

**THE FAMILY PSEUDOCAECILIIDAE (Psocoptera)—  
A REAPPRAISAL BASED ON THE DISCOVERY OF  
NEW ORIENTAL AND PACIFIC SPECIES**

By **S. S. Lee\*** and **Ian W. B. Thornton**

DEPARTMENT OF ZOOLOGY, UNIVERSITIES OF MALAYA  
AND HONG KONG RESPECTIVELY

CONTENTS

<i>Pseudocaecilius</i> and the Pseudocaeciliidae (Historical) . . . . .	2
The systematic problem . . . . .	6
Material and methods . . . . .	6
Check-list of pseudocaeciliid species having a 3-branched median vein . . . . .	7
Systematic conclusions . . . . .	9
Ethiopian Region . . . . .	14
African subregion . . . . .	14
Madagascar subregion . . . . .	14
Oriental Region . . . . .	15
Indochinese subregion . . . . .	15
Malayan subregion . . . . .	26
Philippine subregion . . . . .	47
Papuan subregion . . . . .	47
Polynesian subregion . . . . .	59
Micronesia . . . . .	59
Hawaii . . . . .	86
Eastern Melanesia . . . . .	90
SE Polynesia . . . . .	107
Australian Region . . . . .	109
Australian subregion . . . . .	109
New Zealand subregion . . . . .	109
Neotropical Region . . . . .	112
Nearctic Region . . . . .	112
Palaeartic Region . . . . .	112
Acknowledgments . . . . .	112
References . . . . .	113

\* This author's contribution forms part of a thesis submitted for the degree of Ph. D. at the University of Malaya.

*Abstract:* A world check-list of pseudocaeciliids having a 3-branched median vein is provided. Twenty-four new species satisfying the original diagnosis of *Pseudocaecilius* are described from Asia and the Pacific, and redescriptions are provided for 3 species. Characteristics of these and the 6 adequately described species of *Pseudocaecilius* confirm previous indications of a generic heterogeneity which is recognized by the erection of 3 new genera, *Phallogaecilius*, *Lobogaecilius*, and *Heterogaecilius*.

Five closely related new species are described from the Asian mainland, and form the basis of a new genus, *Allogaecilius*, within the family.

Three new species of *Ophiopelma* End. are described; 1 new species from India related to *Scytosocus* Roesl., known only from Brazil, forms the basis of a new genus, *Scytosocopsis*.

## PSEUDOCAECILIUS AND THE PSEUDOCAECILIIDAE (Historical)

The original generic diagnosis (Enderlein 1903) of *Pseudocaecilius* may be summarized as follows:

“Closely related to *Epipsocus* Hagen rather than to *Caecilius* Curtis as would appear on venational considerations. Differs from *Epipsocus* only in that *rs* and *m* are fused for a length. Areola postica elongate, low: veins of fore wing and apical veins of hind wing with two rows of long setae, stigma sac well developed, usually conical, projecting posteriorly (very small in *Caecilius*) Outer marginal setae of wings crossed; costal border of pterostigma always wide and strong, with fairly dense setae. Male eyes very large, projecting beyond hind margin of head, IO:D ratio low; ♀ IO:D ratio higher, eyes relatively small. Male antennae strongly setose, ♀ rather less so. Terminal segment of maxillary palp elongate, as in *Epipsocus*”.

It will be noted that no genitalic information is provided.

Pearman (1936) designated the family Pseudocaeciliidae with the typical genus *Pseudocaecilius*, and synonymized *Hageniella* Enderlein 1903 with this genus. The original generic diagnosis of *Hageniella* merely states that it differs from *Epipsocus* in the absence of a stalk to the radial fork. It thus also differs from the original diagnosis of *Pseudocaecilius* in having *rs* and *m* joined by a cross-vein, a character which is notoriously variable, even in the now well-known type species, *Pseudocaecilius elutus*.

Roesler (1940 a) listed the subfamilies Pseudocaeciliinae, Archipsocinae, and Peripsocinae within the family Pseudocaeciliidae, which was characterized as “Psocids with two-segmented tarsi and open discoidal cell. Hypandrium of male not divided.” The sub-family Pseudocaeciliinae was characterized as “Areola postica present. Wing veins even in brachypterous forms distinct up to the margin. Apart from setae on veins and margin, at the most isolated setae on membrane”, and seven tribes were included. In the tribe Pseudocaeciliini, characterized as “veins and margin of fore and hind wings setose in more than one row. Claws with or without preapical tooth,” were included the genera *Mesogaecilius* Okamoto, 1910; *Cladioneura* Enderlein, 1906; *Scytosocus* Roesler, 1940 b; *Pseudogaecilius* Enderlein, 1903 (= *Hageniella* End. 1903); *Ophiopelma* Enderlein, 1908; and *Scottiella* Enderlein, 1931.

In 1944, Roesler raised this tribe to subfamily rank (Roesler 1944) and made *Ophiopelma* a subgenus of *Pseudogaecilius*, and *Scytosocus* a subgenus of *Cladioneura*. The family Pseudocaeciliidae which Roesler (1944) designated included 5 of Pearman's families, and was equivalent to the Pseudocaeciliidae and Lachesillidae of his earlier paper (Roesler 1940 a). This very broad conception of the family, including Trichopsocinae, Reuterellinae, Archipsocinae, Electropsocinae, Lachesillinae, Peripsocinae and Ecto-

psocinae as subfamilies, has not found general acceptance. Most of the subfamilies were regarded as separate families, with some genera placed by Roesler in the Reuterellinae being moved to Elipsocidae (see Mockford 1955, Smithers 1964 a).

Badonnel (1946) included *Pseudoscottiella* Badonnel, 1946 in the Pseudocaeciliidae, and in 1951 provided a brief characterization of the family in Pearman's narrower sense, as follows: "neururation of *Caecilius*, clothed with long setae, with oblong and flat pterostigma; areola postica flat; gonapophyses complete; eggs smooth, encrusted; gONDwanian and nearctic."

We prefer the views of Pearman and Badonnel, limiting the family to Roesler's (1940 a) tribe and (1944) subfamily with the addition of *Pseudoscottiella*. The family Pseudocaeciliidae can then be taken to include *Pseudocaecilius* (= *Hageniella* End. 1903), *Ophiidopelma*, *Mesocaecilius*, *Cladioneura*, *Scytopsocus*, *Scottiella* and *Pseudoscottiella*. Reasons for reverting to generic status in the cases of *Ophiidopelma* and *Scytopsocus* will be given below.

The male and female of *Pseudocaecilius elutus* End. have been described by Badonnel (1946, 1955), the female genitalia of *P. citricola* (Ashm.) (= *pretiosus* Banks) by Chapman (1930) and of *P. morstatti* Bad. and *P. machadoi* Bad. by Badonnel (1946, and 1955 respectively.) The female genitalia of these species are all of the same general plan, which may be taken to characterize the genus as erected by Enderlein.

*Cladioneura* differs from the original diagnosis of *Pseudocaecilius* in that the fore wing vein setae are borne on side veins, and a few setae are present on the membrane posterior to the areola postica. The areola postica is not quite so flat as is the case in *Pseudocaecilius*. The genitalic characteristics of *Cladioneura* are as yet unknown. It is monotypic, with the single species *C. pulchripennis* End. 1906, from Australia.

*Ophiidopelma* is diagnosed as having a reduction of ocelli, which are indistinct in the female and apparently absent in the male, by having *rs* in the fore wing bent into an S shape, and by having shorter setae at the apex of both fore and hind wings than are present elsewhere. Roesler (1940 b) described the female genitalia as "very similar to that of *Pseudocaecilius*, the outer valve is extraordinarily large, almost as large as the dorsal valve without the two points". Up to that time, we can find no record of any species of *Pseudocaecilius* being described as having a dorsal valve with "two points." Nevertheless, Roesler provided the information that in *Ophiidopelma ornatipenne* End. 1908, the type species of *Ophiidopelma*, the dorsal valve possesses "two points" and the outer valve is extremely large. The uncertainty about the reference to *Pseudocaecilius* precludes any firm deductions concerning the nature of other structures, *i.e.* the subgenital plate. Roesler also stated that the claw is untoothed. Apart from *O. ornatipenne*, two other species have been placed in this genus, *O. multipunctata* (Hagen) (Banks 1937 b) and *O. hieroglyphica* (End. 1903) (Enderlein 1908). The three species are known from Taiwan, Ceylon and the Philippines, and Ceylon respectively.

*Mesocaecilius* is characterized as having eyes with hairs and areola postica large, very steep and triangular. The single species, *M. quadrimaculatus* Ok. 1910 from Taiwan, was further described by Roesler (1940 b) as "Gonapophyses of the type of *Pseudocaecilius*. The dorsal valve is very broad apically, not tapering. The claws are weakly toothed, in the fore wing the setae are sited on the veins." Figures of the gonapophyses and subgenital plate show the dorsal and ventral valves to be lobate, and the subgenital plate bilobed with apical sclerifications isolated from sclerifications of the disc,

and 3 setae on the apical margin.

*Scytopsocus* is unusual in possessing small setae on the membrane in the middle of the cells of the fore wing and, in the male, sense papillae in cell *An* of the fore wing. The female genitalia were described as "of the type of *Pseudocaecilius*" by Roesler, who provided figures of the gonapophyses and subgenital plate of *S. coriaceus* Roesl. 1940 b). The dorsal and ventral valves are lobate, as in *Mesopsocus quadrimaculatus*, and, also as in that species, the apical sclerifications of the bilobed subgenital plate are isolated; there are 4 setae on the apical margin of the subgenital plate. The hypandrium of *S. coriaceus* (and of *S. difficilis*) Roesl., 1940 b, possesses lateral spine-like sclerites. Only 2 species are known, both from Brazil.

*Scottiella* and *Pseudoscottiella* are characterized by the median vein in the fore wing being but 2-branched. Genitalic information is lacking for *Scottiella*, which is represented by 3 species from the Seychelles, *S. micans* End. 1931, *S. hirsuticornis* End. 1931 and *S. compta* End. 1931. *Pseudoscottiella* has a simple subgenital plate, dorsal and ventral valve only slightly lobed, phallosome without internal parameres, hypandrium with a pair of apical sclerified processes, 9th tergite of the male with a pair of sclerified prongs projecting over the epiproct. Five species of *Pseudoscottiella* are known from Africa, *P. megops* Bad. 1946, *P. tuberculata* Bad. 1955, *P. hyalina* Bad. 1955, *P. immaculata* Bad. 1955 and *P. decolor* Bad. 1955. Badonnel's characterization of the family, would, if strictly applied, exclude these 2 genera.

This paper deals only with *Pseudocaecilius* and allied genera which possess a 3-branched median vein in the fore wing. A summary of the present knowledge of *Pseudocaecilius* and its allies is provided in Table 1.

Twenty-one described species have so far been placed in the genus *Pseudocaecilius*, but in only 7 are there adequate descriptions of the female genitalia, and in only 4 of these have the male genitalia been properly studied.

One species (*P. elutus* End. 1903) is widespread, three (*P. hispidus* End. 1913, *P. morstatti* End. 1913, *P. machadoi* Bad. 1955) are confined to Africa and one (*P. brevicornis* End.) to the Seychelles. One species described from America, *P. citricola* (Ashm. 1879) (= *pretiosus* Banks 1920, Mockford & Gurney 1956), is possibly synonymous with *P. elutus*.

The remaining 14 species are from continental areas and islands bordering the Western Pacific or from islands in the Pacific basin. Enderlein (1903) described *P. testaceus* from New Guinea, *P. lachlani* from Australia, *P. elutus* from Malaya and Singapore and *P. ornatus* from Singapore. He later described *P. maculosus* and *P. solocipennis* from Japan (Enderlein 1907), and in 1926, reported *P. elutus* and *P. ornatus* and described *P. tenellus* from Java (Enderlein 1926). In 1926, Karny described three species from Fiji—*P. marshalli*, *P. veitchi* and *P. greenwoodi* (Karny 1926). Banks (1937 b) described *P. innotatus* from the Philippine Islands, and recorded *P. marshalli* from Guam (Banks 1942). Recently, Thornton (1961) described 3 species from Hong Kong—*P. anomalus*, *P. maculifrons* and *P. hirsutus*, and recorded the occurrence there of *P. elutus*.

*Hageniella* was synonymised with *Pseudocaecilius* by Pearman (1936). Seven described species were referred to this genus, on none of which is there genitalic information. They are *H. formosana* Banks 1937a (Taiwan) which is possibly synonymous with *P. elutus*, *H. pusilla* Banks 1931 (Philippines), *H. zonata* (Hag. 1859), *H. lanata* (Hag.

Table I. Summary of characteristics of Pseudocaeciliid genera\*

Genus	Previous distribution records	Characteristics, other than genitalia	Genitalic information
<i>Pseudocaecilius</i> End. 03 (= <i>Hageniella</i> End. 03)	Africa, Asia, Japan, Philippines, Java, New Guinea, Australia, Guam, Fiji, N. America	Venation as <i>Caecilius</i> ; a. p. elongated, low; fore wing veins 2 ranks setae.	s. g. p. bilobed, 2 apical setae; d. and v. v. unlobed, setose; radula ornamentation lacking; separate hypandrial sclerites.
<i>Ophiopelma</i> End. 08	Ceylon, Philippines, Taiwan	Stalk of <i>rs</i> in fore wing S-shaped. Ocelli indistinct in ♀, absent in ♂.	d. v. lobed, o. v. very large
<i>Mesocaecilius</i> Ok. 10	Taiwan	Eyes with setae. In fore wing a. p. high, steep, setae on membrane.	s. g. p. bilobed, apical sclerotization isolated, 3 marginal setae; d. and v. v. lobate.
<i>Cladioneura</i> End. 06	Australia	In fore wing setae sited on branch veins; setae on membrane posterior to pterostigma; a. p. fairly high.	Unknown.
<i>Scytopsocus</i> Roesl. 40	Brazil	Setae on membrane of fore wing cells; sense-clubs in <i>An</i> of ♂.	s. g. p. bilobed, apical sclerotization isolated, 4 marginal setae; d. and v. v. lobate; hypandrium with lateral sclerotized hooks.
<i>Scottiella</i> End. 31	Seychelles	<i>m</i> 2-branched in fore wing; costa bearing setae in 1 rank; a. p. fairly low, short.	Unknown
<i>Pseudoscottiella</i> Bad. 46	Africa	<i>m</i> 2-branched in fore wing; costa bearing setae in 4-5 ranks; a. p. low, long.	s. g. p. simple; d. and v. v. very slightly lobed; penis frame without internal parameres; hypandrium with 1 pair apical spines; 9th tergite of ♂ with pair of posterior prongs.

\* a. p.—areola postica; s. g. p.— subgenital plate; d. v.—dorsal valve; v. v.—ventral valve; o. v.—outer valve.

1859) and *H. molesta* (Hag. 1859) (Ceylon), *H. marginata* (End. 1903) (New Guinea), and *H. vivv* End. 1926 and *H. pinnata* End. 1926 (Java). The latter 2 species are described as being similar to *marginatus*, which is clearly an *Epipsocus*, and all 3 are ignored in the subsequent treatment. *Caecilius apicipunctatus* Tillyard 1923 and *C. brunellus* Tillyard 1923 from New Zealand are described as possessing 2 ranks of setae on the fore wing veins, and the venation is typical of *Pseudocaecilius*. Despite the lack of knowledge of genitalia, they are provisionally transferred to *Heterocaecilius* (see below) within the Pseudocaeciliidae.

Other species which are possibly referable to *Pseudocaecilius* or its allies are *Epipsocus fasciicornis* Ok. 1910 and *Kolbea kagoshimensis* Ok. 1910 (Taiwan), *Caecilius inaequalis* Banks 1916 and *C. otiosus* Banks 1937 b (Philippines) and *Epipsocus funestus* End. 1903 and *E. villosus* End. 1903 (Australia).

### THE SYSTEMATIC PROBLEM

An examination of the 3 species of *Pseudocaecilius* described from Hong Kong suggested that oriental species with the venation of *Pseudocaecilius* may nevertheless possess genitalic characteristics which differ from those of *Pseudocaecilius* species occurring in Africa. Whereas the female genitalia of the other adequately described species, *P. citricola* (America, possibly synonymous with *P. elutus*), *P. elutus* (widespread), and the African species *P. morstatti* and *P. machadoi*, conform to a common basic plan, those of the Hong Kong species show marked differences. In *hirsutus* the genitalia are quite unusual in a number of respects, while those of the other 2 species, *maculifrons* and *anomalus*, exhibit features which differ quite markedly from the corresponding characters in *P. elutus* and its allies, and suggest that the 2 species are themselves fairly closely related.

It would seem, therefore, that a number of basic genitalic types occur in species satisfying the original generic diagnosis of *Pseudocaecilius*, which lacked genitalic criteria (Enderlein 1903).

The present work involves a study of the pseudocaeciliid fauna of the Pacific area generally, in so far as it is represented in collections available to us, with the object of determining to what degree this apparent heterogeneity is supported by additional evidence.

### MATERIAL AND METHODS

We are indebted to Bishop Museum, Honolulu, for making available for study *Pseudocaecilius* collections from New Guinea, Micronesia, New Zealand, Rapa, Tahiti, and Fiji. Also available were collections from Hong Kong, India, the Philippines and Hawaii made by Thornton and from Malaya by Lee; and specimens collected in Hong Kong by Miss S. K. Wong, who kindly allowed us to dissect them.

All pseudocaeciliid specimens in the Bishop Museum collection were described, dissected, measured and drawn by Lee. Descriptions of coloration and gross features were made under a binocular microscope. From each specimen the left hind leg, left antenna, left fore and hind wings were removed, and mounted on a slide in Euparal. Measurements were made of total body length (excluding wings), antenna length, length of the basal two flagellar segments, fore and hind wing length, length of hind femur, tibia and

tarsal segments; and the number of ctenidiobothria on the basal hind tarsal segment was recorded. Measurements of segments of legs were made in each case from condyle to condyle, those of wing length from the junction of vein *an* with the posterior margin to the apex of the wing. In computing the IO:D ratio (ratio between interocular space and apparent eye-diameter as seen from the front of the head), the method used was that ascribed to Pearman (see Ball 1943), in which the short (transverse) axis of the ellipse formed by the boundary of the eye is measured.

Male and female genitalia were stained, where necessary, in acid fuchsin, dissected in Euparal and mounted on slides. Drawings of these preparations were made by camera lucida.

Nomenclature of wing veins follows that of Badonnel (1951) except that "*rs*" is preferred to "*rr*". Nomenclature of genitalia follows Badonnel (1956). In nomenclature of zoogeographical areas of the Pacific we follow the schemes of Gressitt (1961) and Usinger (1963).

#### CHECK-LIST OF PSEUDOCAECILIID SPECIES HAVING A 3-BRANCHED MEDIAN VEIN

##### Ethiopian Region

###### African subregion

- Pseudocaecilius hispidus* End.
- morstatti* End.
- machadoi* Bad.
- elutus* End. (also widespread)

###### Madagascan subregion

- Pseudocaecilius elutus* End. (Madagascar, also widespread)
- brevicornis* End. (Seychelles)

##### Oriental Region

###### Indochinese subregion

- Heterocaecilius fuscipalpus* n. sp. (India)
- Allocaecilius heterothorax* n. sp. (India)
- Scytopsocopsis hirtipenna* n. sp. (India)
- Pseudocaecilius zonatus* (Hagen), (Ceylon)
- lanatus* (Hagen), (Ceylon)
- molestus* (Hagen), (Ceylon)
- Ophiopelma multipunctata* (Hagen), (Ceylon, also Philippines)
- hieroglyphica* (End.), (Ceylon)
- Allocaecilius sinensis* n. sp. (Hong Kong)
- Heterocaecilius maculifrons* (Thornton), (Hong Kong)
- anomalous* (Thornton), (Hong Kong)
- Phallocaecilius hirsutus* (Thornton), (Hong Kong)
- Pseudocaecilius elutus* End. (Hong Kong, also widespread)
- formosanus* (Banks), (Taiwan)
- Ophiopelma ornatipenne* End. (Taiwan)
- Mesocaecilius quadrimaculatus* Okamoto (Taiwan)

## Malayan subregion

- Pseudocaecilius helicoides* n. sp. (Malaya)  
*Lobocaecilius longifurca* n. sp. (Malaya)  
*Allocaecilius maculatus* n. sp. (Malaya)  
     *fusciceps* n. sp. (Malaya)  
     *elongatus* n. sp. (Malaya)  
*Heterocaecilius longipenna* n. sp. (Malaya)  
     *kobus* n. sp. (Malaya, also New Guinea)  
*Pseudocaecilius ornatus* End. (Singapore, Java)  
     *elutus* End. (Singapore, also widespread)  
     *tenellus* End. (Java)  
*Heterocaecilius longispinus* n. sp. (Palawan)  
     *faciatus* n. sp. (Palawan)  
*Ophiodopelma pictipenna* n. sp. (Palawan)  
     *semiceps* n. sp. (Palawan)

## Philippine subregion

- Pseudocaecilius elutus* End. (Luzon, also widespread)  
     *pusillus* (Banks), (Luzon)  
     *innotatus* (Banks), (Mindanao)  
*Ophiodopelma multipunctata* (Hagen), (Mindanao, also Ceylon)

## Papuan subregion

- Heterocaecilius kobus* n. sp. (New Guinea, also Malaya)  
     *gressitti* n. sp. (New Guinea)  
     *stiliger* n. sp. (New Guinea)  
*Pseudocaecilius cornutus* n. sp. (New Guinea)  
     *testaceus* End. (New Guinea)  
*Ophiodopelma permaculatum* n. sp. (New Guinea)

## Polynesian subregion

## Micronesia

- Heterocaecilius adamsi* n. sp. (Ponape)  
     *minotus* n. sp. (Carolines, Marshalls)  
     *campanula* n. sp. (Ponape, Marshalls, Gilberts, Kapingamarangi)  
     *dybasi* n. sp. (S. Marianas, Gilberts)  
*Lobocaecilius cynara* n. sp. (Palaus)  
     *fennecus* n. sp. (Carolines, Marianas)  
*Pseudocaecilius tahitiensis* (Karny), (S. Marianas, also Tahiti)  
     *elutus* End. (Bonins, Marianas, Carolines, also widespread)  
     *marshalli* Karny (Guam)

## Hawaii

- Lobocaecilius monicus* n. sp. (Hawaiian Islands)  
*Pseudocaecilius elutus* End. (Hawaiian Islands, also widespread)

## Eastern Melanesia

- Heterocaecilius dardanus* n. sp. (Fiji)  
     *simplex* n. sp. (Fiji)  
     *panicus* n. sp. (Fiji)



*volatus* n. sp. (Fiji)

*Lobocaecilius nigrens* n. sp. (Fiji)

*Heterocaecilius greenwoodi* Karny (Fiji)

*Pseudocaecilius marshalli* Karny (Fiji)

*veitchi* Karny (Fiji)

#### SE Polynesia

*Lobocaecilius carinifex* n. sp. (Tahiti, Rapa)

*Pseudocaecilius tahitiensis* (Karny), (Tahiti, also Micronesia)

#### Australian Region

##### Australian Subregion

*Pseudocaecilius lachlani* End.

*Cladioneura pulchripennis* End.

##### New Zealand subregion

*Heterocaecilius diogenes* n. sp.

*apicipunctatus* (Tillyard)

*brunellus* (Tillyard)

#### Neotropical Region

*Scytopsocus coriaceus* Roesler (Brazil)

*difficilis* Roesler (Brazil)

*Pseudocaecilius elutus* End. (Galapagos Islands, also widespread)

#### Nearctic Region

*Pseudocaecilius citricola* (Ashmead) (Southern U.S., Puerto Rico)

#### Palaeartic Region

*Pseudocaecilius maculosus* End. (Japan)

*solocipennis* End. (Japan)

### SYSTEMATIC CONCLUSIONS

By setting additional information on 36 species of pseudocaeciliids in the context of what is known of the 10 or 11 already adequately described species of this part of the family, it is possible to make an analysis of 47 species of the family, and to formulate more precisely the nature of the heterogeneity which was suggested by earlier work.

These 47 species fall into 7 fairly well-defined groups, and one rather heterogeneous assemblage consisting of many Pacific species, often with only one sex known, for which a "holding genus", *Heterocaecilius*, is proposed.

#### Genus **Pseudocaecilius** Enderlein 1903

Venation as in *Caecilius*; stalk of *rs* in fore wing long (ratio *rs* fork:  $r_{4+5}$  or  $>1$ ); nature of *rs-m* junction variable; areola postica elongate, low; fore wing vein setae in two ranks; hind wing setose all round margin. Female gonapophyses complete, outer valve narrowing apically, dorsal and ventral valve with distinct fringe of barbules, all valves without lobes; subgenital plate bilobed, each lobe with a single apical seta and no others. Radula unsclerotised; hypandrium with an apical pair of sclerites; ♂ 9th

tergite with median sclerotized ornamentation. Claw without preapical tooth.

Species which are sufficiently known to be definitely placed in this genus are: *P. elutus* End., recorded from Angola, Congo, Mozambique, Natal, Madagascar, India (?), Singapore, Hong Kong, Java, Palau Is., Ponape, Southern Mariana Is., Bonin Is., and Hawaiian Is; *P. citricola* (Ashmead) from Texas, Washington, D.C. (hot-house record), Florida, and Puerto Rico, which is possibly synonymous with the above; *P. morstatti* End., and *P. machadoi* Bad. from Africa; *P. tahitiensis* (Karny) from Tahiti and the Southern Marianas; *P. cornutus* from New Guinea; and *P. helicoides* from Malaya.

Pearman has pointed out to us that the absence or reduction of a preapical tooth on the claw, when associated with the conversion of the basal claw bristle into a 'sucker' (as in the pseudocaeciliids) is an indication that the species is a dweller on foliage rather than on rock or bark surfaces. Although related species might be expected to have similar habitats and hence similar adaptations in this character, the character should not be used in excluding species from a genus the known members of which have the character in the alternate state; parallel evolution might be expected to be extremely common.

#### Genus **Cladioneura** Enderlein 1906

Fore wing venation as *Caecilius*, setae on upper surface adjacent to veins borne on short side veins, each on a dark spot, a few setae on dark spots posterior to pterostigma. In hind wing  $r_{2+3}$  somewhat oblique. Claws strongly bent, with small preapical tooth.

The genitalic characteristics of this genus are unknown and *C. pulchripennis*, the only species, is known only from a single female from Australia. There were no species in the collections studied referable to this genus.

#### Genus **Ophiopelma** Enderlein 1908

Fore wing venation of the *Caecilius* type with areola postica high, veins *rs* and *m* fused for a distance, vein *rs* bent into an S-shape, a dark spot posterior to apex of areola postica and often pigment in outer cells and anterior basal cells, veins usually with dark and pale stretches. In hind wing  $r_{2+3}$  meets wing margin and *rs* and  $r_{4+5}$  at right angles. Dorsal and ventral valves of female gonapophyses lobate, outer valve not so, fusiform; subgenital plate bilobed, each lobe with a seta near apex and one at base of mesial margin. Penis frame angular anteriorly, with rod-like radula sclerites, hypandrium without accessory sclerites or projections; posterior margin of 9th tergite of ♂ with papillose field. Claws without preapical tooth; ocelli sometimes lacking; antennal setae long, off-standing.

There are now 6 species in this genus: *O. ornatipenne* End., the type species, from Taiwan; *O. multipunctata* (Hagen) from Ceylon and the Philippines; *O. hieroglyphica* (End.) from Ceylon; *O. pictipenna* and *O. semiceps* from Palawan; and *O. permaculatum* from New Guinea.

The three new species of *Ophiopelma* provide information which augments the somewhat fragmentary knowledge of this Oriental genus, including information on male genitalia. The 2 species from Palawan, *O. semiceps* and *O. pictipenna* are somewhat

unusual in wing pattern and shape of pterostigma. The outer valve is not large, as described for *O. ornatipenne* by Roesler (1940), but the dorsal valve is clearly lobed, the lobe being as long as the style, giving the impression that the valve is bifid. The ventral valve has a small lobe. The subgenital plate is bilobed, with 3-4 apical setae. *O. permaculatum* from New Guinea is much closer in wing pattern and venation to the 3 already described species, particularly the type species, possessing a pigment spot in each of the outer fore wing cells. The male epiprocot is not tuberculate, the radula consists of sclerotised rods, the apex of the internal terminal beak of the penis is serrate, and the hypandrium is simple. In all 3 new species, the claws lack a preapical tooth, and the fore wing vein apices have diffused adjacent pigment. *O. hieroglyphica* is somewhat unusual in lacking wing pigment except in the region of the areola postica. Nothing is known of the genitalia of either this species or *O. multipunctata*. The New Guinea species *O. permaculatum* is clearly very closely similar to the type species.

#### Genus **Mesocaecilius** Okamoto 1910

Eyes with hairs. In fore wing areola postica large, very steep, triangular, setae on membrane, venation as *Caecilius*. Dorsal and ventral valves of female gonapophyses lobate, dorsal valve broad apically, outer valve not lobed; subgenital plate bilobed, each lobe with 1 or 2 apical setae, sclerotised areas of lobes separated from those of main plate. Claws with small preapical tooth. Antennal setae long, off-standing.

This genus is known from two females of *M. quadrimaculatus* from Taiwan. *Pseudocaecilius ornatus* End. 1903 from Singapore has a remarkably similar wing pattern and when the genitalia of both sexes of these two species can be compared they may prove to be closely related. Badonnel (*in litt.*) has studied a specimen of *P. ornatus* from Madagascar, which unfortunately is a male. Neither of these species was present in the collections we have studied.

#### Genus **Scytopsocus** Roesler 1940

Fore wing venation as *Pseudocaecilius* with radial stem very thick, *rs* stalk very short, areola postica low, setae along veins inserted some distance from veins, setae also on membrane, *rs-m* junction by cross-vein; ♀ fore wing shorter than ♂, leathery, slightly convex, venation weak; ♂ fore wing with a field of sense-papillae in anal cell. In hind wing  $r_{2+3}$  oblique. Dorsal and ventral valves of female gonapophyses lobate, outer valve shorter, not lobed; sub-genital plate bilobed, each lobe with an apical seta and a more basal seta near mesial margin, sclerotised areas of lobes distinct from that of main plate. Radula without rod-sclerites; hypandrium with a pair of posterior processes and lateral sclerotised bars with spine-like processes. Antennal setae long, off-standing.

Two species are known, *S. coriaceus* Roesler and *S. difficilis* Roesler, both from Brazil.

#### Genus **Scytopsopsis** Lee and Thornton, new genus

Allied to *Scytopsocus* Roesler; differs in: fore wing *rs* stalk long, setae sited actually on veins, ♂ fore wing lacks anal sense field; radula with rods as well as minute spines; hypandrium with a short spine and a curved hook posteriorly at each side.

*S. hirtipenna*, from Darjeeling, India, is the type-species of this genus. It is known only from the male, and although exhibiting features which clearly show its relationship to *Scytopsocus*, nevertheless differs in a number of respects from the Brazilian species of that genus.

Genus **Phallocaecilius** Lee and Thornton, new genus

Venation as *Pseudocaecilius*, ♂ with sense-papillae in anal area of fore wing. Dorsal and ventral valves of female gonapophyses fleshy, unlobed, without barbules, outer valve very small; subgenital plate bilobed. Penis frame without inner parameres, radula with median ribbon and large thorn-like sclerites; hypandrium simple, unsclerotised, setose. *P. hirsutus* Thornton from Hong Kong, is designated as the type-species of this genus. No species at all closely related to this have been found in this study.

Genus **Allocaecilius** Lee and Thornton, new genus

Venation as *Caecilius*, in fore wing *rs* and *m* fused for a distance, *rs* stalk long and strongly arched basally, areola postica high, somewhat triangular, basal veins with setae in 2 ranks, apical vein setae of 2 lengths, in single rank. Fore wing pigmented in region of pterostigma and in basal 1/2 of wing anteriorly, vein ends with diffuse pigmentation. Dorsal and ventral valves of ♀ gonapophyses lobed, outer valve rather narrow. Male radula consists of rod-like sclerites only; hypandrium with lateral sclerotised bars bearing spines, epiproct tuberculate. Claw without preapical tooth.

Five species are placed in this genus, *A. heterothorax* (India) (the type-species); *A. maculatus*, *A. fusciceps* and *A. elongatus* (Malaya); and *A. sinensis* (Hong Kong). *A. sinensis* lacks the hypandrial sclerotization and the epiproct is not tuberculate.

Genus **Lobocaecilius** Lee and Thornton, new genus

Venation as *Pseudocaecilius*, in fore wing *rs* stalk short, less than 1/2 length of  $r_{4+5}$ ; vein ends with adjacent cloudy pigment; ♂ fore wing sometimes with papillae associated with vein *r*; dorsal and ventral valves of ♀ gonapophyses usually each with a distinct, fairly short lobe; outer valve widens apically, its lateral border slightly indented. Subgenital plate apically bilobed, each lobe usually rounded apically, a single seta at apex and one at mesial base of each lobe, latter often on distinct smaller lobe. Radula of ♂ consists of small spines only, outer parameres of penis frame divergent, junction of inner parameres serrate. Hypandrium complex, usually with 2, 3 or 4 pairs of peculiar fingernail-like sclerites posteriorly, epiproct of ♂ usually tuberculate. Claw without preapical tooth.

Type-species: *L. cynara*, n. sp.

This genus includes 8 species distributed over various parts of the Pacific, and one from Malaya: *L. cynara*, from the Caroline Is. (Palau group); *L. fennecus*, extensively distributed over the Caroline Is. and extending into the Southern Marianas; *L. carinifex*, from Rapa and Tahiti; *L. nigrens*, from Fiji; *L. monicus*, from Hawaii; and *L. longifurca* from Malaya. Pearman (*in litt.*) has also examined two further species of this genus from Tahiti.

Variations in the hypandrial ornamentation within this group can be accounted for

by simplification or suppression of parts, from *cynara* through *fennecus*, *nigrens*, *longifurca* and *monicus*. The two species which Pearman has examined fit into this series after *fennecus* and after *monicus*. The male of *L. monicus* is peculiar in the possession of clunial spikes; in this and in the form of the epiproct it is similar to species of *Pseudoscottiella*.

### **Heterocaecilius** Lee and Thornton, new collective group

Venation as *Pseudocaecilius*, *rs* stalk in fore wing at least as long as  $r_{4+5}$ , vein ends usually lack cloudy pigment,  $\hat{\sigma}$  fore wing usually lacks sense-papillae. Dorsal and ventral valves of  $\text{♀}$  gonapophyses with distinct lobe and style. Subgenital plate bilobed, each lobe roughly triangular bearing a single seta at or near the apex and usually another near mesial base of lobe. Hypandrium with at least one pair of posterior sclerotised projections, radula usually with rod-like sclerites.

This is a heterogeneous assemblage of species, none of which can be placed in any of the genera above, and it is proposed that this be regarded as a collective group or 'holding genus'; consequently no type species is designated (Rule 42 c).

Within the assemblage, certain groups are discernible which, nevertheless, in our opinion do not warrant generic rank at this stage.

Five species, apparently endemic to Fiji (*H. greenwoodi* Karny, *H. dardanus*, *H. panicus*, *H. simplex* and *H. volatus*) have a number of features in common: in fore wing stalk of *rs* at least 3/4 length of  $r_{4+5}$ ; vein apices lack cloudy adjacent pigment; pterostigma short and rounded distally; sclerotized band on 9th abdominal tergite short and median; outer valve of gonapophyses 2-lobed, with setae restricted to the smaller, basal lobe. In the latter feature they differ from all other species considered here, except *H. fasciatus*, from Palawan, which, however, differs from them in a number of respects.

*H. diogenes*, from New Zealand, is in many respects intermediate between the *greenwoodi* group mentioned above, and *Lobocaecilius*. Although the fore wing has a long *rs* stalk, the vein apices lack pigmentation and the aedeagus is made up of 2 pairs of sclerotized rods as well as spines; moreover the hypandrium is remarkably similar to those of species of *Lobocaecilius*, having 3 pairs of nail-like sclerites, arranged in the same way. It also resembles *Lobocaecilius* species in the possession of a field of tubercles on the male epiproct, and of papillae on the male fore wing. The species thus stands in a somewhat intermediate position between *Lobocaecilius*, and the *greenwoodi* section of *Heterocaecilius*. However, only the male is known, and although later it may be found necessary to place it in a taxon of generic or subgeneric rank, it is for the present included in *Heterocaecilius*.

The remaining species of *Heterocaecilius* include *H. fuscipalpus* (India); *H. longipenna* (Malaya); *H. maculifrons* (Thornton) and *H. anomalus* (Thornton), (Hong Kong); *H. longispinus* (Palawan); *H. kobus* (Malaya, New Guinea); *H. gressitti* and *H. stiliger* (New Guinea); *H. minotus* (Caroline and Marshall Is.); *H. campanula* (Kapingamarangi Atoll, Ponape, Marshall Is. and Gilbert Is.); *H. adamsi* (Ponape); and *H. dybasi* (Southern Marianas and Gilbert Is.).

The scattered presence throughout these genera of fore wing papillae in the male (*Scytopsocus*, *Scytopsocopsis*, *Heterocaecilius*, *Lobocaecilius*, *Phallocaecilius*); lobed dorsal and ventral valves of the  $\text{♀}$  gonapophyses (*Scytopsocus*, *Lobocaecilius*, *Mesocaecilius*,

*Allocaecilius*, *Ophiopelma*, *Heterocaecilius*) and rod-like radula sclerites (*Scytopsocopsis*, *Ophiopelma*, *Allocaecilius*, *Heterocaecilius*) emphasizes the relationships between them. The separate apical sclerites of the subgenital plate of *Mesocaecilius quadrimaculatus* and *Scytopsocus coriaceus* resemble those of *Heterocaecilius gressitti*, *H. fuscipalpus* and *H. longispinus*. These features, taken together with the venational dichotomy between *Allocaecilius*, *Ophiopelma* and *Mesocaecilius* on the one hand, and the remaining genera on the other, reveal a mosaic of character similarities confirming the relationships between the genera considered here, and their inclusion together in the Pseudocaeciliidae.

Relationships of these groups with the genera *Pseudoscottiella* and *Scottiella*, which possess a 2-branched media, appear to be less close than relationships between the groups themselves. Nevertheless, a link is provided by the male of *Lobocaecilius monicus*, from Hawaii, the penis frame of which, lacking a discreet radula and inner parameres, recalls that of species of *Pseudoscottiella*. Moreover, in this species the hypandrial projections bear fields of small pointed spines similar to those of *Pseudoscottiella megops* and *Pseudoscottiella hyalina*. The posterior medial border of the ninth tergite of the males of several species with a 3-branched media bears incipient paired projections (eg. *Heterocaecilius simplex*, *Heterocaecilius greenwoodi*) but in no species are these as prominent as in species of *Pseudoscottiella*, except in *Lobocaecilius monicus* where they are similarly well-developed.

A study of pseudocaeciliid species from the Pacific which possess a 2-branched media would be of great interest, and may well reveal the existence of a basic dichotomy within the family.

## ETHIOPIAN REGION

### AFRICAN SUBREGION

#### ***Pseudocaecilius hispidus*** Enderlein

*Pseudocaecilius hispidus* Enderlein, 1913, Zool. Anz. **41**: 359.

DISTRIBUTION: East Africa.

#### ***Pseudocaecilius morstatti*** Enderlein

*Pseudocaecilius morstatti* Enderlein, 1913, Zool. Anz. **41**: 358.—Badonnel, 1948, Rev. Zool. Bot. Afr. **40** (4): 293 (genitalia).

DISTRIBUTION: East Africa, Congo.

#### ***Pseudocaecilius machadoi*** Badonnel

*Pseudocaecilius machadoi* Badonnel, 1955, Publ. Cult. Cia. Diamant, Angola **26**: 202.

DISTRIBUTION: Congo.

#### ***Pseudocaecilius elutus*** Enderlein Figs. 133-136.

DISTRIBUTION: Congo, Angola, Natal, Mozambique. (see pp. 40, 47, 90.)

### MADAGASCAR SUBREGION

#### ***Pseudocaecilius elutus*** Enderlein Figs. 133-136.

DISTRIBUTION: Madagascar, Oriental Region (see pp. 40, 47, 90).

**Pseudocaecilius brevicornis** Enderlein*Pseudocaecilius brevicornis* Enderlein, 1931, Trans. Linn. Soc. Lond. (Zool.) **19**: 212.

DISTRIBUTION: Seychelles.

## ORIENTAL REGION

## INDOCHINESE SUBREGION

**Heterocaecilius fuscipalpus** Lee and Thornton, new species Figs. 1-3

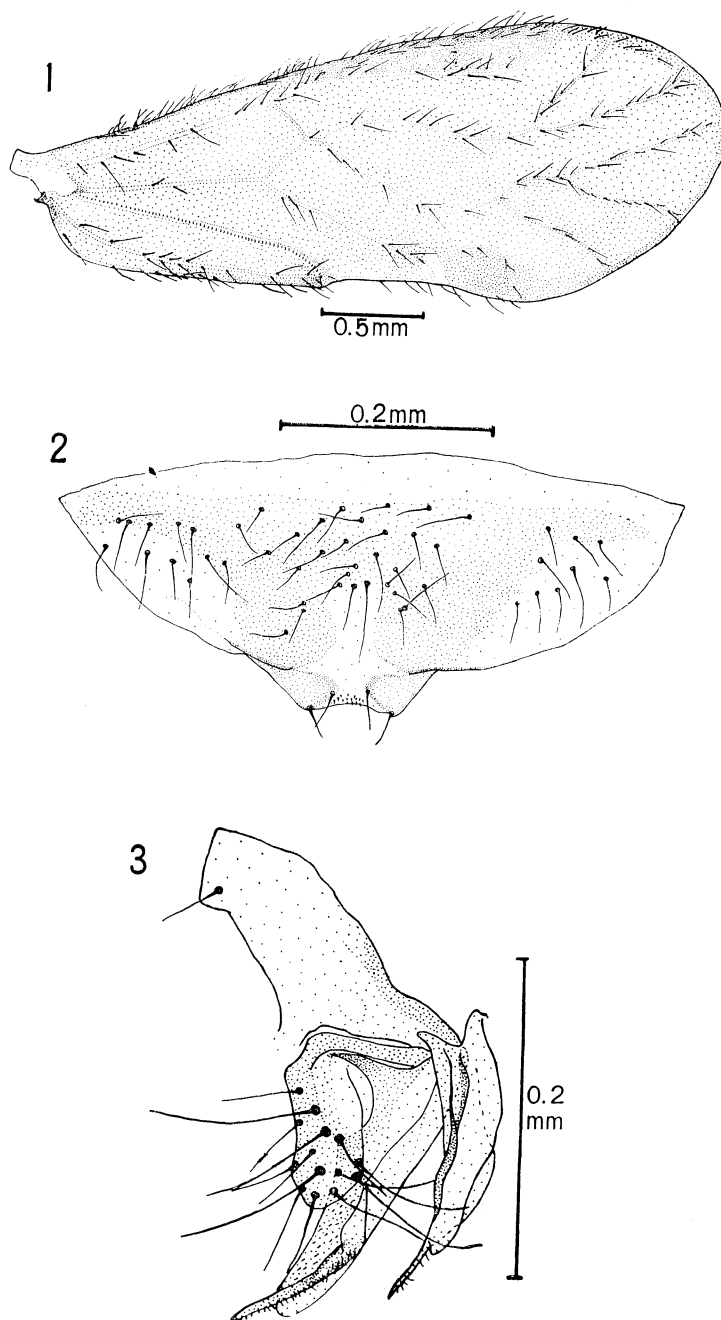
♀. *Coloration* (freshly killed, in alcohol): Head pale cream, usual markings on vertex pale brown. Eyes black, ocelli pale with conspicuous black centripetal borders. A circular mark on frons between ocelli and frons-clypeal suture. Clypeus with faint brown striae. Genae pale cream, a brown mark from orbit to antennal socket. Maxillary palp dark brown, 2 apical segments almost black. Antenna with pedicel and basal flagellar segment buff, otherwise pale brown. Thoracic terga pale brown, sutures bordered cream; pleura brown. Fore wing (fig. 1) suffused gray-brown, darker next to veins and margin, a distinct hyaline area at basal angle of areola postica, hyaline line along  $cu_2$ . Hind wing paler. Legs gray-brown, tarsal segments darker. Abdomen buff dorsally, gray-brown ventrally.

