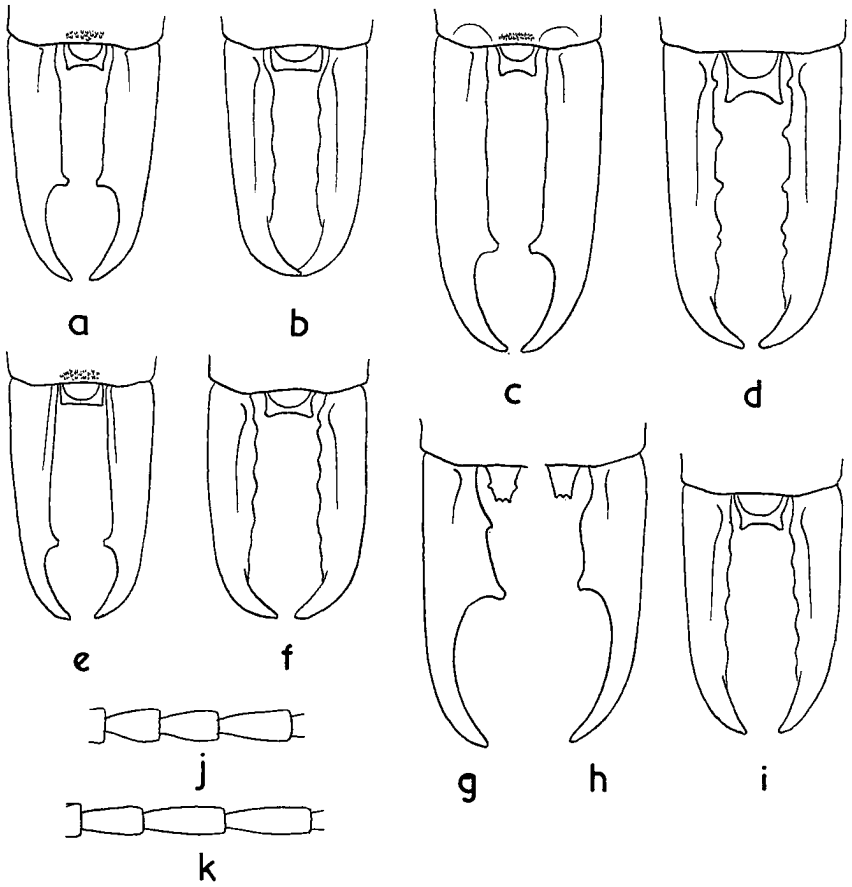

FIGURE 13. Forceps of *Chaetospania*. **a-k**: **a-b**, *C. fuscata yapensis*, male and female; **c-d**, *C. fuscata fuscata*, male and female; **e-f**, *C. fuscata clavata*, male and female; **g-i**, *C. ponapensis*, male and female (type male = **h**). Fourth to sixth antennal segments: **j**, *C. fuscata clavata*; **k** *C. fuscata fuscata*.

to 3; 5, 2.5 × as long as broad; distal segments elongated, nearly 4 × as long as broad, (fig. 13k), pubescent, hairs short and yellow, with sparse longer yellow hairs.

Thorax: Pronotum longer than broad, parallel-sided, sides straight, posterior margin convex; elytra nearly 2 × as long as pronotum measured along lateral margins, wings as long as pronotum; legs relatively short, femora strongly broadened, compressed, widest at 1/3 from base, tibiae broad and compressed, widest at about 1/4 from base, tapering distally, external margin with 2 to 4 widely spaced short but conspicuous setae on distal 1/2; basal tarsal segment cylindrical, with similar setae ventrally, segment 2 short and transverse, distal segment long, almost cylindrical but wider near apex, claws long and evenly curved. External margin of femora concave for apical 2/3 apparently allowing the tibiae to fit into the concavity.

Abdomen: Broad, depressed, evenly and slightly widened from base to tergites 7–8, lateral tubercles not visible; posterior margins of tergites 2–7 with small tubercles, from each of

which arises a long yellow hair. Last tergite transverse, almost smooth; towards each lateral margin is a longitudinal ridge, slightly oblique, more displaced laterally at the posterior end; posterior margin of tergite concave medially, blackish and rugose. Each branch of forceps trigonal at extreme base only, elliptical for most of length, cylindrical beyond the inner tooth, inner margin directed ventro-medially, and forming a thick flange, the margin of which is slightly sinuate and ends in a blunt tooth, the tooth with the apex almost truncate, but the distal edge somewhat rounded; pygidium short, transverse, narrowed from base, then widened, posterior margin concave (fig. 13c).