**Table II.** Length (in mm) of various characters of *Heterocaecilius fuscipalpus*, *Scytosocopsis hirtipenna*, *Pseudocaecilius helicoides* and *Heterocaecilius longipenna*.

(Measurements in this and following tables are accurate for Fw, Hw to 0.050 mm., for A,  $f_1$ ,  $f_2$ , Hf, Ht, to 0.010 mm. and for  $t_1$ ,  $t_2$  to 0.005 mm.)

Characters	<i>H. fuscipalpus</i> (♀)	<i>S. hirtipenna</i> (♂)	<i>P. helicoides</i> (♂)	<i>H. longipenna</i> (♀)
A (Antenna)	2.270	—	2.690	—
$f_1$ (Basal flagellar segment)	0.540	0.550	0.530	0.440
$f_2$ (2nd flagellar segment)	0.340	0.390	0.340	—
Ratio $f_1/f_2$	1.57	1.40	1.52	—
Fw (Fore wing)	3.150	3.450	2.200	2.600
Hw (Hind wing)	2.400	2.600	1.700	2.050
Hf (Hind femur)	0.600	0.570	0.550	0.440
Ht (Hind tibia)	1.180	1.120	0.970	0.840
$t_1$ (Basal tarsal segment)	0.425	0.375	0.380	0.295
$t_2$ (Apical tarsal segment)	0.155	0.130	0.110	0.135
Ratio $t_1/t_2$	2.74	2.88	3.45	2.14

*Morphology*: I.O.: D.=5.5:1. Head and thoracic terga shining. In fore wing  $rs$  and pterostigma very long, areola postica rather small. Hind wing with  $rs$ ,  $r_{2+3}$ ,  $r_{4+5}$  and  $m$  setose (single rank), veins otherwise bare. Proximal hind tarsal segment with 14 ctenidiobothria; claw with small preapical tooth and a second larger tooth more basally; Pearman's organ complete. *Subgenital plate* (fig. 2): with separate, sclerotized apical lobes, each bearing an apical and a mesial basal seta; unsclerotized between lobes.



**Figs. 1-3.** *Heterocaecilius fuscipalpus*, ♀: 1, fore wing; 2, subgenital plate; 3, gonapophyses.



*Gonapophyses* (fig. 3): ventral valve lobate, apical spine with fine spinelets; dorsal valve lobate, apical spine projecting beyond lobe and bearing fine spinelets; outer valve rectangular, with 7 long stout and 8 shorter finer setae. A field of 10 trichobothria on each paraproct.

*Dimensions*: Body length (in alcohol): 2.2 mm. Dimensions of other characters as in Table II.

♂. Unknown.

Holotype ♀ (BISHOP 7162), Darjeeling, West Bengal, India, 2200 m, 22. III. 1965, ex *Cryptomeria*, Thornton.

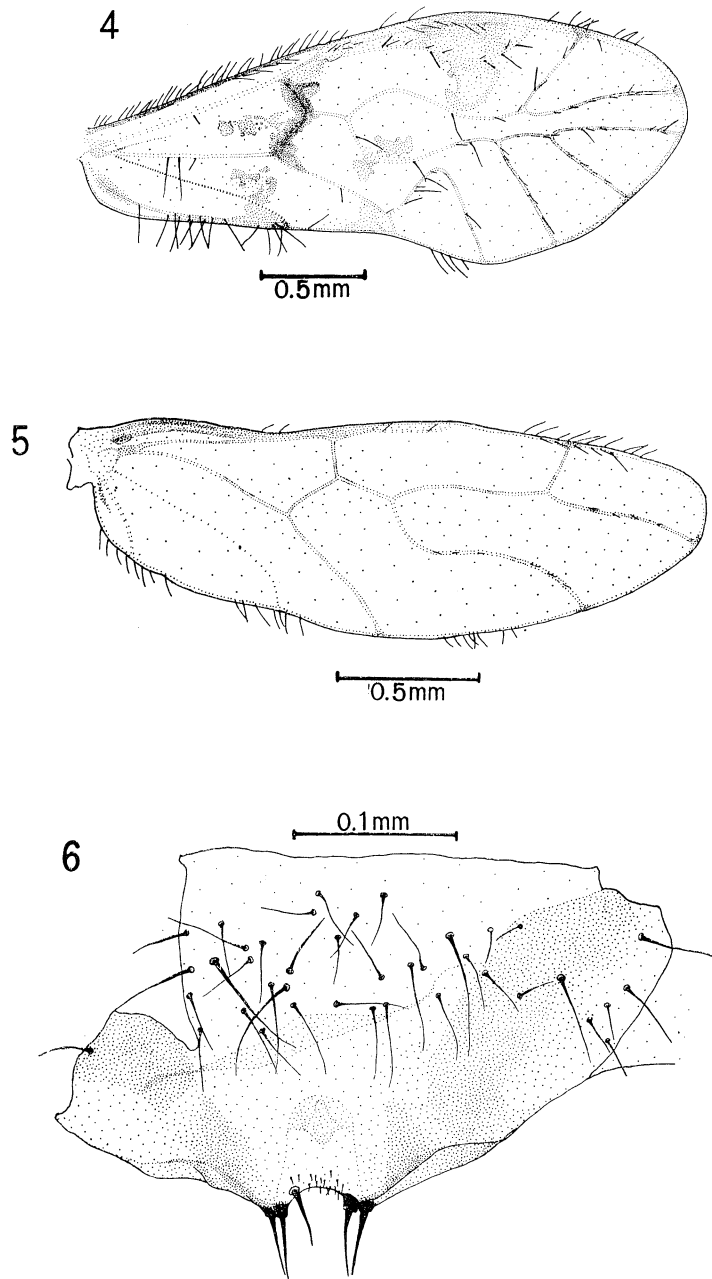
***Allocaecilius heterothorax*** Lee and Thornton, new species (Figs. 4-10)

♀. *Coloration* (freshly killed, in alcohol): Head white, vertex markings and clypeal striae pale gray. A brown mark between orbit and antennal socket. Eyes black, ocelli pale, marked with dark gray at centripetal borders. Maxillary palp white. Antennae very pale buff, almost white, basal 5 flagellar segments with short gray apical bands, distal segments gray. Mesothoracic terga very pale gray, pleura darker gray, postnotum very dark brown; dorsa of metathorax pale gray with wide brown margins, pleura gray, postnotum very dark brown. Fore wing (fig. 4) with brown pattern of pigmentation, veins *r*, *m+cu*, and *cu*, light brown, others dark brown. Hind wing (fig. 5) hyaline, veins with light and dark stretches, costal cell with brown pigment. Legs wholly very pale buff. Abdomen dorsally with transverse bands of dark gray-brown granulated pigment, ventrally cream.

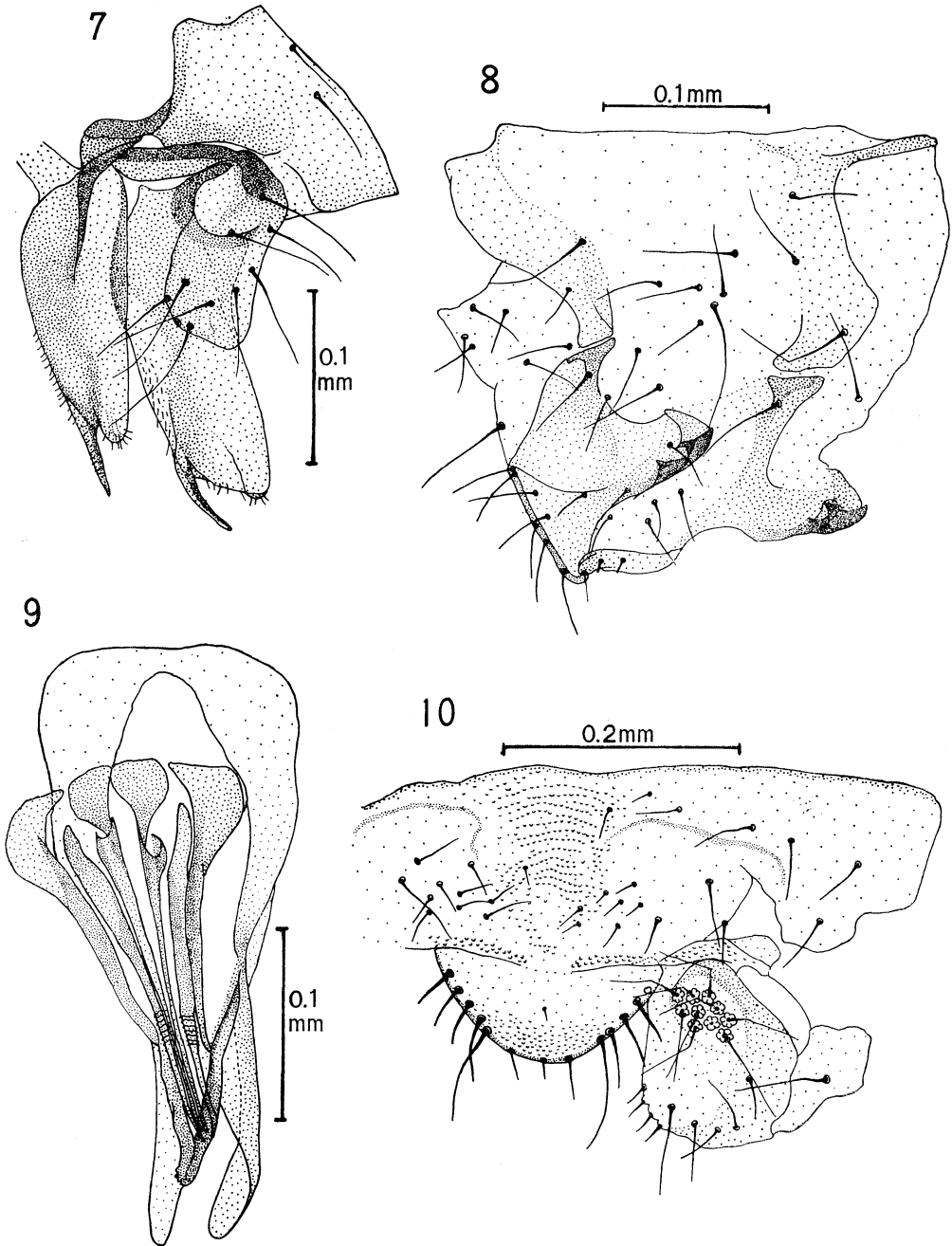
*Morphology*: I.O.: D.=3.5:1. In fore wing (fig. 4) *rs* and *m* strongly divergent basally, converging distally; areola postica high, triangular, apex rounded; in basal 1/2 of wing long stout setae set at sides of veins, in distal 1/2 additional smaller setae, both types situated on veins. Hind wing with small fine setae on *r*<sub>2+3</sub>, *r*<sub>4+5</sub>, *m*. Proximal hind tarsal segment with 16 ctenidiobothria; claw untoothed; Pearman's organ complete. *Subgenital plate* (fig. 6): apical lobes low, shallow, sclerotized on lateral edges, each bearing a pair of stout setae, one lobe with an additional more mesial seta, posterior

**Table III.** Length (in mm) of various characters of *Allocaecilius heterothorax*

Characters	♂			♀		
A	2.710	1.980	—	2.250	—	—
f <sub>1</sub>	0.620	0.460	0.500	0.480	0.510	0.480
f <sub>2</sub>	0.440	0.320	0.340	0.340	0.310	0.320
f <sub>1</sub> /f <sub>2</sub>	1.42	1.44	1.45	1.42	1.63	1.49
Fw	3.150	3.100	3.200	3.050	3.000	3.050
Hw	2.350	2.300	2.300	2.200	2.150	2.120
Hf	0.480	0.600	0.590	0.570	0.590	0.590
Ht	0.670	1.070	1.050	1.030	1.030	1.000
t <sub>1</sub>	0.205	0.330	0.310	0.320	0.310	0.310
t <sub>2</sub>	0.115	0.130	0.115	0.130	0.115	0.125
t <sub>1</sub> /t <sub>2</sub>	1.79	2.50	2.71	2.44	2.72	2.53



**Figs. 4-6.** *Allocaecilius heterothorax*, ♀: 4, fore wing; 5, hind wing; 6, subgenital plate.



**Figs. 7-10.** *Allocaecilius heterothorax*: 7, ♀ gonapophyses; 8, hypandrium; 9, penis frame; 10, apex of abdomen, ♂.

margin between lobes finely setose. *Gonapophyses* (fig. 7): ventral valve lobate, lobe and long style finely spinose; dorsal valve lobate, lobe and style (extends just beyond apex of lobe) finely spinose; outer valve fairly small, with about 15 long setae. A field of 10 trichobothria on each paraproct.

*Dimensions*: Body length (in alcohol): 2.5 mm. Dimensions of other characters as in Table III.

♂. *Coloration* (freshly killed, in alcohol): As ♀, with following exceptions: basal flagellar segments ringed with brown apically; antedorsum and dorsa of mesothorax brown anteriorly; fore wing with pigmentation reduced, costal cell of hind wing pigmented only basally; abdomen cream, narrow gray lateral stripes along basal 1/4.

*Morphology*: I.O.:D.=1.3:1. Venation as ♀, ciliation of veins consists of fine setae only. Hind legs damaged; claw untoothed. *Hypandrium* (fig. 8): unsclerotized mesially, laterally with sclerotized processes each bearing 2 large spines in series (obliquely mounted in figure). *Penis frame* (fig. 9) broadened and angular basally, with 3 pairs of rod-like radula sclerites. *Tergite 9* (fig. 10) with fine rugose field on posterior border. Epiproct with similar field apically. A field of 10 trichobothria on each paraproct.

*Dimensions*: Body length (in alcohol): 2.2 mm. Dimensions of other characters as in Table III.

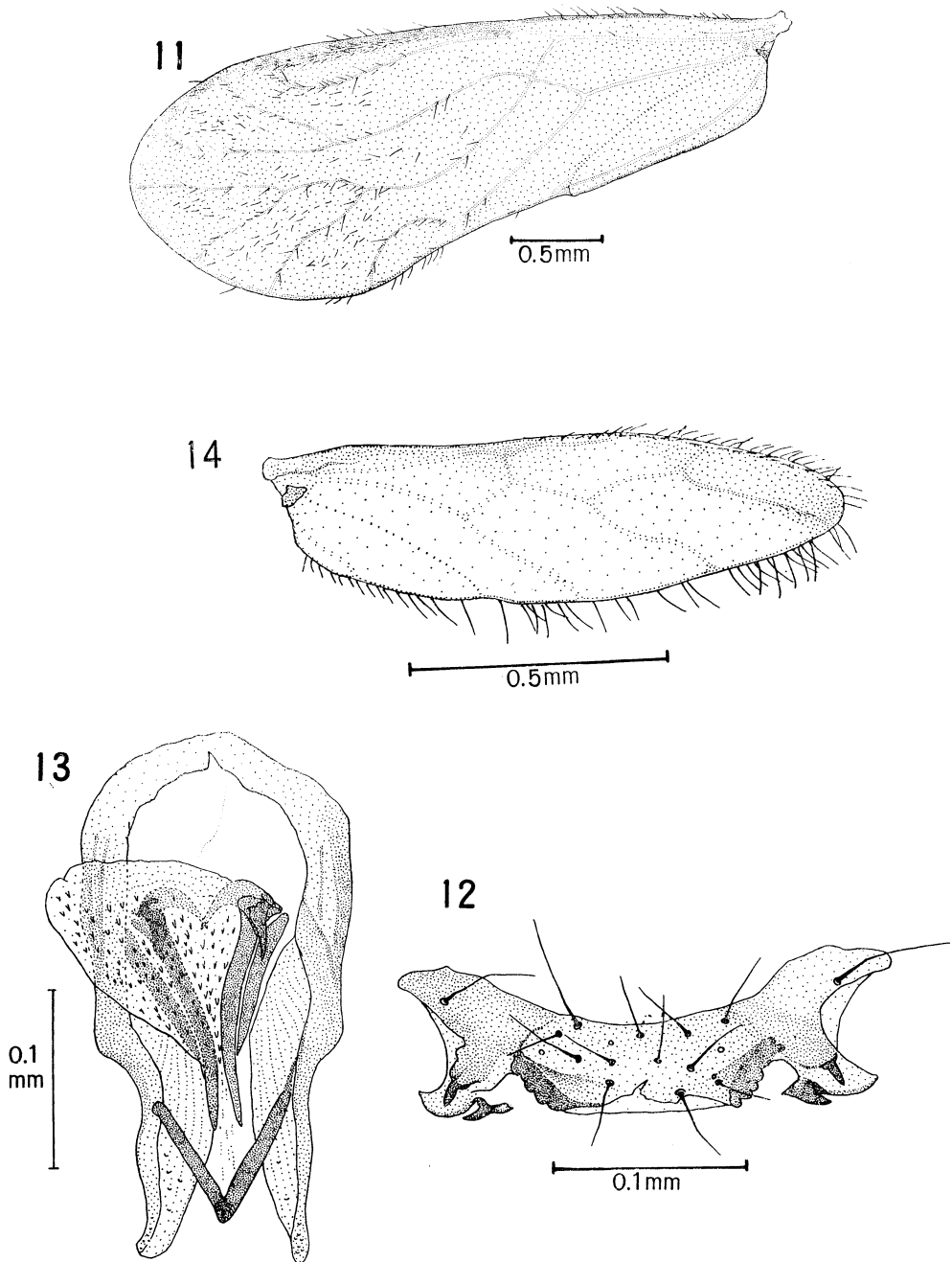
Holotype ♀ (BISHOP 7163), Darjeeling, West Bengal, India, 2100 m, 22. III.1965, ex *Cryptomeria*, Thornton. Allotopotype ♂ (BISHOP), same data as type. Paratypes: 4 ♀♀, same data but beating low shrubs.

This species bears a certain resemblance in male wing pattern to that of the male of *Kolbea hieroglyphica* (End. 03) from Ceylon, later transferred to *Ophiodopelma* by Enderlein (1908). In the Indian species, however, the S-shaped radial sector is not apparent, and the ocelli are obvious in both sexes. The species resembles several others to be described below from Malaya and Hong Kong, and evidently belongs to a species group widely distributed on the Asian mainland.

**Scytopsocopsis hirtipenna** Lee and Thornton, new species Figs. 11-13

♂. *Coloration* (freshly killed, in alcohol): Head wholly dark brown except antennae (broken) brown. Eyes black, ocelli dark brown. Thoracic terga brown, sutures lined with buff, pleura slightly darker. Fore wing (fig. 11) uniformly suffused brown, a small hyaline area at basal angle of areola postica and a narrow hyaline line along  $cu_2$ . Hind wing suffused pale brown, costal cell a little darker. Legs light brown, tarsal segments brown. Abdomen gray-brown.

*Morphology*: I.O.:D.=1.2:1. Head sclerites highly polished. Thoracic sclerites highly polished. In fore wing (fig. 11) scattered setae on membrane as well as on veins in 2 ranks, no trace of sense papillae in axillary cell,  $r_s$  and  $m$  meet at a point or are joined by a very short cross vein. Hind wing with  $r_{2+3}$ ,  $r_{4+5}$  and  $m$  sparsely setose, veins otherwise bare. Proximal hind tarsal segment with 19 ctenidiobothria; claw with small preapical tooth some distance from apex; Pearman's organ complete. *Hypandrium* (fig. 12): median lobe with lateral sclerified, coarsely rugose bars, each side a sclerified process bearing a short stout spine basally and a curved hook subapically. *Penis frame* (fig. 13) fairly short and broad, 2 pairs of longitudinal rod-shaped and 2 pairs of anterior spine-like radula sclerites. Anterior margin of 9th tergite medially, and epiproct apically, very finely rugose. A field of 12 trichobothria on each paraproct.



**Figs. 11-14.** *Scytopsocopsis hirtipenna*, ♂: 11, fore wing; 12, hypandrium; 13, penis frame; 14, hind wing of *Ophiodopelma pictipenna* ♀.

*Dimensions*: Body length (in alcohol): 1.8 mm. Dimensions of other characters as in Table II.

♀. Unknown.

Holotype ♂ (BISHOP 7164), Darjeeling, West Bengal, India, 2100 m, 22. III. 1965, beating low shrubs, Thornton.

This species differs from the two species of *Scytopsocus*, *S. coriaceus* and *S. difficilis* described by Roesler (1940 b) from Brazil, in that *rs* in the fore wing is long, no sense-papillae are present in the axillary cell, and in details of genitalia.

**Pseudocaecilius zonatus** (Hagen), new combination

*Psocus zonatus* Hagen, 1859, Verh. Zool. Bot. Ges. Wien. **2**: 204.

*Epipsocus zonatus*: Hagen, 1866, Verh. Zool. Bot. Ges. Wien. **16**: 219, 207; 1882, Stettin. Ent. Ztg. **43**: 280.

*Hageniella zonata*: Enderlein, 1903, Ann. Hist.-Nat. Mus. Hung. **1**: 258.

DISTRIBUTION: Ceylon.

**Pseudocaecilius lanatus** (Hagen), new combination

*Psocus lanatus* Hagen, 1859, Verh. Zool. Bot. Ges. Wien. **2**: 202.

*Epipsocus lanatus*: Hagen, 1866, Verh. Zool. Bot. Ges. Wien. **16**: 214, 207; 1882, Stettin. Ent. Ztg. **43**: 280.

*Hageniella lanata*: Enderlein, 1903, Ann. Hist.-Nat. Mus. Hung. **1**: 259.

DISTRIBUTION: Ceylon.

**Pseudocaecilius molestus** (Hagen), new combination

*Psocus molestus* Hagen, 1859, Verh. Zool. Bot. Ges. Wien. **2**: 203.

*Epipsocus molestus*: Hagen, 1866, Verh. Zool. Bot. Ges. Wien. **16**: 215, 208; 1882, Stettin. Ent. Ztg. **43**: 280.

*Hageniella molesta*: Enderlein, 1903, Ann. Hist.-Nat. Mus. Hung. **1**: 259.

DISTRIBUTION: Ceylon.

**Ophiodopelma multipunctata** (Hagen)

*Psocus multipunctatus* Hagen, 1859, Verh. Zool. Bot. Ges. Wien. **2**: 204.

*Caecilius multipunctatus*: Hagen, 1866, Verh. Zool. Bot. Ges. Wien. **16**: 215, 205.—Enderlein, 1903, Ann. Hist.-Nat. Mus. Hung. **1**: 266.

*Ophiodopelma multipunctata*: Banks, 1937 b, Philipp. J. Sci. **63**(2): 127 (distribution).

This species is known from Ceylon and also from Mindanao, Philippines (1800 meters). (See also page 47).

**Ophiodopelma hieroglyphica** (Enderlein)

*Kolbea hieroglyphica* Enderlein, 1903, Ann. Hist.-Nat. Mus. Hung. **1**: 279.

*Ophiodopelma hieroglyphica*: Enderlein, 1908, Zool. Anz. **33**: 767.

DISTRIBUTION: Ceylon (2000 m).

**Allocaecilius sinensis** Lee and Thornton, new species Figs. 15-22.

♂. *Coloration* (after about 2 years storage in alcohol): Head generally buff, clypeus and labrum darker. Eyes coffee black, ocelli pale with brown centripetal borders. Maxillary palp light brown, terminal segment brown. Antenna light buff, scape and pedicel brown. Anterior part of antedorsum, dorsum and pleura of meso- and metathorax

brown, rest of thorax buff. Fore wing (fig. 15) hyaline, veins brown with diffuse brown pigment at distal ends; pterostigma and area at base of *rs* brown, a brown spot in cell *R* near vertex of pterostigma. Hind wing hyaline, veins brown. Legs light gray-brown, distal 1/2 of femur gray-brown. Abdomen very light yellowish brown, dark gray patches on pleura and sterna.

*Morphology*: I.O.:D.=2.3:1. In fore wing (fig. 15) *rs* and *m* fused for a distance; radial stem,  $r_{2+3}$  and  $r_{4+5}$  with short spine-like bristles;  $r_{2+3}$  and  $r_{4+5}$  rather long; areola postica high. In hind wing  $r_{4+5}$  and *m* setose. Proximal hind tarsal segment with 14 ctenidiobothria; no pre-apical tooth on claw. *Hypandrium* (fig. 16): simple, roughly triangular in shape, with blunt apex. *Penis frame* (fig. 17) with lateral sclerites narrow, heavily sclerotized; inner parameres united at apex (separate in figure, due to mounting); outer parameres broad, convergent; 3 pairs of rod-like sclerotized radula sclerites, spines on membrane. *Tergite 9* (fig. 18) with anterior marginal chitinized band and 2 fields of papillae near base of epiproct. Paraproct with 10 trichobothria.

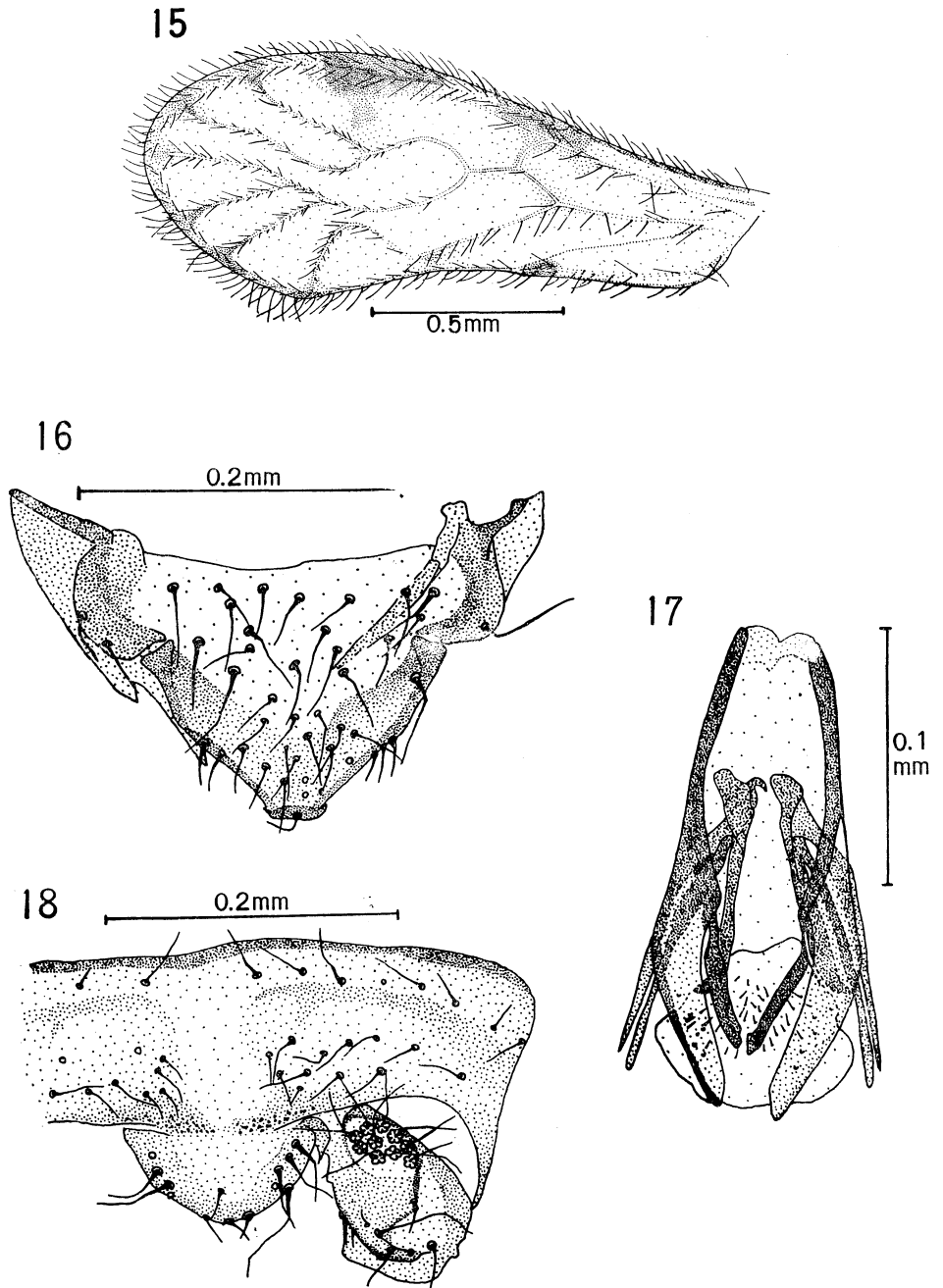
**Table IV.** Length (in mm) of various characters of *Allocacilius sinensis*, *A. maculatus*, and *A. fusciceps*.

Characters	<i>A. sinensis</i>					<i>A. maculatus</i>	<i>A. fusciceps</i>
	♂	♀				♀	♀
A	1.570	1.250	1.180	1.160	1.070	1.130	1.040
f <sub>1</sub>	0.360	0.260	0.230	0.260	0.240	0.240	0.280
f <sub>2</sub>	0.240	0.180	0.160	0.180	0.160	0.180	0.190
f <sub>1</sub> /f <sub>2</sub>	1.52	1.45	1.40	1.45	1.45	1.37	1.47
Fw	1.650	1.850	1.750	1.750	1.700	1.950	1.850
Hw	1.300	1.400	1.350	1.350	1.350	1.450	1.400
Hf	0.360	0.380	0.360	0.360	0.340	0.340	0.370
Ht	0.610	0.660	0.570	0.620	0.630	0.620	0.660
t <sub>1</sub>	0.200	0.215	0.210	0.205	—	0.200	0.215
t <sub>2</sub>	0.105	0.095	0.095	0.100	—	0.100	0.095
t <sub>1</sub> /t <sub>2</sub>	1.89	2.24	2.16	2.08	—	2.08	2.28

*Dimensions*: Body length (in alcohol): 1.8 mm. Dimensions of other characters as in Table IV.

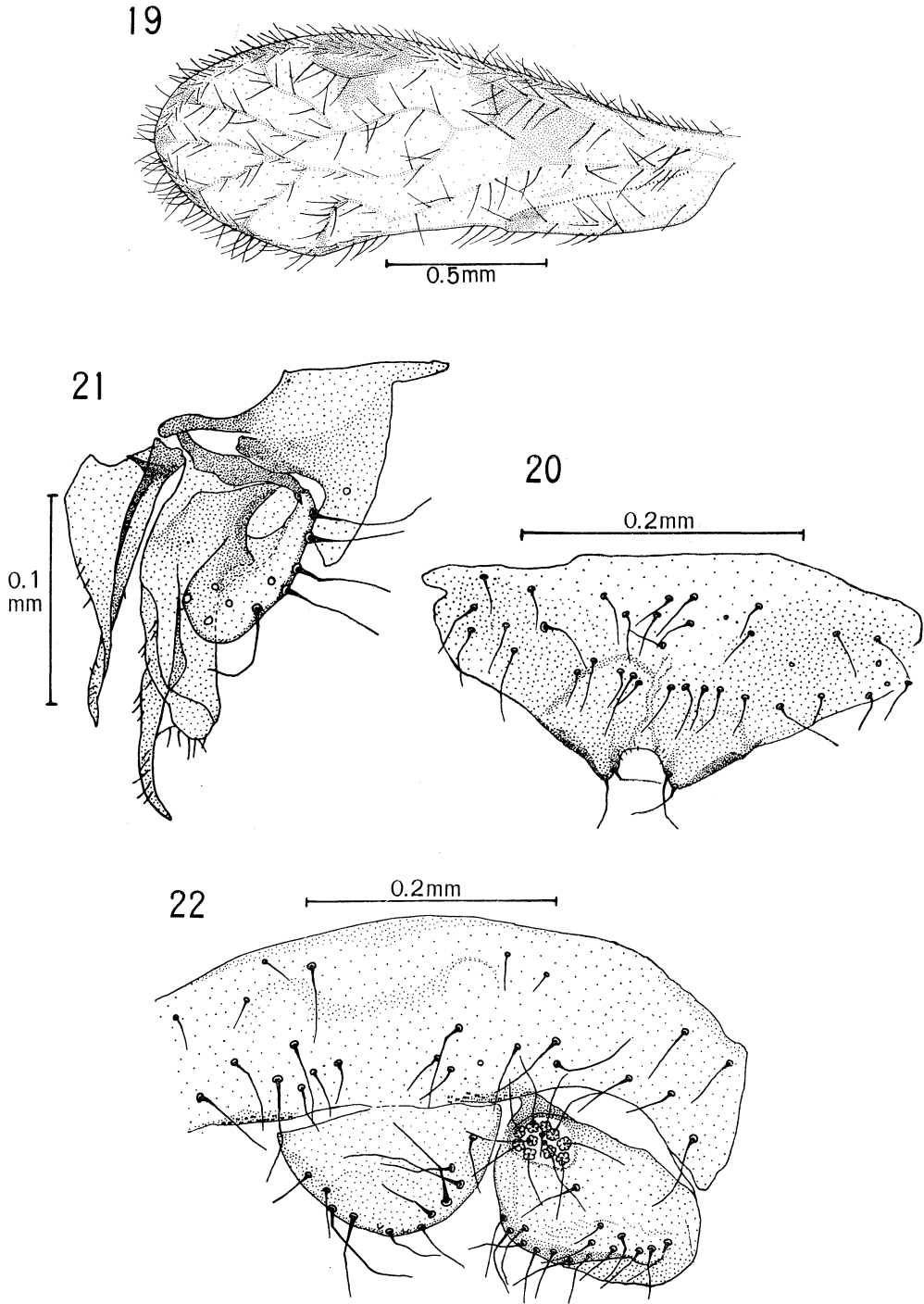
♀. *Coloration* (after about 2 years storage in alcohol): As ♂, except fore wing also has brown pigment at proximal angles of cells *R*<sub>1</sub> and *M* and distal angles of cells *R*, *Cu*<sub>2</sub> and *An*.

*Morphology*: I.O.:D.=3.2:1 (average for 4 specimens—3.3:1). In fore wing (fig. 19) *rs* and *m* fuse for a distance (all 4 specimens)  $r_{2+3}$  and  $r_{4+5}$  rather long; apex of areola postica high. In hind wing  $r_{4+5}$  setose (all 4 specimens). Proximal tarsal segment of hind leg with 10 ctenidiobothria (range in 3 specimens: 10–14); no pre-apical tooth on claw. *Subgenital plate* (fig. 20): apical lobes small but well developed, each bearing an apical and an adjacent mesial sub-apical seta; median indentation deep, lined sparsely with very short fine bristles. *Gonapophyses* (fig. 21): ventral valve lobate with broad base, bearing a moderately long bristled apical stylet; dorsal valve lobate, bristled stylet



Figs. 15-18. *Allocaccilius sinensis*, ♂: 15, fore wing; 16, hypandrium; 17, penis frame; 18, apex of abdomen.





**Figs. 19-22.** *Allocaecilius sinensis*, ♀: 19, fore wing; 20, subgenital plate; 21, gonapophyses; 22, apex of abdomen.

projecting well beyond lobe; outer valve elongate, rounded distally, bearing several long setae. *Tergite 9* (fig. 22) with lightly chitinized anterior sub-marginal band, 2 posterior fields of fine papillae near base of epiproct. Paraproct with 10 trichobothria.

*Dimensions*: Body length (in alcohol): 1.9 mm. (range for 4 specimens: 1.8–1.9 mm.). Dimensions of other characters as in Table IV.

Holotype ♂ (BISHOP 7165), Victoria Peak, Hong Kong Is., 300 m, 26. VIII. 1963, beating *Citrus* sp., Wong. Allotopotype ♀ (BISHOP), same data as type. Paratypes: 2♀, same data as type; 1♀, nr. Pokfulam Reservoir, Hong Kong Is., 27. VI. 1962, beating vegetation, Wong.

***Heterocaecilius maculifrons*** (Thornton), new combination

*Pseudocaecilius maculifrons* Thornton, 1961, Proc. R. Ent. Soc. Lond. (B) **30** (11–12): 146.

DISTRIBUTION: Hong Kong.

***Heterocaecilius anomalus*** (Thornton), new combination

*Pseudocaecilius anomalus* Thornton, 1961, Proc. R. Ent. Soc. Lond. (B) **30** (11–12): 146.

DISTRIBUTION: Hong Kong.

***Phallocaecilius hirsutus*** (Thornton), new combination

*Pseudocaecilius hirsutus* Thornton, 1961, Proc. R. Ent. Soc. Lond. (B) **30** (11–12): 148.

DISTRIBUTION: Hong Kong. This species is viviparous (S. K. Wong, pers. comm.).

***Pseudocaecilius elutus*** Enderlen. (See pp. 14, 40, 47, 83, 112). Hong Kong.

***Pseudocaecilius formosanus*** (Banks), new combination

*Hageniella formosana* Banks, 1937a, Philipp. J. Sci. **62** (3): 265.

DISTRIBUTION: Taiwan. (This is probably *Pseudocaecilius elutus*).

***Ophiodopelma ornatipenne*** Enderlein

*Ophiodopelma ornatipenne* Enderlein, 1908, Zool. Anz. **33**: 767.—Okamoto, 1910, Ann. Hist.-Nat. Mus.

Hung. **8**: 197.—Banks, 1937a Philipp. J. Sc. **62** (3): 264.—Roesler, 1940 b, Zool. Anz. **130**: 10 (genitalia).

DISTRIBUTION: Taiwan.

***Mesocaecilius quadrimaculatus*** Okamoto

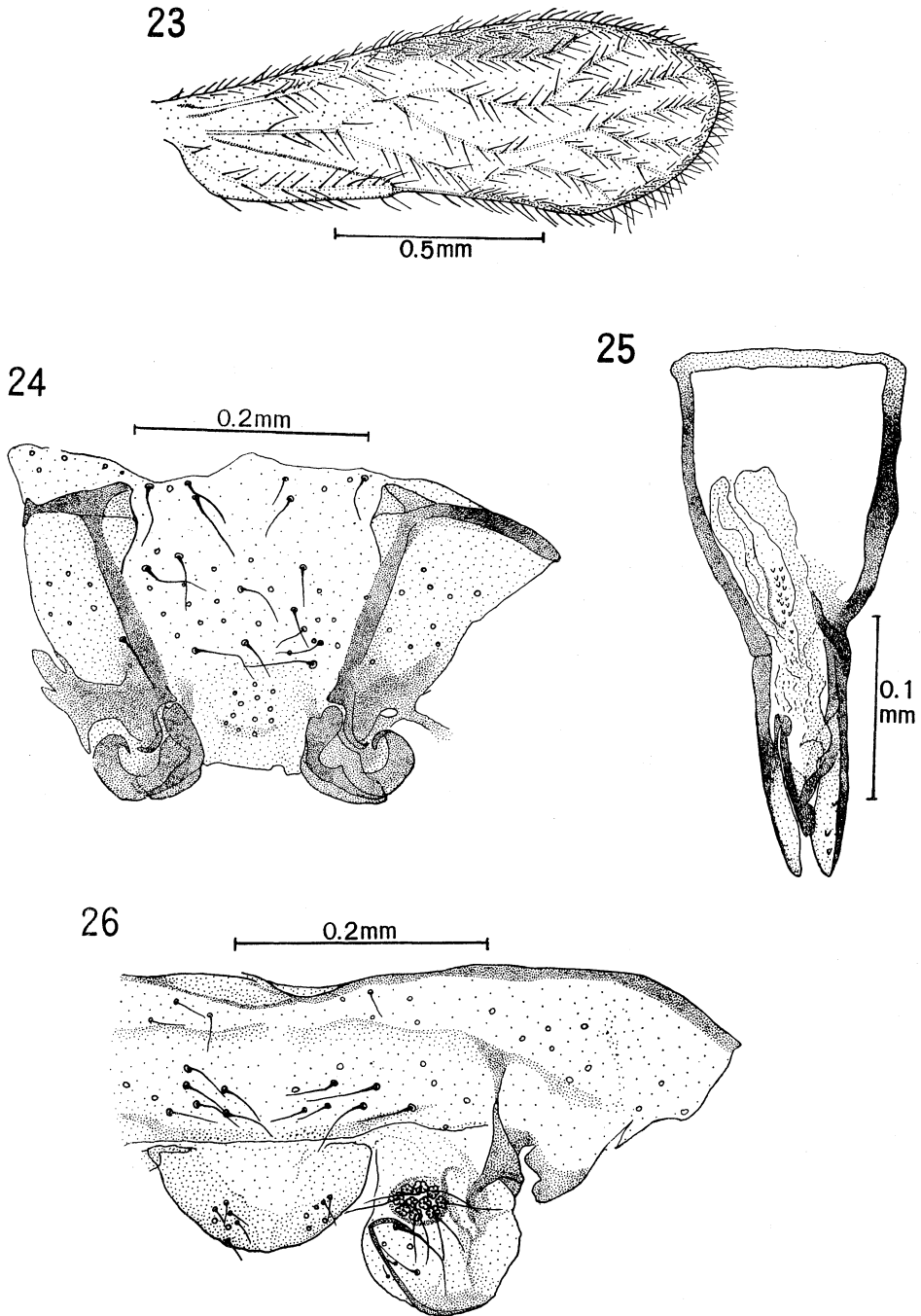
*Mesocaecilius quadrimaculatus* Okamoto, 1910, Ann. Hist.-Nat. Mus. Hung. **8**: 198.—Roesler, 1940 b, Zool. Anz. **130**: 11 (genitalia).

DISTRIBUTION: Taiwan.

MALAYAN SUBREGION

***Pseudocaecilius helicoides*** Lee and Thornton, new species Figs. 23–26.

♂. *Coloration* (freshly killed, in alcohol): Head generally light brown with 2 pale spots on vertex next to mesial border of eyes. Eyes black, ocelli pale, indistinct. Maxillary palp light brown. Antenna brown, basal flagellar segment and pedicel dark brown. Antedorsum and dorsum of mesothorax and metathorax brown, pleura light brown with an irregular dark band just above coxae. Wings light yellowish brown, veins brown. Legs light brown, claws brown. Abdomen very pale buff with grayish brown terminal tergite.



**Figs. 23-26.** *Pseudocaecilius helicoides*, ♂: 23, fore wing; 24, hypandrium; 25, penis frame; 26, apex of abdomen.

*Morphology*: I.O.:D.=1.1:1. In fore wing (fig. 23) veins *rs* and *m* fuse for a short distance. Hind wing: vein  $r_{2+3}$ ,  $r_{4+5}$  and *m* setose, otherwise veins bare. Proximal hind tarsal segment with 14 ctenidiobothria; claw without preapical tooth. *Hypandrium* (fig. 24): with 3 pairs of broad, heavily sclerotised hooks; 1 pair curled apically. *Penis frame* (fig. 25) triangular with wide base, high apex; inner parameres apically united, point of fusion serrated; outer parameres separate, slightly convergent; radula membrane with a few fine spines. *Tergite 9* (fig. 26) with 2 fields of very fine papillae at base of epiproct; anterior margin of tergite heavily sclerotized. Paraproct with a field of 10 trichobothria.

*Dimensions*: Body length (in alcohol): 2.2 mm. Dimensions of other characters as in Table II.

♀. Unknown.

Holotype ♂ (BISHOP 7166) at 16th mile, Gombak Rd., Selangor, Malaya, 16.III. 1963, Lee.

This specimen is remarkably similar to *Pseudocaecilius cornutus* (see below), known from 2 males from New Guinea. The only distinct difference is in wing markings, the fore wing of *P. helicoides* (which was described freshly killed), lacking the brown marking found in *P. capricornis*.

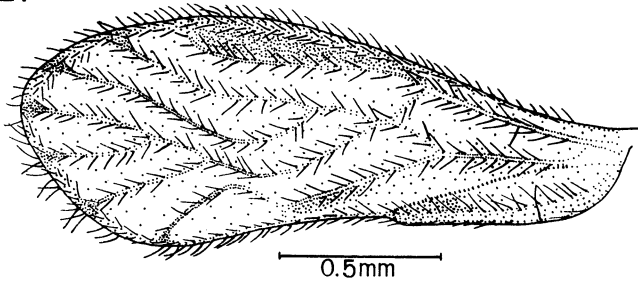
**Lobocaecilius longifurca** Lee and Thornton, new species Figs. 27-33.

♂. *Coloration* (freshly killed, in alcohol): Head generally buff, with a short brown band from antennal socket to eye. Eyes charcoal black, ocelli pale with black mesial borders. Maxillary palp light buff. Antenna light brown, scape and pedicel dark brown. Thorax buff with brown areas on antedorsum and dorsum of meso- and metathorax; pleura with an irregular dark brown band just above coxae of legs. Fore wing (fig. 27) hyaline with brown pigmentation at distal angles of cells  $Cu_1$ ,  $Cu_2$  and *An*. Pterostigma granulated. Veins brown with diffuse brown distal ends. Hind wing hyaline, veins faint, indistinct. Legs very light yellowish brown. Abdomen very light brown.

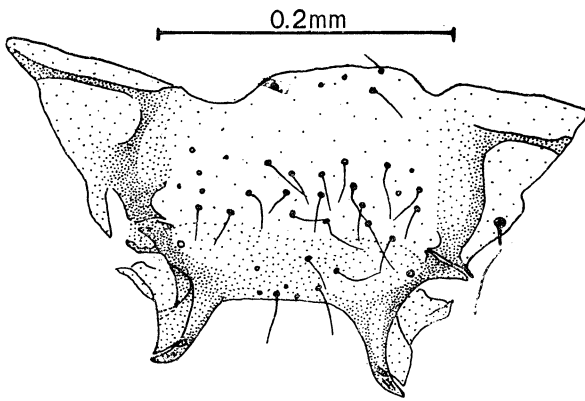
**Table V.** Length (in mm) of various characters of *Lobocaecilius longifurca*, *Heterocaecilius longispinus* and *H. fasciatus*.

Characters	<i>L. longifurca</i>				<i>H. longispinus</i>				<i>H. fasciatus</i>
	♂	♀			♀				♀
A	1.730	1.530	—	—	1.160	1.150	—	1.120	3.000
$f_1$	0.400	0.360	0.330	0.310	0.260	0.250	0.230	0.240	0.610
$f_2$	0.290	0.250	0.210	0.210	0.160	0.160	0.150	0.150	0.470
$f_1/f_2$	1.40	1.47	1.56	1.50	1.68	1.58	1.56	1.61	1.30
Fw	2.000	2.050	1.800	1.750	1.700	1.750	1.650	1.700	2.360
Hw	1.550	1.550	1.350	1.350	1.450	1.400	1.300	1.350	1.300
Hf	0.410	0.410	0.390	0.380	0.340	0.340	0.310	0.330	0.570
Ht	0.740	0.740	0.690	0.670	0.640	0.660	0.620	0.620	0.900
$t_1$	0.275	0.265	0.255	0.235	0.230	—	0.195	0.205	—
$t_2$	0.095	0.105	0.105	0.095	0.100	—	0.080	0.100	—
$t_1/t_2$	2.94	2.50	2.48	2.48	2.33	—	2.40	2.08	—

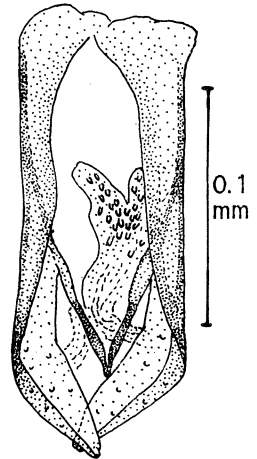
27



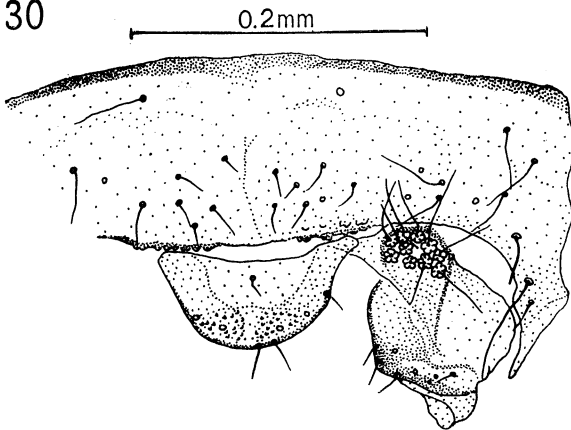
28



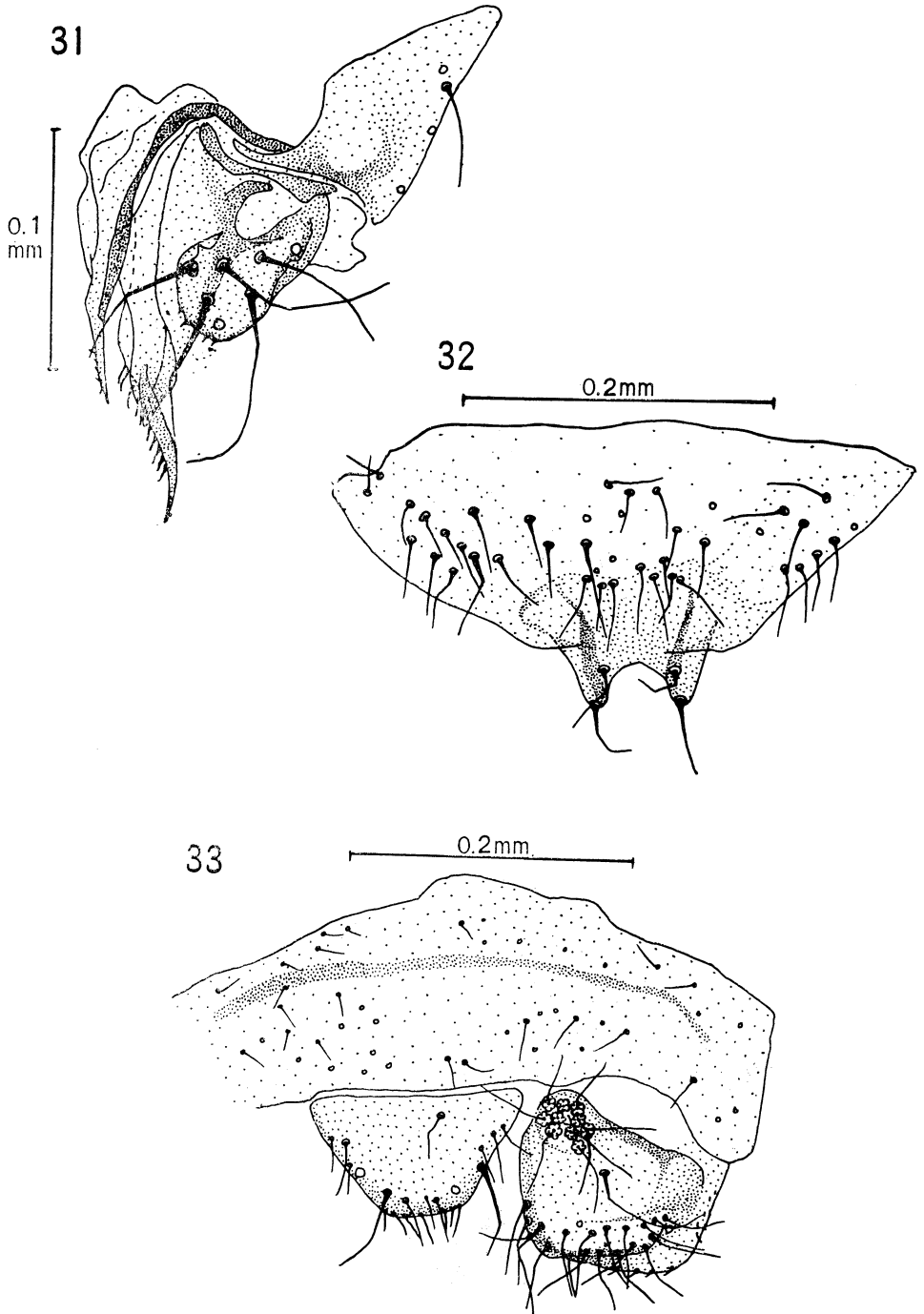
29



30



**Figs. 27-30.** *Lobocaecilius longifurca*, ♂: 27, fore wing; 28, hypandrium; 29, penis frame; 30, apex of abdomen.



**Figs. 31-33.** *Lobocaeilius longifurca*, ♀: 31, gonapophyses; 32, subgenital plate; 33, apex of abdomen.

*Morphology*: I.O.:D.=1.0. In fore wing (fig. 27) *rs* and *m* fuse for a short distance. Prongs of radial fork approximately  $3\times$  length of stem. Pterostigma long and narrow, tapering distally. Hind wing:  $r_{2+3}$ ,  $r_{4+5}$  and *m* setose. Proximal hind tarsal segment with 17 ctenidiobothria; no preapical tooth on claw, *Hypandrium* (fig. 28): apically bearing a pair of forked posterolaterally directed sclerotized hooks, larger arm of each ending in a fingernail-shaped spine. *Penis frame* (fig. 29) with broad lateral sclerites; inner parameres united at apex; outer parameres broad, flat; radula with tooth-shaped spinelets on membrane, sclerotized rods absent. *Tergite 9* (fig. 30) with anterior band of sclerotization and 2 fields of papillae on posterior margin. Paraproct with a field of 10 trichobothria. Epiproct with apical field of papillae.

*Dimensions*: Body length (in alcohol): 1.8 mm. Dimensions of other characters as in Table V.

♀. *Coloration*: As ♂.

*Morphology*: I.O.:D=2.5:1 (paratypes 2.9:1), eyes smaller than ♂. Wings as in ♂, (in paratypes *rs* and *m* joined by short cross-vein). Proximal hind tarsal segment with 16 ctenidiobothria (2 paratypes both with 14); no preapical tooth on claw. *Subgenital plate* (fig. 32): apical lobes well developed, rounded, each bearing an apical seta and another at base of mesial edge. *Gonapophyses* (fig. 31): ventral valve lobate bearing a short bristled apical stylet; dorsal valve lobate, stylet long, projecting well beyond lobe, bristles on stylet short and thick; outer valve elongate with a few fine, small apical spine-shaped projections (lacking in paratypes) and a few long setae. *Tergite 9* (fig. 33) with anterior sub-marginal band of chitinization. Paraproct with a field of 10 trichobothria.

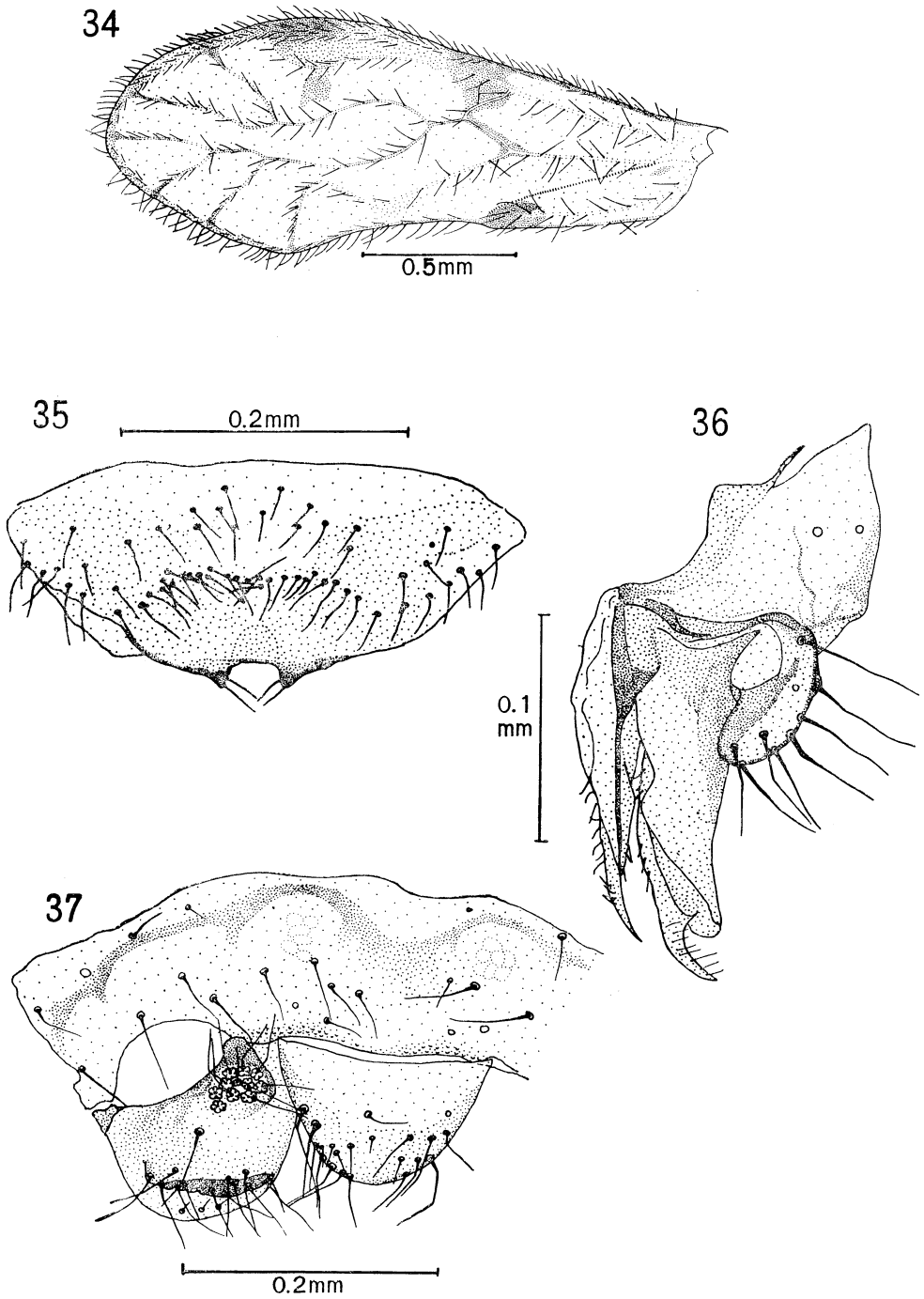
*Dimensions*: Body length in (alcohol): 1.9 mm. Dimensions of other characters as in Table V.

Holotype ♂ (BISHOP 7167), and allotype ♀, at 16th mile, Gombak Rd., Selangor, Malaya, 16. III. 1963, beating vegetation near stream, Lee. 2♀♀, at the 13th mile, Gombak Rd., on 17. VIII. 63, differ from the allotype in lacking the spinelets on the outer valve and in having a deeper median indentation of the subgenital plate. Further collections may support the view that these differences are of specific validity.

***Allocaecilius maculatus*** Lee and Thornton, new species Figs. 34-37.

♀. *Coloration* (freshly killed, in alcohol): Head generally buff. Eyes black, ocelli pale. Maxillary palp gray-brown. Antenna light brown. Terga of meso- and meta-thorax buff; pleura brown. Fore wing (fig. 34) yellowish hyaline; veins paler in places, with slightly diffuse brown distal ends; membrane with brown pigmentation at distal end of pterostigma and cells  $Cu_1$  and  $An$ , a brown spot in cell  $R_1$  immediately posterior to pterostigma, a brown area at proximal angle of cell  $R_1$  and just behind stigma sac. Hind wing hyaline with brown veins. Legs light brown, claws brown. Abdomen very light brown.

*Morphology*: I.O.:D.=2.5:1. In fore wing (fig. 35) *rs* and *m* fuse for a short distance,  $r_{2+3}$  and  $r_{4+5}$  diverge distally, apex of areola postica high. In hind wing veins  $r_{4+5}$  and *m* setose. Hind leg with 12 ctenidiobothria on proximal tarsal segment; no pre-apical tooth on claw. *Subgenital plate* (fig. 35): apical lobes small and not well marked off from basal portion of plate, each bearing an apical and an adjacent sub-apical



**Figs. 34-37.** *Allocaecilius maculatus*, ♀: 34, fore wing; 35, subgenital plate; 36, gonapophyses; 37, apex of abdomen.



row of long setae, otherwise ciliation diffuse. *Gonapophyses* (fig. 36): ventral valve lobate with short bristled stylet; dorsal valve with well developed lobe, bristled stylet projecting for a distance beyond lobe; outer valve small, elongated, with convex outer margin and several long setae. *Tergite 9* (fig. 37) with anterior sub-marginal sclerotized band and fields of fine papillae on posterior margin. Paraproct with field of 11 trichobothria.

*Dimensions*: Body length (in alcohol): 1.9 mm. Dimensions of other characters as in Table IV.

♂. Unknown.

Holotype ♀ (BISHOP 7168), at 16th mile, Gombak Rd., Selangor, Malaya, 16. VIII. 63, beating vegetation, Lee.

***Allocaecilius fusciceps*** Lee and Thornton, new species Figs. 38-41.

♀. *Coloration* (freshly killed, in alcohol): Head generally dark gray brown, clypeus slightly lighter. Eyes black, ocelli pale, on dark brown protuberance. Maxillary palp light gray-brown with darker terminal segment and pale joints. Antenna light brown, scape and pedicel darker. Antedorsum and anterior of dorsum of mesothorax dark gray-brown, pleura gray-brown, rest of thorax buff. Fore wing (fig. 38) yellowish hyaline with brown pterostigma and brown patch at apical region of cell *R*, veins brown. Hind wing yellowish hyaline with brown veins. Legs: coxa light gray-brown, femur light gray-brown darkening distally, tibia and tarsus light brown, claws brown. Abdomen light brown, sternites of 3 apical segments brown.

*Morphology*: I.O.:D.=3.2:1. In fore wing (fig. 38) veins *rs* and *m* fuse for a short distance;  $r_{2+3}$  and  $r_{4+5}$  diverge distally; apex of areola postica fairly high; pterostigma wide and rounded. In hind wing  $r_{2+3}$ ,  $r_{4+5}$  and *m* setose. Hind leg with 14 ctenidiobothria on proximal tarsal segment; no pre-apical tooth on claw. *Subgenital plate* (fig. 39): apical lobes narrow, rod-like, convergent, each bearing terminally 2 adjacent long setae. Median indentation with a field of short spine-like bristles. *Gonapophyses* (fig. 40): ventral valve lobate, a moderately long apical bristled stylet; dorsal valve with better developed lobe, bristled stylet projecting for a short distance beyond lobe; outer valve elongate, bearing several long setae. *Tergite 9* (fig. 41) with anterior band of sclerotization, and 2 posterior fields of papillae near base of epiproct. Paraproct with 10 trichobothria.

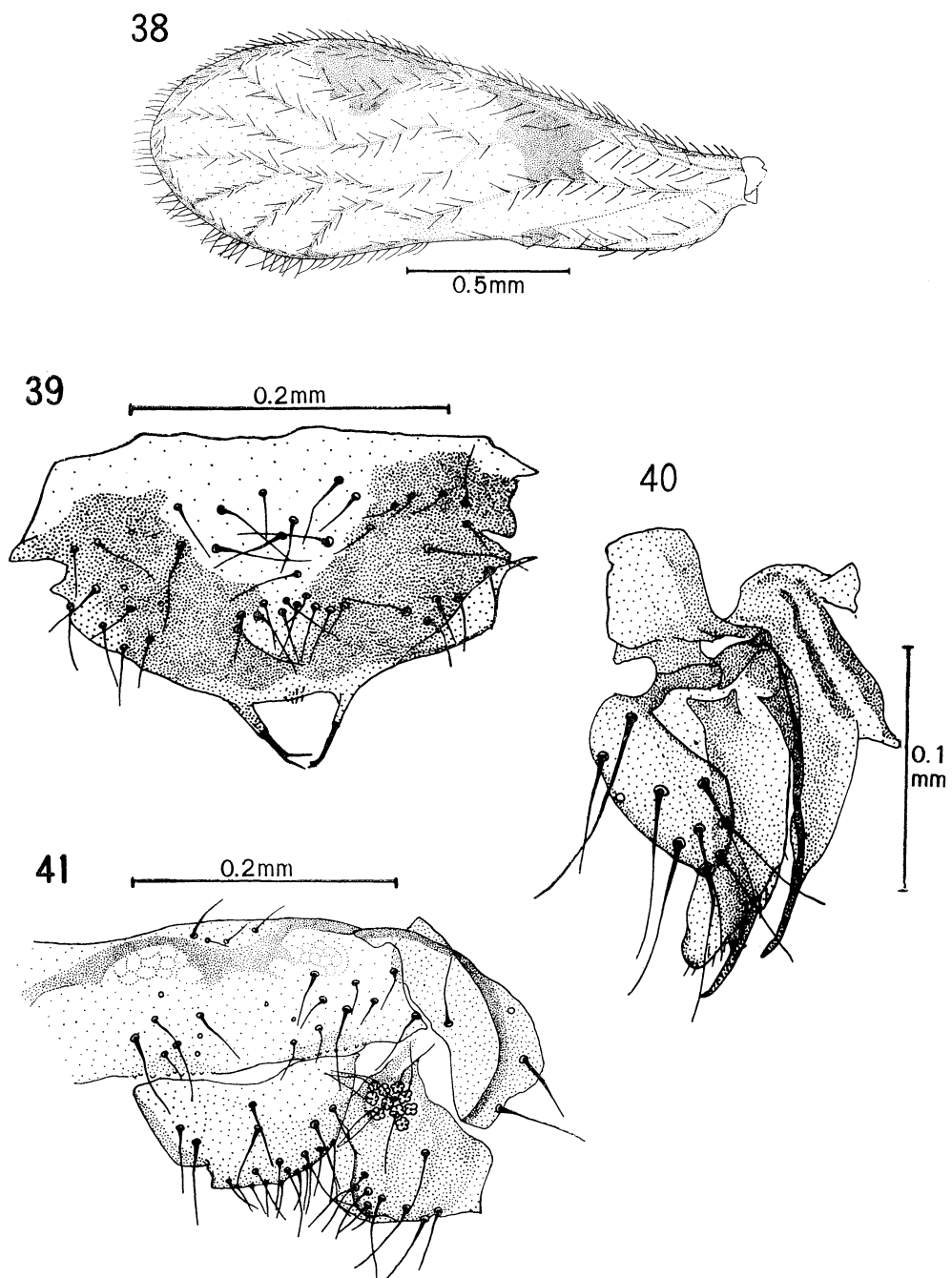
*Dimensions*: Body length (in alcohol): 2.0 mm. Dimensions of other characters as in Table IV.

♂. Unknown.

Holotype ♀ (BISHOP 7169), 16th mile, Gombak Rd., Selangor, Malaya, 16. VIII. 1963, beating vegetation, Lee.

***Allocaecilius elongatus*** Lee and Thornton, new species Figs. 42-49.

♀. *Coloration* (freshly killed, in alcohol): Head generally gray brown, vertex and frons buff. Eyes black, ocelli pale with brown centripetal borders. Maxillary palp gray-brown. Antenna with gray-brown, scape and pedicel, light brown flagellum. Dorsum, anterior part of antedorsum, and pleura of metathorax brown, rest of thorax buff. Fore wing (fig. 42) hyaline, with brown pigmentation at pterostigma, cell *R*<sub>1</sub> near apex of pterostigma and proximal angle, proximal angle of cell *M* and distal 1/2 of cell *R*; veins



**Figs. 38-41.** *Allocacilius fusciceps*, ♀: 38, fore wing; 39, subgenital plate; 40, gonapophyses; 41, apex of abdomen.

brown, with diffuse brown pigment at distal ends. Hind wing hyaline, veins gray-brown. Legs generally light gray-brown, proximal 1/2 of femur lighter. Abdomen very light brown, slightly darker apex.

*Morphology*: I.O.:D.=2:1. Veins *rs* and *m* in fore wing (fig. 42) fuse for a distance; areola postica high; pterostigma narrow, tapering distally. In hind wing  $r_{4+5}$  and *m* setose. Proximal hind tarsal segment with 12 ctenidiobothria; no pre-apical tooth on claw. *Subgenital plate* (fig. 43): apical lobes each bearing a terminal seta with a sub-apical seta each side of this, median indentation deep, U-shaped. *Gonapophyses* (fig. 44): ventral valve lobate with long stylet beset with a few fine bristles; dorsal valve lobate, very long, a short stylet (not extending to apex of lobe) covered with fine bristles; outer valve comparatively small, beset with several long setae and some shorter ones. *Tergite 9* (fig. 45): anterior sub-marginal band of sclerotization light. Epiproct semicircular. Paraproct with a field of 10 trichobothria.

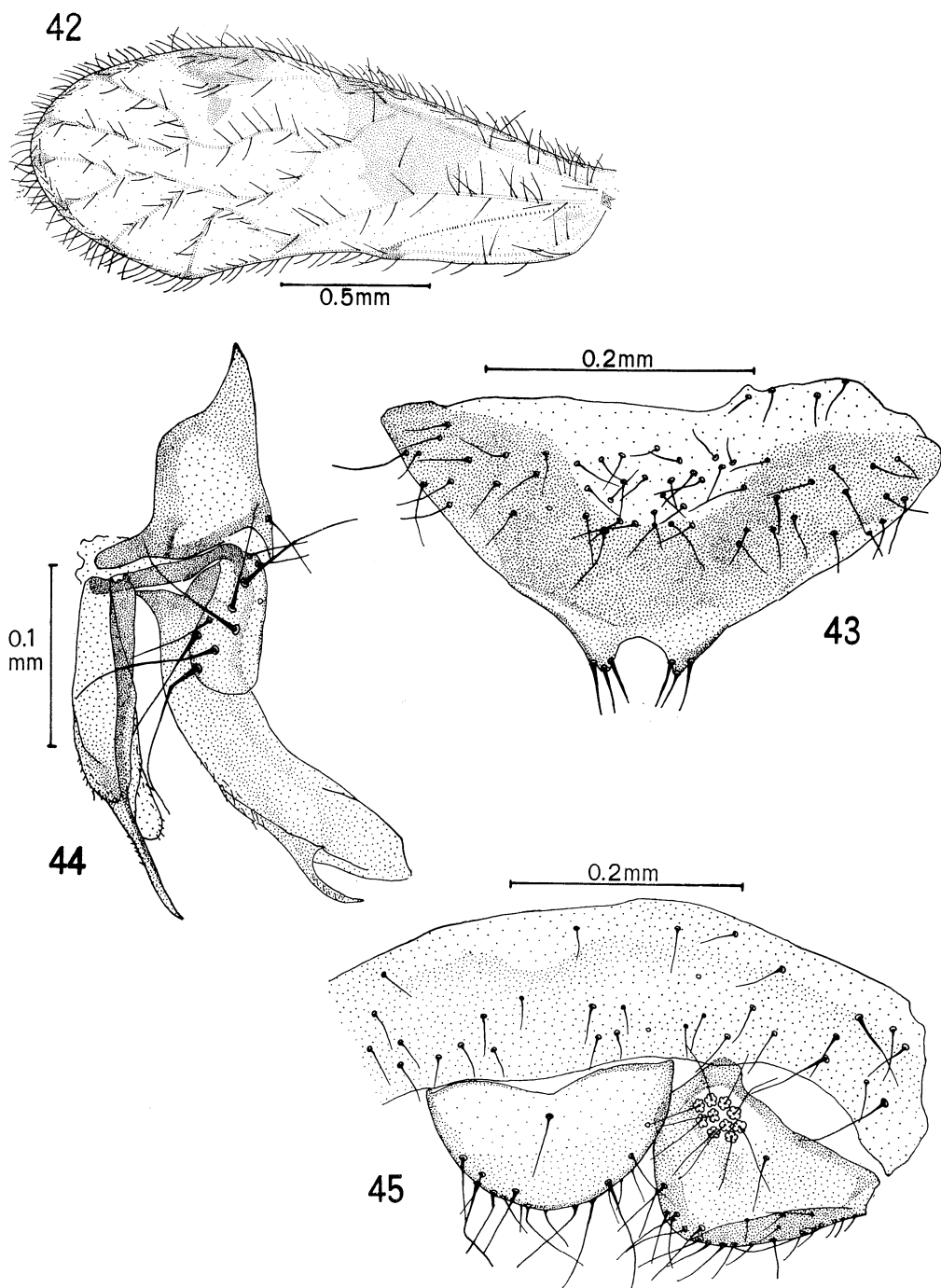
**Table VI.** Length (in mm) of various characters of *Allocacilius elongatus*

Characters	♂		♀
A	1.870	2.010	1.460
f <sub>1</sub>	0.420	0.440	0.320
f <sub>2</sub>	0.280	0.300	0.210
f <sub>1</sub> /f <sub>2</sub>	1.50	1.49	1.52
Fw	1.950	1.900	1.950
Hw	1.400	1.400	1.500
Hf	0.350	0.390	0.390
Ht	0.670	0.690	0.710
t <sub>1</sub>	0.235	0.230	0.240
t <sub>2</sub>	0.090	0.100	0.115
t <sub>1</sub> /t <sub>2</sub>	2.58	2.31	2.10

*Dimensions*: Body length (in alcohol): 1.9 mm. Dimensions of other characters as in Table VI.

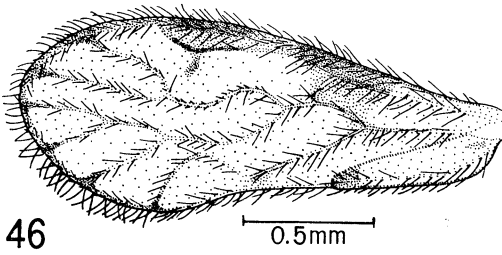
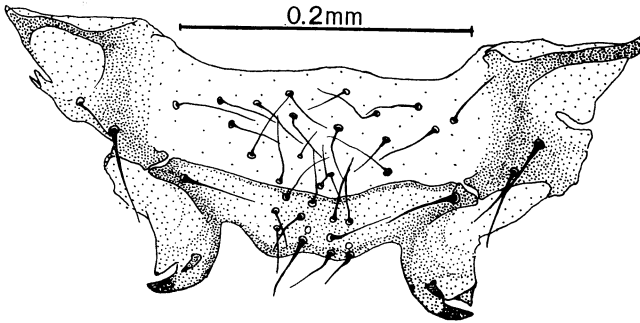
♂. *Coloration* (freshly killed, in alcohol): Head generally gray-brown with lighter frons and vertex. Eyes black, ocelli pale with reddish-brown mesial borders. Maxillary palp gray-brown, apex of terminal segment slightly darker. Antenna light brown. Anterior-dorsum, dorsum and pleura of meso- and metathorax brown, other parts buff. Fore wing (fig. 46) hyaline, veins brown with diffuse brown pigment at tips; pterostigma and apex of cell *R* with brown pigment. Hind wing hyaline, veins gray-brown. Legs generally light gray-brown, femur with proximal 1/2 lighter. Abdomen very light brown, slightly darker at apex.

*Morphology*: I.O.:D.=1.4:1 (value for paratype=1.3:1). In fore wing (fig. 46) veins *rs* and *m* fuse for a short distance (both specimens);  $r_{2+3}$  and  $r_{4+5}$  diverge slightly distally; apex of areola postica high; pterostigma narrow with slightly angular vertex; radial stem and 1/2 of  $r_{2+3}$  with short spine-like bristles. Hind wing with  $r_{4+5}$  setose. Proximal tarsal segment of hind legs with 14 ctenidiobothria (15 in paratype); no pre-

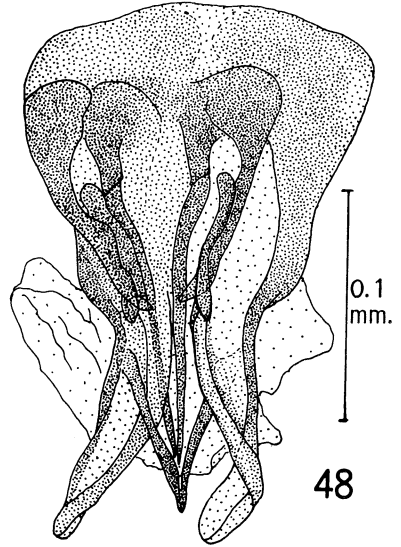


**Figs. 42-45.** *Allocaecilius elongatus*, ♀: 42, fore wing; 43, subgenital plate; 44, gonapophyses; 45, apex of abdomen.

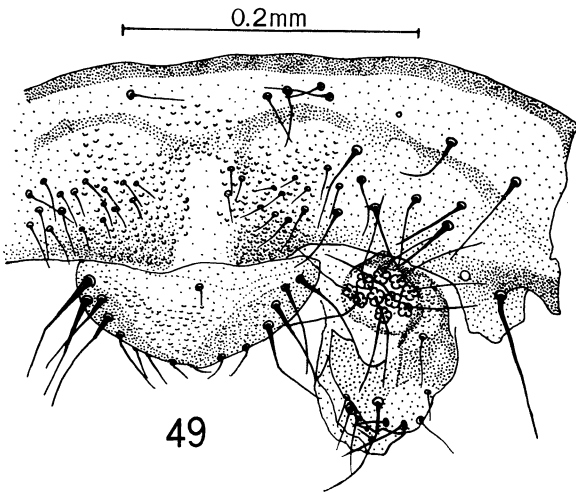
47



46



48



49

**Figs. 46-49.** *Allocaccilius elongatus*, ♂: 46, fore wing; 47, hypandrium; 48, penis frame; 49, apex of abdomen.

apical tooth on claw. *Hypandrium* (fig. 47): bearing apically a pair of posterolaterally directed unequally bifurcated sclerotized hooks, larger arm of each ending in a fingernail-shaped spine. *Penis frame* (fig. 48) with lateral sclerites broad at base; inner parameres heavily sclerotized and united at apex; outer parameres broad, divergent; radula with a pair of long pointed rods, 2 pairs of shorter sclerotized rods. *Tergite 9* (fig. 49) with anterior marginal and submarginal sclerotized bands; posteriorly with 2 extensive fields of papillae intermingled with short setae. Epiproct with diffuse field of papillae at apex and 4 long thick setae on either side. Paraproct with field of 10 trichobothria.

*Dimensions*: Body length (in alcohol): 2.0 mm (value for paratype: 17 mm) Dimensions of other characters as in Table VI.

Holotype ♀ (BISHOP 7170), allotype ♂ and paratype ♂, 16th mile, Gombak Rd., Selangor, Malaya, 14. VIII. 1963, beating vegetation, Lee.

**Heterocaecilius longipenna** Lee and Thornton, new species Figs. 50-53.

♀. *Coloration* (after 2 years storage in alcohol): Head generally gray-brown, labrum dark gray-brown. Eyes coffee black, ocelli pale. Maxillary palp gray-brown, darkening towards terminal segment. Antenna (damaged): basal flagellar segment gray-brown, scape and pedicel darker. Thorax uniformly gray-brown. Fore wing (fig. 50) gray-brown, veins slightly darker, a hyaline spot at proximal region of areola postica, another in cell  $Cu_1$  near distal end of vein  $cu_2$ . Hind wing light gray-brown, veins brown. Legs gray-brown, claws brown. Abdomen very light brown.

*Morphology*: I.O.:D.=3.0:1. In fore wing (fig. 50)  $rs$  and  $m$  fuse for short distance,  $r_{2+3}$  and  $r_{4+5}$  diverge distally; pterostigma roughly rectangular; areola postica with rounded apex. Hind wing veins bare. Proximal hind tarsal segment with 15 ctenidiobothria; small pre-apical tooth on claw. *Subgenital plate* (fig. 51): apical portion undivided, but well marked off from basal plate, bearing a pair of setae; a field of short fine spines between bases of long setae. *Gonapophyses* (fig. 52): ventral valve lobate, with an apical bristled stylet; dorsal valve lobate, stylet bristled, projecting as far as lobe; outer valve large, long, with rounded distal margin, covered with numerous long and some shorter setae. *Tergite 9* (fig. 53): anterior sub-marginal band of sclerotization very faint, not extending beyond middle portion of plate. Paraproct with 10 trichobothria.

*Dimensions*: Body length (in alcohol): 2.4 mm. Dimensions of other characters as in Table II.

♂. Unknown.

Holotype ♀ (BISHOP 7171), Mt. Brinchang, Pahang, Malaya, 1500 m, 6. I. 1959, light trap, E. C. McClure.

**Heterocaecilius kobus** Lee and Thornton, new species Figs. 67-70.

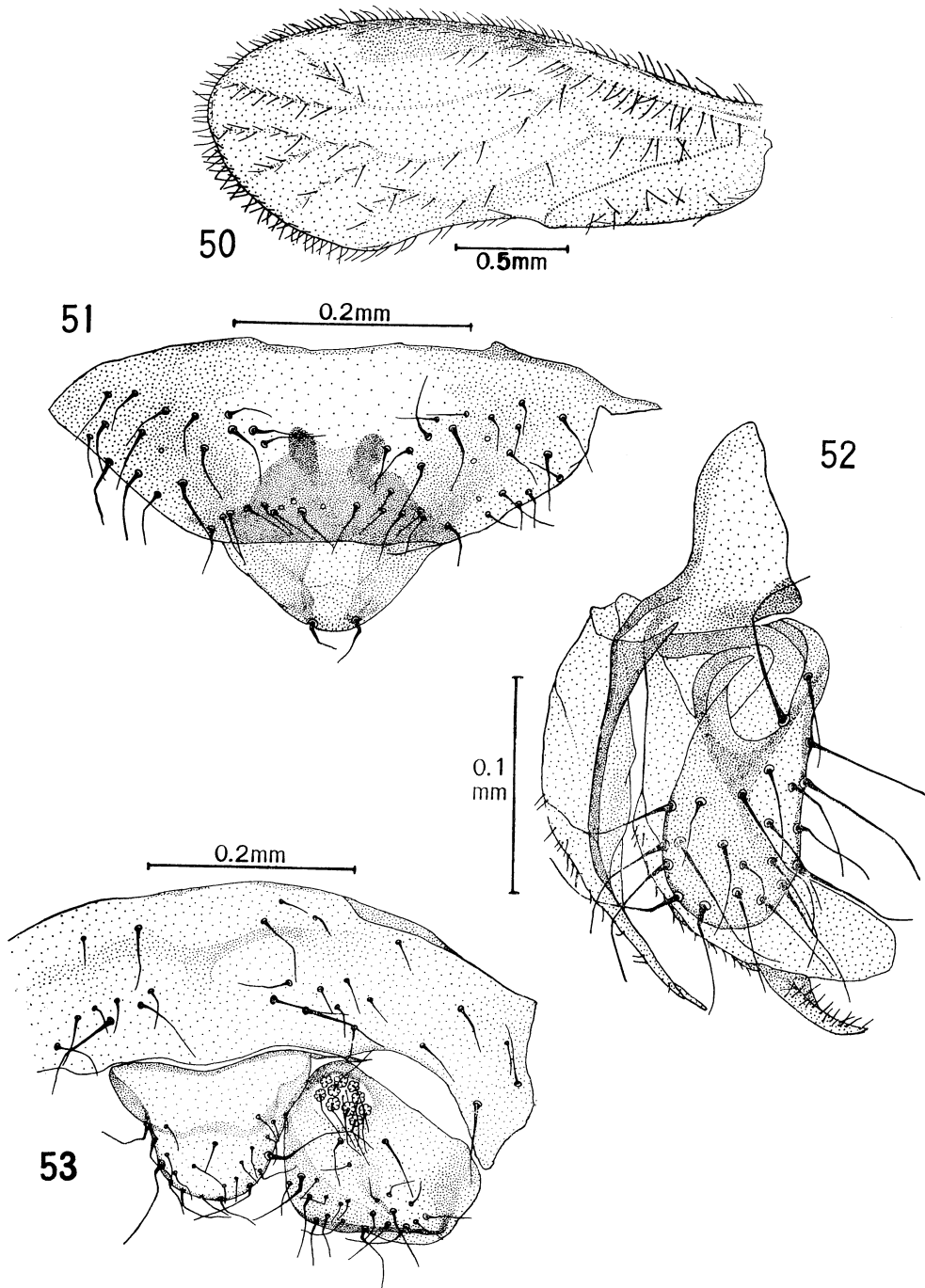
DISTRIBUTION: Malaya (Selangor), New Guinea.

Four ♀♀ were collected by Lee at the 16th mile, Gombak Rd., Selangor, Malaya, on 12, 13. VIII. 1963, beating dead vegetation.

The species is described below from New Guinea material (see also page 47).

**Pseudocaecilius ornatus** Enderlein

*Pseudocaecilius ornatus* Enderlein, 1903, Ann. Hist.-Nat. Mus. Hung. 1 : 262; 1926, Zool. Meded. 9 : 58 (distribution).



**Figs. 50-53.** *Heterocaecilius longipenna*, ♀: 50, fore wing; 51, subgenital plate; 52, gonapophyses; 53, apex of abdomen.

Described from Singapore, later recorded also from Java. Not represented in our collections.

**Pseudocaecilius elutus** Enderlein Figs. 133-136.

Described from Singapore. (See also p. 14).

**Pseudocaecilius tenellus** Enderlein

*Pseudocaecilius tenellus* Enderlein, 1926, Zoolog. Meded. **9** : 59.

DISTRIBUTION : Java.

**Heterocaecilius longispinus** Lee and Thornton, new species Figs. 54-56.

♀. *Coloration* (freshly killed, in alcohol): Head generally gray-brown; vertex markings, clypeus and genae darker brown. Eyes black, ocelli pale on dark brown protuberance. Maxillary palp very dark brown, antenna wholly pale brown. Thoracic terga and pleura brown, dorsal sutures margined paler brown. Fore wing (fig. 54) suffused brown, often a little fainter alongside veins; very small hyaline area at base of areola postica; fine hyaline line along  $cu_2$ . Hind wing paler brown, somewhat darker towards costal margin. Legs brown, tibiae paler in distal 1/2. Abdomen with a uniform granulated gray-brown pigment, fainter dorsally than ventrally.

*Morphology*: I.O.:D.=2.5:1. Head sclerites waxy. Fore wing (fig. 54) with *rs* and *m* fused for a short distance in all 4 specimens, *rs* stalk long, areola postica small, setae on veins in 2 ranks, those in basal 1/2 longer and stouter than those in apical 1/2. Hind wing veins bare. Proximal hind tarsal segment with 13 ctenidiobothria; small preapical tooth on only one of the pairs of claws; Pearman's organ complete. *Subgenital plate* (fig. 55): apical lobes each consisting of a separate sclerite, well sclerotized along lateral margin, with a sub-apical and more mesial seta, between and anterior to these sclerites disc unsclerotized. *Gonapophyses* (fig. 56): ventral valve lobate, with very long finely spinose style; dorsal valve lobate, curved finely spinose style projecting well beyond lobe; outer valve large, almost circular, with about 17 fairly long setae. A field of 10 trichobothria on each paraproct, epiproct with anterior lateral angles unsclerotized.