FEMALE. Similar to ♂, each branch of forceps trigonal for most of length, dorsal edge sinuate near base and blackish, and displaced from the inner margin laterally; ventral edge with large crenulations, which are blackish at the tips; distal 1/5 elliptical in cross section, narrower and curved medially apically; pygidium as broad as long, sides weakly concave, posterior margin strongly concave, margins blackish (fig. 13d).

Length of body 8–9.5 mm, forceps 2.5–2.75 mm (♂♂), 2.5–3 mm (♀♀).

Holotype, ♂ (US 71557) Kusaie, 580 m, Mt. Matante, 11 Feb. 1953, Clarke (from dead cyathea fronds); allotype, ♀ (Bishop), same data. Paratypes, 4 ♂♂, 4 ♀♀, same data.

13a. Chaetospania fuscata clavata Brindle, n. ssp. (fig. 13e-f, j)

Dark brown; legs yellowish; abdomen dark yellowish-brown, last tergite dark brown; forceps and pygidia dark brown. Occiput behind eyes slightly paler in color. Cuticle of head and pronotum finely punctured and pubescent; elytra, wings, and abdomen more closely punctured and pubescent, hairs rather long and yellow; forceps with numerous long yellow hairs.

MALE. *Head:* Transverse, depressed, sides rounded, posterior margin concave; eyes small; antennal segment 1 short and broad, shorter than the distance between the antennal bases, segment 2 transverse, 3, 1.5 × as long as broad, 4 equal in length to 3, segment 5, 2 × as long as broad; distal segments broad, each strongly narrowed to base (fig. 13j).

Thorax: Pronotum more or less quadrate, parallel-sided, sides straight, posterior margin convex. Elytra 2 × as long as pronotum, wings as long as pronotum; legs similar in structure to those of *fuscata fuscata*.

Abdomen: Widened to tergites 7–8, depressed, broad; last tergite transverse, posterior margin concave and rugose between the bases of the forceps. Each branch of forceps trigonal for basal 1/4, thence elliptical in cross section, with last 1/4 cylindrical and curved; ventral inner edge with a narrow flange, the margin of which is smooth, and this flange ends distally in a small tooth; pygidium transverse, margins almost smooth (fig. 13e).

FEMALE. Similar to ♂; each branch of the forceps broad, trigonal for basal 1/2, dorsal edge sinuate basally; inner ventral edge with a crenulated flange; pygidium short and transverse (fig. 13f).

Length of body 5–7.5 mm, forceps 1.25–2 mm (♂♂), 1.25–1.75 mm (♀♀).

Holotype, ♂ (US 71558), S. Marianas, Guam, Pilgo River, 26 May 1945, Bohart and Gressitt; allotype, ♀ (CAS), same data. Paratypes, 7 ♂♂, 5 ♀♀ (US, CAS, Bishop), same data.

13b. Chaetospania fuscata yapensis Brindle, n. ssp. (fig. 13a-b)

Head dark brown, except for occiput behind the eyes which is yellowish-brown; elytra and wings dark brown to blackish; abdomen and forceps reddish-yellow; legs yellow. Cuticle

of head and pronotum finely punctured and pubescent, that of elytra and wings more deeply and strongly punctured; abdominal tergites finely punctured and pubescent.

MALE. Similar to *fuscata fuscata* in structure. Antennal segment 1 rather shorter than the distance between the antennal bases, segment 2 transverse, segment 3 nearly 2 × as long as broad and equal to 4 in length, segment 5, 2.5 × as long as broad; distal segments elongated, narrow, each segment slightly narrowed to base. Pronotum slightly longer than broad. Elytra, wings, and legs as in *fuscata fuscata*. Each branch of forceps elliptical in cross section, with a dorsal edge for about basal 1/3, and with a narrow inner flange which ends in a blunt tooth; pygidium slightly narrower distally (fig. 13a).

FEMALE. Similar to ♂, as far as available material is concerned; the allotype has only the abdomen and forceps remaining. Each branch of forceps broad, almost straight, with a ventral crenulated inner flange; dorsal edge of branch sinuate basally; pygidium short and transverse (fig. 13b).

Length of body 7.5 mm, forceps 2.5 mm (♂), 2.25 mm (♀).

Holotype, ♂ (US 71559) S. Yap Is., Jul.-Aug. 1950, Goss; allotype, ♀ (MCZ), same data (abdomen and forceps only remaining).

14. Chaetospania ponapensis Brindle, n. sp. (fig. 13g-i)

Yellowish-brown, elytra and wings dark brown; legs yellow. Cuticle of head, pronotum, and abdomen finely punctured and pubescent, elytra and wings strongly punctured and pubescent.

MALE. *Head:* Transverse, depressed, sides almost parallel just behind eyes but curving smoothly into posterior margin, the latter concave medially; eyes small; antennal segment 1 nearly as long as the distance between the antennal bases, segment 2 transverse, segment 3, 1.25 × as long as broad, segment 4, 1.5 as long as broad, 5, 2.25 as long as broad; distal segments elongated, moniliform, all segments pubescent, hairs short and yellow and with isolated longer yellow hairs.

Thorax: Pronotum slightly longer than broad, parallel-sided, sides straight, posterior margin convex; elytra 2 × as long as pronotum measured along lateral margins, wings as long as pronotum. Legs similar to those of *fuscata* in structure.

Abdomen: Depressed, more or less parallel-sided, but narrower towards the base; last tergite transverse, smooth, with a median longitudinal furrow. Each branch of forceps trigonal for basal 1/3, almost cylindrical distally, dorsal inner edge curved and ventral inner edge forming a large flange, the margin of which is sinuate and ending in a large blunt tooth (fig. 13h) or with the sinuate margin produced into a secondary tooth (fig. 13g); pygidium declivent, narrowed distally, posterior margin concave with a small median projection, and the median part of the pygidium may also have small projections.

FEMALE. Similar to ♂; each branch of the forceps trigonal for basal 1/3, inner ventral edge with 4 crenulations (fig. 13i).

Length of body 4.5–6 mm, forceps 1.25–2 mm (♂♂), 1 mm (♀).

Holotype, ♂ (US 71560) Ponape, Nanpil, Nett district, 25 Feb. 1948, Dybas; allotype, ♀ (CNH), same data. Paratypes (US, CNH, Bishop), 1 ♂, 2 ♀♀, same data (1 ♀ with only abdomen and forceps remaining); 1 ♂, 1 ♀, Mt. Tamatamansakir, Jun.-Sep. 1950, Adams; 1 ♀, Mt. Tamatamansakir, under dead bark, c. 150–300 m, Feb. 1948, Dybas; 1 ♀, Mt. Kupuriso, summit, beating vegetation, c. 610 m, Mar. 1948, Dybas.

The number of species in this genus is now smaller than that in Burr (1911, Genera Insectorum, **122:** 55-57), since several species have now been transferred to other genera. The genus is, however, now more adequately defined.

DISTRIBUTION: In all faunal regions.

Key to Micronesian Species of Labia

1. Pronotum relatively small, and more or less quadrate (fig. 15a); eyes small; branches of ♂ forceps much wider at bases and forming an inner process, each branch strongly curved distally; pygidium transverse or quadrate (fig. 15a); forceps of ♀ short, broad at base (fig. 15b); abdomen often reddish and pronotum yellow, contrasting with the blackish head, elytra, and wings, but the insect may be more or less uniformly brown or dark brown.....**18. curvicauda**

   Pronotum relatively larger, and transverse; eyes larger; branches of ♂ forceps not much wider at bases and without an inner process, each branch very slightly curved; pygidium triangular, or with apex bifid (fig. 15c); forceps of ♀ with longer branches, which are less broadened at base (fig. 15d); dark brown species, always more or less unicolorous, or with elytra and wings slightly paler.....**19. pilicornis**

18. Labia curvicauda (Motschulsky) (figs. 4b, 15a-b, 16a)

Forficesila curvicauda Motschulsky, 1863, Bull. Soc. nat. Moscou **36:** 2 (♂ and ♀, Ceylon; lost).

Labia flavicollis Bormans IN Burr, 1903, Ann. Mag. Nat. Hist. (7) **11:** 236 (Samoa).

Labia rechingeri Holdhaus, 1909, Denkschr. math.-naturw. Kl. K. Akad. Wiss. Wien **84:** 15 (Samoa).

Labia curvicauda: Burr, 1911, Gen Insect. **122:** 56.—Menozzi, 1941, Mushi **13:** 73 (Ponape, Kusaie, Jaluit).

Blackish, abdomen reddish; legs yellow, femora darker on basal 1/2 or more; antennae yellow or brown; pronotum yellow; sometimes the whole insect is generally dark brown. A depressed species, not brightly shining. Length of body 4–5 mm, forceps 75–1.25 mm.

DISTRIBUTION: Cosmopolitan. In all faunal regions, but subtropical or tropical in distribution, occurring as an adventive in the more northern parts of the Palaearctic and Nearctic Regions. In the Pacific it is recorded from Micronesia eastwards and southwards to Fiji, Samoa, the Society Islands, the Marquesas, and the Hawaiian Islands.

VOLCANO IS. Iwo Jima: Sep. 1945, Dybas.