*Dimensions*: Body length (in alcohol): 1.7 mm. Dimensions of other characters as in Table V.

♂. Unknown.

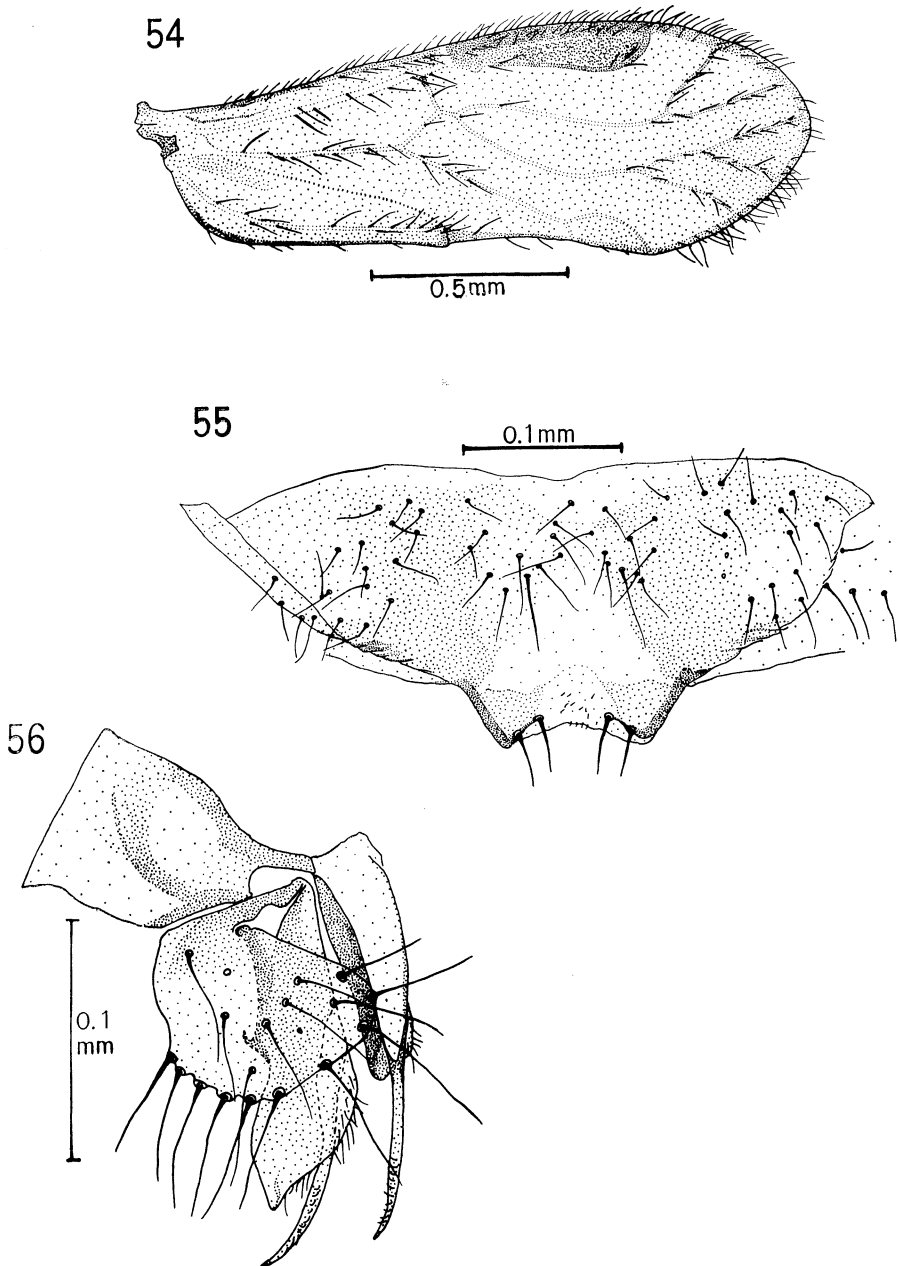
Holotype ♀ (BISHOP 7172), and 3♀ paratypes, Aborlan, Palawan, on 17. IV. 1965, dead twigs, Thornton.

The separate sclerotized areas on the sub-genital plate resemble those figured by Roesler (1940b) for *Mesocaecilius quadrimaculatus* Ok., and *Scytopsocus coriaceus* Roesl. However, clearly this Philippine species cannot be included in either of these genera.

**Heterocaecilius fasciatus** Lee and Thornton, new species Figs. 57-59.

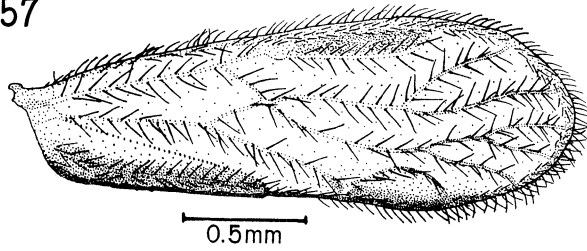
♀. *Coloration* (freshly killed, in alcohol): Head creamy-white, with following exceptions: a brown patch on each side on posterior edge of vertex; tip of apical segment of maxillary palp and scape and pedicel of antenna faint brown; flagellum dark brown; eyes black, ocelli pale but with wide dark brown centripetal margins. Thorax white, including legs (except claws brown), apart from dorsal sclerites, marked as follows: mesothoracic antedorsum brown, white median suture, dorsal lobes and scutellum brown,



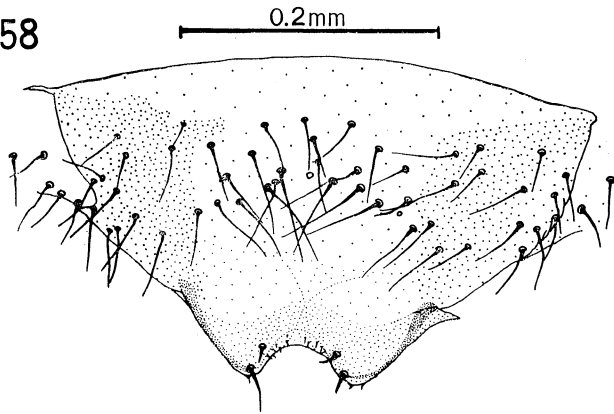


**Figs. 54-56.** *Heterocaecilius longispinus*, ♀: 54, forc wing; 55, subgenital plate  
56, gonapophyses.

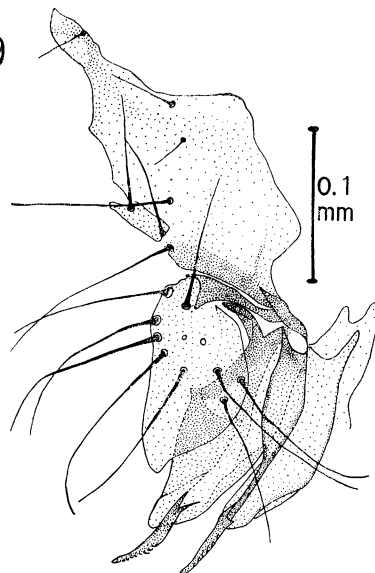
57



58



59



**Figs. 57-59.** *Heterocaecilius fasciatus*, ♀: 57, fore wing; 58, subgenital plate; 59, gonapophyses.

forming wide oblique bands enclosing a triangular creamy-white area behind antedorsum; mesothorax marked similarly. Fore wing (fig. 57) hyaline, except whole of anal cell and posterior margin of areola postica dark brown; veins pale except in distal 1/3 of wing brown. Hind wing hyaline, distal sections of veins brown, a narrow, ill-defined brown margin along posterior edge of wing. Abdomen creamy-white.

*Morphology*: I.O.:D.=5.5:1. In fore wing (fig. 57) *rs* and *m* fused for a short distance; setae on veins in 2 ranks, uniformly large and stout. In hind wing setae in single rank on *rs*, *r*<sub>4+5</sub>, *m*. Proximal hind tarsal segment with 14 ctenidiobothria; claw with small preapical tooth; Pearman's organ complete. *Subgenital plate* (fig. 58): bilobed, lobes triangular, with sclerotized lateral margins, each bearing an apical seta and 1 on mesial edge, posterior margin between lobes finely spinose; disc sclerotized laterally. *Gonapophyses* (fig. 59): ventral valve lobate, long style only sparsely spinose; dorsal valve lobate, curved spinose style projecting well beyond lobe; outer valve with about 11 very long setae, a posterior lobe without setae narrowing apically. *Tergite 9* with an ill-defined small sclerotized area in middle, epiproct roughly triangular, a field of 12 trichobothria on each paraproct.

*Dimensions*: Body length (in alcohol): 2.2 mm. Dimensions of other characters as in Table V.

♂. Unknown.

Holotype ♀ (BISHOP 7173), Aborlan, Palawan, 17. IV. 1965, from coconut thatch, Thornton.

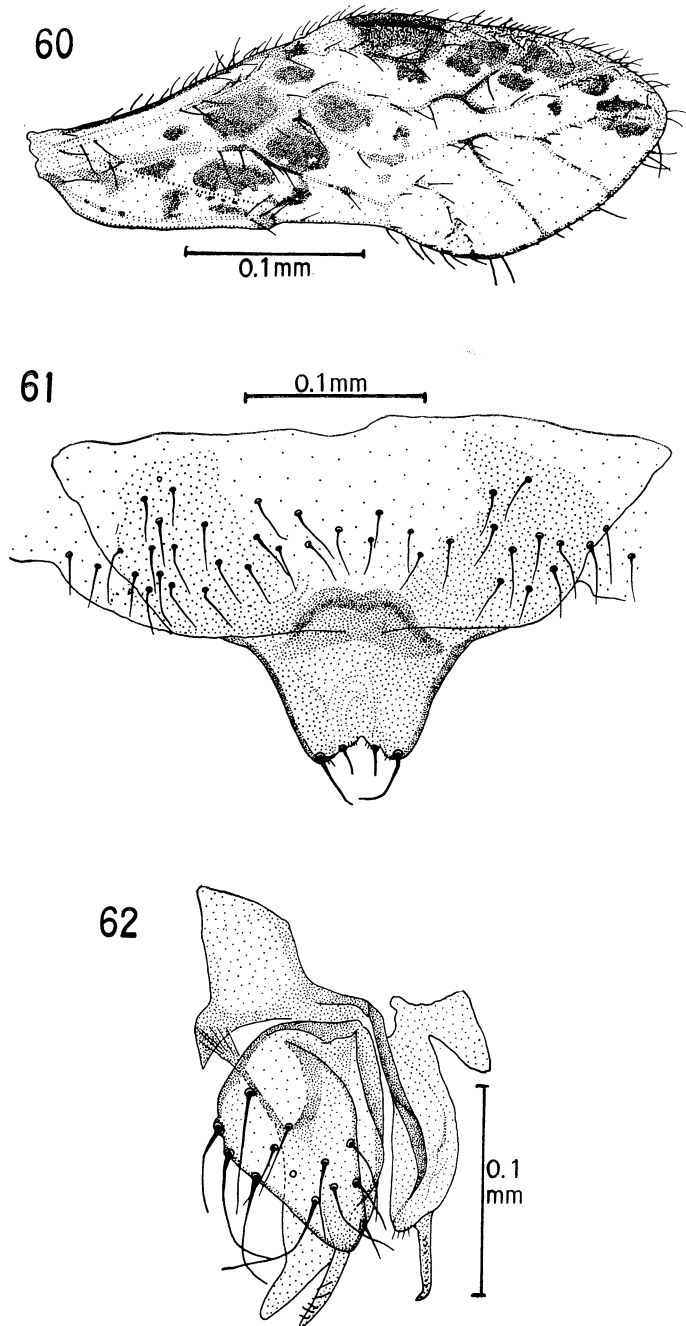
This distinctively marked species, superficially very like a *Caecilius*, is unusual in having a lobate outer valve, a condition otherwise unknown outside Fiji.

**Table VII.** Length (in mm) of various characters of *Ophiodopelma pictipenna*, *O. semiceps* and *O. permaculatum*

Characters	<i>O. pictipenna</i>			<i>O. semiceps</i>	<i>O. permaculatum</i>	
	♀			♀	♂	
A	0.980	0.960	1.030	1.500	1.350	1.450
f <sub>1</sub>	0.200	0.200	0.200	0.340	0.330	0.300
f <sub>2</sub>	0.120	0.120	0.130	0.210	0.250	0.220
f <sub>1</sub> /f <sub>2</sub>	1.71	1.78	1.50	1.58	1.33	1.37
Fw	1.550	1.600	1.650	2.000	1.750	1.700
Hw	1.200	1.200	1.150	1.450	1.250	1.250
Hf	0.300	0.300	0.300	0.390	0.360	0.340
Ht	0.530	0.530	0.520	0.720	0.700	0.670
t <sub>1</sub>	0.150	0.150	0.140	0.245	0.260	0.255
t <sub>2</sub>	0.080	0.075	0.080	0.100	0.115	0.110
t <sub>1</sub> /t <sub>2</sub>	1.80	2.00	1.80	2.50	2.30	2.31

***Ophiodopelma pictipenna*** Lee and Thornton, new species Figs. 60-62.

♀. *Coloration* (freshly killed, in alcohol): Head cream, distinctive dark brown markings on vertex and frons, faint brown markings on clypeus. Eyes black, ocelli absent. Maxillary palp dark brown. Antenna cream, flagellar segments ringed with



**Figs. 60-62.** *Ophiopelma pictipenna*, ♀: 60, fore wing; 61, subgenital plate; 62, gonapophyses.

gray-brown apically. Mesothoracic terga brown, sutures bordered cream except median suture of antedorsum, a large cream area behind antedorsum; metathoracic terga similar, paler; pleural sclerites pale brown. Fore wing (fig. 60) hyaline with large dark brown patches in basal 1/2 and along apical 1/2 of anterior margin; veins dark in patterned areas, pale otherwise apart from apex of areola postica, origin of  $m_{4+5}$ , apices of veins grayish. Hind wing (fig. 14) hyaline, faint gray-brown suffusion in basal 2/3 of costal cell and anterior apical portion of wing. Legs brown, except coxae and tarsi pale cream. Abdomen cream with broken light brown transverse bands dorsally and laterally.

*Morphology*: I.O.:D.=2.5:1. Ocelli absent. Fore wing veins (fig. 60) in basal 1/2 of wing with setae in 2 rows, setae in single row on other veins. Hind wing veins bare, apart from 4 setae on  $r_{2+3}$ . Proximal hind tarsal segment with 8 ctenidiobothria; claw rather straight, untoothed; Pearman's organ complete. *Subgenital plate* (fig. 61): with apical portion distinctly marked off from disc, sclerotized, with a pair of low apical lobes, each bearing a stout seta near apex and a smaller one more mesially, margin between lobes finely spinose. *Gonapophyses* (fig. 62): ventral valve with very small lobe, long finely spinose style; dorsal valve lobate, lobe very long, narrowing apically, finely spinose style slightly curved, not extending beyond apex of lobe; outer valve narrowing distally, with about 20 fairly long setae. Epiproct semicircular; an elongate field of 10 trichobothria on each paraprot.

*Dimensions*: Body length (in alcohol): 1.4 mm. Dimensions of other characters as in Table VIII.

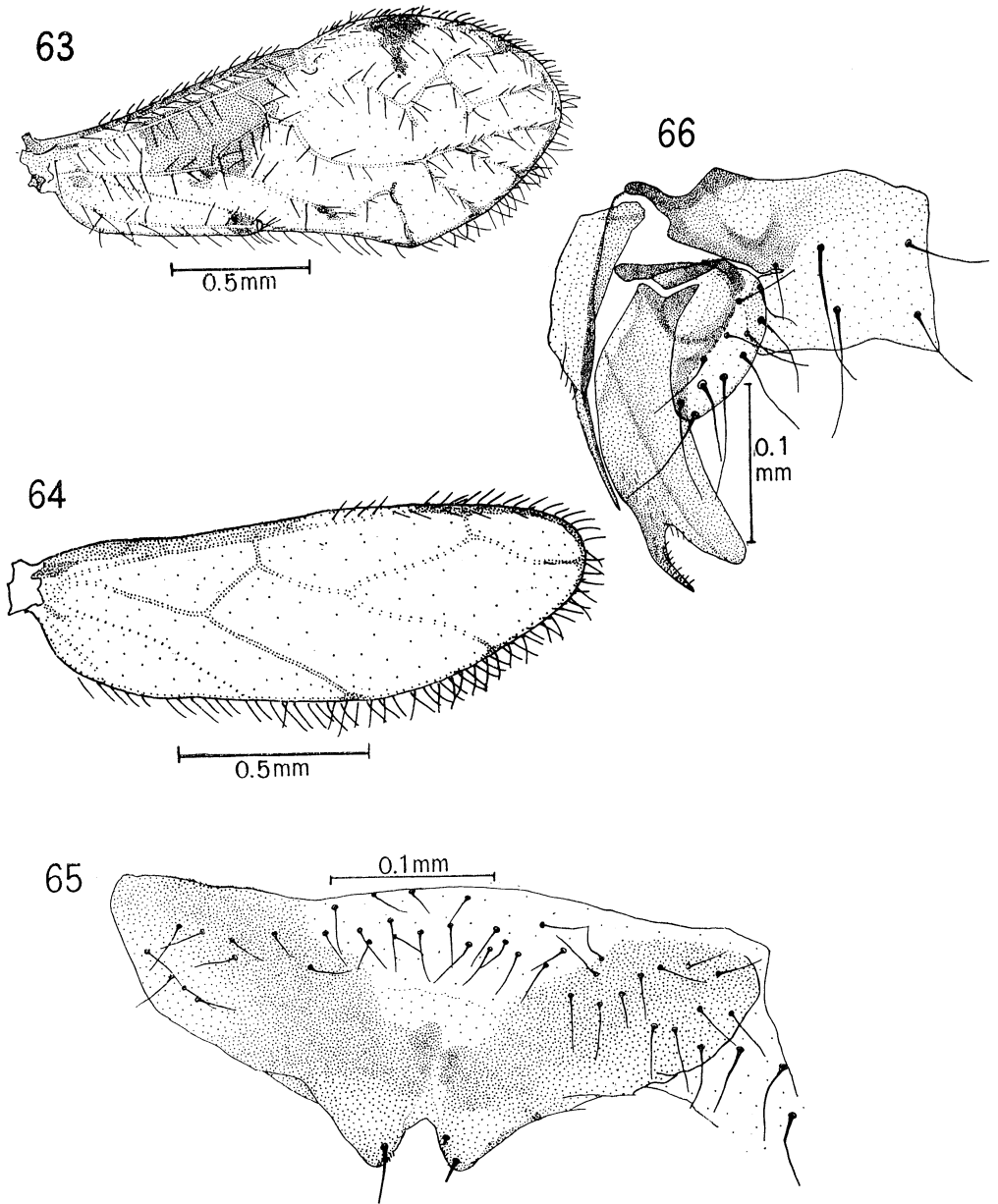
♂. Unknown.

Holotype ♀ (BISHOP 7174), 1♀ paratopotype, Aborlan, Palawan, 17. IV. 1965, beating foliage, Thornton. 1♀ paratype, same data as type but ex coconut thatch.

Referable to *Ophiodopelma* on grounds of venation and reduction of ocelli, this species does not exhibit the very large outer valve described for *O. ornatipenne* End. by Roesler (1940 b).

***Ophiodopelma semiceps*** Lee and Thornton, new species Figs. 63-66.

♀. *Coloration* (freshly killed, in alcohol): Lower 1/2 of head, including 1/2 orbit, antennal socket and anterior 1/2 of clypeus very dark brown almost black; upper 1/2 of head cream, 3 grayish brown spots on each side of vertex, posterolateral one darker and distinct, anterolateral and mesial ones lighter, fainter; fine semicircular faint grayish brown line on frons round antennal socket; median grayish brown spot on posterior margin of clypeus. Eyes brownish black, ocelli pale with dark grayish brown inner borders. Maxillary palp very dark grayish brown, almost black, with fine cream rings at joints. Scape and pedicel of antenna light grayish brown, darker on anterior surface, flagellum basally light grayish brown darkening towards apex, cream at joints. Antedorsum of mesothorax very dark grayish brown anteriorly and laterally, other thoracic terga, including scutella, cream, apart from small brown patches at posteromesial angles of dorsal lobes; pleura dark grayish brown. Fore wing (fig. 63) hyaline, with large very dark grayish brown, almost black patch anteriorly basal to pterostigma, a smaller similar patch in apical 1/3 of pterostigma with club-shaped posterior extension; pterostigma yellowish white just apical to stigma sac; veins grayish brown, very dark at junctions and apices, except  $cu_2$   $cu_{1b}$ , origin of  $cu_{1a}$  and a section of  $rs$  beyond fusion which are hyaline. Hind wing (fig. 64) with basal 2/3 of costal cell grayish brown; veins grayish



**Figs. 63-66.** *Ophiodopelma semiceps*, ♀: 63, fore wing; 64, hind wing; 65, subgenital plate; 66, gonapophyses.

brown in basal 1/2, hyaline in apical 1/2 with dark grayish brown apices. Legs very dark grayish brown, cream at joints, apical tarsal segment of meso- and metathoracic legs cream. Abdomen cream.

*Morphology*: I.O.:D.= 3.5:1. In fore wing (fig. 63) *rs* bent in a right angle and with posterior cross-vein stump,  $r_{4+5}$  similarly bent with cross-vein stump, a cross-vein stump at apex of areola postica. Proximal hind tarsal segment with 12 ctenidiobothria; claw untoothed; Pearman's organ complete. *Subgenital plate* (fig. 65): bilobed, each lobe triangular, bearing a sub-apical seta (and on one lobe another seta on mesial margin). *Gonapophyses* (fig. 66): ventral valve lobate, lobe unsclerotized, long finely spinose style; dorsal valve lobate, with curved spinose style projecting as far as apex of lobe; outer valve small, oval, bearing about 11 long setae. Epiproct semicircular; a field of 10 trichobothria on each paraproct.

*Dimensions*: Body length (in alcohol): 2.0 mm. Dimensions of other characters as in Table VII.

♂. Unknown.

Holotype ♀ (BISHOP 7175), Aborlan, Palawan, 17. IV. 1965, beating vegetation, Thornton.

Placed in *Ophiidopelma* because of the similarity of the fore wing with the previous species; the generic placing is tentative.

#### PHILIPPINE SUBREGION

##### **Pseudocaecilius elutus** Enderlein 1903 Figs. 133-136.

Eight ♀♀ of this widespread species were collected from *Ficus retusa* on 20. VII. 1964 by C. R. Baltazar in Manila, Luzon, and a single ♀ from *Pinus* at Los Banos, Luzon, on 7. IV. 1965, Thornton. (See also p. 14, 40, 83, 90, 112).

##### **Pseudocaecilius pusillus** (Banks), new combination

*Hageniella pusilla* Banks, 1931, Psyche, 38 : 56.

Not represented in this collection.

DISTRIBUTION: Luzon.

##### **Pseudocaecilius innotatus** Banks

*Pseudocaecilius innotatus* Banks, 1937 b, Philipp. J. Sc. 63 (2) : 132.

DISTRIBUTION: Mindanao.

##### **Ophiidopelma multipunctata** (Hagen)

DISTRIBUTION: Mindanao, also from Ceylon. Not represented in this collection. (See also p. 22).

#### PAPUAN SUBREGION

##### **Heterocaecilius kobus** Lee and Thornton, new species Figs. 67-70.

♀. *Coloration* (after 4 years storage in alcohol): Head brown with pale areas on either side of sagittal suture. Clypeus with slightly darker diagonal striae. Eyes coffee black, ocelli pale. Maxillary palp brown fading towards basal region. Antenna (damaged)

**Table VIII.** Length (in mm) of various characters of  
*Heterocaccilius kobus* (♀♀)

Characters	Holotype (New Guinea)	Paratypes (Malaya)			
A	—	1.340	—	—	—
f <sub>1</sub>	—	0.320	—	0.320	—
f <sub>2</sub>	—	0.200	—	0.190	—
f <sub>1</sub> /f <sub>2</sub>	—	1.56	—	1.66	—
Fw	1.800	1.850	1.900	1.800	1.850
Hw	1.500	1.450	1.500	1.450	1.450
Hf	0.340	0.360	0.380	0.350	0.370
Ht	0.670	0.710	0.720	0.680	0.710
t <sub>1</sub>	0.215	0.220	—	0.205	0.215
t <sub>2</sub>	0.105	0.115	—	0.110	—
t <sub>1</sub> /t <sub>2</sub>	2.04	1.93	—	1.86	—

with brown scape, pedicel and basal flagellar segment. Terga and pleura of thorax brown. Fore wing (fig. 67) brown with darker pterostigma and areola postica; membrane of wing with a narrow colorless band stretching in a shallow arc from anterior end of pterostigma to areola postica, and a colorless area at nodal angle of cell  $Cu_1$ ; veins dark brown with darker distal regions. Hind wing light brown with  $Cu_2$  and  $An$  cells and distal regions of veins darker. Legs brown with darker coxae. Abdomen buff with brown narrow ring-like bands. Ninth abdominal tergite brown.

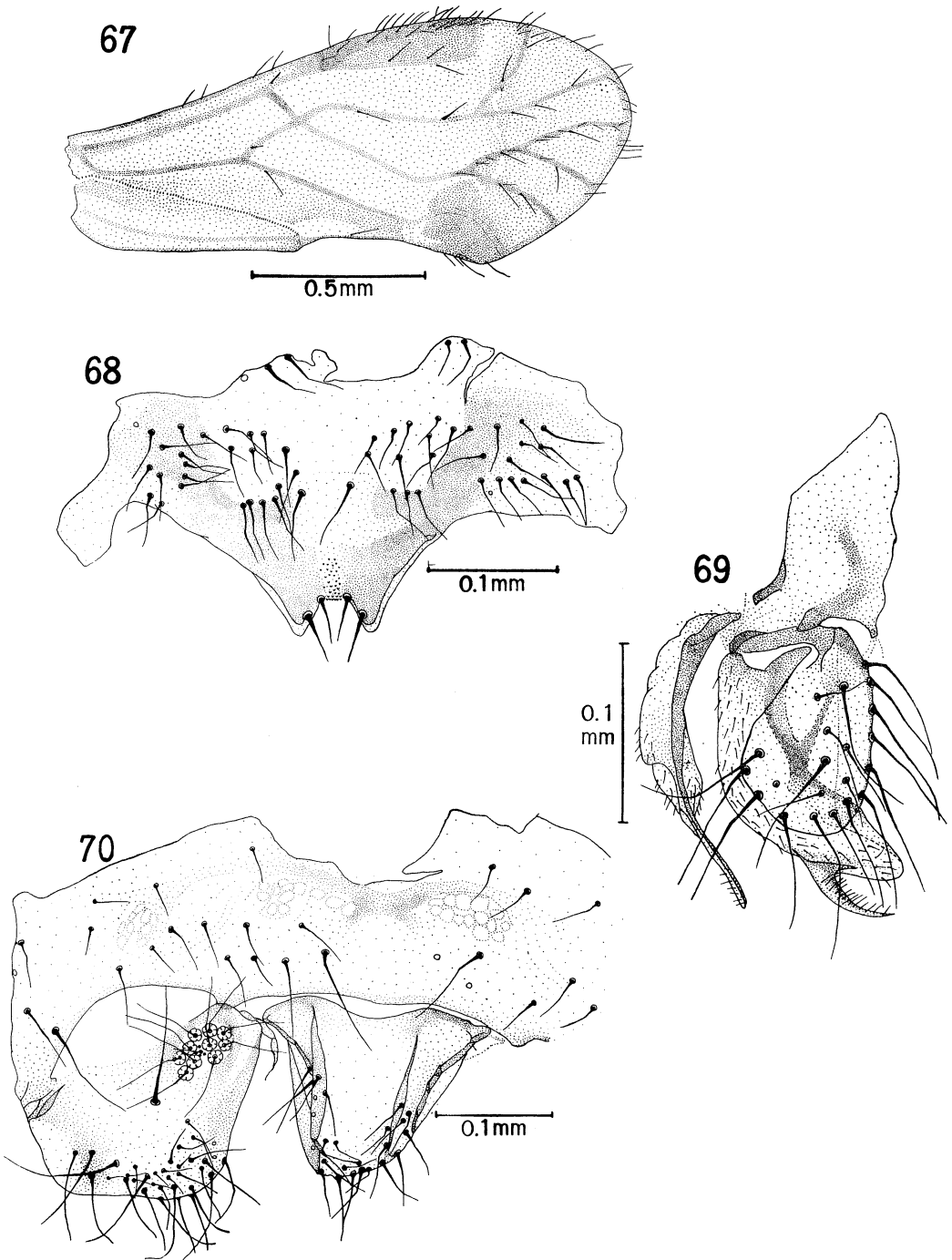
*Morphology*: I.O.:D.=2.4:1. In fore wing (fig. 67) veins  $rs$  and  $m$  meet at a point;  $r_{2+3}$ , and  $r_{4+5}$  divergent; pterostigma somewhat rectangular with blunt distal end. Hind wing with 1 seta on  $r_{4+5}$ , otherwise veins bare. Hind leg with 13 ctenidiobothria on proximal tarsal segment (all 5 specimens); small preapical tooth on claw. *Subgenital plate* (fig. 68): with a pair of pointed apical lobes, each lobe bearing 2 sub-apical setae on its mesial border, between bases of basal pair of setae a field of papillae. *Gonapophyses* (fig. 69): ventral valve with foliaceous lobe and a pointed styliform projection both covered with short spine-like bristles; dorsal valve with foliaceous lobe larger, its surface beset with bristles, stylet short and bristled, curving inwards and hardly projecting beyond lobate portion of valve; outer valve roughly spade-shaped with narrow basal and wide distal end, surface covered with a number of long setae and a few short ones. *Tergite 9* (fig. 70) with narrow band of sclerotization near anterior margin. Paraproct with a field of 10 trichobothria.

*Dimensions*: Body length in alcohol: 1.4 mm. Dimensions of other characters as in Table VIII.

♂. Unknown.

Holotype ♀ (BISHOP 7176), Waris, NW New Guinea, 8. VIII. 1959, at light, T.C. Maa. Paratypes: 4 ♀♀, Selangor, Malaya, 12, 13. VIII. 1963, beating dead vegetation, Lee. (See also p. 38).





**Figs. 67-70.** *Heterocaecilius kobus*, ♀: 67, fore wing; 68, subgenital plate; 69, gonapophyses; 70, apex of abdomen.

**Table IX.** Length (in mm) of various characters of specimens of *Heterocaecilius gressitti*, *H. stiliger* and *Pseudocaecilius cornutus*

Character	<i>H. gressitti</i> ♀	<i>H. stiliger</i> ♀	<i>P. cornutus</i> 2 ♂♂	
A	—	—	—	—
f <sub>1</sub>	0.270	0.490	—	0.480
f <sub>2</sub>	0.140	0.330	—	0.300
f <sub>1</sub> /f <sub>2</sub>	1.92	1.50	—	1.57
Fw	1.300	2.200	2.200	2.200
Hw	1.000	1.700	1.700	1.700
Hf	0.310	0.530	0.570	0.510
Ht	0.560	0.970	0.980	0.940
t <sub>1</sub>	0.195	0.415	0.360	0.315
t <sub>2</sub>	0.085	0.135	0.105	0.080
t <sub>1</sub> /t <sub>2</sub>	2.24	3.03	3.39	3.95

***Heterocaecilius gressitti*** Lee and Thornton, new species Figs. 71-74.

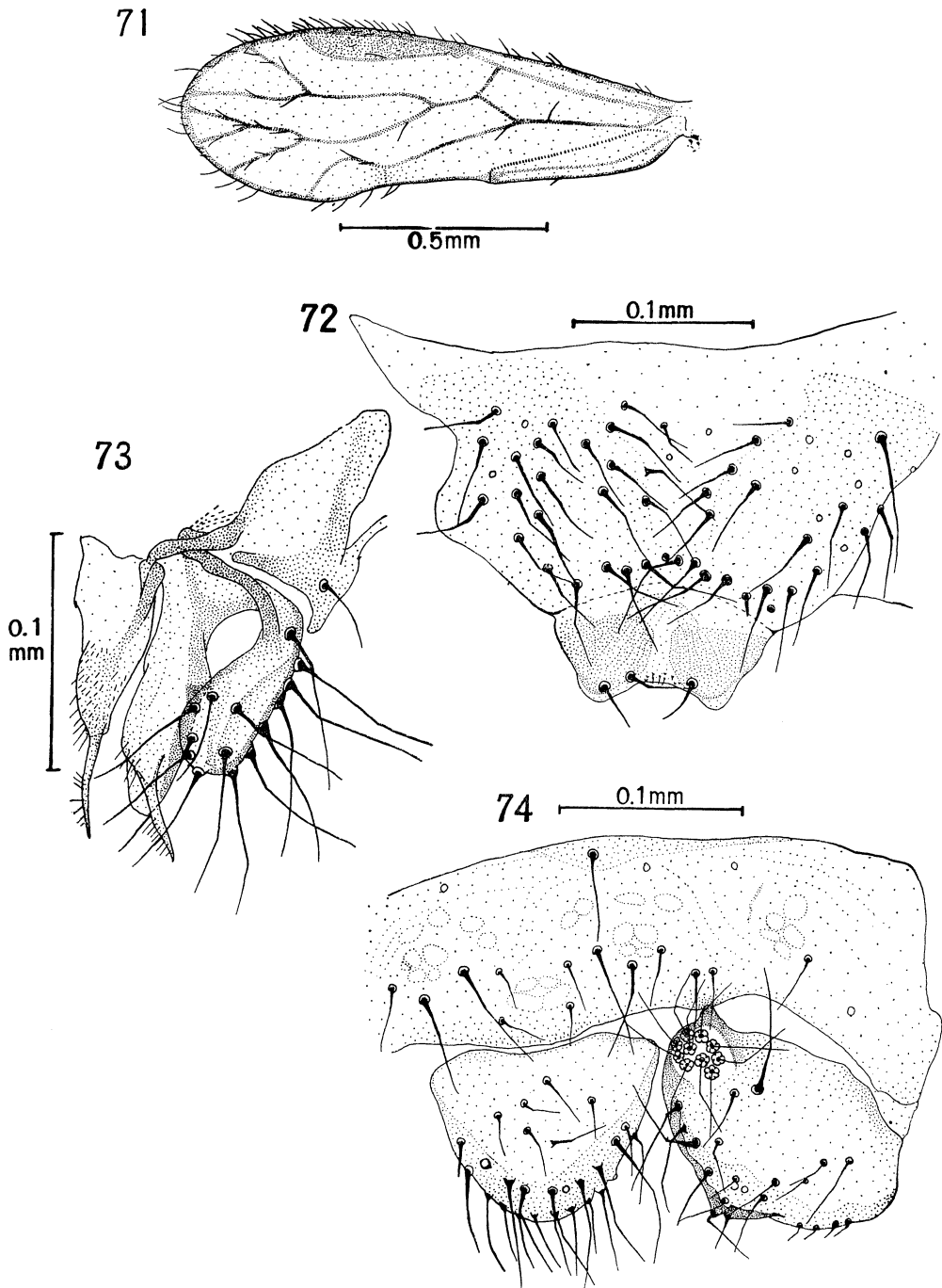
♀. *Coloration* (after 3 years storage in alcohol): General color, buff; clypeus, anteclypeus and labrum slightly darker. Eyes black, ocelli pale and indistinct. Maxillary palps damaged. Antenna (damaged) with scape and pedicel brown, basal 2 flagellar segments light brown. Thorax uniformly brown, sutures not distinct. Fore wing (fig. 71) hyaline with slightly darker pterostigma; veins light yellow-brown. Hind wing hyaline with slightly darker veins. Legs very light brown, claws brown, dark brown area on inner surface of femur at its junction with tibia and one on tibia along distal 1/2 of its length. Abdomen very pale brown with deep brown apex.

*Morphology*: I. O.: D=3.6:1. Clypeus markedly convex. In fore wing (fig. 71) veins *rs* and *m* fuse for a considerable distance; *r*<sub>2+3</sub> and *r*<sub>4+5</sub> divergent; veins *m*<sub>1</sub> and *m*<sub>2</sub> short. Hind wing with *r*<sub>2+3</sub>, *r*<sub>4+5</sub> and *m* bare; *r*<sub>2+3</sub> perpendicular to front edge of wing. Hind leg with 12 ctenidiobothria on proximal tarsal segment; no pre-apical tooth on claw. *Subgenital plate* (fig. 72): apical lobes broad and indistinct from apical portion of plate, each bearing a long seta at base of mesial border, near apex of 1 lobe a sub-apical seta; between basal pair of setae a field of fine spinelets; ciliation dense, a sub-apical row of setae extending across plate in a shallow curve. *Gonapophyses* (fig. 73): ventral valve lobate, narrowly triangular, produced into a stylet beset with bristles, lobe densely covered with bristles at base of stylet; dorsal valve similar with relatively broader lobe and shorter stylet; outer valve narrow, elongate, round and broader distally, surface beset with several long setae. *Paraproct* (fig. 74) with a field of 10 trichobothria.

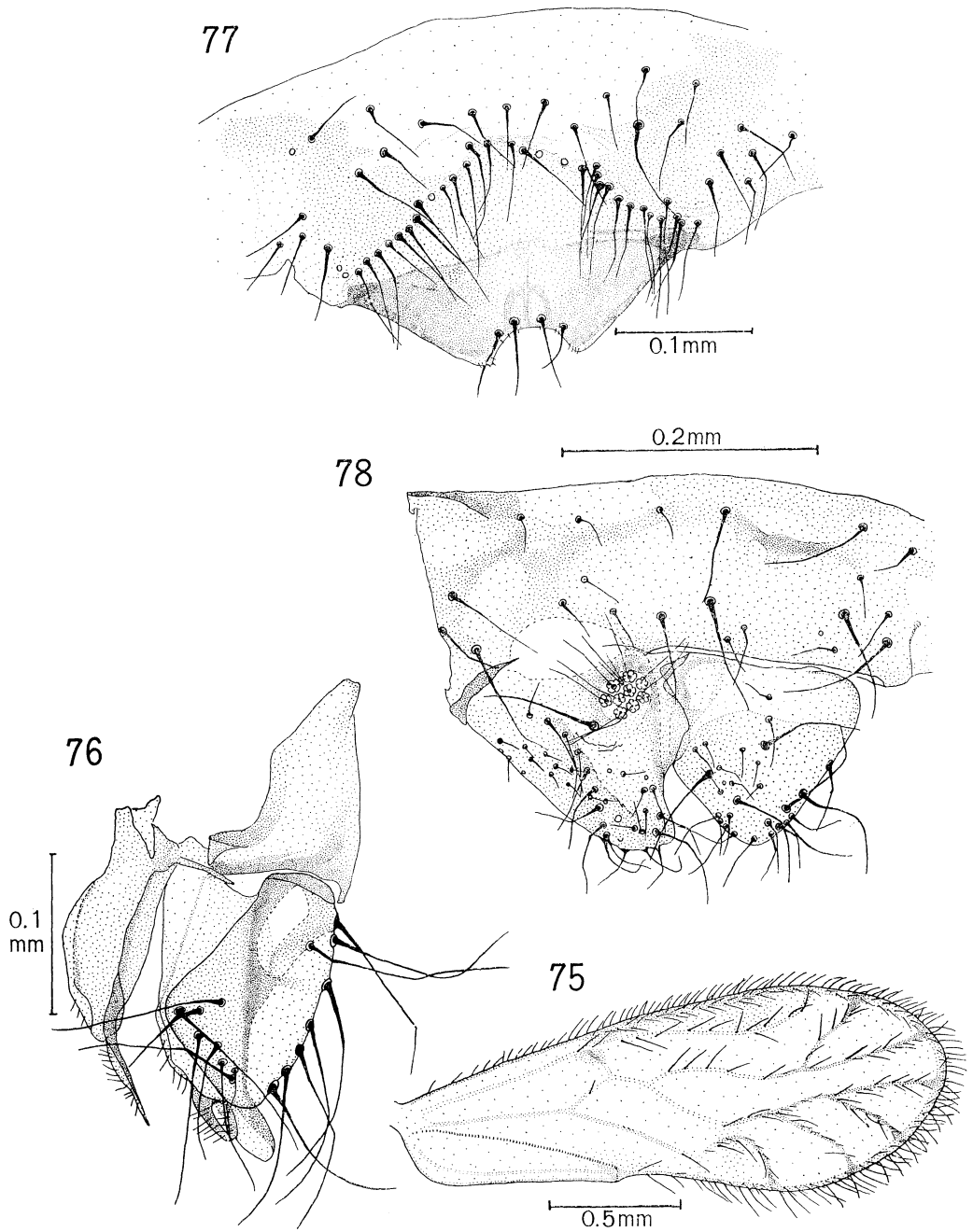
*Dimensions*: Body length (in alcohol): 1.4 mm. Dimensions of other characters as in Table IX.

♂. Unknown.

Holotype ♀ (BISHOP 7177), Oriomo, W. District, SE New Guinea (Papua), 28. X. 1960, ex *Calamus*, J. L. Gressitt.



**Figs. 71-74.** *Heterocaecilius gressitti*, ♀: 71, fore wing; 72, subgenital plate; 73, gonapophyses; 74, apex of abdomen.



**Figs. 75-78.** *Heterocaecilius stiliger*, ♀: 75, fore wing; 76, gonapophyses; 77, subgenital plate; 78, apex of abdomen.

**Heterocaecilius stiliger** Lee and Thornton, new species Figs. 75-78.

♀. *Coloration* (after 4 years storage in alcohol): Generally buff. Eyes black, ocelli pale and indistinct. Maxillary palp buff. Antenna (damaged) buff. Terga and pleura of thorax buff. An irregular dark band stretches from metathorax to prothorax on either side just above coxae of legs. Fore wing (fig. 75) light buff with brown veins, distal tips of veins darker; areola postica and pterostigma with light brown pigmentation. Hind wing hyaline, veins faint and indistinct. Legs very light buff, claws brown. Abdomen light brown.

*Morphology*: I.O.:D.=2.7:1. Vertex, frons and clypeus beset with bristles, some long and thick. In fore wing (fig. 75) veins *rs* and *m* fuse for a distance; areola postica short and rounded. In hind wing veins  $r_{4+5}$  and *m* setose. Hind leg with 21 ctenidobothria on proximal tarsal segment; pre-apical tooth present on claws. *Subgenital plate* (fig. 77): apical lobes small, indistinct, each bearing 2 setae at base of mesial side which is covered with fine short spinelets. A well-defined V-shaped sub-apical row of long thick setae on plate. *Gonapophyses* (fig. 76); ventral valve lobate, with bristled stylet; dorsal valve similar, stylet not projecting beyond foliaceous lobe; outer valve oblong, wider distally, several long setae along distal and lateral edges. *Tergite 9* (fig. 78) with an irregular band of sclerotization along anterior border. Paraproct conical, curved mesially, with a field of 9 trichobothria. Epiproct with blunt conical apex.

*Dimensions*: Body length (in alcohol): 1.8 mm. Dimensions of other characters as in Table IX.