S. MARIANA IS. Saipan: Garapan, Dec. 1944, Dybas; Papago, Sadog Talofolo, Mt. Tagpochau, Halaitai, Feb-Mar. 1945, Dybas. Tinian: harbor and Mt. Lasso, Mar. 1945, Dybas. Guam: Oca Pt., Pati Pt., Piti, Fadang, Gurgan Pt., Jun. 1945, Dybas; Pilgo River, May. 1945, Bohart and Gressitt; Talofofo Bay, Apr. 1945, Strong; Asan, Nov. 1947, Dybas.

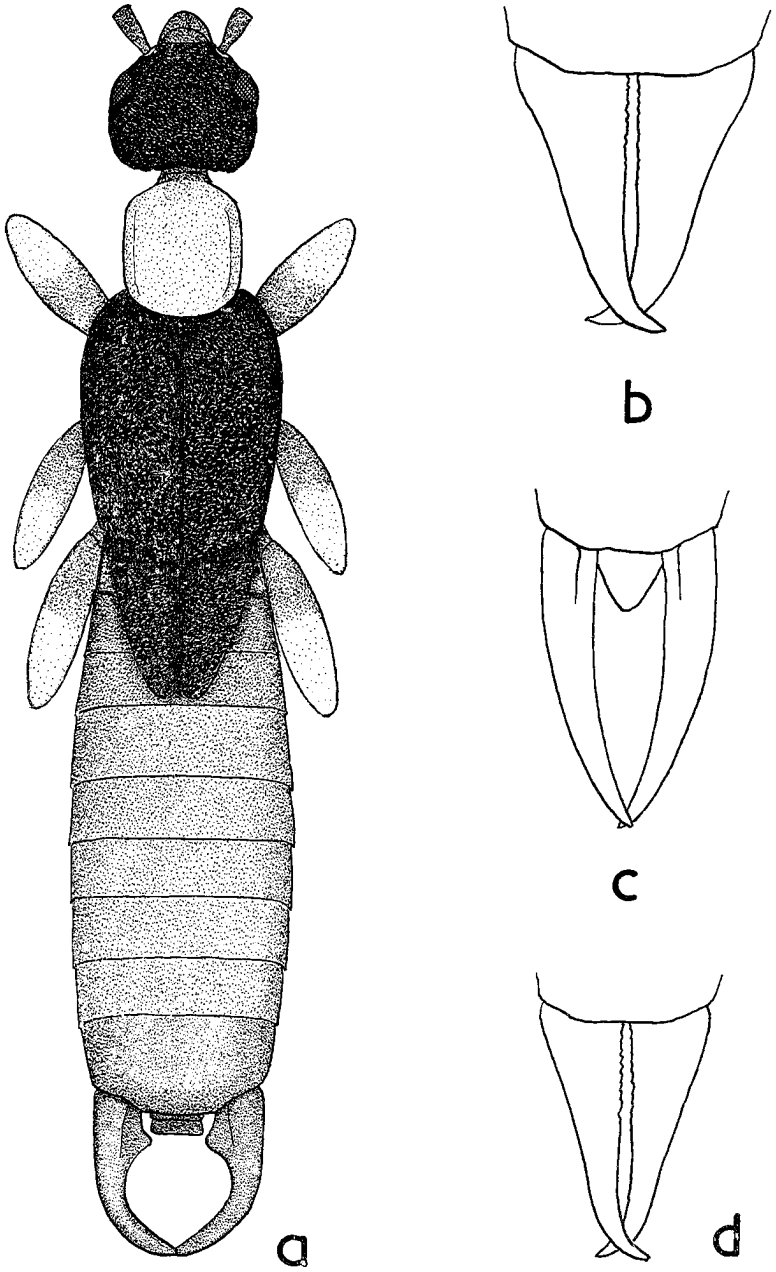

FIGURE 15. *Labia.* **a-d: a-b**, *L. curvicauda*, dorsal view of male, and female forceps. **c-d,** *L. pilicornis*, male and female forceps.

PALAU. BABELTHUAP: Ulimang, Dec. 1947, Dybas; Ngatpang, Dec. 1952, Gressitt; Ngaremaskang, Dec. 1952, Townes; Ngaremlengui, Jun. 1957, Sabrosky. KOROR: Nov.-Dec. 1947, Dybas; limestone ridge, north of inlet, Jan. 1948, Dybas. PELELIU: West coast, Nov. 1948, Dybas; east coast, Aug. 1945, Jan. 1948, Dybas; north ridge, Jan. 1948, Dybas, Jul. 1946, Townes. ANGAUR: Feb. 1948, Dybas. GARAKAYO: Aug. 1945, Hagen.

YAP. Gagil, Tomil, Ruul, and S. YAP I.: Jul.-Aug. 1950, Goss.

CAROLINE ATOLLS. ULITHI: Potangeras I., Nov. 1947, Dybas. KAPINGAMARANGI: Aug. 1946, Townes. PINGELAP: Jan. 1953, Gressitt.

TRUK. MOEN: Feb. 1948, Dybas; Mt. Tonachau, Apr. 1949, Potts.

PONAPE. Colonia, Jun.-Sep. 1950, Adams, Feb. 1948, Dybas; Nanpil, Feb. 1948, Dybas; Awakpo, Mar. 1948, Dybas; Jokaj, Feb. 1948, Dybas; Matalanim, Aug. 1950, Adams; Mt. Peipalap, Jun.-Sep. 1950, Adams; Mt. Dolennankap, 550 m, Aug. 1946, Townes; Mt. Kupuriso, summit, 610 m, Mar. 1948, Dybas; Mt. Tamatamansakir, 500 m, Mar. 1948, Dybas; Nanpohnmal, Jan. 1953, Gressitt.

KUSAIE. Mutunlik, Mar. 1953, Clarke; Mt. Matante, Feb. 1953, Clarke.

MARSHALL IS. KWAJALEIN: Sep. 1956, Clagg. JALUIT: Medyado I., Aug. 1946, Townes. MAJURO: Aug. 1946, airfield, Townes. ARNO: Jul. 1950, La Rivers; Ine I., 1950, La Rivers.

Recorded from beneath bark of breadfruit trees, banyan trees, etc., and in porous wood of log; in staminate strobilus of *Cycas;* in decaying fruit, on leaves, or in decaying crown of *Pandanus;* in decaying banana stems, decaying crown of betel palm, rotting breadfruit, papaya, and also by sweeping air at dusk, at light, and by Berlese funnel.

The larvae of this species (fig. 4b) is not distinctive, but may be recognized by the small pronotum, the relatively short antennal segments which are narrowed to the bases, and the small size. They occur in a wide range of habitats and are often found in dryer places than most species of earwigs. The instars of the larvae can be approximately separated as follows:–

	Instar 1	Instar 2	Instar 3	Instar 4	Adult
Number of antennal segments	8	9	10	11	12
Length of body (mm)	2–2.5	2.5–3	3–3.5	3.5–4	4–5
Length of forceps (mm)	.25	.35	.45	.55	.75–1.25

19. Labia pilicornis (Motschulsky) (fig. 15c-d)

Forficesila pilicornis Motschulsky, 1863, Bull. Soc. nat. Moscou **36:** 2 (♂ and ♀, Ceylon; lost).

Labia pilicornis: Burr, 1911, Gen. Insect. **122:** 56;—Rehn, 1949, Ent. Soc. Am. Trans., **75:** 110 (Guam).

Dark brown, or with elytra and wings somewhat paler; head, pronotum, and abdomen sometimes blackish; legs yellowish-brown or with femora darker. Length of body 3.5–4.5 mm, forceps .75–1.25 mm (♂♂), .5–.75 mm (♀♀).

DISTRIBUTION: Cosmopolitan. Recorded from the West Indies (Cuba) as an established species, and from the Nearctic as an adventive. Mainly Oriental but extending into the Australasian Region and the Pacific, in which it is recorded from the Marianas, Fiji, Samoa, the Society Islands, the Marquesas, and Hawaii.

PALAU. PELELIU: 1 ♂, 1 ♀, east coast, Mar. Aug. 1945, Dybas. ANGAUR: 1 ♀, Aug. 1945, Dybas. GARAKAYO: 1 ♂, Aug. 1945, Dybas.

YAP. 4 ♀♀, 6 larvae, Dugor, Rumung, Jul.-Aug. 1950, Goss. S. Yap I.: 4 ♀♀, 8 larvae, Jul.-Aug. 1950, Goss.

PONAPE. 1 ♂, 1 ♀, Mt. Tamatamansakir, Jun.-Sep. 1950, Adams; 1 ♂, 2 ♀♀, Nanpohnmal, Jan. 1953, Gressitt.

KUSAIE. 1 ♂, 1 ♀, Wakap, Apr. 1953, Clarke.

Recorded from light (Wakap) and from a light trap (Nanpohnmal).

SUBFAMILY SPONGIPHORINAE

This subfamily appears to be best represented in the Neotropical Region, where it far outnumbers the Labiinae, but it is poorly represented in the Australasian Region. One genus is recorded from Micronesia.

Genus **Marava** Burr

Marava Burr, 1911, Deut. Ent. Natn.-Biblthk **2:** 60 (type: *Labia grandis* Dubrony, 1879, Mus. Civ. Stor. Nat. Genova, Ann. **14:** 366).