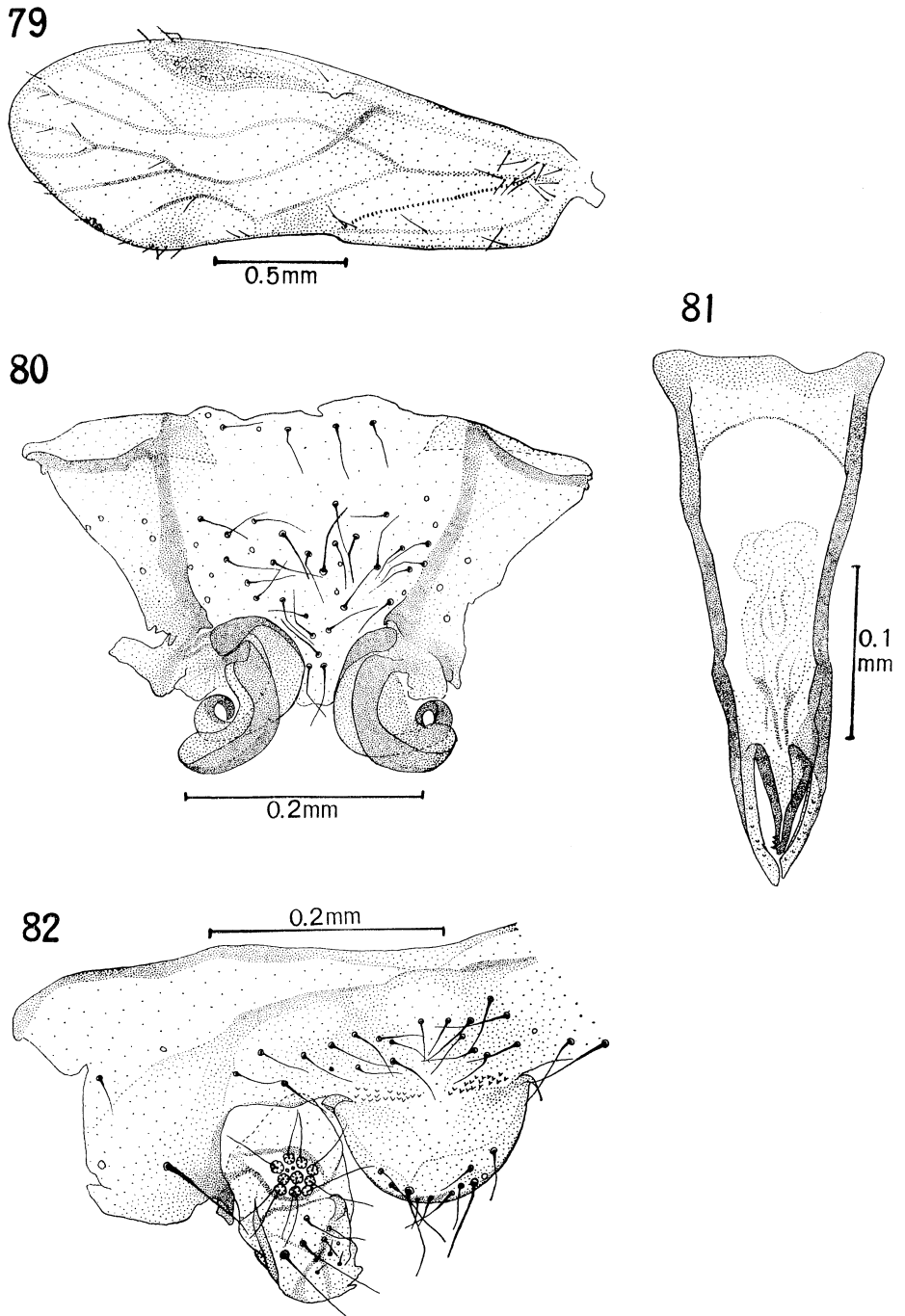
♂. Unknown.

Holotype ♀ (BISHOP 7178), Waris, NW New Guinea, 8. VIII. 1959, at light, T. C. Maa.

**Pseudocaecilius cornutus** Lee and Thornton, new species Figs. 79-82.

♂. *Coloration* (after 4 years storage in alcohol): Head generally light brown, brown markings on vertex and mesial borders of eyes, brown band between orbit and antennal socket. Clypeus with brown diagonal striae. Eyes coffee black, ocelli pale. Maxillary palp light brown with basal segment slightly darker. Antenna (damaged) with proximal flagellar segment light brown, pedicel and scape brown. Pleura and terga of metathorax brown; terga of mesothorax darker; lateral brown band on thorax above coxae. Fore wing (fig. 79) hyaline with brown pigmentation in distal part of pterostigma, areola postica and distal angle of  $Cu_1$  cell; veins brown, lighter in some areas. Hind wing hyaline with light brown veins. Legs with light brown coxae and femora, slightly darker tibiae and tarsi. Abdomen light brown.

*Morphology*: I.O.:D.=0.9:1. (value for paratype=1.1). Vertex, frons, and clypeus beset with bristles, some on vertex thick and long. In fore wing (fig. 79) veins *rs* and *m* meet at a point (in paratype they unite for a short distance). Hind wing with veins  $r_{2+3}$ ,  $r_{4+5}$  and *m* setose. Hind leg with 16 ctenidobothria on proximal tarsal segment; no pre-apical tooth on claw. *Hypandrium* (fig. 80): apically with 2 pairs of broad heavily sclerotized, curved hooks, the mesial pair tightly curled apically. *Penis frame* (fig. 81) triangular, with wide base, high apex, inner parameres fused apically, point of fusion serrated; outer parameres separate, convergent. At base of epiproct posterior edge of abdominal tergite 9 (fig. 82) bears 2 fields of papillae; anterior margin



**Figs. 79-82.** *Pseudocacilius cornutus*, ♂: 79, fore wing; 80, hypandrium; 81, penis frame; 82, apex of abdomen.

of tergite lightly sclerotized; ciliation practically confined to posterior region close to papillae. Paraproct with a field of 10 trichobothria. Epiproct of paratype with apical field of fine papillae (not visible in holotype).

*Dimensions*: Body length (in alcohol): 2.1 mm. (Paratype: 1.3 mm, abdomen telescoped). Dimensions for other characters as shown in Table IX.

♀. Unknown.

Holotype ♂ (BISHOP 7179), Kampong Landbouw, Biak I., NW New Guinea, 28. V. 1959, J. L. Gressitt. Paratype: ♂, Waris, NW New Guinea, 31. VII. 1959, at light, T. C. Maa.

### **Pseudocaecilius testaceus** Enderlein

*Pseudocaecilius testaceus* Enderlein, 1903, Ann. Hist.-Nat. Mus. Hung. 1: 262; 1931, Trans. Linn. Soc. Lond. 19 (2): 212.—Soehardjan, 1958, Idea 11: 31.

DISTRIBUTION: New Guinea.

### **Ophiodopelma permaculatum** Lee and Thornton, new species Figs. 83-86.

♂. *Coloration* (after about 4 years storage in alcohol): Head generally brown, 2 pale spots on clypeus along mesial border of each antennal socket, a short pale transverse band on vertex on each side mesial to orbit, a pale quadrilateral area enclosing a brown cross with unequal arms above and between antennal sockets. Eyes coffee black, ocelli pale. Maxillary palp light brown darkening basally, with pale bands at 2 apical joints. Antenna with brown scape, otherwise light brown. Thoracic terga pale; pleura brown with pale areas. Fore wing (fig. 83) hyaline with brown pigmented patches, veins brown, paler here and there. Hind wing hyaline, veins paler, brown at distal ends. Legs: coxa and proximal 2/3 of femur brown, femur lighter distally, tibia light brown, tarsus very light brown. Abdomen pale, a slightly darker backwardly directed median dorsal knob on each of 4 anterior segments.

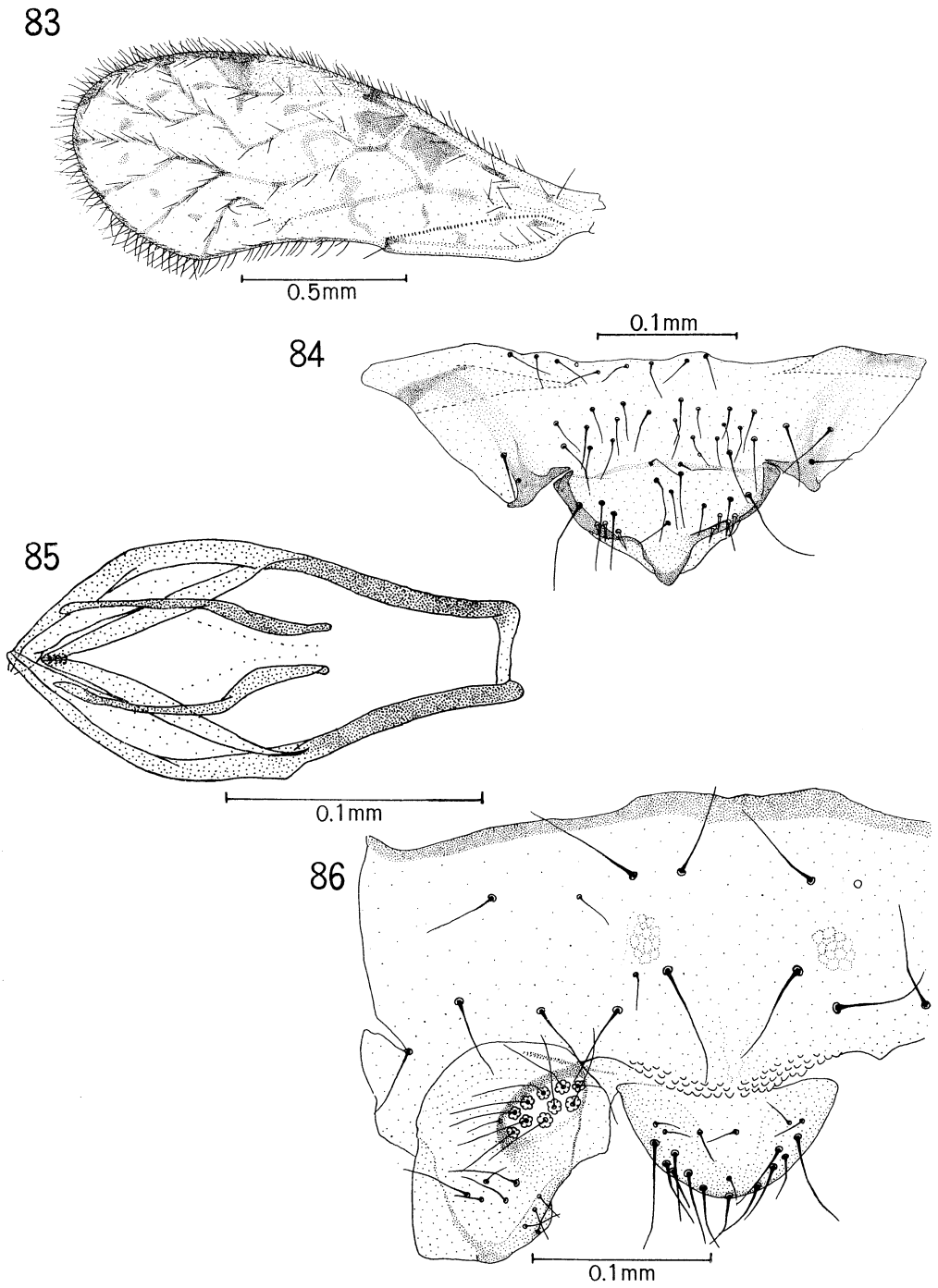
*Morphology*: I.O.:D. = 1.7:1 (both specimens). Vertex with wedge-shaped depression. In fore wing (fig. 83) *rs* and *m* fuse for a distance in both specimens. In hind wing *r*<sub>4+5</sub> setose; *r*<sub>2+3</sub> very short, almost perpendicular to front edge of wing. Proximal hind tarsal segment with 13 ctenidiobothria (both specimens); claw untoothed. *Hypandrium* (fig. 84): roughly triangular, tapering apically, with 4 short stout setae on one, 3 on the other side; accessory sclerites absent. *Penis frame* (fig. 85) narrow at base; inner parameres fused at apex, point of fusion serrated; outer parameres broad, convergent; radula with a pair of rod sclerites. *Tergite 9* (fig. 86) with anterior marginal sclerotized band and a field of papillae at posterior margin along base of epiproct; epiproct semi-circular; paraproct with 10 trichobothria.

*Dimensions*: Body length (in alcohol): 1.6 mm (paratype 1.4 mm). Dimensions of other characters as in Table VII.

♀. Unknown.

Holotype ♂ (BISHOP 7180), Waris, NW New Guinea, 8. VIII. 1959, T. C. Maa. Paratype: 1♂, Oriomo, W. District, SE New Guinea (Papua), 28. X. 1960, J. L. Gressitt.

Enderlein's description of the fore wing of *O. ornatipenne* End. 1908 from southern Taiwan, fits this species in all respects except that the pale transverse fascia is described as extending from the stigma sac to the node, and the pterostigma is described simply



**Figs. 83-86.** *Ophiodopelma permaculatum*, ♂: 83, fore wing; 84, hypandrium; 85, penis frame; 86, apex of abdomen.



as "brown". No figure was provided. In this species the broken fascia reaches the pterostigma distal to the stigma sac, and the pterostigma is brown only distally. Roesler (1940 b) described the female genitalia of *O. ornatipenne* without figures. Tarsal ratio (not lengths), ctenidiobothria number, fore wing and body length, are similar in the two species.

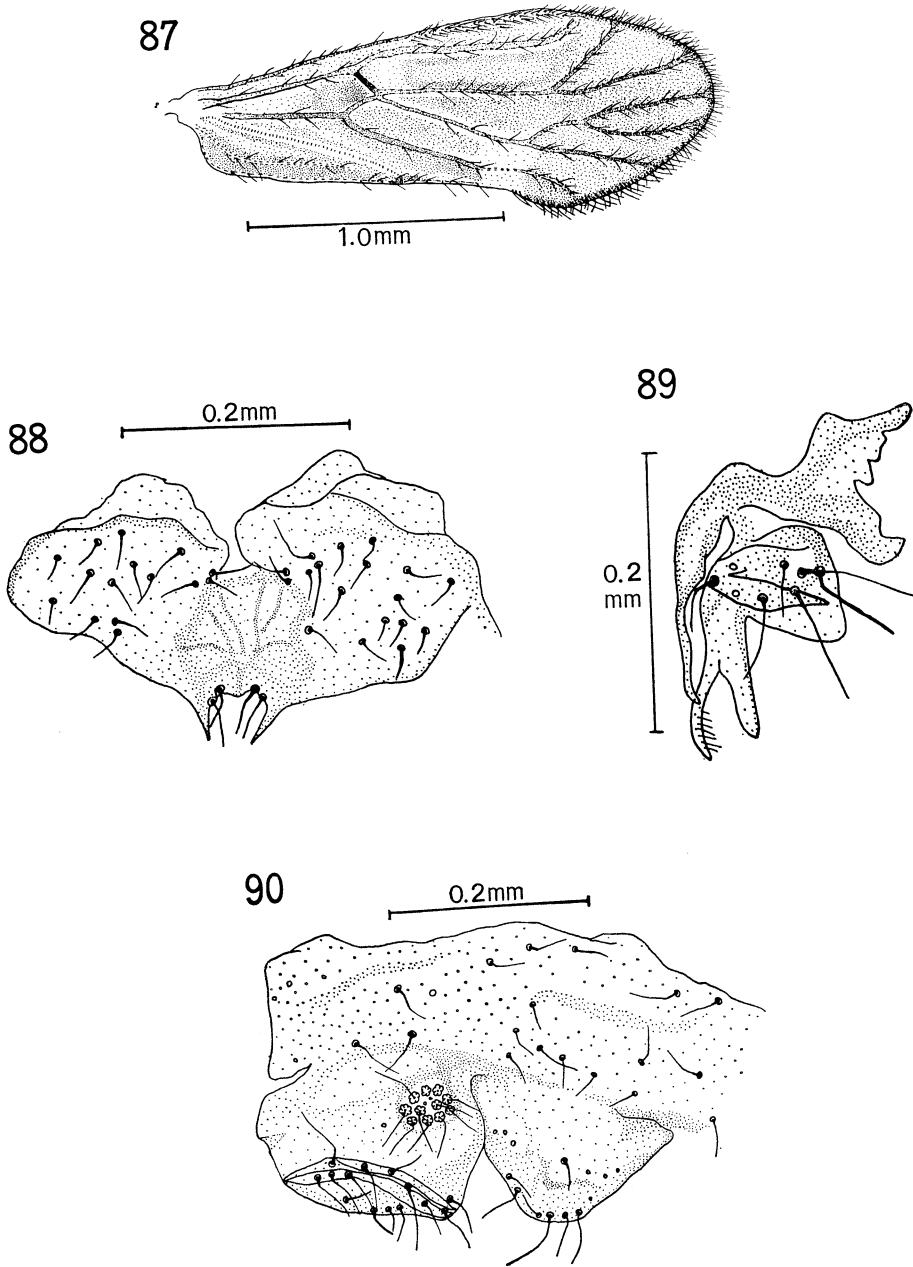
There seems little doubt that the two species are very similar, but in the absence of information on the male genitalia of *O. ornatipenne*, and the slight but nevertheless distinct differences from the description of the fore wing pattern of that species, the New Guinea specimens are not identified with it.

This species also differs from *O. multipunctata* (Hagen), from Ceylon and the Philippines, in fore wing pattern.

*H. kobus* and *H. gressitti* differ from the other species of the Papuan subregion and from each other in the nature of the venation and pigmentation of their wings, and in their genitalia. In the fore wing of *H. gressitti*, veins  $r_{4+5}$  and  $m$  converge towards each other at the distal margin of the wing. The fore wing of *H. kobus* has a narrow colorless band across the proximal parts of its marginal cells, including the areola postica, and a colorless area at the distal part of cell  $Cu_1$ . *H. stiliger* and *P. cornutus* bear some resemblance to *P. elutus* in the pigmentation of the fore wings; they differ from each other in the shape of the areola postica, in the mode of branching of  $m$  and  $rs$  and in the presence (*H. stiliger*) and absence (*P. cornutus*) of a pre-apical tooth on the claw. *P. cornutus* differs from *P. elutus* in the following genitalic characters: hypandrium with two pairs of sclerotized hooks, the median pair curved apically into a spiral (one pair in *P. elutus*); ratio of length of external parameres to length of penial frame=1:3 (2:3 in *P. elutus*); epiproct with apical field of fine papillae (papillae in *P. elutus* not in a discreet field) It is closely similar to *P. helicoides* from Malaya (see above). *H. stiliger* differs from *P. elutus* markedly in female genitalia.

**Table X.** Length (in mm) of various characters of ♀♀ of *Heterocaecilius adamsi*

Characters	No. of Specimens N	Range	Mean ± S. D.
A	2	1.450-1.690	—
$f_1$	3	0.370-0.390	0.385 ± 0.100
$f_2$	3	0.250-0.270	0.260 ± 0.010
$f_1/f_2$	3	1.38 -1.65	1.528 ± 0.114
Fw	8	1.950-2.250	2.130 ± 0.080
Hw	7	1.750-2.150	1.663 ± 0.069
Hf	8	0.470-0.530	0.502 ± 0.030
Ht	8	0.790-0.900	0.856 ± 0.017
$t_1$	7	0.280-0.320	0.303 ± 0.017
$t_2$	7	0.100-0.115	0.110 ± 0.006
$t_1/t_2$	7	2.46 -2.94	2.791 ± 0.149



**Figs. 87-90.** *Heterocaecilius adamsi*, ♀: 87, fore wing; 88, subgenital plate; 89, gonapophyses; 90, apex of abdomen.

## POLYNESIAN SUBREGION

*Micronesia***Heterocaecilius adamsi** Lee and Thornton, new species Figs. 87-90.

♀. *Coloration* (after softening in dil. NaOH following 13 years dry storage): Head generally brown, slightly darker around inner borders of eyes, vertex and on clypeus. Borders of antennal sockets dark. Anteclypeus and labrum light brown. Frontal sutures faint. Sagittal suture dark, distinct. Eyes and ocelli pale. Maxillary palp brown becoming lighter towards its base. Flagellum of antenna light brown, darkening basally; scape and pedicel brown. Antedorsum and dorsum of mesothorax brown, pleura and metathorax lighter. Pleural sutures distinct. Mesosternum brown. Fore wing (fig. 87) brown except for 3 hyaline patches: at proximal 1/4 of cell  $R_1$ ; base of wing spreading to proximal tip of cells  $Cu_1$  and  $Cu_2$ , 1/2 of cell  $R$  and all of cell  $Sc$ ; proximal end of areola postica, middle of cell  $M$  and posterior margin of apex of cell  $Cu_1$ . Veins brown, bordered on each side by narrow hyaline strips. Hind wing light brown, veins brown, bordered by hyaline strips as in fore wing. Leg with femur and coxa brown, tibia and tarsus light brown, trochanter pale. Abdomen light brown.

*Morphology*: I.O.:D=2.9:1 (average of 7 specimens: 2.7). Veins  $rs$  and  $m$  in fore wing (fig. 87) joined by a short vein (7 specimens) or meet at a point (1 specimen). In hind wing veins  $r_{2+3}$ ,  $r_{4+5}$  and  $m$  setose, rest of veins bare. Number of ctenidiobothria on proximal hind tarsal segment: 15 (range of 7 specimens=12-16); claw without pre-apical tooth. *Subgenital plate* (fig. 88): apical lobes small, pointed, each with 2 setae at base of mesial border. *Gonapophyses* (fig. 89): ventral valve lobate, bearing a styliform projection beset with fine spinelets: dorsal valve lobate, its bristled stylet projecting very slightly beyond lobe; outer valve triangular with rounded apices and bearing about 8 long setae. *Paraproct* (fig. 90) with a field of 11 trichobothria.

*Dimensions*: Body length (in alcohol): 1.6 mm (average of 6 specimens: 1.3 mm). Dimensions of other characters as in Table X.

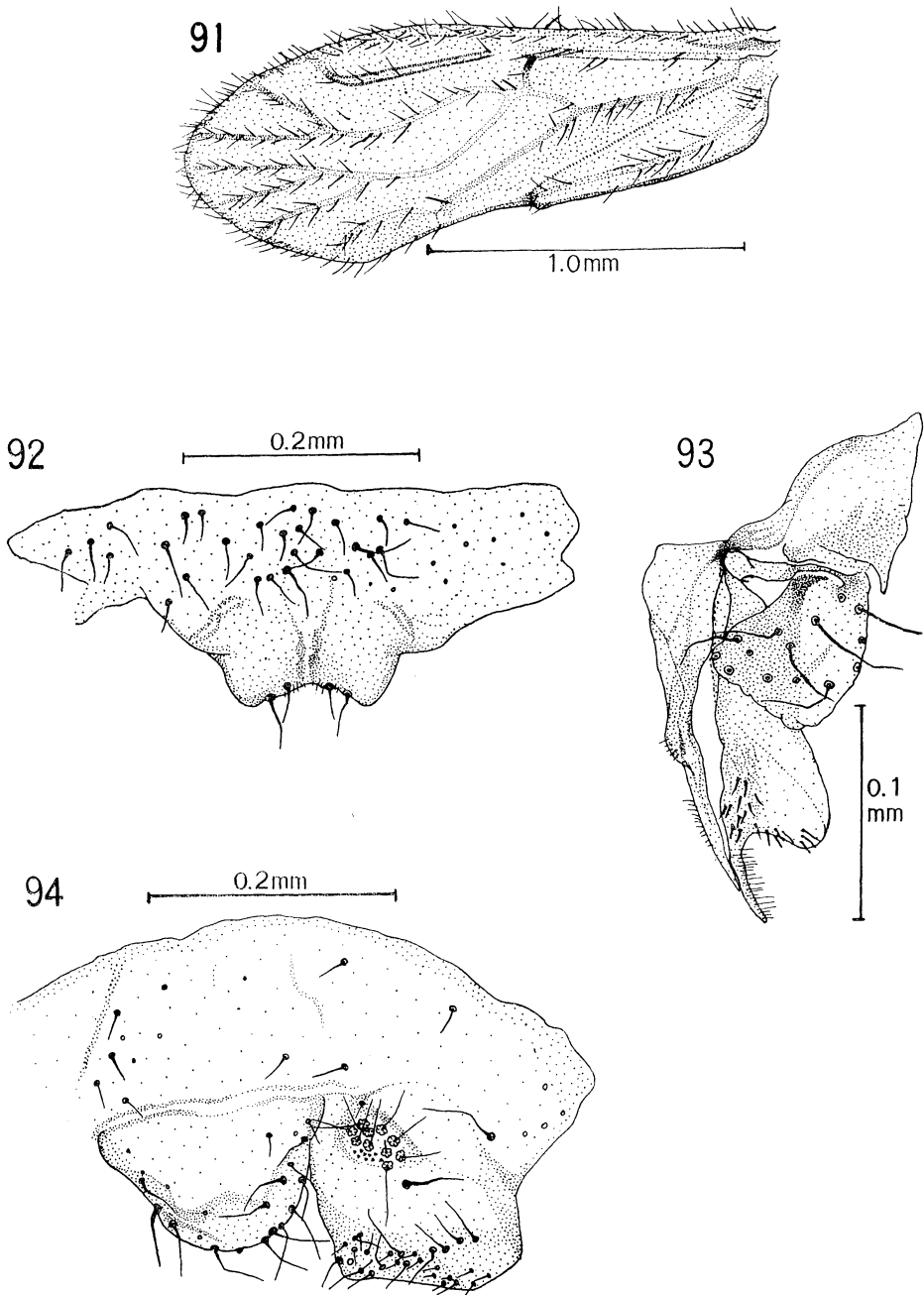
♂. Unknown.

Holotype ♀ (USNM 69424), Mt Tamatamansakir, 424 m, Ponape, Caroline Is., 6. IX. 1950, P. A. Adams. Paratypes: 2 ♀♀, Ponape, Caroline Is., 363-606 m, 10. VIII. 1946, H. K. Townes; 5 ♀♀, Mt Beirut, Ponape, Caroline Is., 6. IX. 1950, Adams.

This species is apparently endemic to Ponape. The narrow pointed apical lobes of the subgenital plate are distinctive.

**Heterocaecilius minotus** Lee and Thornton, new species Figs. 91-97.

♀. *Coloration* (after softening in dil. NaOH following 11 years dry storage): Markings on head leave a faint X-shaped area on vertex and frons. Sagittal suture dark brown, distinct. Frontal sutures not apparent. Anteclypeus and clypeus light brown, latter with faint diagonal striae. Eyes pale. Ocelli pale, situated on brown protuberance. Maxillary palp brown, proximal end of each segment pale. Labrum brown. Antenna uniformly pale brown. Thorax generally light brown with antedorsum and dorsum of mesothorax slightly darker. Fore wing (fig. 91) light brown with darker veins; membrane with a hyaline area at vein  $cu_{1b}$  and distal end cell of  $Cu_1$  and a hyaline transverse band at proximal end of cell  $R_1$  and pterostigma; pterostigma granulated in



**Figs. 91-94.** *Heterocaecilius minotus*, ♀: 91, fore wing; 92, subgenital plate; 93, gonapophyses; 94, apex of abdomen.

**Table XI.** Length (in mm) of various characters of *Heterocaecilius minutus*

Characters	N	♂		N	♀	
		Range	Mean ± S. D.		Range	Mean ± S. D.
A	—	—	—	2	1.180–1.350	—
f <sub>1</sub>	5	0.310–0.470	0.404 ± 0.053	9	0.290–0.370	0.316 ± 0.024
f <sub>2</sub>	3	0.170–0.290	0.243 ± 0.044	9	0.170–0.240	0.202 ± 0.022
f <sub>1</sub> /f <sub>2</sub>	3	1.53–1.84	1.650 ± 0.135	9	1.41–1.84	1.572 ± 0.131
Fw	8	1.700–1.900	1.750 ± 0.066	13	1.470–1.900	1.808 ± 0.104
Hw	8	1.300–1.600	1.420 ± 0.070	13	1.200–1.550	1.465 ± 0.080
Hf	6	0.390–0.470	0.431 ± 0.027	13	0.320–0.430	0.416 ± 0.030
Ht	6	0.670–0.850	0.760 ± 0.052	13	0.570–0.800	0.736 ± 0.052
t <sub>1</sub>	6	0.255–0.295	0.278 ± 0.014	13	0.255–0.280	0.268 ± 0.011
t <sub>2</sub>	6	0.100–0.105	0.101 ± 0.001	13	0.090–0.110	0.100 ± 0.006
t <sub>1</sub> /t <sub>2</sub>	6	2.53–2.90	2.741 ± 0.117	13	2.27–2.87	2.664 ± 2.195

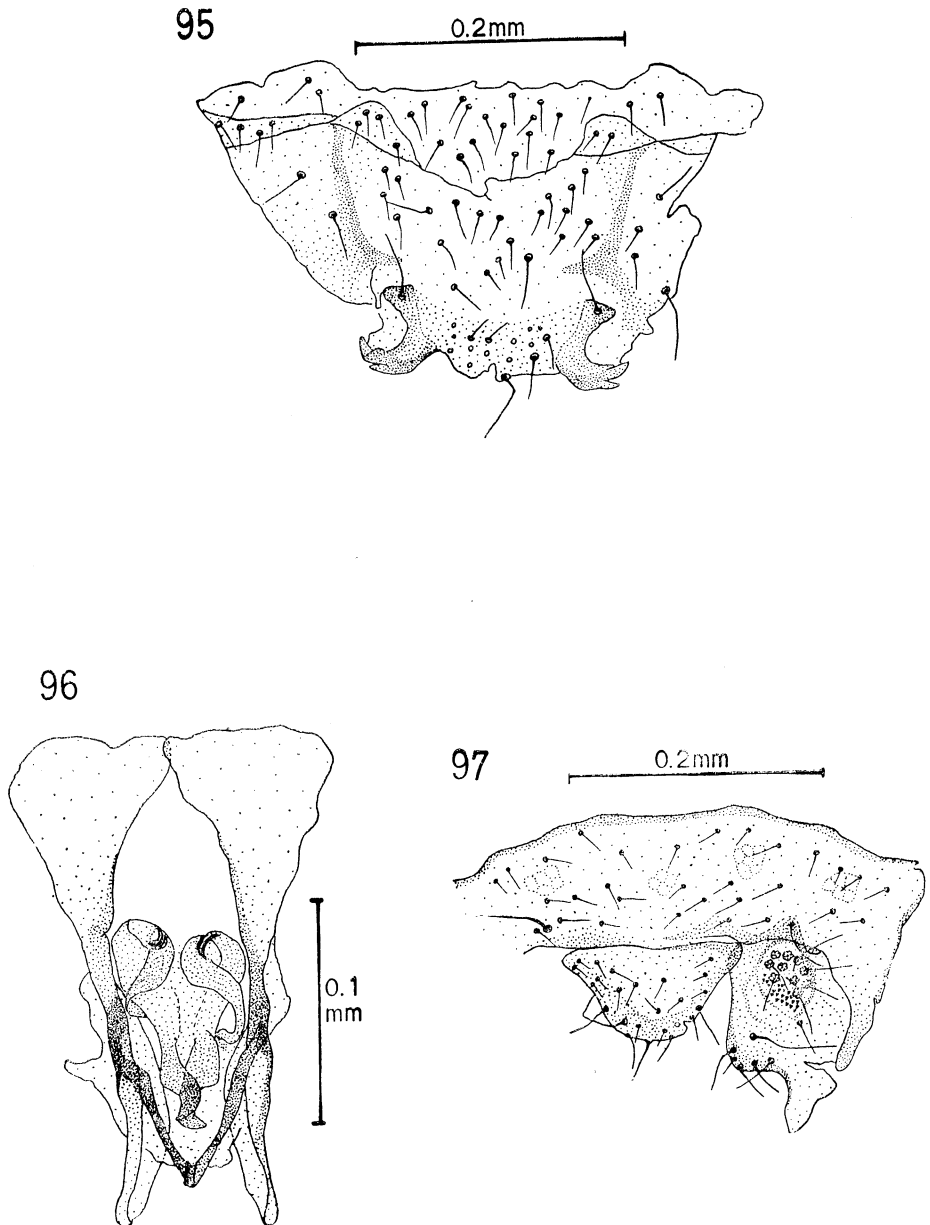
a specimens; posterior margin of pterostigma with distinct brown border. Hind wing very pale brown, distinct brown veins. Legs light brown with darker coxae and tarsi. Abdomen light brown.

*Morphology*: I.O.:D.=2.5:1 (average of 10 specimens: 2.5). In fore wing (fig. 91) veins *rs* and *m* fused for a short distance in all 15 specimens studied. In hind wing *r*<sub>4+5</sub> setose, otherwise veins bare. Number of ctenidiobothria on proximal hind tarsal segment: 15 (range of 13 specimens: 12–15); small preapical tooth on only one of the pair of claws. *Subgenital plate* (fig. 92): apically bilobed, lobes low and wide, their mesial borders forming a shallow median indentation bearing 4 setae and short, fine bristles. *Gonapophyses* (fig. 93): ventral valve with foliaceous lobe bearing a rather long styliform arm covered with bristles; dorsal valve similar but with larger foliaceous lobe, stylet projects beyond lobe and is slightly curved in direction of lobe, lobe near base of stylet covered with short stout spine-like bristles; outer valve roughly spade-shaped, bearing approximately 10 long setae and some shorter ones. Paraproct (fig. 94) with a field of 10 trichobothria and a cluster of spinous papillae within borders of field.

*Dimensions*: Body length (in alcohol): 1.3 mm (average of 12 specimens: 1.4 mm). Dimensions of their characters as in Table XI.

♂. *Coloration* (after softening in dil. NaOH following 10 years dry storage): Head generally dark brown, anteclypeus and labrum lighter. Pale X on frons and vertex not apparent. Eyes and ocelli as ♀. Maxillary palp dark brown with pale segmental junctions. Antenna (broken) with 2 proximal flagellar segments brown, darkening basally, scape and pedicel dark brown. Thorax brown, antedorsum and dorsum of mesothorax darker. Fore and hind wings as ♀. Legs brown, tibiae lighter apically, tarsi light brown. Abdomen light brown.

*Morphology*: I.O.:D.=0.8:1 (average of 4 specimens=0.9). Wings and legs similar to ♀. Number of ctenidiobothria on proximal hind tarsal segment: 13–15 (6 specimens). *Hypandrium* (fig. 95): with apex bearing a pair of posterolaterally curved, apically bifid sclerites. *Penis frame* (fig. 96) with sides greatly expanded basally; outer



**Figs. 95-97.** *Heterocaecilius minotus*, ♂: 95, hypandrium; 96, penis frame; 97, apex of abdomen.

parameres broad and divergent; inner parameres narrow, heavily sclerotized, fused at apex, point of fusion serrated; radula armed with 2 pairs of spirally curved sclerites. *Tergite 9* (fig. 97) with a band of sclerotization along anterior margin, posterior margin laterally produced into a narrow bar forming part of basal attachment for paraproct. Paraproct as in ♀.

*Dimensions*: Body length (in alcohol): 1.5 mm (average of 8 specimens: 1.2 mm). Dimensions of other characters as in Table XI.

Holotype ♀ (USNM 69425), Peleliu, Palau, Caroline Is., 23. XII. 1952, J. L. Gressitt. Allotype ♂ (BISHOP 7181), Ponape, Caroline Is., 11. I. 1953, Gressitt. Paratypes: Caroline Is.: 1 ♂, 3 ♀♀, Ponape, 6. IX. 1950, P. A. Adams; 1 ♀, Auluaptagel, Palau, 7. XI. 1952, sweeping, J. W. Beardsley; 1 ♀, Babelthuap, Palau, 9. IX. 1952, at light, Beardsley; 2 ♀♀, Koror, Palau, IX. 1952, N. L. H. Krauss; 1 ♂, SW Koror, Palau, 25 m, 5. XII. 1952, light trap, Gressitt; 1 ♀, Auluaptagel, Palau, 25 m, 13. XII. 1952, Gressitt; 1 ♀, Peleliu, Palau, 23. XII. 1952, Gressitt; 1 ♂, Tol I., Truk, 390 m, 31. XII. 1952, Gressitt; 2 ♀♀, Tol. I., Truk, 390 m, 2. I. 1953, Gressitt; 1 ♀, Mt Tamatamansakir, Ponape, 180 m, 11. I. 1953, Gressitt; 1 ♀, Matanluk, Kusaie, 23. I. 1953, Gressitt; 1 ♀, Mt Matante, Kusaie, 580 m, 10. III. 1953, beating, J. F. G. Clarke; 1 ♀, Peleliu, Palaus, 5. VIII. 1944, E. Hagen; 1 ♂, Babelthuap, Palau, 22. V. 1957, at light. Marshall Is.: 1 ♂, Ebon Atoll, 27. IX. 1953.

This species, apparently widespread along the Carolines and present in the Marshalls, may be distinguished from others of *Heterocaecilius* by the spiral sclerites of the male radula, and the very low apical lobes of the female subgenital plate. The lateral bar of the ninth tergite of the male is similar to the condition found in *P. hirsutus*, though not so well developed.

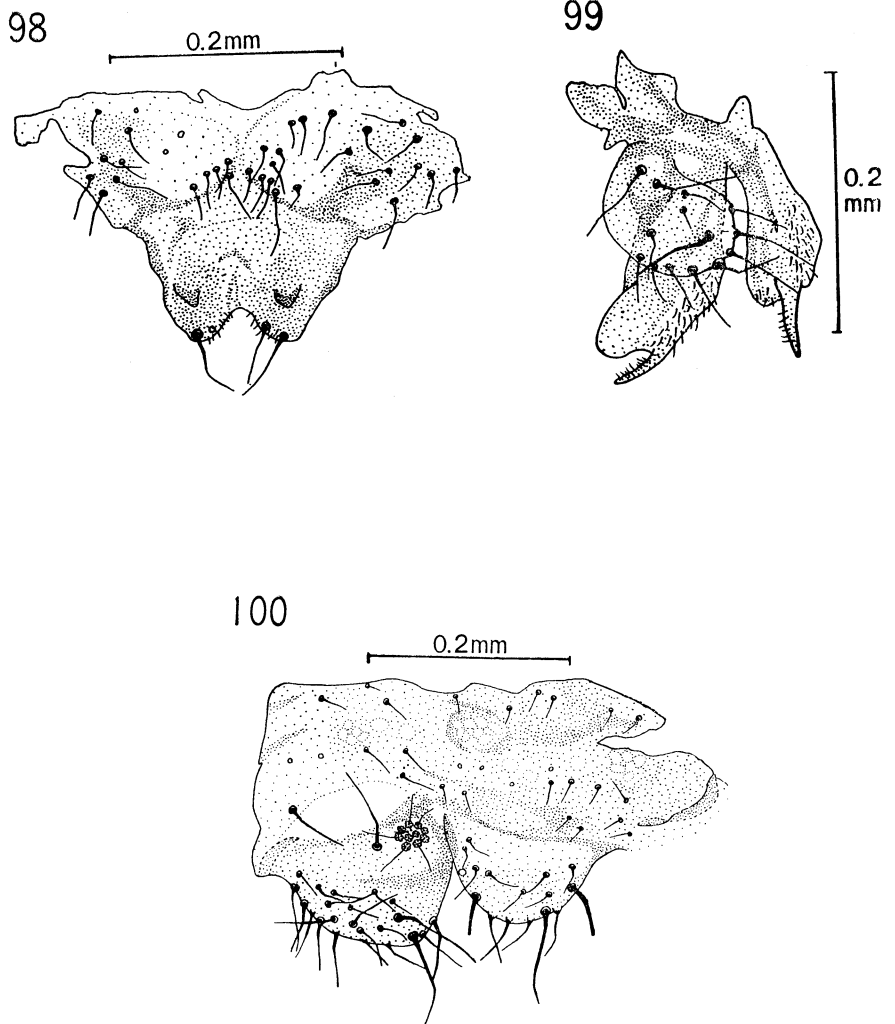
The species has been taken at light on several occasions.

**Table XII.** Length (in mm) of various characters of 2♂♂ and a ♀ of *Heterocaecilius campanula*

Characters	Male		Female
A	1.960	—	—
f <sub>1</sub>	0.520	0.430	0.380
f <sub>2</sub>	0.290	0.250	0.240
f <sub>1</sub> /f <sub>2</sub>	1.77	1.72	1.59
Fw	1.900	1.750	1.900
Hw	1.450	1.350	1.500
Hf	0.430	0.410	0.420
Ht	0.770	0.700	0.690
t <sub>1</sub>	0.255	0.240	0.215
t <sub>2</sub>	0.085	0.075	0.055
t <sub>1</sub> /t <sub>2</sub>	2.91	3.25	4.03

***Heterocaecilius campanula*** Lee and Thornton, new species Figs. 98-104.

♀. *Coloration* (after softening in dil. NaOH following 17 years dry storage): Head light brown, sagittal suture dark, distinct. Eyes and ocelli pale. Maxillary palp light brown. Antenna (damaged) brown, flagellum lighter basally, scape and pedicel light



**Figs. 98-100.** *Heterocacilius campanula*, ♀: 98, subgenital plate; 99, gonapophyses; 100, apex of abdomen.



brown. Thorax generally very light brown, dorsum and antedorsum of mesothorax slightly darker. Pleural sutures dark, distinct. Fore wing hyaline with light brown veins darkening distally. Hind wing hyaline, veins pale brown. Legs very light brown. Abdomen pale brown.

*Morphology*: I.O.:D.=2.9:1. Sagittal suture very long, nearly touching clypeus. Frons reduced with an expansion of vertex forming greater portion of inner border of eye. In fore wing *r*<sub>s</sub> and *m* fuse for a short distance, apical angle of pterostigma acute, areola postica small, veins *m*<sub>2</sub> and *m*<sub>3</sub> diverge forming an hour-glass-shaped *M*<sub>2</sub> cell. Veins in hind wing bare. Number of ctenidiobothria on proximal hind tarsal segment: 14; claw without preapical tooth. *Subgenital plate* (fig. 98): apical lobes well developed, each bearing 2 long setae, mesial borders with short fine bristles, near base of each apical lobe a triangular sclerotization. *Gonapophyses* (fig. 99): ventral valve with very well developed foliaceous lobe bearing apically a stylet beset with fine bristles; dorsal valve with larger foliaceous lobe, stylet projecting only short distance beyond lobe; outer valve rounded, bearing a number of long setae. *Paraproct* (fig. 100) with a field of 10 trichobothria. Epiproct with 4 very stout setae on posterior margin, 3 smaller setae between mesial pair.

*Dimensions*: Body length (in alcohol): 1.3 mm. Dimensions of other characters as in Table XII.