Prolabia Burr, 1911, Deut. Ent. Natn-Biblthk **2:** 60 (type: *Forficula arachidis* Yersin, 1960, Ent. Soc. Fr., Ann. ser. 3, **8:** 509).

The synonymy of the above genera rests on the observation by Boeseman (1954, Verh. zool., Leiden **21:** 83) that *grandis* and *arachidis* are forms of the same species, an observation which appears to be substantiated by later work. Two species occur in Micronesia.

DISTRIBUTION: Neotropical, Nearctic, Ethiopian, Oriental, and Australasian Regions; adventive in the Palaearctic Region.

KEY TO MICRONESIAN SPECIES OF MARAVA

1. General coloration reddish-brown, or with head, pronotum, and elytra blackish; wings, when present, broadly yellow at bases; forceps of ♂ with branches evenly arcuate, bases not broadened, each branch with 1 or 2 inner teeth (fig. 17a);

branches of ♀ forceps with a small inner tooth near base (fig. 17b).....**20. arachidis**

General coloration black; wings always present, whitish with external margins broadly black; abdomen often reddish medially or posteriorly; forceps of ♂ with branches unevenly arcuate, broader at base, narrower medially, distal part swollen (fig. 17c); branches of ♀ forceps without an inner tooth near base (fig. 17d).....**21. feae**

20. Marava arachidis (Yersin) (figs. 16d, 17a-b)

Forficula arachidis Yersin, 1860, Ent. Soc. Fr., Ann. ser. 3, **8:** 509 (♂♂, ♀♀, Marseilles, probably introduced; Paris Museum).

Labia wallacei Dohrn, 1864, Stett. Ent. Zeitung **25:** 427 (♀, New Guinea; ? Warsaw Zoological Museum).

Labia grandis Dubrony, 1879, Mus. Civ. Stor. Nat. Genova, Ann. **14:** 366 (♂♂, ♀♀, New Guinea and Australia; Genoa Museum).

Marava grandis: Burr, 1911, Gen. Insect. **122:** 53.

Prolabia arachidis: Burr, 1911, Gen. Insect. **122:** 57.

Marava arachidis: Hincks, 1954, Roy. Ent. Soc. London, Proc. ser. B, **23:** 162.

Marava wallacei: Menozzi, 1941, Mushi **13:** 73 (Babelthuap, Kusaie).

This is a species which shows considerable variation in color, but is usually recognizable in the male by the shape of the forceps and pygidium. The species may have fully developed elytra and wings, or the elytra may be short and the wings absent or concealed. The size of the eyes may also vary, often being large in the fully winged form and smaller in the form with short elytra.

There are 2 color forms of this species in the present material. Dark form: head, pronotum, and elytra blackish, pronotum with yellow lateral margins, sometimes also with posterior margin yellow; legs yellow, femora largely darkened and tibiae sometimes dark; abdomen reddish, blackish laterally; forceps and pygidium dark red. Light form: head, pronotum, and elytra reddish-brown or dark brown, pronotum yellow on lateral margins and posteriorly; wings reddish or dark brown, broadly yellow basally; legs yellowish, femora partly darkened and tibiae slightly darker medially; abdomen dark reddish, sometimes blackish laterally; forceps and pygidium reddish. Many dark specimens have no visible wings and the elytra are short, but if wings are present these are partly yellow; most of the lighter specimens have wings, but these are sometimes absent or concealed. Length of body 6–9 mm, forceps 1.75–2.75 mm (♂♂), 1–1.5 mm (♀♀).

DISTRIBUTION: Mainly Indo-Australian, but occurs in all faunal Regions but as an adventive in temperate countries so it is classed as a cosmopolitan species. The fully winged form and the dark form described above appear to be restricted to the Australasian Region, and the most widely distributed form is yellowish or reddish with short elytra and without visible wings. Previously recorded in the Pacific from Samoa and Hawaii.

PALAU. BABELTHUAP: 1 ♀, Ngiwal, Nov. 1951, Gressitt; 2 ♂♂, Ulimang, Dec. 1947, Dybas. KOROR: 1 ♀, Jul. 1946, Oakley; 1 ♂, Oct. 1951, Gressitt;