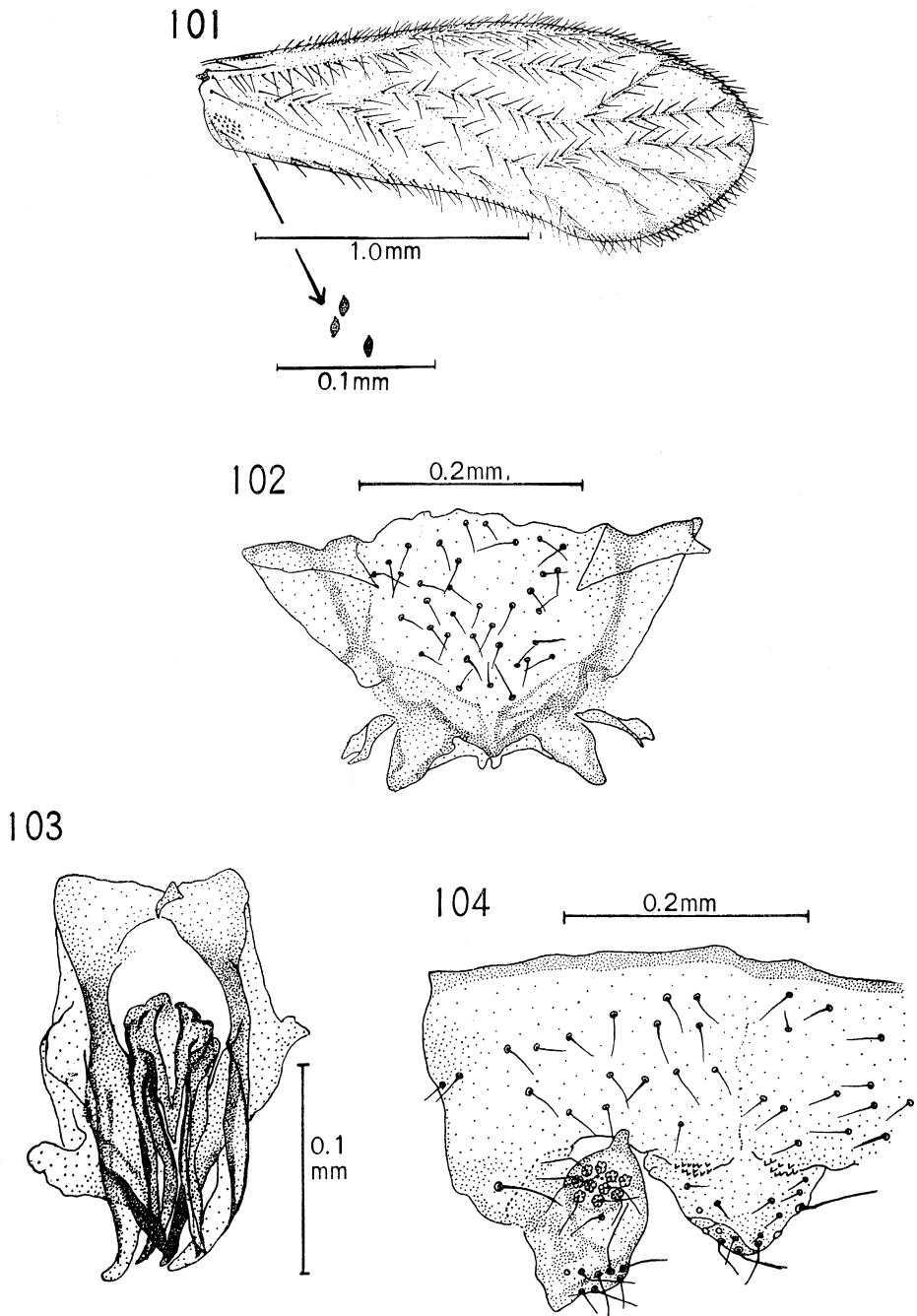
♂. *Coloration* (after softening in dil. NaOH following 17 years dry storage): As ♀ except frons and posterior part of postclypeus pale, maxillary palp very light brown with terminal segment slightly darker, thorax light brown with tergites of mesothorax and metathorax darker, legs uniformly pale, abdomen very light brown.

*Morphology*: I.O.:D.=1.0:1 (value for other specimen: 1.5), eyes larger than those of ♀. Fore wing (fig. 101) as that of ♀ except field of papillae at proximal end of cell *Cu*<sub>2</sub>. Proximal hind tarsal segment with 17 ctenidiobothria (15 in paratype). *Hypandrium* (fig. 102): with posterolateral borders produced into a pair of stout canine-shaped sclerites; apex bears a median pair of short prolongations. *Penis frame* (fig. 103) with lateral borders expanded basally; outer parameres broad and separate, inner parameres heavily sclerotized and fused at apex; radula armed with 3 pairs of heavily sclerotized rods. *Tergite 9* with anterior margin (fig. 104) heavily sclerotized, posterior margin and basal attachment of epiproct with a pair of tubercular fields. Paraproct with a field of 10 trichobothria.

*Dimensions*: Body length (in alcohol): 1.4 mm (both specimens). Dimensions of other characters as in Table XII.

Holotype ♀ (USNM 69426), Kapingamarangi, 3. VIII. 1946, H. K. Townes. Allotype ♂ (BISHOP 7182), Ponape, Caroline Is., 6. I. 1953, light trap, J. L. Gressitt. Paratype: ♂, Majuro Atoll, Marshall Is., 28. VIII. 1946, Townes. 2♂♂, 4♀♀, Gilbert Is. (Butaritari Atoll, Tarawa Atoll).

Described from 4 males and 5 females, this species of the *maculifrons* group of *Heterocaecilius* may be distinguished from other members of the group by the three pairs of rod-like sclerites of the male radula, and the rather simple hypandrium which resembles that of *H. dybasi*. The male is also unique in the group in possessing papillae at the proximal end of cell *Cu*<sub>2</sub>. Moreover, it is the only species of the group so far known which lacks a preapical tooth on the claw and has the fore wing vein ends darkened.



**Figs. 101-104.** *Heterocacilius campanula*, ♂: 101, fore wing; 102, hypandrium; 103, penis frame; 104, apex of abdomen.

**Table XIII.** Length (in mm) of various characters of a ♂ and 2 ♀♀ of *Heterocaecilius dybasi*.

Characters	♂	♀	
A	—	—	—
f <sub>1</sub>	0.410	0.380	0.360
f <sub>2</sub>	0.220	0.180	0.180
f <sub>1</sub> /f <sub>2</sub>	1.85	2.09	2.00
Fw	1.450	1.550	1.550
Hw	1.150	1.250	1.250
Hf	0.360	0.380	0.390
Ht	0.620	0.710	0.710
t <sub>1</sub>	0.220	0.230	0.235
t <sub>2</sub>	0.095	0.100	0.100
t <sub>1</sub> /t <sub>2</sub>	2.30	2.24	2.23

**Heterocaecilius dybasi** Lee and Thornton, new species Figs. 105-111.

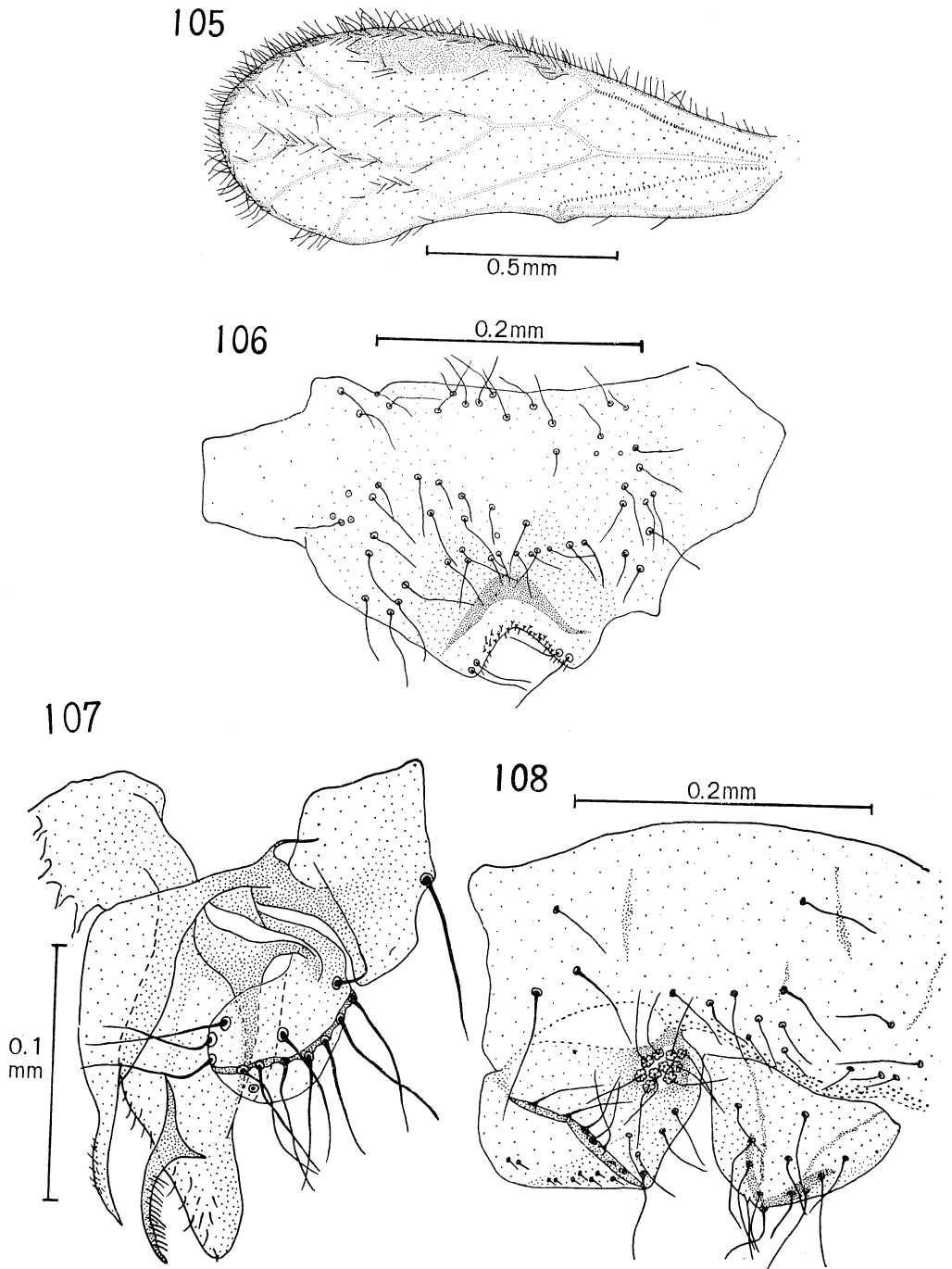
♀. *Coloration* (after softening in dil. NaOH following 18 years dry storage): Head generally very light yellowish brown. Eyes black; ocelli pale, indistinct. Maxillary palp very light brown. Antenna (damaged) with scape, pedicel and basal flagellar segment light yellowish brown. Thoracic sclerites as those of head but with a slightly darker tinge. Wings hyaline. Legs yellowish brown with 2 short brown stripes on tibia, one on mesial surface of proximal end, the other on same surface near distal end. Abdomen light yellowish brown with deep brown terminal sclerites.

*Morphology*: I.O.:D.=2.7:1 (value for paratype: 3.0). In fore wing (fig. 105) *r*<sub>5</sub> and *m* fuse for a distance (both specimens), areola postica rather high. Hind wing long and narrow, veins *r*<sub>4+5</sub> and *m* setose, *r*<sub>2+3</sub> almost perpendicular to leading edge of wing. Number of ctenidiobothria on proximal hind tarsal segment: 13 (both specimens); claw without preapical tooth. *Subgenital plate* (fig. 106): apical lobes small, triangular, with mesial borders lined with spinelets and a crescent-shaped area of chitinization at bases; each lobe bearing 2 closely positioned subapical setae on its mesial border. *Gonapophyses* (fig. 107): ventral valve with broad triangular base, apically produced into a bristled stylet; dorsal valve broad, lobate, bearing a curved bristled stylet not projecting beyond lobe, apex of stylet and distal region of lobe around base of stylet covered with bristles; outer valve rounded, bearing several long setae. *Tergite 9* with posterior margin (fig. 108) anterior to base of epiproct covered with a band of papillae. Paraproct with 10 trichobothria.

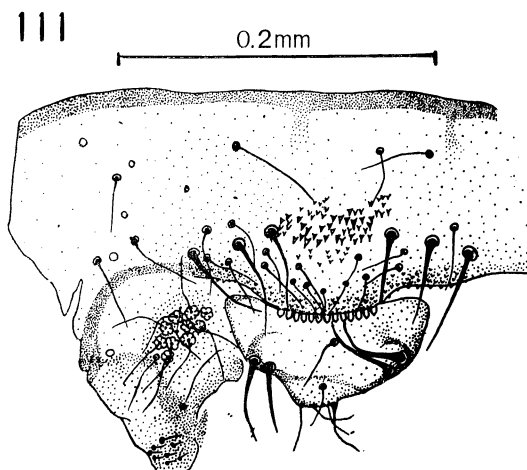
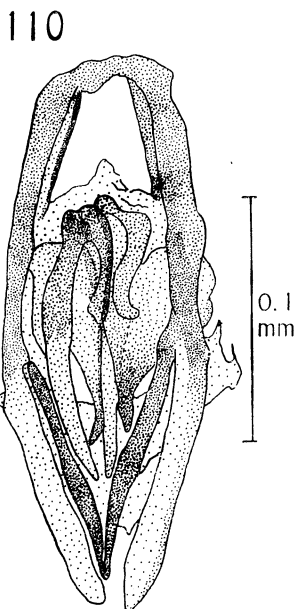
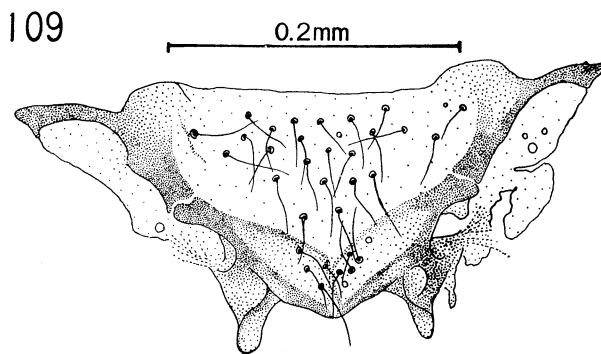
*Dimensions*: Body length (in alcohol): 1.7 mm (length of paratype: 1.9 mm). Dimensions of other characters as in Table XIII.

♂. *Coloration* (after softening in dil. NaOH following 18 years dry storage): As ♀.

*Morphology*: I.O.:D.=1.7:1, eyes larger than in ♀. Fore and hind wings as ♀. Number of ctenidiobothria on proximal hind tarsal segment: 13; claw without preapical tooth. *Hypandrium* (fig. 109): subapically produced into a pair of posteriorly directed conical knob-shaped sclerites. *Penis frame* (fig. 110) elongate and convergent towards



**Figs. 105–108.** *Heterocaecilius dybasi*, ♀: 105, fore wing; 106, subgenital plate; 107, gonapophyses; 108, apex of abdomen.



**Figs. 109-111.** *Heterocaccilius dybasi*, ♂: 109, hypandrium; 110, penis frame; 111, apex of abdomen.

base; internal parameres narrow, heavily sclerotized and fused at apex; external parameres broad, convergent; radula with 3 pairs of sclerotized rods. *Tergite 9* (fig. 111) anterior to base of epiproct produced into a low broad knob crowned with a row of tooth-shaped projections; anterior to this, and for a short distance beyond on each side, a band of papillae; in center of tergite a field of spinelets on either side of which are 3 long, thick setae arranged in a single row in a posterolateral direction; posterior margin of tergite heavily sclerotized. Paraproct with a field of 10 trichobothria, and a cluster of setae at its apex. Epiproct semicircular and with 2 pairs of long, thick, subapical setae.

*Dimensions*: Body length (in alcohol): 1.4 mm. Dimensions of other characters as in Table XIII.

Holotype ♀ (CM), Saipan, Mariana Is., 20. I. 1945, beating vegetation, H. S. Dybas. Allotype ♂ (CM), same data as type. Paratype: 1♀, NW slope, Mt. Lasso, Tinian, Mariana Is., 4. IV. 1945, Dybas.

*DISTRIBUTION*: Southern Marianas (Saipan, Tinian), Gilbert Is. (Butaritari Atoll). This species closely resembles *H. campanula* in male genitalia, but is easily distinguished by the peculiar ornamentation of the 9th tergite in both sexes. The *rs-m* junction in the fore wing is unusually long in this species.

**Lobocaecilius cynara** Lee and Thornton, new species Figs. 112-118.

♀. *Coloration* (after softening in dil. NaOH following 13 years dry storage): Head light brown with brown lateral bands along inner borders of eyes extending over entire length of clypeus, color of band fades near clypeus but deepens again on passing through it; sagittal suture distinct. Ocelli and eyes pale. Maxillary palp light brown. Antenna (damaged) light brown, basal flagellar segment, scape and pedicel fainter. Thoracic

**Table XIV.** Length (in mm) of various characters of ♀ *Lobocaecilius fennecus* and *Lobocaecilius cynara* and the probability value of the differences in their measurements

Characters	Range				Mean ± S. D.		Probability value	Signif.
	N	<i>L. fennecus</i>	N	<i>L. cynara</i>	<i>P. fennecus</i>	<i>P. cynara</i>		
B. L.	44	1.00 -2.10	11	1.20 -1.90	1.60 ± 0.343	1.61 ± 0.193	> 0.01	-
A	23	1.350-1.950	4	1.980-2.230	1.736 ± 0.136	2.118 ± 0.094	< 0.010	++
f <sub>1</sub>	36	0.350-0.530	9	0.480-0.530	0.410 ± 0.033	0.505 ± 0.017	< 0.001	++
f <sub>2</sub>	32	0.230-0.410	9	0.350-0.410	0.296 ± 0.028	0.387 ± 0.020	< 0.001	++
f <sub>1</sub> /f <sub>2</sub>	32	1.14 -1.68	9	1.25 -1.37	1.382 ± 0.084	1.308 ± 0.042	> 0.100	-
Fw	50	1.750-2.000	13	1.950-2.300	1.888 ± 0.068	2.130 ± 0.073	< 0.001	++
Hw	43	1.350-1.600	13	1.500-1.750	1.450 ± 0.057	1.647 ± 0.077	< 0.001	++
Hf	44	0.390-0.480	12	0.470-0.560	0.411 ± 0.017	0.533 ± 0.022	< 0.001	++
Ht	44	0.670-0.790	12	0.890-0.970	0.734 ± 0.028	0.925 ± 0.020	< 0.050	+
t <sub>1</sub>	44	0.205-0.280	12	0.280-0.355	0.252 ± 0.010	0.326 ± 0.020	< 0.001	++
t <sub>2</sub>	43	0.075-0.095	10	0.085-0.105	0.086 ± 0.006	0.098 ± 0.005	> 0.010	++
t <sub>1</sub> /t <sub>2</sub>	43	2.66 -3.42	10	3.01 -4.06	2.936 ± 0.182	3.335 ± 0.271	< 0.020	++
IO/D	33	1.84 -3.01	11	2.00 -2.65	2.517 ± 0.314	2.368 ± 0.189	< 0.300	-

**Table XV.** Length (in mm) of various characters of male *Lobocaecilius fennecus* and *Lobocaecilius cynara* and the probability value of the difference in their measurements

Characters	Range				Mean $\pm$ S. D.		Probability value	Signif.
	N	<i>L. fennecus</i>	N	<i>L. cynara</i>	<i>L. fennecus</i>	<i>L. cynara</i>		
B.L.	27	1.00-1.80	8	0.90-1.40	1.25 $\pm$ 0.28	1.20 $\pm$ 0.17	> 0.500	-
A	14	1.750-2.290	4	2.500-2.630	2.051 $\pm$ 0.178	2.545 $\pm$ 0.048	< 0.001	++
f <sub>1</sub>	22	0.250-0.530	7	0.490-0.560	0.470 $\pm$ 0.026	0.545 $\pm$ 0.022	< 0.001	++
f <sub>2</sub>	22	0.250-0.390	7	0.420-0.490	0.339 $\pm$ 0.035	0.453 $\pm$ 0.024	< 0.001	++
f <sub>1</sub> /f <sub>2</sub>	22	1.26-1.89	7	1.14-1.26	1.406 $\pm$ 0.163	1.203 $\pm$ 0.045	< 0.005	++
Fw	28	1.650-1.950	12	1.550-2.050	1.755 $\pm$ 0.087	1.895 $\pm$ 0.136	> 0.200	-
Hw	28	1.200-1.450	10	1.250-1.600	1.344 $\pm$ 0.066	1.474 $\pm$ 0.102	< 0.001	++
Hf	26	0.340-0.480	9	0.350-0.530	0.404 $\pm$ 0.024	0.487 $\pm$ 0.051	< 0.001	++
Ht	26	0.470-0.790	9	0.610-0.910	0.723 $\pm$ 0.062	0.847 $\pm$ 0.087	< 0.001	++
t <sub>1</sub>	25	0.140-0.285	8	0.225-0.340	0.256 $\pm$ 0.026	0.309 $\pm$ 0.033	< 0.001	++
t <sub>2</sub>	24	0.075-0.095	8	0.085-0.105	0.085 $\pm$ 0.005	0.094 $\pm$ 0.077	< 0.001	++
t <sub>1</sub> /t <sub>2</sub>	24	1.88-3.58	8	2.69-4.02	3.027 $\pm$ 0.297	3.323 $\pm$ 0.382	< 0.050	+
IO/D	19	0.60-1.35	2	0.79-0.86	0.99 $\pm$ 0.21	0.82 $\pm$ 0.04	< 0.001	++

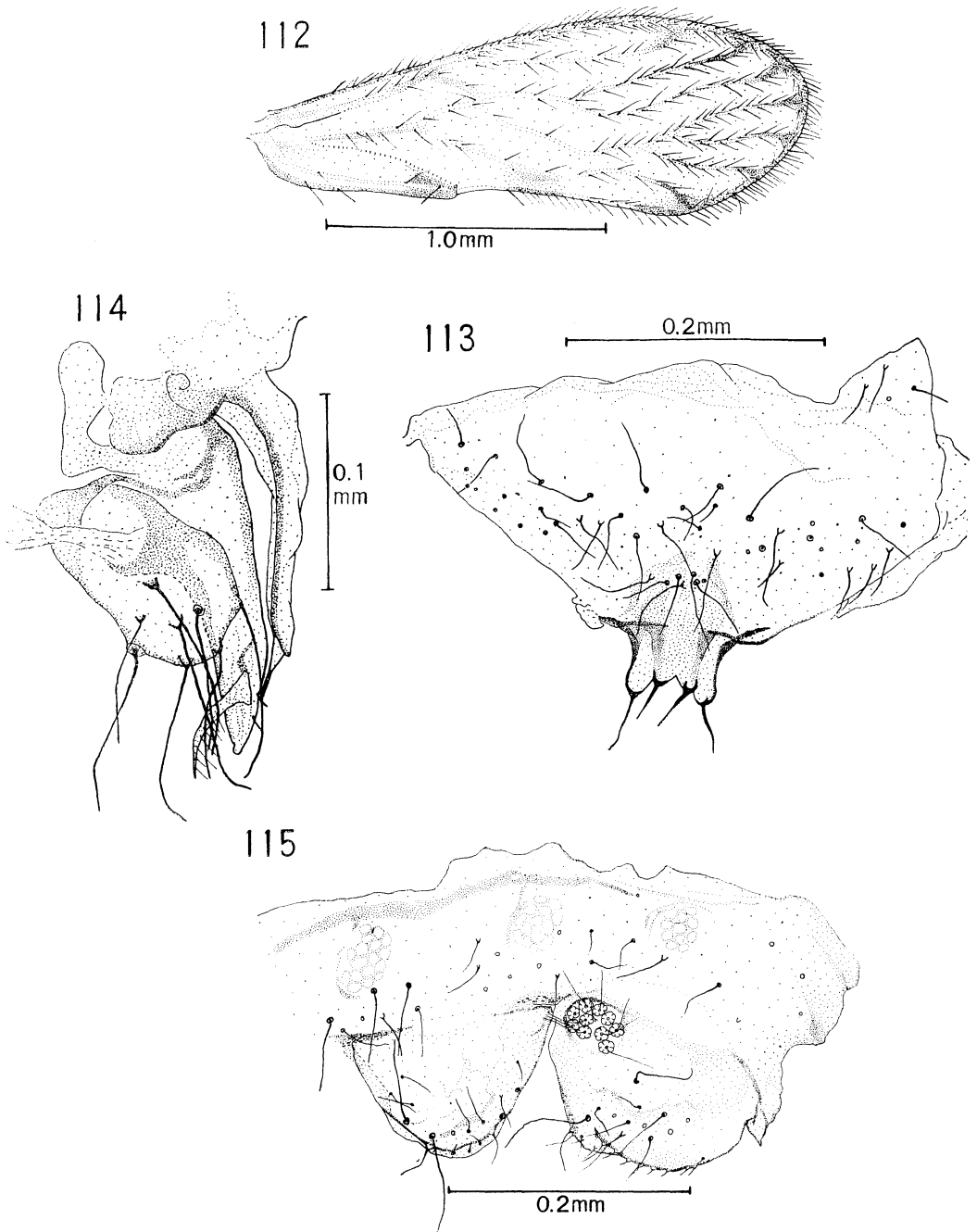
sclerites light brown with darker antedorsum and dorsum of mesothorax. Fore wing (fig. 112) hyaline, veins light brown with diffuse brown pigment over distal ends, veins *m+cu* and *cu*<sub>1</sub> darker than others; distal areas of cells *Cu*<sub>1</sub>, *Cu*<sub>2</sub> and *An* with brown pigmentation. Hind wing hyaline with very light brown veins. Legs very light brown. Abdomen light brown.

*Morphology*: I.O.:D.=2.1:1 (average of 11 specimens: 2.4). Veins *rs* and *m* in fore wing (fig. 112) joined by a short cross-vein (of 16 specimens studied, in 12 *rs* and *m* join by a cross-vein, in 4 they fuse for a short distance); prongs of radial fork long, approximately 3 $\times$ length of stem; pterostigma long and narrow. In hind wing veins *r*<sub>2+3</sub>, *r*<sub>4+5</sub> and *m* setose. Number of ctenidiobothria on proximal hind tarsal segment: 14 (range of 12 specimens: 14-18); claw without preapical tooth. *Subgenital plate* (fig. 113): bilobed, each lobe bearing an apical seta and another on a smaller sub-lobe at base of its mesial border. *Gonapophyses* (fig. 114): ventral valve lobate with terminal stylet bearing fine spinelets; dorsal valve lobate, stylet bristled and long, projecting beyond lobe; outer valve bears about 9 long setae. *Tergite 9* with posterior margin (fig. 115) with 2 fields of papillae, anterior margin with a sclerotized band. Paraproct with a field of 10 trichobothria.

*Dimensions*: Body length (in alcohol): 1.7 mm (average of 11 specimens: 1.6 mm). Dimensions of other characters are given in Table XIV.

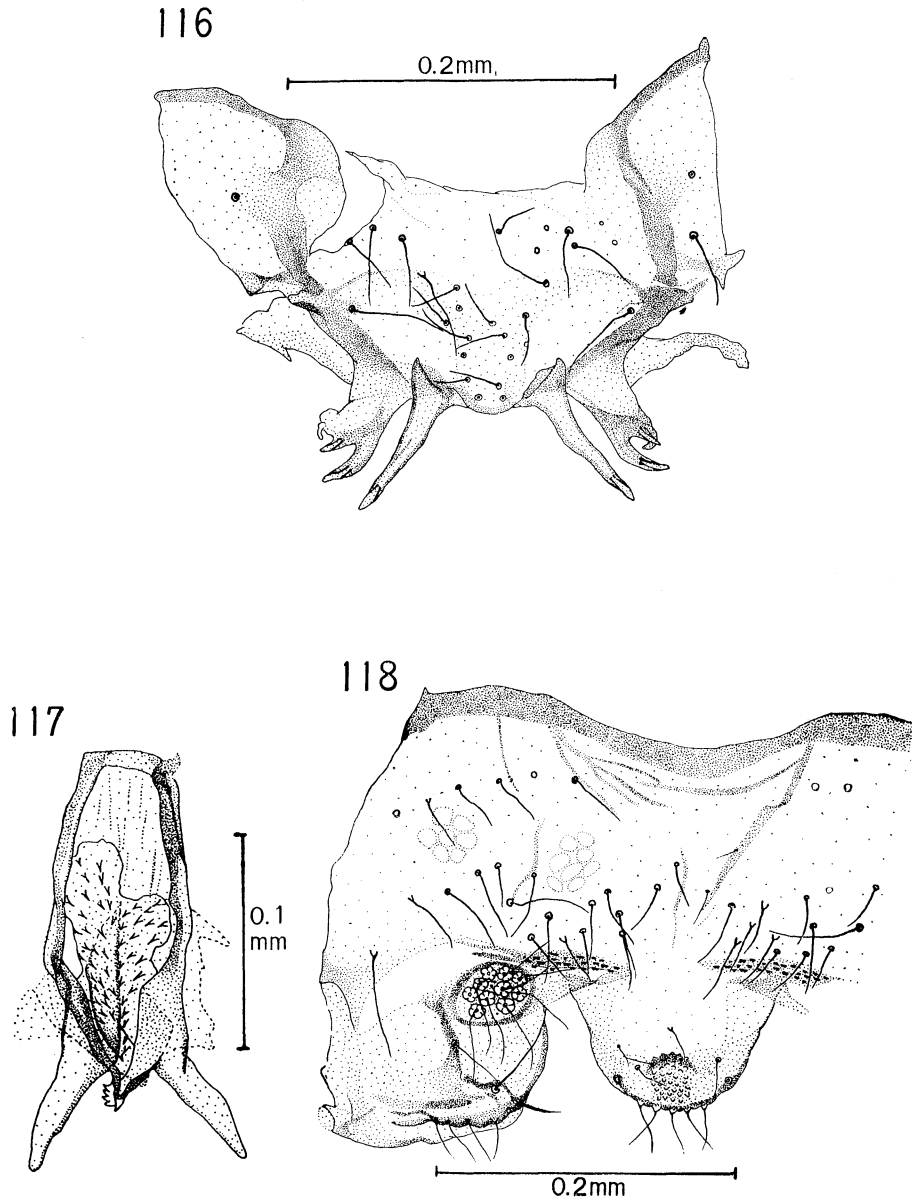
♂. *Coloration* (after softening in dil. NaOH following 11 years dry storage): As ♀, head a little lighter.

*Morphology*: I.O.:D.=0.8:1 (2 specimens), eyes larger than ♀. Veins *rs* and *m* in fore wing united by a cross-vein (of 12 specimens) studied, *rs* and *m* fuse for a short distance in 2 cases, in 4 they meet at a point, in the rest they are joined by a cross-



**Figs. 112-115.** *Lobocaeilius cynara*, ♀: 112, fore wing; 113, subgenital plate; 114, gonapophyses; 115, apex of abdomen.





**Figs. 116-118.** *Lobocaecilius cynara*, ♂: 116, hypandrium; 117, penis frame; 118, apex of abdomen.

vein. Number of ctenidiobothria on hind tarsal segment: 20 (range of 8 specimens: 15-20). *Hypandrium* (fig. 116): apically bearing 2 pairs (larger one forked) of posterolaterally directed sclerotized hooks, each ending in a fingernail-shaped apex. *Penis frame* (fig. 117) with lateral sclerites narrow; inner parameres united at apex, point of fusion serrated; outer parameres broad, flat, divergent; radula with spinelets on membrane, sclerotized rods absent. *Tergite 9* (fig. 118) with anterior band of sclerotization thicker, papillae at posterior margin larger than in ♀. Paraproct with 10 trichobothria. Apex of epiproct with a field of papillae.

*Dimensions*: Body length (in alcohol): 1.4 mm (average of 8 specimens: 1.2 mm). Dimensions of other characters in Table XV.

Holotype ♀ (USNM 69427), Babelthuap, Palau, 20. XII. 1952, J. L. Gressitt. Allotype ♂ (USNM), same data as type. Paratypes: 1♀, Babelthuap, Palau, 21. VII. 1946, H. K. Townes; 1♂, Koror, Palau, IX. 1952, N. L. H. Krauss; 1♀, 1♂, Babelthuap, Palau, 9. XII. 1952, Gressitt; 8♀♀, 3♂♂, Babelthuap, Palau, 10. XII. 1952, Gressitt; 1♂, Babelthuap, Palau, 19. XII. 1952, Gressitt; 2♀♀, Babelthuap, Palau, 20. XII. 1952, Gressitt; 1♀, Babelthuap, Palau, 21. XII. 1952, Gressitt; 1♂, Koror, Palau, 27. IV. 1957, C. W. Sabrosky; ♂, Babelthuap, Palau, 20. V. 1957, Sabrosky.

DISTRIBUTION: Palau Is. (Babelthuap, Koror, Auluptagel). The species is one of a group of six Pacific species, and occurs in the Palaus together with the other Micronesian representative of the group, *L. fennecus*, to which it is very closely related.

**Lobocaecilius fennecus** Lee and Thornton, new species Figs. 119-126.

♀. *Coloration* (after softening in dil. NaOH following 11 years dry storage): General color of head and brown markings similar to *Lobocaecilius cynara*. Eyes light brown, ocelli pale. Maxillary palp light brown, terminal segment a little darker. Antenna brown, basal flagellar segment, scape and pedicel lighter. Thoracic sclerites light brown,

**Table XVI.** Comparison of lengths (in mm) of various characters between ♀♀ of *L. fennecus* from the Carolines and from the Marianas

Characters	ex Carolines			ex Marianas			Value of P.	Signif.
	N	Range	Mean ± S. D.	N	Range	Mean ± S. D.		
B.L.	25	1.00-1.70	1.35	19	1.40-2.10	1.93	< 0.001	++
A	4	1.350-1.740	1.558 ± 0.160	19	1.560-1.950	1.797 ± 0.084	> 0.050	—
f <sub>1</sub>	12	0.350-0.430	0.393 ± 0.024	24	0.360-0.530	0.419 ± 0.033	> 0.200	—
f <sub>2</sub>	8	0.230-0.340	0.281 ± 0.035	24	0.280-0.410	0.302 ± 0.026	> 0.400	—
f <sub>1</sub> /f <sub>2</sub>	8	1.25-1.68	1.401 ± 0.117	24	1.14-1.65	1.376 ± 0.067	> 0.700	—
Fw	26	1.750-2.000	1.885 ± 0.081	24	1.800-1.950	1.891 ± 0.048	> 0.080	—
Hw	20	1.350-1.600	1.439 ± 0.063	23	1.350-1.500	1.461 ± 0.045	> 0.500	—
Hf	20	0.390-0.480	0.418 ± 0.020	24	0.380-0.430	0.405 ± 0.010	> 0.100	—
Ht	20	0.670-0.790	0.738 ± 0.033	24	0.700-0.780	0.730 ± 0.024	> 0.600	—
t <sub>1</sub>	20	0.240-0.280	0.255 ± 0.010	24	0.205-0.270	0.249 ± 0.010	> 0.300	—
t <sub>2</sub>	20	0.075-0.095	0.086 ± 0.005	23	0.075-0.095	0.087 ± 0.010	> 0.800	—
t <sub>1</sub> /t <sub>2</sub>	20	2.66-3.42	2.979 ± 0.195	23	2.67-3.24	2.899 ± 0.163	> 0.400	—
IO/D	13	1.84-2.50	2.20	20	2.38-3.01	2.72	< 0.001	++

**Table XVII.** Comparison of lengths (in mm) of various characters between ♂♂ of *L. fenecus* from the Carolines and from the Marianas

Characters	ex Carolines			ex Marianas			Value of P.	Signif.
	N	Range	Mean ± S.D.	N	Range	Mean ± S.D.		
B.L.		1.00 -1.60	1.119		1.00 -1.80	1.446	> 0.050	—
A	15	1.700-2.060	1.898 ± 0.095	9	1.750-2.290	2.135 ± 0.155	> 0.050	—
f <sub>1</sub>	12	0.430-0.530	0.461 ± 0.027	10	0.460-0.520	0.481 ± 0.014	> 0.200	—
f <sub>2</sub>	12	0.250-0.370	0.317 ± 0.030	10	0.340-0.390	0.365 ± 0.014	< 0.020	+
f <sub>1</sub> /f <sub>2</sub>	12	1.31 -1.89	1.479 ± 0.189	10	1.26 -1.37	1.319 ± 0.028	> 0.050	—
Fw	19	1.650-1.950	1.731 ± 0.089	9	1.700-1.900	1.804 ± 0.016	> 0.050	—
Hw	17	1.200-1.450	1.331 ± 0.077	11	1.300-1.400	1.364 ± 0.011	> 0.300	—
Hf	15	0.340-0.450	0.410 ± 0.027	11	0.370-0.430	0.395 ± 0.020	> 0.400	—
Ht	15	0.470-0.790	0.721 ± 0.077	11	0.680-0.790	0.724 ± 0.011	> 0.900	—
t <sub>1</sub>	14	0.140-0.285	0.105 ± 0.235	11	0.230-0.280	0.258 ± 0.014	> 0.100	—
t <sub>2</sub>	13	0.075-0.095	0.086 ± 0.001	11	0.075-0.095	0.084 ± 0.002	> 0.100	—
t <sub>1</sub> /t <sub>2</sub>	13	1.88 -3.58	2.993 ± 0.377	11	2.87 -3.33	3.066 ± 0.014	> 0.600	—
IO/D	9	0.60 -1.08	0.888 ± 0.127	10	0.64 -1.33	1.076 ± 0.224	> 0.200	—

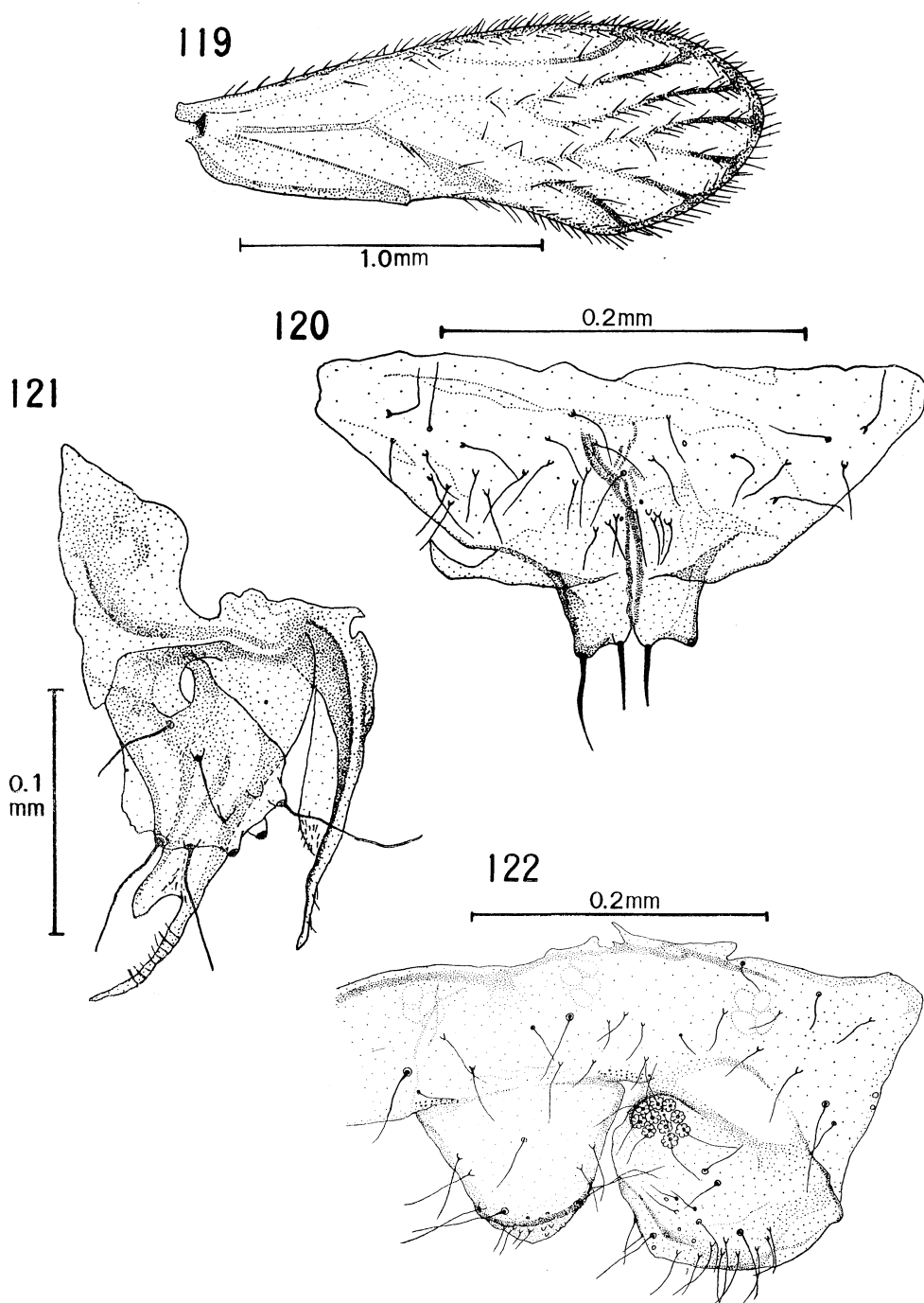
antedorsum and dorsum of mesothorax and metathorax slightly darker. Pleural sutures distinct. Forewing (fig. 119) hyaline with light brown veins, distal region darker but diffuse brown pigment (present in *P. cynara*) absent. Cells *Cu*<sub>1</sub>, *Cu*<sub>2</sub> and *An* with distal pigmented areas. Hind wing hyaline, veins light brown. Legs light brown. Abdomen light brown.

*Morphology*: I.O.:D.=2.5:1 (average of 33 specimens). In fore wing (fig. 119) *rs* and *m* fuse for a distance (of 52 specimens studied, in 6 *rs* and *m* meet at a point, in 2 they are joined by a cross-vein, in the rest they fuse for a distance); prongs of *rs* longer than stem; pterostigma long, narrow, tapering distally. In hind wing veins *r*<sub>2-3</sub>, *r*<sub>4+5</sub>, *rs* and *m* setose. Number of ctenidiobothria on proximal hind tarsal segment: 17 (range of 44 specimens: 13-18); claw without preapical tooth. *Subgenital plate* (fig. 120): with apical lobes extremely low, each bearing a terminal and a sub-terminal seta. *Gonapophyses* (fig. 121): ventral, dorsal and outer valve similar to *Pseudocaecilius cynara*. *Tergite 9* (fig. 122) with sclerotized band along anterior margin and 2 fields of fine papillae at its posterior margin. Paraprocts with 10 trichobothria.

*Dimensions*: Body length (in alcohol): 1.2 mm (average of 44 specimens: 1.6 mm). Dimensions of other characters as in Table XIV.

♂. *Coloration* (after softening in dil. NaOH following 13 years dry storage): As ♀.

*Morphology*: I.O.:D.=0.6:1 (average of 19 specimens=1.0), eyes larger than in ♀. Fore wing with *rs* and *m* fused for a distance (of 36 specimens studied, in 8 *rs* and *m* meet at point, in the rest they fuse for a distance), with papillae (fig. 123) (in 36 specimens they occur at base of wing near proximal termination of vein *r*; in 8 cases they are located along entire length of vein *r*). Hind wing as ♀. Number of ctenidiobothria on proximal hind tarsal segment: 16 (range of 28 specimens: 13-18); claw without preapical tooth. *Hypandrium* (fig. 124) apically with 2 posterolateral pairs of stout



**Figs. 119-122.** *Lobocaccilius fennecus*, ♀: 119, fore wing; 120, subgenital plate; 121, gonapophyses; 122, apex of abdomen.