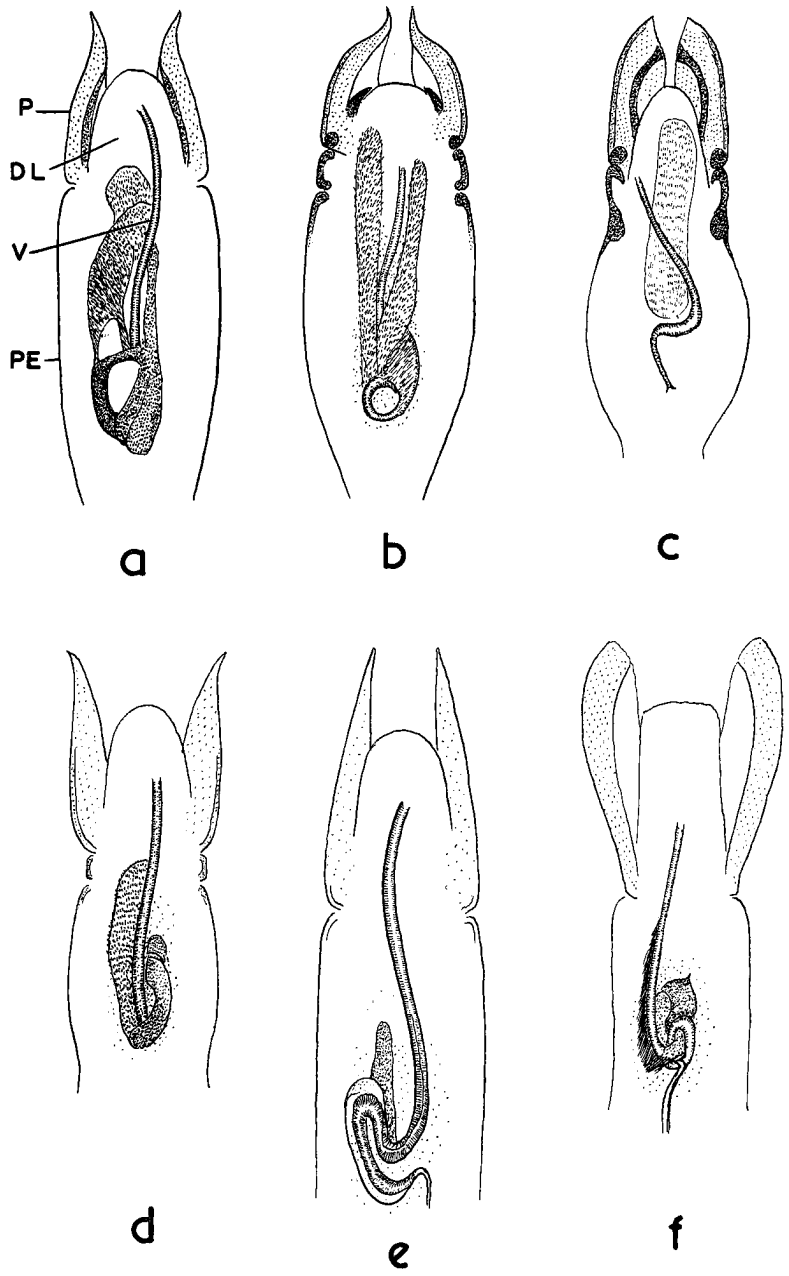

FIGURE 16. Male genitalia. **a-f: a,** *Labia curvicauda;* **b,** *Chaetolabia esakii;* **c,** *Chaetospania nigritula;* **d,** *Marava arachidis;* **e,** *Auchenomus javanus;* **f,** *Nesogaster aculeatus.* (DL = distal lobe; P = Paramere; PE = penis; V = virga).

DISTRIBUTION: New Guinea and Australia; not previously recorded from Micronesia.

PALAU. PELELIU: 2 ♂♂, 2 ♀♀, Aug. 1945, at light, Hagen; 1 ♂, east coast, Aug. 1945, Dybas.

Although this species was transferred from *Spongovostox* to *Marava* by the present author, its systematic position is not yet clearly fixed. It differs in some features from the other Australian species of *Spongovostox*, but is not entirely congeneric with *Marava*. It is distinct from most species of *Marava* mainly by the less brightly shining cuticle, and by the more cylindrical antennal segments.

FAMILY CHELISOCHIDAE

KEY TO MICRONESIAN GENERA OF CHELISOCHIDAE

1. Elytra and wings punctured and pubescent. Parameres of ♂ genitalia short and almost triangular (fig. 20b); branches of ♂ forceps slender, arcuate, with (fig. 20a) or without an inner tooth on each branch; forceps of ♀ shorter, comparatively broad, each branch with an inner tooth towards base, pygidium angular (fig. 20c)..... **Hamaxas**

   Elytra and wings smooth and glabrous. Parameres of ♂ genitalia not almost triangular in shape.....2

2(1). Distal antennal segments long and slender. Each elytron blackish, with an oblique longitudinal yellow patch, sometimes obscured; wings mainly yellow; pronotum longer than broad, wider posteriorly; each branch of ♂ forceps short and broad, inner margin of each branch dentated (fig. 18a); pygidium of ♀ short, distal part narrowed (fig. 18c)..... **Proreus**

   Distal antennal segments shorter and broader. Elytra unicolorous, blackish, sometimes with a metallic sheen and sometimes reddish or reddish-brown; wings unicolorous, similar to elytra; pronotum slightly transverse, not wider posteriorly; each branch of ♂ forceps broad and with inner margin dentated (fig. 19a) or arcuate (fig. 19b); pygidium of ♀ transverse, distal part not narrowed (fig. 19d) ..... **Chelisoches**

KEY TO LARVAE OF GENERA OF MICRONESIAN CHELISOCHIDAE

1. Pronotum relatively large, as wide as head or almost so, quadrate or slightly transverse, and more or less parallel-sided, posterior margin not strongly convex (fig. 19e); blackish or reddish, yellowish when newly moulted, usually with posterior part of elytra whitish, and white along posterior margins of wing sheaths ..... **Chelisoches**

   Pronotum relatively smaller, narrower than head, at least anteriorly; blackish or yellowish when newly moulted, but without distinct whitish marks.....2

2(1). Pronotum longer than broad, wider posteriorly (as fig. 18a))..... **Proreus**

   Pronotum shorter, not wider posteriorly (as fig. 20a)..... **Hamaxas**

Genus **Proreus** Burr

Proreus Burr, 1907, Ent. Soc. London, Trans. **1907:** 129 (type: *Forficula simulans* Stal, 1860, Eug. Resa, Ins.: 302, ♂, Java).

An Old World genus, mainly Oriental, but extending into the Australasian Region. One species occurs in Micronesia.

22. **Proreus laetior** (Dohrn) (fig. 18a-c)

Lobophora laetior Dohrn, 1865, Stett. Ent. Zeitung **26:** 73 (♀, Batchian; ? Warsaw Zoological Museum).

Proreus laetior: Burr, 1911, Gen. Insect. **122:** 64.

Shining black; antennae, legs, lateral and posterior margins of pronotum, yellow; elytra usually with a large median elliptical yellow patch, somewhat oblique, nearer to the lateral margins anteriorly; wings partly yellow (fig. 18a). Length of body 8–10 mm., forceps 2–3 mm (♂♂), 2–2.75 mm (♀♀).

DISTRIBUTION: Celebes, New Guinea, Bismarck Archipelago, and the Solomon Islands. Not previously recorded from Micronesia.

PALAU. BABELTHUAP: 1 ♀, Ulimang, Dec. 1947, Dybas; 5 ♀♀, Aurang, Dec. 1947, Dybas; 3 ♀♀, Ngarekeai, Nov. 1956, Fehlmann; 1 ♂, Ngiwal, Dec. 1952, Gressitt; 3 ♂♂, Ngaremeskang, Dec. 1952, Gressitt; 1 ♀, Aupluptagel, Dec. 1952, Gressitt; 1 ♀, Aimelik, Aug. 1953, Beardsley. KOROR: 1 ♂, Dec. 1952, Gressitt; 6 ♀♀, 3 specimens (abdomen missing) Mar.-Jun.-Oct. 1953, Beardsley. PELELIU: 1 ♀, Jan. 1948, Dybas.

Recorded most frequently on palm blossom, but also recorded from light traps and at light, and on *Pandanus*.

Genus **Chelisoches** Scudder

Lobophora Serville, 1839, Hist. nat. Ins. Orth.: 32 [type: *Lobophora rufitarsis* Serville, Hist. nat. Ins. Orth.: 32 (generic name pre-occupied by *Lobophora* Curtis, 1825, Lepidoptera].

Chelisoches Scudder, 1876, Boston Soc. nat. Hist., Proc. **28:** 292 (type: *Forficula morio* Fabricius, 1775, Syst. Ent.: 270).

Mainly Australasian in distribution, less common in the Oriental Region. One species is represented in Micronesia.

23. **Chelisoches morio** (Fabricius) (fig. 19a-e)

Forficula morio Fabricius, 1775, Syst. Ent.: 270 (♂♂, ♀♀, Tahiti; British Museum (Nat. Hist.) and Kiel Museum).

Chelisoches morio: Burr, 1911, Gen. Insect. **122:** 65—Menozzi, 1941, Mushi **13:**77 (Saipan, Babelthuap, Truk, Ponape, Kusaie, Jaluit)—Rehn, 1949, Ent. Soc. Am., Trans. **74:** 171 (Gilbert Islands)—Rehn, 1949, Ent. Soc. Am., Trans. **75:** 110 (Guam).