**Table XVIII.** Mode of junction of veins *rs* and *m* in fore wing of 88 specimens of *L. fennecus* and 28 specimens of *L. cynara*

Mode of junction	<i>L. fennecus</i>	<i>L. cynara</i>
Fusion	72 (81.8 %)	6 (21.4 %)
Cross-vein	2 ( 2.3 %)	18 (64.3 %)
Point meeting	14 (15.9 %)	4 (14.3 %)
Total	88	28

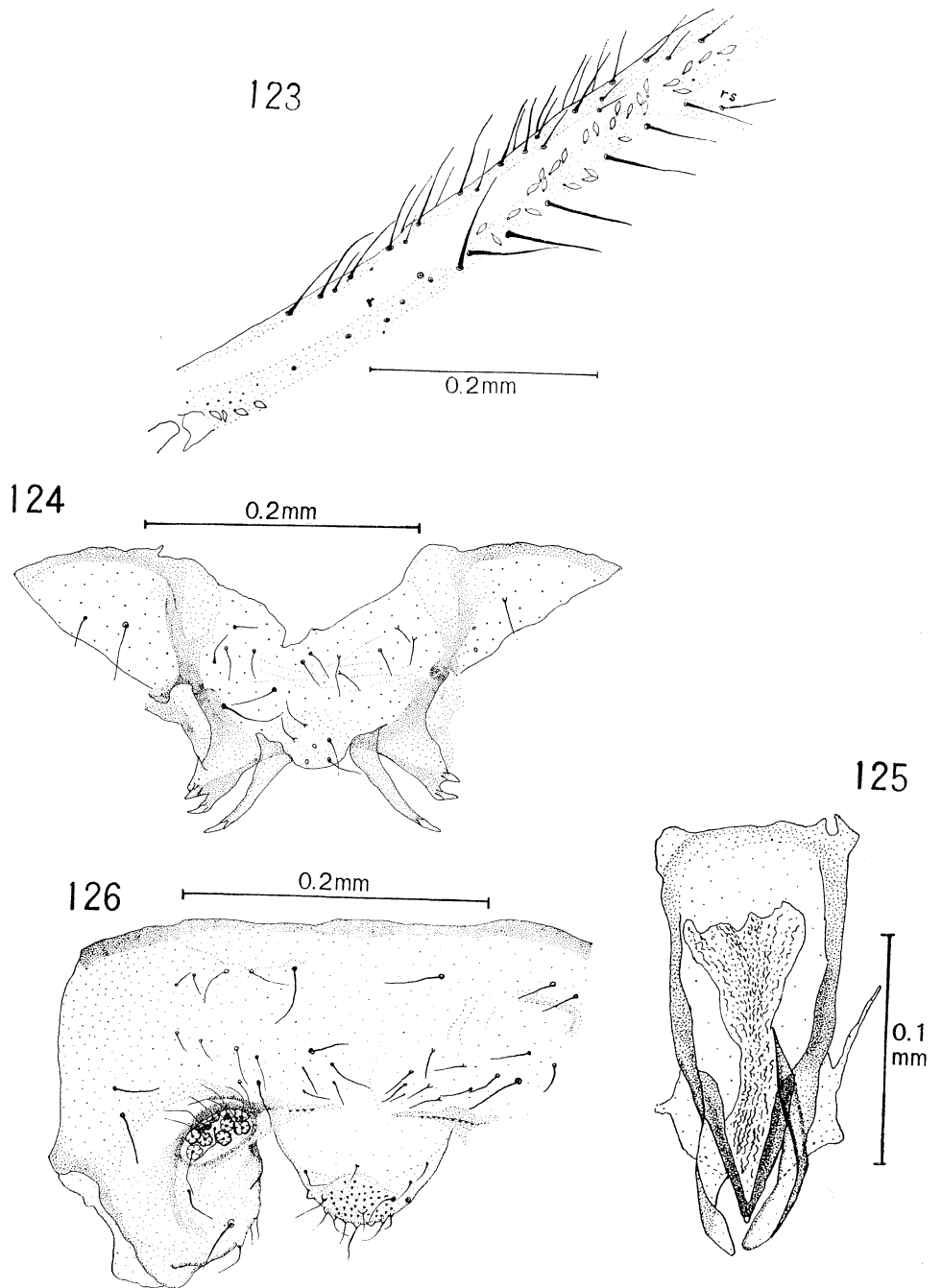
sclerites (1 pair divided), similar to those of *Lobocaecilius cynara*. *Penis frame* (fig. 125) with lateral sclerites narrow; inner parameres fused at apex, region of fusion serrated; outer parameres broad, flat, well separated; radula with spinelets (not drawn in figure). *Tergite 9* (fig. 126) with heavily sclerotized band at anterior margin (slightly wider than ♀) and 2 papillose areas on posterior margin. Paraproct with a field of 10 trichobothria.

*Dimensions*: Body length (in alcohol): 1.3 mm (average of 27 specimens: 1.25 mm). Dimensions of other characters as in Table XV.

Holotype ♀ (USNM 69428), Ifalik Atoll, Caroline Is., 25. IX. 1952, N. L. H. Krauss. Allotype ♂ (USNM), Potts Junction, Guam, Mariana Is., X. 1952, Krauss. Paratypes: Mariana Is.: 1♀, Papago Area, Saipan, 17. I. 1945, beating vegetation, Dybas; 1♀, near Garapan, Saipan, 19. I. 1945, Dybas; 1♀, Anatahan, 26. VIII. 1951, R. M. Bohart; 3♀♀, 4♂♂, Potts Junction, Guam, X. 1952, Krauss; 1♀, Mt Lau lau, Guam, X. 1952, Krauss.; 4♀♀, Talofoto, Saipan, 9. II. 1945, beating vegetation, Dybas; 1♀, Lamlam Bay, Saipan, 3. XII. 1944, Dybas; 1♀, near Garapan, Saipan, 19. I. 1945, Dybas; 1♀, hills east of Garapan, Saipan, 23. I. 1945, Dybas; 2♀♀, Tinian, 27. III. 1945, Dybas; 1♂, 6♀♀, NW slope, Mt. Lasso, Tinian, 1-17. IV. 1945, Dybas; 1♂, Sedong, Talofoto, Saipan, 9. II. 1945, Dybas; 1♂, Mt. Lasso, N.W. Slope, Tinian, 25. III. 1945, Dybas; 1♂, Tinian, 1-14. IV. 1945, Dybas; 1♂, beach cove, Tinian; 5. IV. 1945, Dybas; 1♂, North Gurgan Point, Tinian, 14. IV. 1945, Dybas; 1♂, Maroo Valley, Tinian, 10. X. 1945, Dybas. Caroline Is.: 1♀, Ponape, 16. I. 1938, T. Esaki; 7♀♀, 3♂♂, Ponape, VI. IX. 1950, Adams; 1♀, Tasatawau Atoll, 3. IX. 1952, Beardsley; 1♀, Merir, 11. IX. 1952, Krauss; 1♀, 1♂, Tobi, 12. IX. 1952, Krauss; 3♀♀, 4♂♂, Woleai Atoll, 19-20. IX. 1952, Krauss; 2♀♀, 3♂♂, Faraulep Atoll, 21. IX. 1952, Krauss; 1♂, Ifalik Atoll, 25. IX. 1952, Krauss; 1♂, Koror, Palaus, X. 1952; 2♂♂, Ngulu Atoll, 3. X. 1952, Krauss; 2♀♀, Sorol Atoll, 4. X. 1952, Krauss; 1♀, Ulithi Atoll, 7. X. 1952, Krauss; 1♀, Yap, 29. XI. 1952, Gressitt; 1♀, 1♂, Koror, Palaus, 24. III. 1952, Gressitt; 1♂, Ifalik Atoll, 4. VIII. 1953, M. Bates; 3♀♀, 2♂♂, Koror, Palaus, sweeping, 10. III. 1954, Beardsley; 1♂, Koror, Palaus, 18. IV. 1957, Sabrosky.

Of 49 females and 36 males examined, 25 females and 24 males were collected in the Carolines, from Tobi in the southwest to Ponape in the east. No specimens were collected from the high islands Truk and Kusaie, although the species was represented on nine atolls as well as in the Palaus, Yap, and Ponape.

24 females and 12 males were collected from the Marianas, chiefly the Southern Marianas. Of the 24 females, 16 (66%) have a subgenital plate intermediate in shape between that of the rest of the specimens of *L. fennecus* and that of *L. cynara* (figures 120 and 113). Moreover, there is a significant difference (Table XVI) in body length and I.O.:D. ratio between females taken from the Marianas and those collected in the



**Figs. 123-126.** *Lobocaccilius fennecus*, ♂: 123, fore wing papillae; 124, hypandrium; 125, penis frame; 126, apex of abdomen.

Carolines: the Marianas females have longer bodies and a higher I.O.:D. ratio. In other measurements and ratios there is no significant difference between females from the two island chains.

8 males from the Marianas (66% of the Marianas males) have wing papillae along the whole of vein *r*; in the rest they are restricted to the base of *r*, as they are in all the males from the Carolines. However, there was no significant difference in measurements between males from the 2 island chains except in length of second flagellar segment (Table XVII).

There is thus evidence of a restriction of gene flow between populations on the 2 island chains, although this has not evidently reached the arbitrary point at which a sub-specific distinction can be supported.

*L. fenneceus* is very closely similar to *L. cynara*, which, however, has only been found in the Palau group of the West Carolines, where it occurs together with *L. fenneceus* on Koror (the 2 species were collected within 9 days of each other). The 2 species resemble each other in the color pattern of the head, wing color, structure and chaetotaxy of female gonapophyses, epiproct, paraproct, and in the structure of the phallosome and hypandrium.

*L. fenneceus* differs from *L. cynara* in lacking very diffuse brown pigment over the extremities of the fore wing veins, in possessing papillae in association with vein *r* in the male fore wing, and in the low indistinct apical lobes of the subgenital plate. Moreover, there is a significant difference in the dimensions of nine structures measured, between females of the 2 species (Table XIV), and in all but fore wing length between males (Table XV). Other significant differences are, in females: body length, ratio of lengths of 2 basal flagellar segments, and ratio of lengths of tarsal segments; in males: I.O.:D. ratio, ratio of lengths of flagellar segments and ratio of lengths of tarsal segments. The 2 species also differ in the nature of the *rs-m* junction in the fore wing (Table XVIII) though this also is statistical and cannot be applied to individuals. In *L. cynara*, of 28 specimens studied, in 18 these veins are connected by cross-veins, in 6 they fuse for a length and in 4 they meet at a point. In *L. fenneceus*, on the other hand, of 88 specimens studied, in 2 the veins are connected by a cross-vein, in 72 they are fused for a length, and in 14 they meet at a point. Other slight differences between the 2 species are: tubercular field on the male epiproct is rather more widespread in *L. fenneceus*; the small rod-like spines on the posterior margin of the 9th tergite of the male are slightly smaller in *L. fenneceus*; the penis frame is generally broader basally in *L. fenneceus*.

Because of the number of these differences, though slight, and because of the sympatry on Koror, these forms are regarded as distinct species, though undoubtedly very closely related.

**Pseudocaecilius tahitiensis** (Karny) new combination Figs. 127-132.

*Epipsocus tahitiensis* Karny, 1926, Bull. Ent. Res. 16: 288.

♀. *Coloration* (after 18 years storage in alcohol): Head very light buff with a brown band from eye to antennal socket on either side. Eyes black, ocelli pale. Maxillary palp very light in color. Antenna light yellowish brown. Thorax slightly darker than head, with a lateral irregular brown band on each side stretching from prothorax to anterior tip of abdomen. Fore wing (fig. 127) hyaline with light brown veins and pigmentation on areola postica, pterostigma, distal ends of cells *Cu*<sub>1</sub>, *Cu*<sub>2</sub> and *An*. Hind wing hyaline

**Table XIX.** Length (in mm) of various characters of ♀♀ of *Pseudocacilius tahitiensis* (Karny)

Characters	N	♀	
		Range	Mean ± S.D.
A	8	1.690-1.960	1.780 ± 0.085
f <sub>1</sub>	15	0.370-0.430	0.384 ± 0.017
f <sub>2</sub>	15	0.210-0.270	0.234 ± 0.014
f <sub>1</sub> /f <sub>2</sub>	15	1.56 -1.78	1.646 ± 0.049
Fw	16	2.000-2.250	2.058 ± 0.059
Hw	14	1.500-1.700	1.576 ± 0.050
Hf	16	0.430-0.500	0.456 ± 0.020
Ht	16	0.810-0.930	0.840 ± 0.030
t <sub>1</sub>	16	0.270-0.316	0.282 ± 0.010
t <sub>2</sub>	16	0.090-0.110	0.099 ± 0.006
t <sub>1</sub> /t <sub>2</sub>	16	2.69 -3.14	2.850 ± 0.128

with slightly darker veins. Legs light buff with brown claws. Abdomen very light buff.

*Morphology*: I.O.:D.=3.3 (average of 16 specimens: 3.5). Fore wing (fig. 127) with veins *rs* and *m* fused for a distance (of 16 specimens studied, *rs* and *m* fuse in 12 cases, in the rest they meet at a point). Hind wing with veins *r*<sub>4+5</sub> and *m* setose. Number of ctenidiobothria on proximal hind tarsal segment: 16 (range of 16 specimens: 13-16); claw without preapical tooth. *Subgenital plate* (fig. 128): with apical lobes very small, each bearing a long thick apical seta; ciliation in form of a band running across entire plate in a shallow curve; a pair of very long stout setae in middle of plate. *Gonapophyses* (fig. 129): ventral valve styliform, with bristles at apex; dorsal valve long, with tapering distal region bearing long fine bristles, not lobate; outer valve triangular, more or less rounded at base, covered with several long and some shorter setae. *Paraproct* (fig. 130) with a field of 10 trichobothria and a transverse row of 8 long setae. Epiproct with 2 rows of 4 long setae arranged in a V, arms of V pointing in a posterolateral direction.

*Dimensions*: Body length (in alcohol): 2.1 mm (average of 16 specimens: 2.0 mm). Dimensions of other characters as in Table XIX.

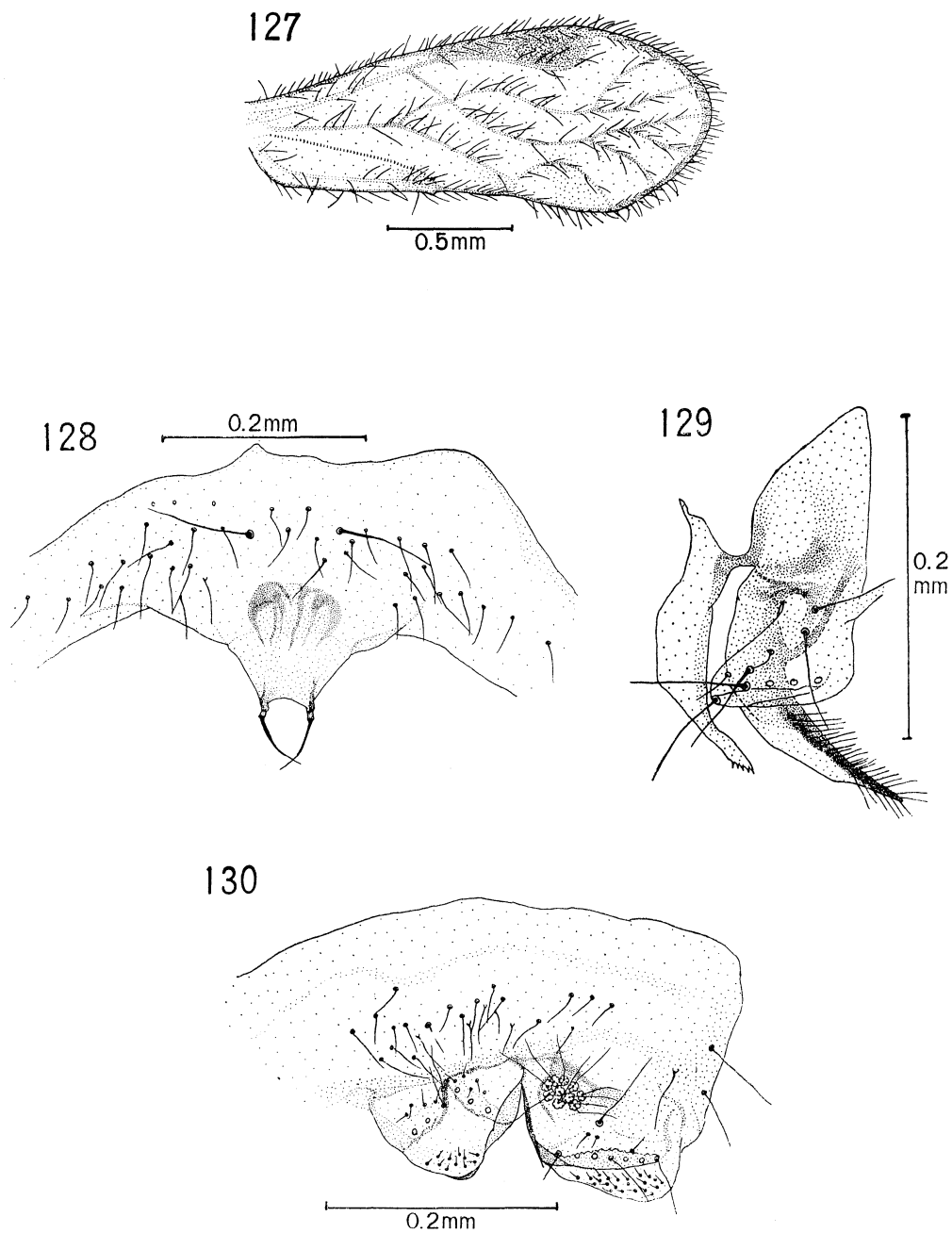
♂. Unknown.

DISTRIBUTION: Southern Marianas (Saipan, Tinian). (See also page 109).

On Saipan, Dybas collected 15♀♀ from the Chalan Laulau area, and 1♀ from the hills E of Garapan, on 23/24. I. 1945. The same worker collected a ♀ from a ridge on the SE section of Tinian on 27. III. 1945.

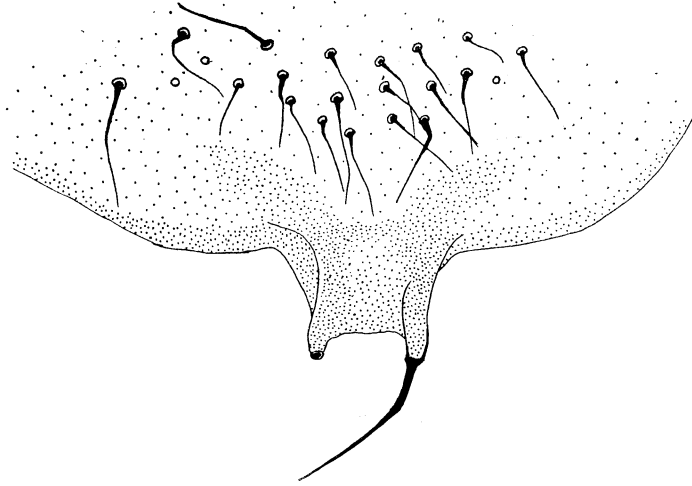
Karny (1926) described *Epipsocus tahitiensis* from Tahiti, as having a pigmented band across the pterostigma and one across the areola postica to the media, i.e. with a wing similar to that of *P. elutus*. Thornton confirmed this similarity by examining the type specimen of *E. tahitiensis* in London. Comparison of the female genitalia of the Micronesian specimens with drawings of the holotype's genitalia (figs. 131, 132) show that they are of the same species.



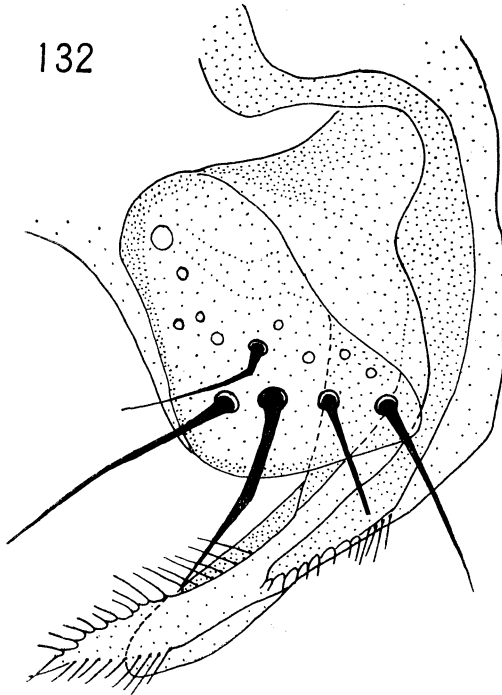


**Figs. 127-130.** *Pseudocaecilius tahitiensis* (Karny), ♀: 127, fore wing; 128, subgenital plate; 129, gonapophyses; 130, apex of abdomen.

131



132



**Figs. 131-132.** *Pseudocaeccilius tahitiensis* (Karny) ♀: 131, subgenital plate; 132, gonapophyses.

The general features of the wings and female genitalia are of the *Pseudocaecilius* type, and *E. tahitiensis* is therefore transferred to *Pseudocaecilius*.

*P. tahitiensis* is distinct from *P. elutus*, despite a strong general resemblance in pigmentation and venation of fore wing and in gonapophyses. There is a significant difference in size (Table XIX), and a definite and regular difference in the structure of the subgenital plate, without intermediate forms. In *P. elutus* the subgenital plate lobes are well developed, tapering distally, and the median indentation is quite deep; the ciliation of the disc is concentrated medially. In *P. tahitiensis* the lobes are very short and little wider than the bosses of the setae, the median indentation is shallow, and the ciliation of the disc is in the form of a transverse band. Moreover, the patterns of sclerotization of the 2 plates differ. In addition, in all 37 specimens of *P. elutus* studied here, the pterostigma of the fore wing is narrower, with a more acute apex and a larger and darker stigma sac than in the specimens of *P. tahitiensis* examined. The 2 species are, nevertheless, closely related.

**Pseudocaecilius elutus** Enderlein Figs. 133-136.

*Pseudocaecilius elutus* Enderlein, 1903, Ann. Hist-Nat. Mus. Hung. **1** : 261; 1926, Zool. Meded. **9** : 58 (further description).—Soehardjan, 1958, Idea **11** : 31.—Thornton, 1961, Proc. R. Ent. Soc. Lond. B. **30** (11-12) : 141.

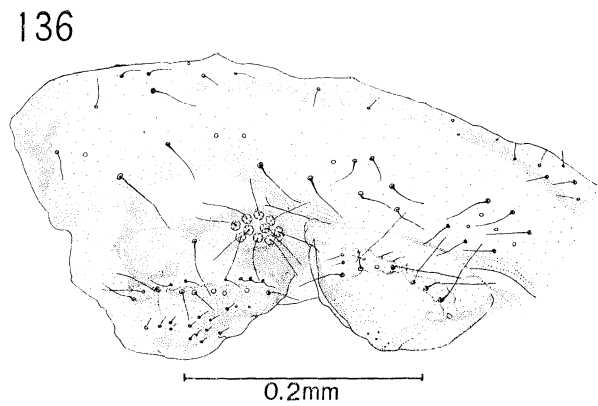
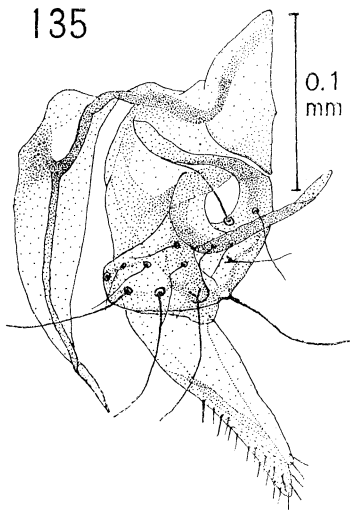
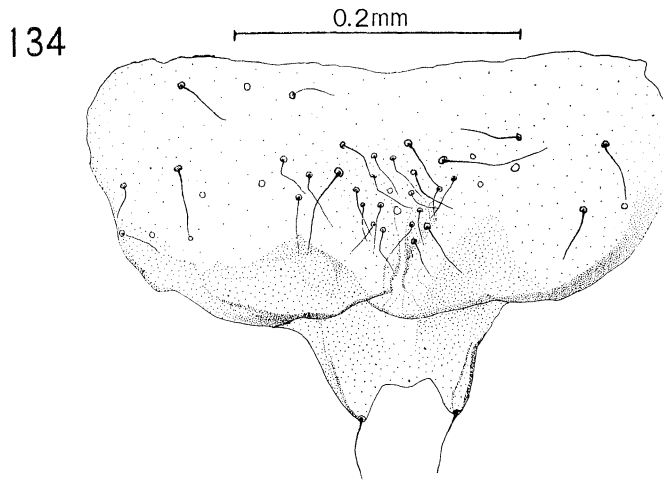
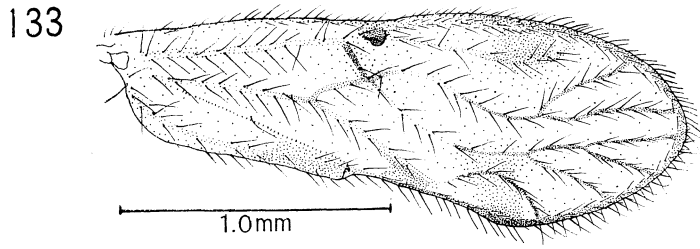
*Pseudocaecilius elutus* var. *africanus* Badonnel, 1931, Ann. Sci. Nat., Bot. Zool. **14** : 230; 1946, Rev. Zool. Bot. Afr. **39** : 168 (genitalia); 1948, Rev. Zool. Bot. Afr. **40** : 292; 1955, Publ. Cult. Cia. Diamant. Angola **26** : 200 (genitalia); 1959, Parc National Albert I., Mission G. F. de Witte (1933-1935) **95** (1) : 18.—Smithers, 1960, J. Ent. Soc. S. Afr. **23** (1) : 221; 1964 b, Rev. Zool. Bot. Afr. **70** (3-4) : 253.

♀. *Coloration* (after softening in dil. NaOH, following 9 years dry storage): As Enderlein's description.

**Table XX.** Length (in mm) of various characters of ♀♀ of *Pseudocaecilius elutus* from Micronesia

Characters	N	Range	Mean ± S.D.
A	17	1.520-2.530	1.764 ± 0.221
f <sub>1</sub>	23	0.310-0.610	0.421 ± 0.054
f <sub>2</sub>	23	0.140-0.380	0.253 ± 0.045
f <sub>1</sub> /f <sub>2</sub>	23	1.17 -3.30	1.704 ± 0.437
Fw	35	2.050-2.550	2.296 ± 0.089
Hw	36	1.500-1.950	1.761 ± 0.082
Hf	32	0.450-0.630	0.556 ± 0.037
Ht	33	0.840-1.050	0.918 ± 0.469
t <sub>1</sub>	33	0.255-0.355	0.294 ± 0.020
t <sub>2</sub>	31	0.080-0.125	0.104 ± 0.001
t <sub>1</sub> /t <sub>2</sub>	31	2.39 -3.67	2.869 ± 0.315

*Morphology*: I.O.:D.=2.8 (average of 23 specimens: 2.7). In fore wing (fig. 133) veins *rs* and *m* fuse in 20 specimens, in 12 they meet at a point and in 4 cases they are joined by a short cross-vein. Hind wing: *r*<sub>4+5</sub>, *rs* and *m* setose. Number of ctenidio-



**Figs. 133-136.** *Pseudocacilius elutus* Enderlein, ♀: 133, fore wing; 134, subgenital plate; 135, gonapophyses; 136, apex of abdomen.

bothria on proximal hind tarsal segment: 12-17 (27 specimens); claw without preapical tooth. *Subgenital plate* (fig. 134): apically bilobed, lobes broad, well developed, each bearing a terminal long seta, median indentation deep. Ciliation concentrated at center of plate. *Gonapophyses* (fig. 135): ventral valve undivided and styloform, apically bristled (not shown in figure); dorsal valve not lobate, distally covered with bristles; outer valve triangular, with rounded apices, bearing several long and some shorter setae. *Tergite 9* (fig. 136) with sclerotized band along anterior margin. Paraproct with a field of 10 trichobothria and a transverse band of 8 long setae. Epiproct with 8 long setae arranged in a V, arms of which point in a posterolateral direction.

*Dimensions*: Body length (in alcohol): 1.7 mm. (average of 26 specimens). Dimensions of other characters as in Table XX.

*DISTRIBUTION*: Philippine Is. (see page 47), Bonin Is. (Chichi Jima), Southern Marianas (Saipan, Tinian, Guam). Caroline Is. (Koror, Yap, Ponape), Hawaiian Is. (Kauai, Oahu, Molokai, Lanai, Maui, Hawaii). Galapagos Is. (see page 112). (See also pp. 14, 40, 90).

Originally described from Singapore specimens, this species occurs also in the Congo, Angola, Natal, Mozambique, Madagascar, India (?) (Navas 1934, see Thornton 1961), Hong Kong, and Java, and specimens from Texas, Washington D.C., Florida and Puerto Rico, identified as *Pseudocaecilius citricola* are very closely related, if not conspecific (see Thornton 1961). Banks (1937a) described *Hageniella formosana* from Taiwan, which on the description and figure of the fore wing is possibly *P. elutus*. Thornton examined Banks' type of this species in Harvard, and confirmed that a pale X on the head and a dark lateral stripe on the thorax are present. The specimen was not dissected, and it is *possible* that it may be *P. tahitiensis* (Karny). However, it is more likely that this specimen (from Taiwan) is the same species as those from Hong Kong, namely *P. elutus*.

**Table XXI.** Length (in mm) of various characters of *Pseudocaecilius elutus* Enderlein, and *P. tahitiensis* (Karny) and the significance of the differences.

Characters	Range		Mean		Value of P.	Signif.
	<i>P. elutus</i>	<i>P. tahitiensis</i>	<i>P. elutus</i>	<i>P. tahitiensis</i>		
B.L.	1.00 -2.50	1.85 -2.15	1.706	1.991	< 0.050	+
A	1.520-2.530	1.690-1.960	1.764	1.779	> 0.100	-
f <sub>1</sub>	0.310-0.610	0.370-0.430	0.421	0.384	< 0.025	+
f <sub>2</sub>	0.140-0.380	0.210-0.270	0.253	0.236	> 0.100	-
f <sub>1</sub> /f <sub>2</sub>	1.17 -3.30	1.56 -1.78	1.704	1.646	> 0.500	-
Fw	2.050-2.550	1.950-2.250	2.296	2.058	< 0.001	++
Hw	1.500-1.950	1.500-1.700	1.761	1.576	< 0.001	++
Hf	0.450-0.640	0.430-0.500	0.556	0.456	< 0.001	++
Ht	0.840-1.050	0.810-0.930	0.918	0.840	< 0.001	++
t <sub>1</sub>	0.255-0.355	0.270-0.315	0.294	0.282	< 0.010	++
t <sub>2</sub>	0.080-0.125	0.090-0.110	0.104	0.099	> 0.100	-
t <sub>1</sub> /t <sub>2</sub>	2.39 -3.67	2.69 -3.14	2.869	2.850	< 0.050	+
I.O./D	2.00 -3.75	3.18 -4.00	2.749	3.457	< 0.001	++

An examination of the posterior lobe of the subgenital plate of specimens from Hong Kong, Micronesia and Hawaii, and comparison with the figure of *P. citricola* (= *pretiosus*) given by Chapman (1930) and that provided by Badonnel (1946) for African specimens, reveals that, contrary to the conditions in *P. tahitiensis*, in all cases the apical setae are considerably shorter than the outer sides of the posterior lobe, usually little more than half as long and the mesial borders of the apical sub-lobes are about half the length of the apical setae. The median posterior margin is variable. In some of the Micronesian and Hong Kong specimens it exhibits a slight median bulge, as is shown in Chapman's figure for *P. citricola*.

Measurements of various parts of the specimens from Micronesia fall between those for African and Hong Kong specimens. All 38 specimens from Micronesia are females; the male of *P. elutus* is only known from Africa.

It seems therefore that *P. elutus* has a very wide distribution, including tropical Africa, Madagascar, India, the Malay peninsula, South China (probably including Taiwan), the Philippines, the Bonin, Marianas and Caroline Is., the Hawaiian Is., the Galapagos Is., and possibly extending to the southern United States and Puerto Rico. Pearman (*in litt.*) has examined males and females from India which are probably of this species; the females differ from those of *P. tahitiensis* in the subgenital plate details as listed above.

***Pseudocaecilius marshalli*** (Karny) (See also page 106).

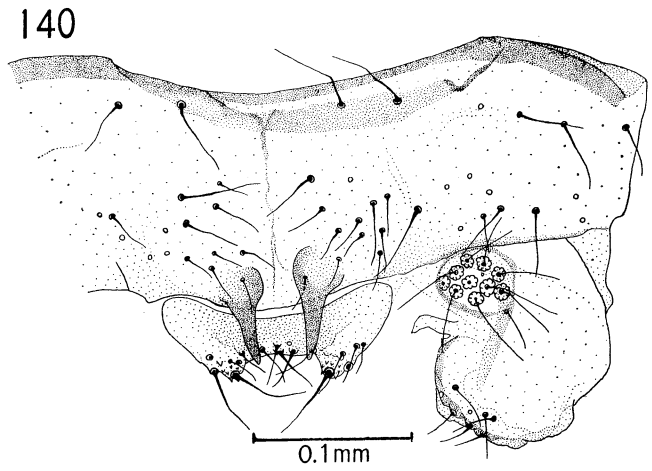
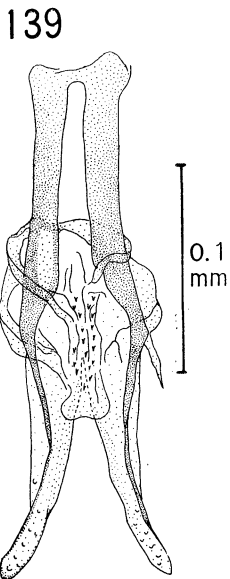
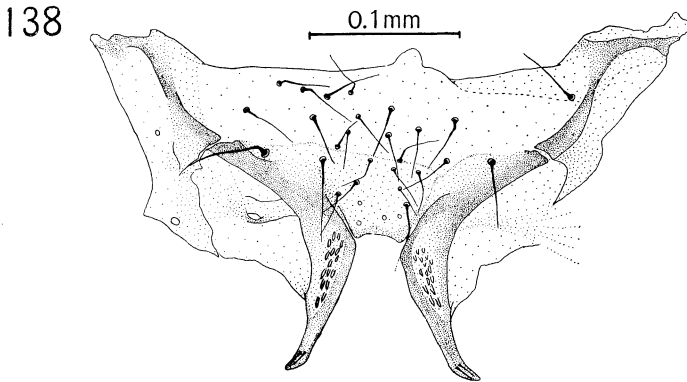
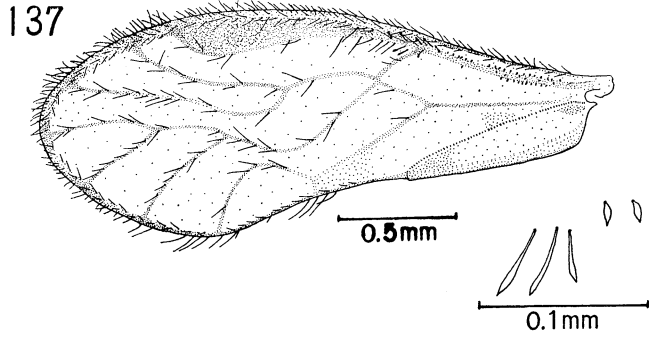
Recorded from Guam by Banks (1942).

#### *Hawaii*

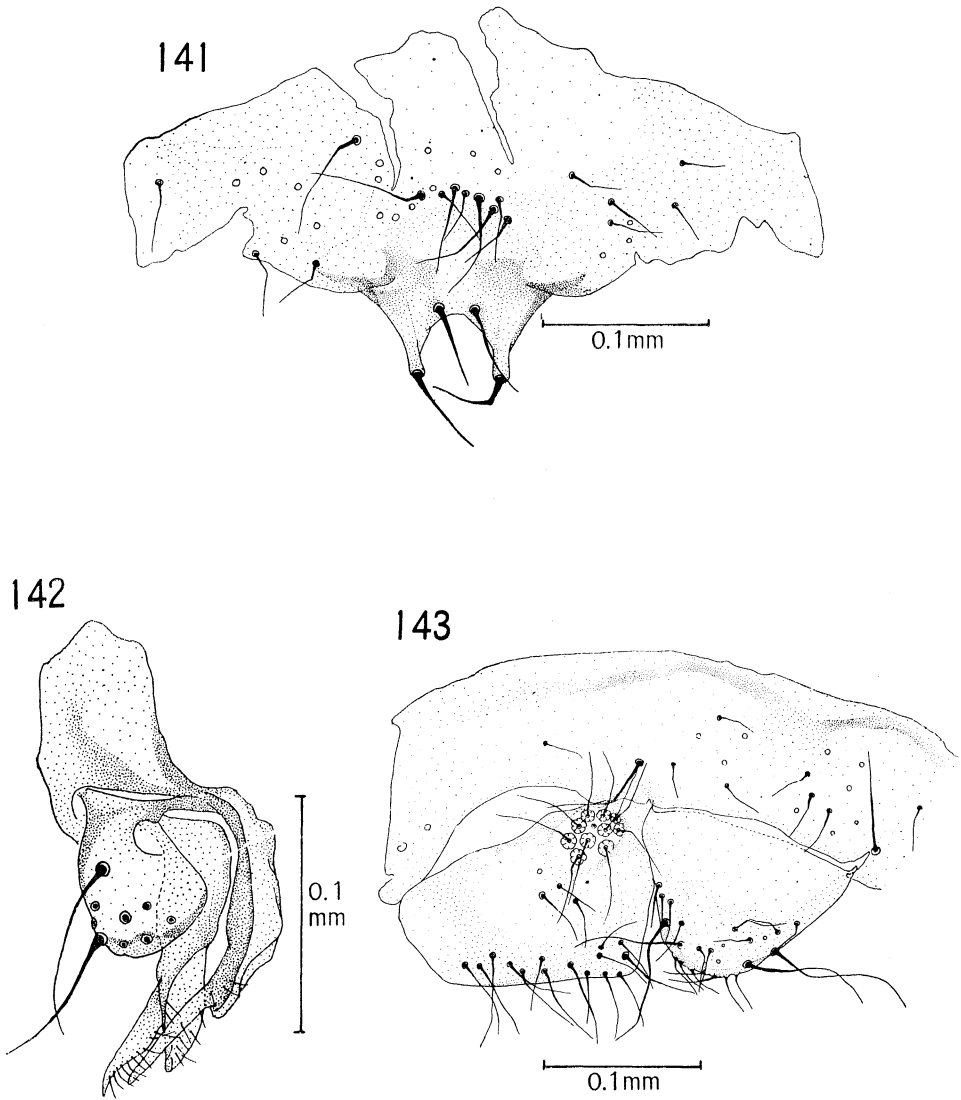
***Lobocaecilius monicus*** Lee and Thornton, new species Figs. 137-143.

♂. *Coloration* (after less than year in alcohol): Head light buff, clypeus slightly darker, with brown diagonal striae; a pair of transverse brown bands on vertex, a pair of brown bands along mesial borders of eyes. Bristles on vertex and near mesial borders of eyes brown and thicker than those on other parts of head. Eyes black, ocelli pale with reddish-brown centripetal border. Maxillary palp light buff. Antenna (damaged) with pedicel, scape and proximal flagellar segment light buff. Thorax light buff, dorsum and anterior part of antedorsum of mesothorax darker with a buff median band. Pleura on either side of thorax lined by a narrow irregular dark band. Fore wing (fig. 137) hyaline with brown veins; proximal and distal angles of cells  $Cu_1$  and  $Cu_2$  with brown pigment. Hind wing hyaline with faint veins, darkening distally. Legs fawn. Abdomen very light buff.

*Morphology*: I.O.:D.=1.2:1. Fore wing (fig. 137): veins  $rs$  and  $m$  meet at point;  $r_{2+3}$  and  $r_{4+5}$  long and convergent in middle region forming an hour-glass-shaped  $R_3$  cell; vein  $m$  bends close to apex of rather high areola postica; sensory papillae along vein  $r$ , those at junction of  $rs$  and  $r_1$  elongated and pointed. Vein  $r_{2+3}$  in hind wing short and almost perpendicular to front edge of wing;  $r_{4+5}$  and  $m$  setose. Hind leg with 17 ctenidiobothria on proximal tarsal segment; no preapical tooth on claw. *Hypandrium* (fig. 138) apically bearing a pair of large divergent sclerotized hooks, each terminating in a fingernail-like spine; basal 1/2 of each hook with a field of papillose projections; ciliation concentrated in medial part of hypandrium. *Penis frame* (fig. 139) long and



**Figs. 137-140.** *Lobocaecilius monicus*, ♂ : 137, fore wing ; 138, hypandrium ; 139, penis frame ; 140, apex of abdomen.



**Figs. 141-143.** *Lobocaccilius monicus*, ♀: 141, subgenital plate; 142, gonapophyses; 143, apex of abdomen.



narrow; with broad, divergent outer parameres; inner parameres absent; radula membranous, bearing small spines, sclerotized rods absent. *Tergite 9* (fig. 140) heavily sclerotized along anterior margin; posteriorly at base of epiproct and projecting in a posterior direction dorsal to it, a pair of sclerotized pointed rods. Paraproct with a field of 10 trichobothria surrounded by a somewhat circular sclerotized ridge. Epiproct with wide median indentation lined with a row of short setae, and 2 posteriorly directed lobes covered with fine papillae, each bearing an apical and a sub-apical long setae.

*Dimensions*: Body length (in alcohol): 1.5 mm. Dimensions of other characters as in Table XXII.

♀. *Coloration* (after less than a year in alcohol): General color of head similar to ♂, brown bands on head more distinct. Antenna (damaged) very light brown. Thorax and abdomen like ♂.

*Morphology*: I.O.:D.=2.8:1, eyes smaller than in ♂. Venation of fore and hind wings as ♂ except for absence of sensory papillae. Veins *rs* and *m* fused for a distance. Number of ctenidiobothria on proximal hind tarsal segment: 15; no preapical tooth on claw. *Subgenital plate* (fig. 141): apically produced into a pair of narrow, roughly cylindrical lobes each bearing a long apical seta, base of each lobe mesially with a long seta; ciliation on medial part of plate as a crescentic line. *Gonapophyses* (fig. 142): ventral valve lobate, bearing a thick apical stylet beset with fine bristles; dorsal valve bristled, with broader lobe and stouter subapical stylet projecting beyond lobe; outer valve short, broad, with a few long setae. *Tergite 9* (fig. 143) with faint band of sclerotization along anterior margin, no sclerotized projection on posterior margin. Epiproct and paraprocts differ from ♂ in shape, size and chaetotaxy. Paraproct with a field of 10 trichobothria.

*Dimensions*: Body length (in alcohol): 1.4 mm. Dimensions of other characters as in Table XXII.

Holotype ♂ (BISHOP 7183), 360 m, above Captain Cook, Hawaii, Hawaiian Is., 28. VI. 1963, on dead frons of *Cibotium*, Thornton. Allotype ♀ (BISHOP), same data as type. Other specimens from all main Hawaiian Islands.

DISTRIBUTION: Hawaiian Is. (Kauai, Oahu, Molokai, Lanai, Maui, Hawaii).

Common on all six of the main Hawaiian Islands, taken at heights up to 1,225 m., in months II, III, IV, V, VI, VII, VIII, IX, XII. Occurring on *Antidesma*, *Acacia koa*, *Metrosideros*, *Psidium guajava*, *Sadleria cyathodes*, *Pisonia sandwicensis*, *Pritchardia*, *Euphorbia*, *Macadamia*, *Cibotium* (dead and live fronds), *Juniperus*, *Cheirodendron*, *Eucalyptus* (including dead leaves), *Araucaria*.

*Lobocaecilius monicus* has several peculiar male features: a complete absence of internal parameres; papillae on the single pair of apical sclerites in the hypandrium; a pair of projecting rod-like sclerites on the posterior margin of the 9th abdominal tergite; and an epiproct with a median indentation and apical lobes. The first 3 of these characters are found elsewhere only in species of *Pseudoscottiella*, which, however has marked venational differences. The female genitalia are of the *Lobocaecilius* type. Veins  $r_{2+3}$  and  $r_{4+5}$  in the fore wing are long and converge towards each other in the middle forming an hour-glass-shaped  $R_3$  cell.

**Table XXII.** Length (in mm) of various characters of *Lobocaecilius monicus*, *Heterocaecilius diogenes* and *Lobocaecilius carinifex*

Characters	<i>L. monicus</i>		<i>H. diogenes</i>		<i>L. carinifex</i>	
	♂	♀	♂	♀	♂	♀
A	—	—	—	—	—	—
f <sub>1</sub>	—	0.390	0.440	0.410	0.410	0.390
f <sub>2</sub>	—	0.280	0.300	0.280	0.280	0.250
f <sub>1</sub> /f <sub>2</sub>	—	1.41	1.50	1.47	1.47	1.52
Fw	2.350	2.350	2.650	2.550	2.190	1.950
Hw	1.700	1.750	2.100	1.950	—	1.500
Hf	0.450	0.410	0.510	0.490	0.390	0.390
Ht	0.820	0.780	0.950	0.870	0.720	0.720
t <sub>1</sub>	0.280	0.265	0.325	0.310	0.245	0.245
t <sub>2</sub>	0.120	0.105	0.145	0.135	0.095	0.095
t <sub>1</sub> /t <sub>2</sub>	2.60	2.50	2.26	2.28	2.60	2.65

**Pseudocaecilius elutus** Enderlein

This species occurs on all 6 of the main Hawaiian islands. (See also pp. 14, 40, 47, 83, 112).

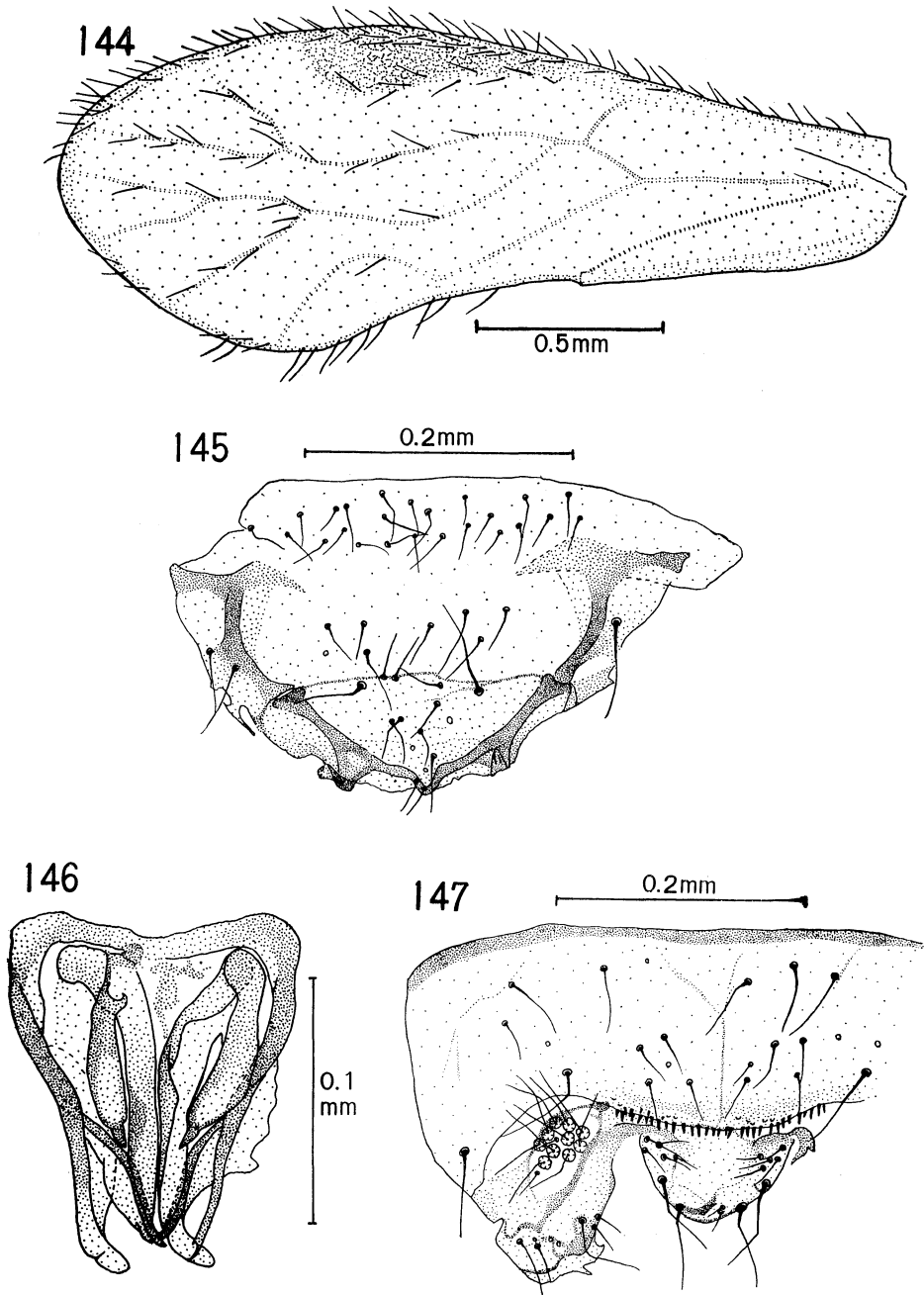
*Eastern Melanesia*

**Heterocaecilius dardanus** Lee and Thornton, new species Figs. 144-150.

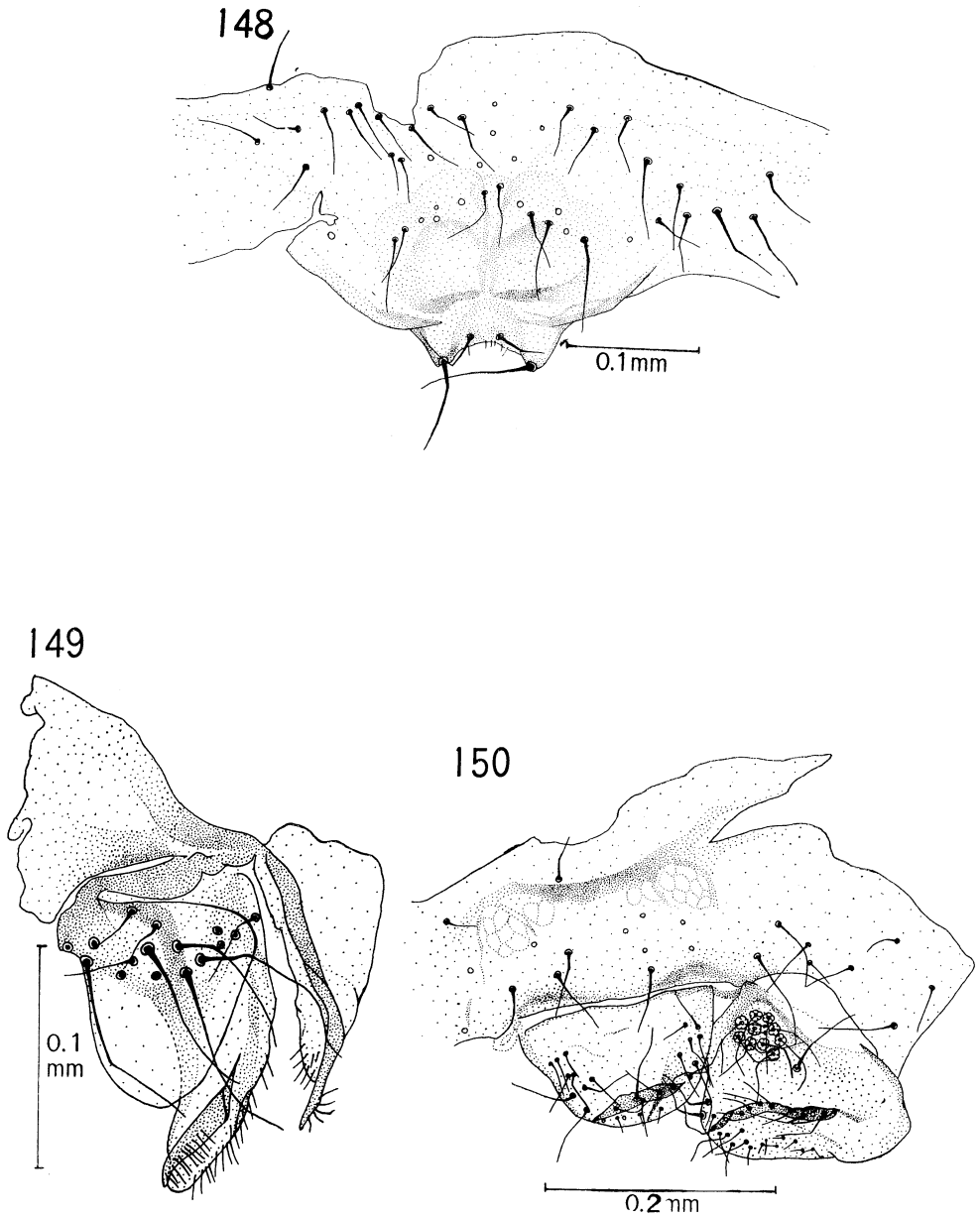
♂. *Coloration* (after 25 years storage in alcohol): Head generally yellowish brown. Sagittal and epicranial sutures and mesial borders of eyes brown and distinct. Eyes coffee black, ocelli pale. Maxillary palp light buff. Antenna (damaged) with proximal 6 segments of flagellum brown. Thorax light brown with dorsum of mesothorax slightly darker. Fore wing (fig. 144) yellowish hyaline with light yellowish-brown veins. Hind wing as fore wing but of a lighter shade. Legs light buff with brown claws. Abdomen very light yellowish-brown.

*Morphology*: I.O.:D.=1.0. In fore wing (fig. 144) veins *rs* and *m* fuse for a short distance; pterostigma with a smoothly rounded distal margin. Hind wing: *r*<sub>4+5</sub> and *m* setose; *r*<sub>2+3</sub> inclined at an angle with fore edge of wing. Proximal hind tarsal segment with 17 ctenidiobothria; no preapical tooth on claw. *Hypandrium* (fig. 145) with a pair of short, posteriorly directed sub-apical hooks, each bearing a fingernail-like terminal spine. *Penis frame* (fig. 146) short, with broad base; inner parameres fused at apices, point of fusion produced into a slightly curved thorn-shaped projection; outer parameres separated and broad; radula armed with 2 pairs of sclerotized rods, 1 pair long, broad and apically pointed, the other shorter, terminating in a thorn-shaped structure. *Epiproct* (fig. 147) with 2 pairs of long setae. Paraproct with a field of 10 trichobothria. Anterior margin of tergite 9 heavily sclerotized, posterior margin along entire base of epiproct with a band of short tooth-like sclerites.

*Dimensions*: Body length (in alcohol): 1.8 mm: Dimensions of other characters as shown in Table XXIII.



**Figs. 144-147.** *Heterocaecilius dardanus*, ♂: 144, fore wing; 145, hypandrium; 146, penis frame; 147, apex of abdomen.



**Figs. 148-150.** *Heterocaccilius dardanus*, ♀: 148, subgenital plate; 149, gonapophyses; 150, apex of abdomen.

♀. *Coloration* (after 25 years storage in alcohol): Head light brown. Clypeus darker, with faint diagonal striae. Eyes coffee brown, ocelli pale. Maxillary palp light brown with pale areas at joints; terminal segments darker. Antenna (damaged) with basal and 2nd segment of flagellum and pedicel yellowish brown, scape slightly darker. Thorax light brown, dorsum and antedorsum of mesothorax darker. Pleural sutures distinct. Fore and hind wings, legs, as in ♂. Abdomen very light brown.

*Morphology*: I.O.:D.=2.7, eyes smaller than in ♂. Fore wing with veins *rs* and *m* meeting at a point; pterostigma as in male. In hind wing  $r_{2+3}$ ,  $r_{4+5}$  and *m* setose. Number of ctenidiobothria on proximal hind tarsal segment: 15; no preapical tooth on claw. *Subgenital plate* (fig. 148): apical lobes short, with shallow mesial indentation and 2 pairs of long setae, longer pair apical. *Gonapophyses* (fig. 149): ventral valve with short stylet beset with bristles, and broad, somewhat triangular base; dorsal valve broad and ciliated at base of bristled stylet, stylet short, thick, not projecting beyond lobate portion, basally beset with several long thick setae and some shorter ones; outer valve with very long setae and a posterior basal lobate portion. *Tergite 9* (fig. 150) with a short medial sclerotized band near anterior margin; posterior margin near basal corners of epiproct with 2 sclerotized strips. Paraproct with a field of 10 trichobothria.

*Dimensions*: Body length (in alcohol): 1.9 mm. Dimensions of other characters as given in Table XXIII.

Holotype ♂ (BISHOP 7184), Mt Victoria, W. Slope, 900 m, Viti Levu, Fiji, 16. IX. 1938, E. C. Zimmerman. Allotype ♀ (BISHOP), Navai Hill, Thola North, 758 m, Viti Levu, Fiji, 17. IX. 1938, Zimmerman.

**Heterocaecilius simplex** Lee and Thornton, new species Figs. 151-157.

♂. *Coloration* (after 25 years storage in alcohol): Head uniformly buff. Eyes coffee brown, ocelli pale and not distinct. Maxillary palp light brown. Antenna light brown. Thorax with terga and pleura of meso- and metathorax buff. Fore wing (fig. 151) hyaline with yellowish brown veins; pterostigma slightly darker. Hind wing as fore wing but with fainter veins. Legs light yellowish brown, uniform. Abdomen light brown.

*Morphology*: I.O.:D.=1.3 (value for paratype: 1.6). In fore wing (fig. 151) veins *rs* and *m* fuse for a short distance; sensory papillae on  $Cu_1$  and *An* cells; vein *an* bare, indistinct. In hind wing  $r_{4+5}$  and *m* setose;  $r_{2+3}$  inclined at an angle with fore edge of wing. Proximal tarsal segment of hind leg with 18 ctenidiobothria (17 in paratype); no preapical tooth on claw. *Hypandrium* (fig. 152): apex bears a pair of cockscomb-shaped sclerites pointing in a posterolateral direction and covered with spines; ciliation dense, a pair of very long setae, 1 at base of supporting rod of each "cockscomb" sclerite. *Penus frame* (fig. 153) elongate, with rectangular base; inner parameres heavily sclerotized and fused at their apices; outer parameres broad and divergent. *Tergite 9* (fig. 154) with sclerotized anterior margin; at posterior median margin 2 projecting fields of papillae. Paraproct with a field of 10 trichobothria. Epiproct semicircular.

*Dimensions*: Body length (in alcohol): 2.1 mm (value for paratype: 1.5 mm). Dimensions for other characters as in Table XXIV.

♀. *Coloration* (after 25 years storage in alcohol): General color of head, eyes, ocelli and antenna similar to ♂. Maxillary palp light brown with darker terminal segment. Thoracic and abdominal coloration as ♂.

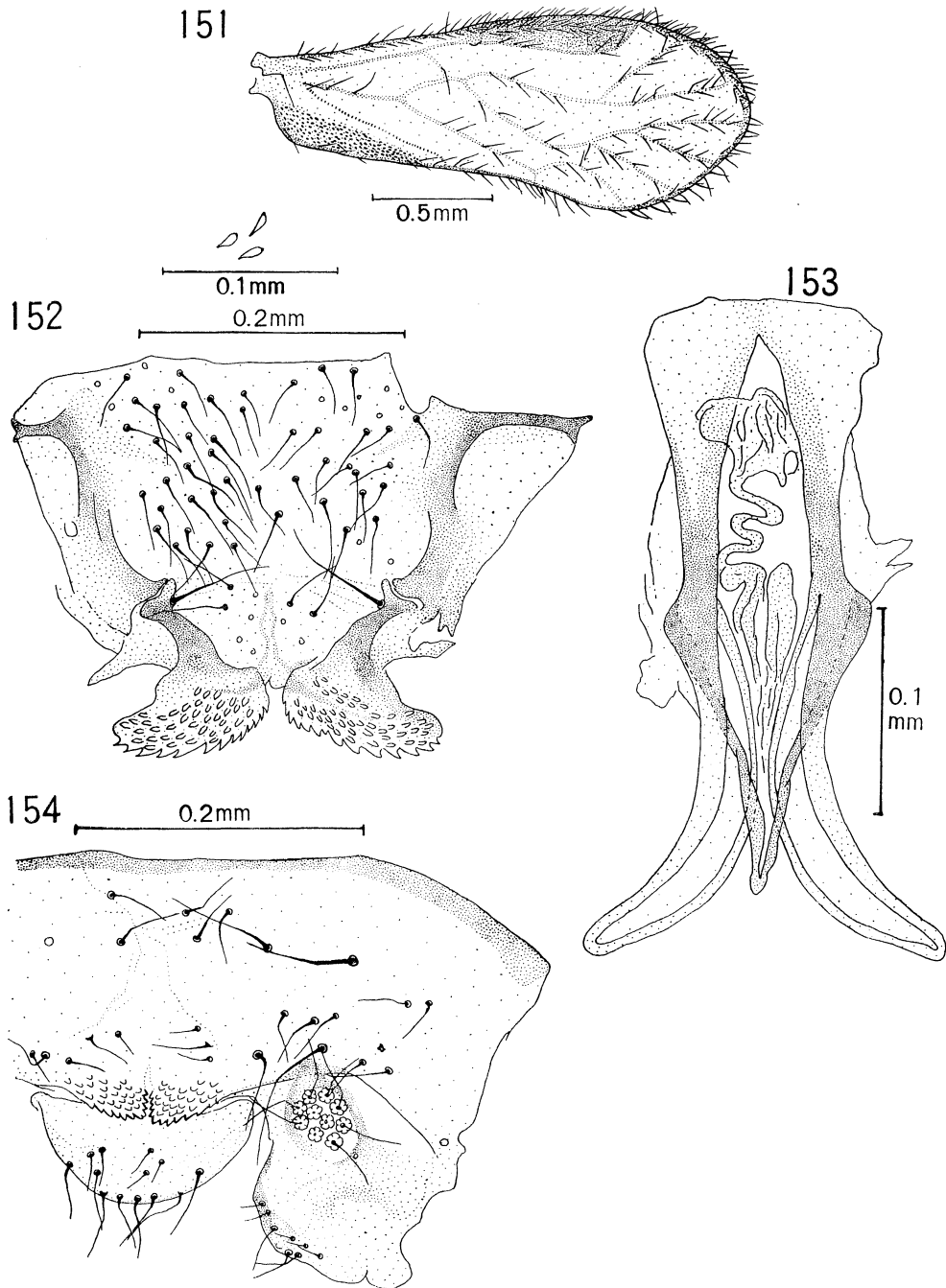
**Table XXIII.** Length (in mm) of various characters of specimens of *Heterocaecilius dardanus*, *H. panicus*, *H. volatus* and *Lobocaecilius nigrens*

Characters	<i>H. dardanus</i>		<i>H. panicus</i>	<i>H. volatus</i>		<i>L. nigrens</i>	
	♂	♀	♀	♀	♀	♂	♀
A	—	—	—	—	—	—	—
f <sub>1</sub>	0.500	—	0.480	0.490	0.480	0.440	—
f <sub>2</sub>	0.350	—	0.200	—	0.310	0.300	—
f <sub>1</sub> /f <sub>2</sub>	1.44	—	2.42	—	1.53	1.47	—
Fw	2.200	2.200	2.300	2.450	2.600	1.850	2.050
Hw	1.700	1.750	1.950	2.000	2.100	1.550	1.550
Hf	0.450	0.430	0.530	0.540	0.530	0.410	0.440
Ht	0.850	0.840	0.940	1.000	1.020	0.740	0.790
t <sub>1</sub>	0.295	0.295	0.285	0.355	0.360	0.270	0.275
t <sub>2</sub>	0.120	0.110	0.150	0.120	0.130	0.090	0.090
t <sub>1</sub> /t <sub>2</sub>	2.44	2.66	1.92	3.32	2.79	2.96	3.00

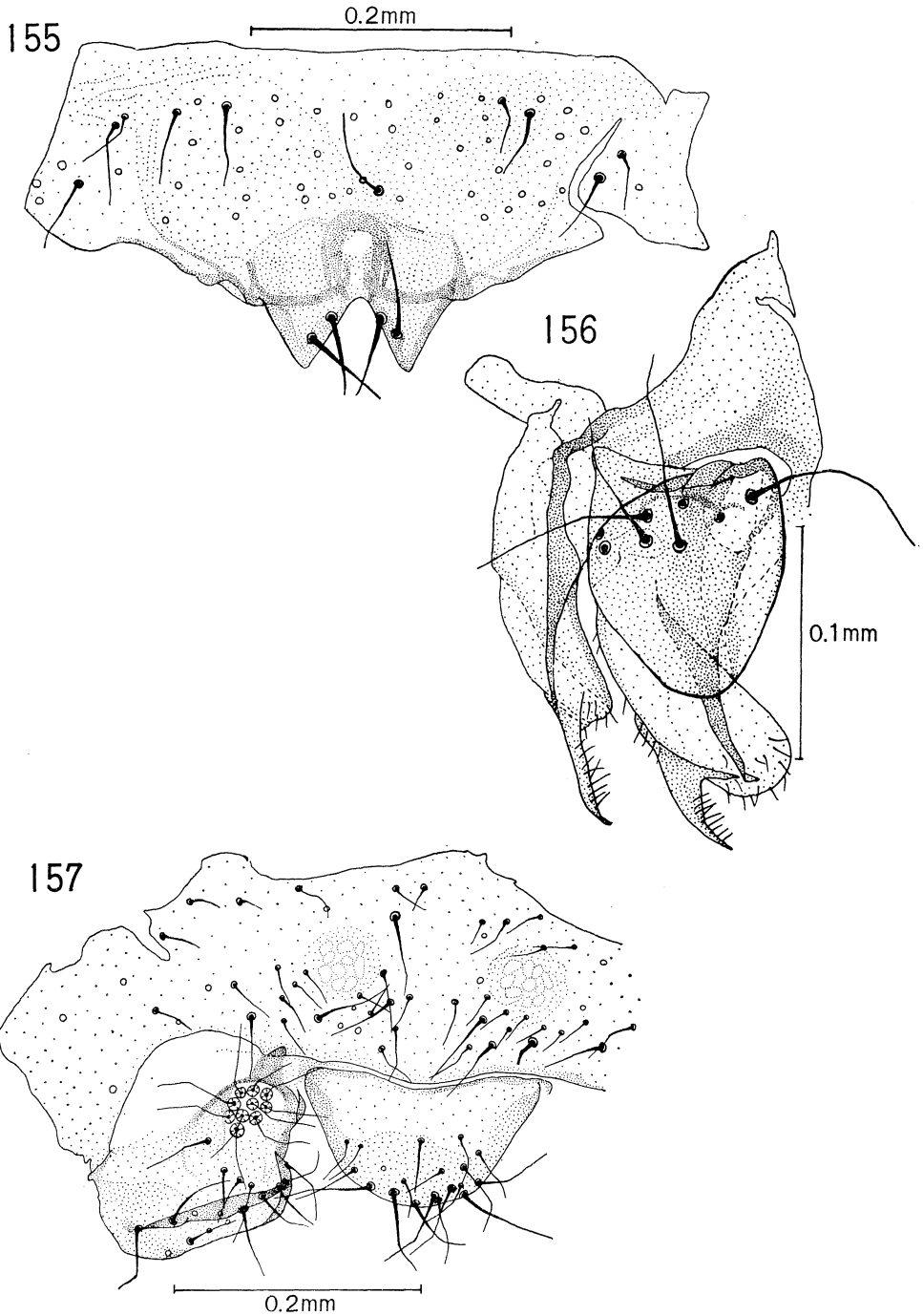
**Table XXIV.** Length (in mm) of various characters of *Heterocaecilius simplex*

Characters	♂		♀			
A	—	—	—	—	—	1.790
f <sub>1</sub>	0.510	0.510	0.380	0.380	0.440	0.430
f <sub>2</sub>	0.340	0.340	0.260	0.250	0.300	0.270
f <sub>1</sub> /f <sub>2</sub>	1.51	1.48	1.44	1.53	1.47	1.68
Fw	2.050	2.150	2.150	2.100	2.400	2.250
Hw	1.550	1.700	1.650	1.600	1.850	1.750
Hf	0.480	0.530	0.530	0.480	0.560	0.540
Ht	0.820	0.860	0.860	0.800	0.950	0.900
t <sub>1</sub>	0.285	0.305	0.295	0.290	0.325	0.305
t <sub>2</sub>	0.110	0.105	0.110	0.105	0.125	0.120
t <sub>1</sub> /t <sub>2</sub>	2.59	2.91	2.69	2.71	2.65	2.58

*Morphology*: I.O.:D.=2.2 (average value for 4 specimens: 2.8), eyes smaller than ♂. Venation of fore wing close to pattern of ♂ except absence of sensory papillae and ciliation of anal vein (bare in male); veins *rs* and *m* joined by a short cross vein; in 2 specimens they fuse for a short distance. Hind wing similar to ♂. Hind leg with 17 ctenidiobothria on proximal tarsal segment (range for 4 specimens: 16-18); no pre-apical tooth on claw. *Subgenital plate* (fig. 155): with an apical pair of pointed triangular lobes, each bearing 2 sub-apical setae along mesial border. *Gonapophyses* (fig. 156): ventral valve with an elongate somewhat triangular lobe bearing apically a stylet beset with bristles and the suggestion of a setose subapical lobe; dorsal valve like ventral valve but with broader lobe, stylet with broader base and directed towards lobate portion,



**Figs. 151-154.** *Heterocaecilius simplex*, ♂: 151, fore wing; 152, hypandrium; 153, penis frame; 154, apex of abdomen.



**Figs. 155-157.** *Heterocacilius simplex*, ♀: 155, subgenital plate; 156, gonapophyses; 157, apex of abdomen.



projecting for only a short distance beyond it; outer valve subtriangular with rounded edges, long setae at proximal basal region, distal region bare. *Paraproct* (fig. 157) with a field of 10 trichobothria.

*Dimensions*: Body length (in alcohol): 2.1 mm (average for 4 specimens: 1.9 mm). Dimensions for other characters as in Table XXIV.

Holotype ♂ (BISHOP 7185), Viti Levu, Nandarivatu, Navai Hill, 818 m, Fiji, 7. IX. 1938, E. C. Zimmerman. Allotype ♀ (BISHOP), Viti Levu, Navai Hill, Thola North, 758 m, Fiji, 16. IX. 1938, Zimmerman. Paratypes: 1♂, 1♀, same data as allotype; 1♀, Viti Levu, Navai Hill, Thola North, 758 m, Fiji, Zimmerman; 1♀, Viti Levu, Nandaivatu, Navai Hill, 848 m, Fiji, 11. IX. 1938, Zimmerman.

**Heterocaecilius panicus** Lee and Thornton, new species Figs. 158-161.

♀. *Coloration* (after 25 years storage in alcohol): General color reddish brown with anteclypeus and labrum lighter. Suture between anteclypeus and clypeus dark. Sagittal suture dark and distinct. Eyes coffee brown, ocelli pale. Maxillary palps brown with whitish areas at segmental joints. Antenna (damaged) similar in color to maxillary palp. Thorax with deep brown, distinct sutures. Antedorsum and dorsum of mesothorax brown; metathorax lighter. Fore wing (fig. 158) yellowish brown with darker pterostigma; veins darker than membrane which has a hyaline strip stretching in a shallow curve from distal region on cell  $Cu_1$  to middle of vein  $r_{4+5}$ . Hind wing hyaline with light buff anterior edge and slightly darker veins. Hind leg with coxa, trochanter and femur brown, becoming successively yellowish and lighter; claws brown. Abdomen very light buff. Ninth abdominal tergite darker.

*Morphology*: I.O.:D.=4.4. Head beset with short thick bristles. Vertex large; eyes very small. In fore wing (fig. 158) vein  $m$  traces a semicircular path before branching into  $m_1$ ,  $m_2$  and  $m_3$  which are short; veins  $rs$  and  $m$  unite for a very short distance; basal part of wing broad. Hind wing with  $r_{2+3}$  nearly perpendicular to anterior edge of wing;  $r_{4+5}$  and  $m$  setose. Hind leg with 16 ctenidiobothria on proximal tarsal segment; preapical tooth present on only one of the pairs of claws. *Subgenital plate* (fig. 159): apical lobe poorly developed, each bearing an apical seta; 1 lobe with an additional subapical seta. Sclerotized pattern at base of apical lobes. *Gonapophyses* (fig. 160): ventral valve lobate with a broad triangular base and bearing a stylet beset with bristles; dorsal valve similar but stylet broader and not projecting beyond lobate portion; outer valve round, with apical region thin and bare, basal region beset with several long setae. *Tergite 9* (fig. 161) with short sclerotized band at center. Paraproct with a field of 11 trichobothria.

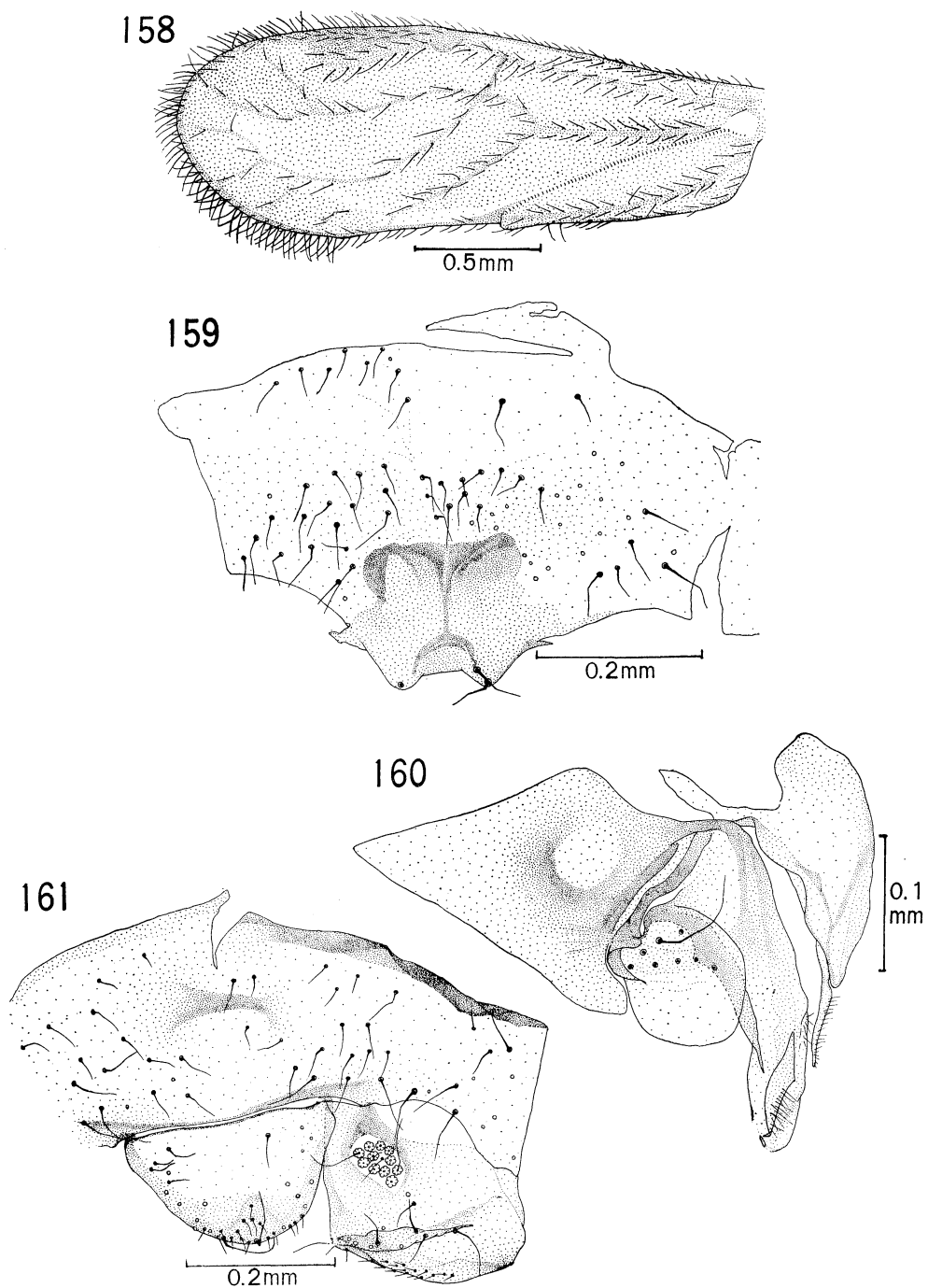
*Dimensions*: Body length (in alcohol): 2.5 mm. Dimensions of other characters as in Table XXIII.

♂. Unknown.

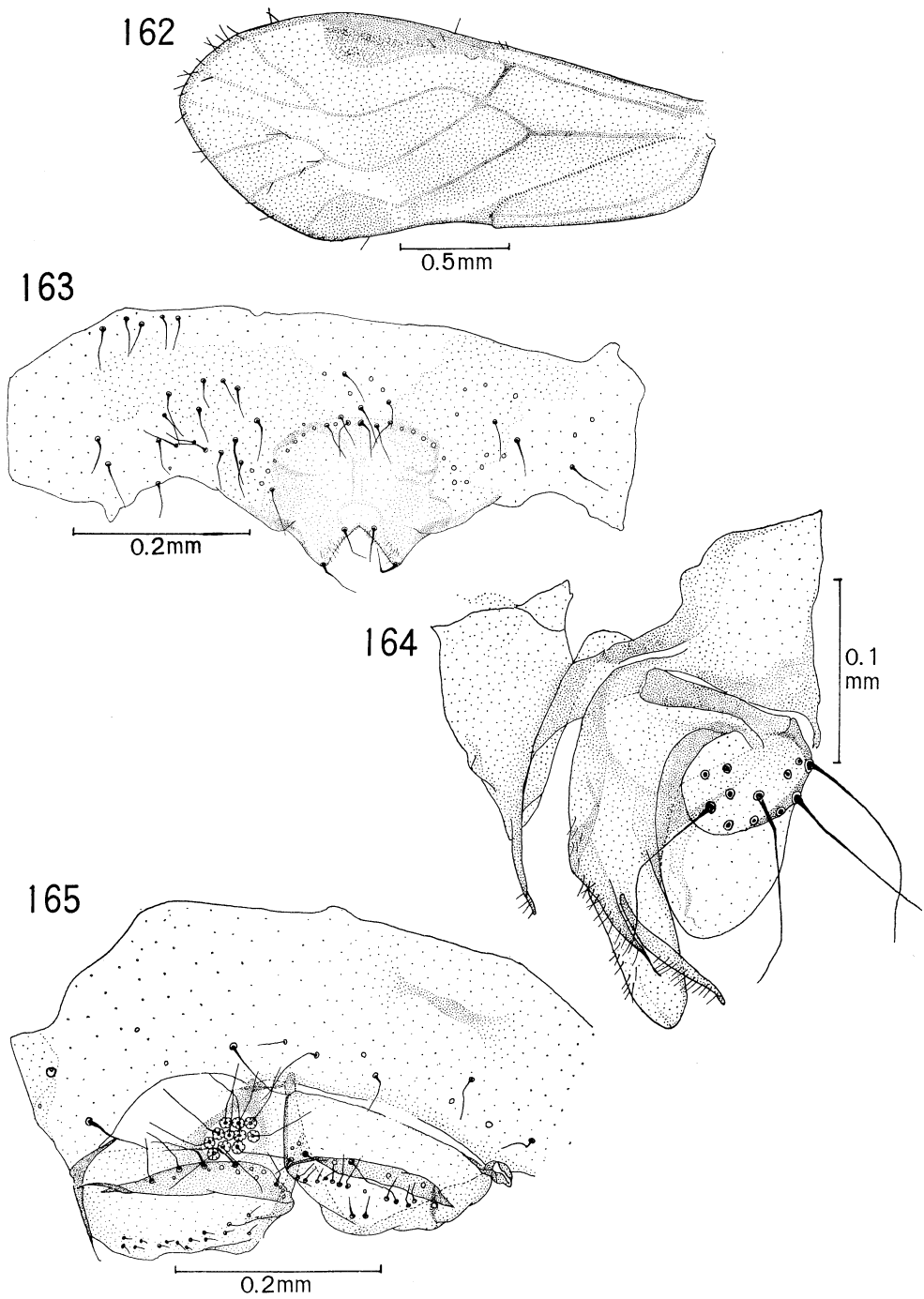
Holotype ♀ (BISHOP 7186), Viti Levu, Navai Hill, 758 m, Thola North, Fiji, 17. IX. 1938, E. C. Zimmerman.

**Heterocaecilius volatus** Lee and Thornton, new species Figs. 162-165.

♀ *Coloration* (after 25 years storage in alcohol): Head with brown vertex and frons. Area on either side of epistomial sutures and region of antennal socket lighter in color. Clypeus and other parts of head brown. Sutures black and distinct, especially



**Figs. 158-161.** *Heterocaecilius panicus*, ♀: 158, fore wing; 159, subgenital plate; 160, gonapophyses; 161, apex of abdomen.



**Figs. 162-165.** *Heterocaecilius volatus*, ♀: 162, fore wing; 163, subgenital plate; 164, gonapophyses; 165, apex of abdomen.

sagittal suture and suture between anteclypeus and clypeus. Eyes coffee brown, ocelli pale, on brown protuberance. Antenna (damaged) fawn, basal flagellar segment, scape and pedicel slightly darker than rest. Thorax with dorsum and antedorsum of mesothorax light brown; metanotum and pleura buff; thoracic sutures brown and distinct. Fore wing (fig. 162) brown with some lighter areas; veins darker and more distinct for short stretches in mid-wing. Hind wing light brown with brown veins; anterior edge of wing darker. Legs reddish brown; coxae and distal end of proximal 2 tarsal segments buff.

*Morphology*: I.O.:D.=3.6 (3.2 in paratype). Fore wing (fig. 162) broad basally; veins *rs* and *m* meet at a point (fuse for a short distance in paratype); pterostigma wide apically, bluntly rounded. Hind wing with veins  $r_{2+3}$ ,  $r_{4+5}$  and *m* setose. Hind leg with 19 ctenidiobothria on proximal tarsal segment (18 in paratype); preapical tooth present on only one of the pairs of claws. *Subgenital plate* (fig. 163): apical lobes triangular, each bearing an apical seta and another at base of its mesial border; mesial borders of apical lobes covered with fine hair-like bristles; pattern of sclerotization at base of apical lobes. *Gonapophyses* (fig. 164): ventral valve lobate, with broad triangular base and a styliform projection bearing fine bristles at distal end; dorsal valve with broad lobe and bearing a bristled stylet, bristles on lobate portion at base of stylet; outer valve 2-lobed, with larger thin portion bare, basally lobe beset with about 12 long setae. *Tergite 9* (fig. 165) with short, medial sclerotized band near anterior margin. Paraproct with a field of 11 trichobothria.

*Dimensions*: Body length (in alcohol): 2.5 mm (2.6 mm paratype). Dimensions of other characters as shown in Table XXIII.

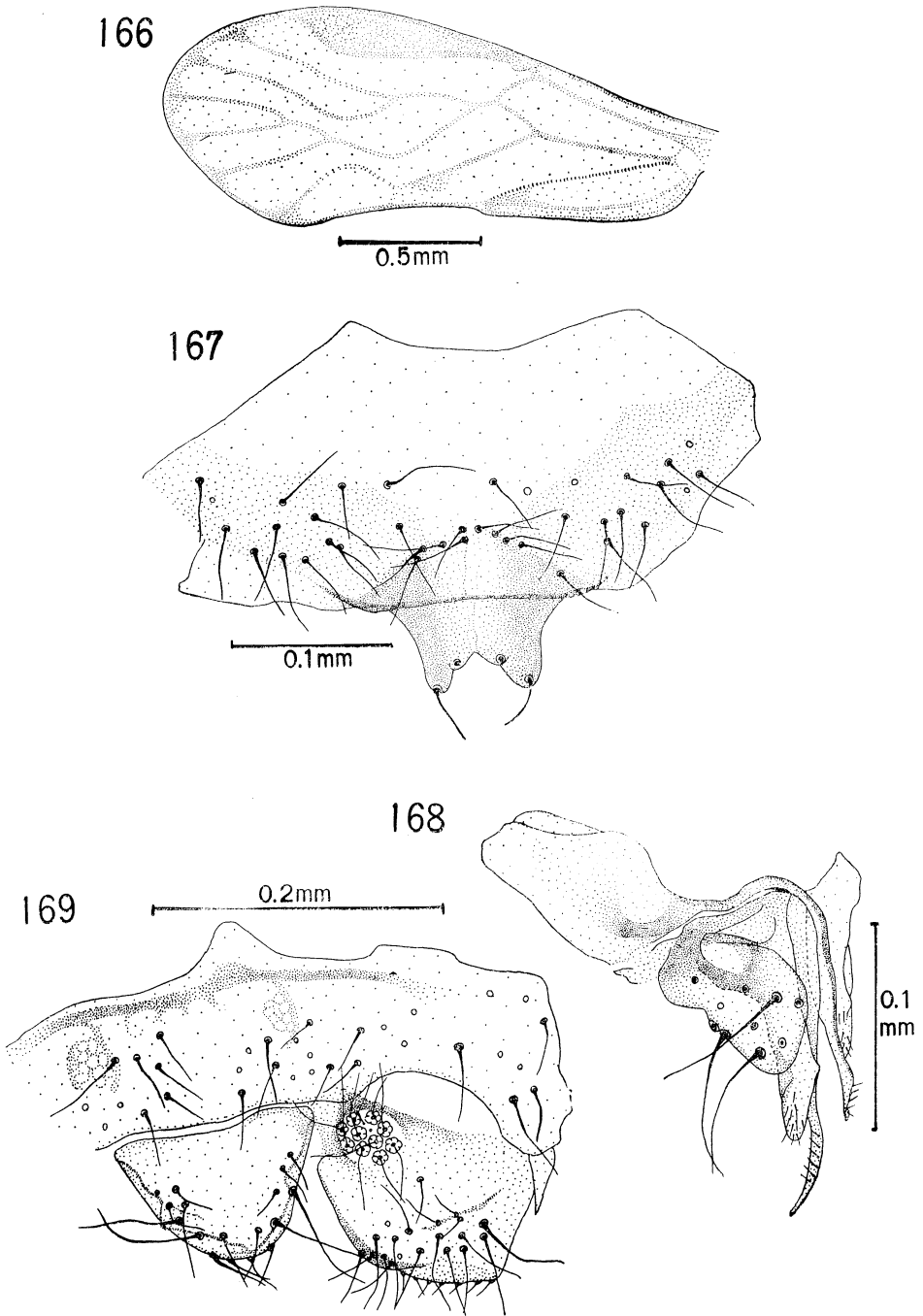
♂. Unknown.

Holotype ♀ (BISHOP 7187), Viti Levu, Nandarivatu, 900-1120, Fiji, 3. IX. 1938, E. C. Zimmerman. Paratype: same data but 115 m, 5. IX. 1938.

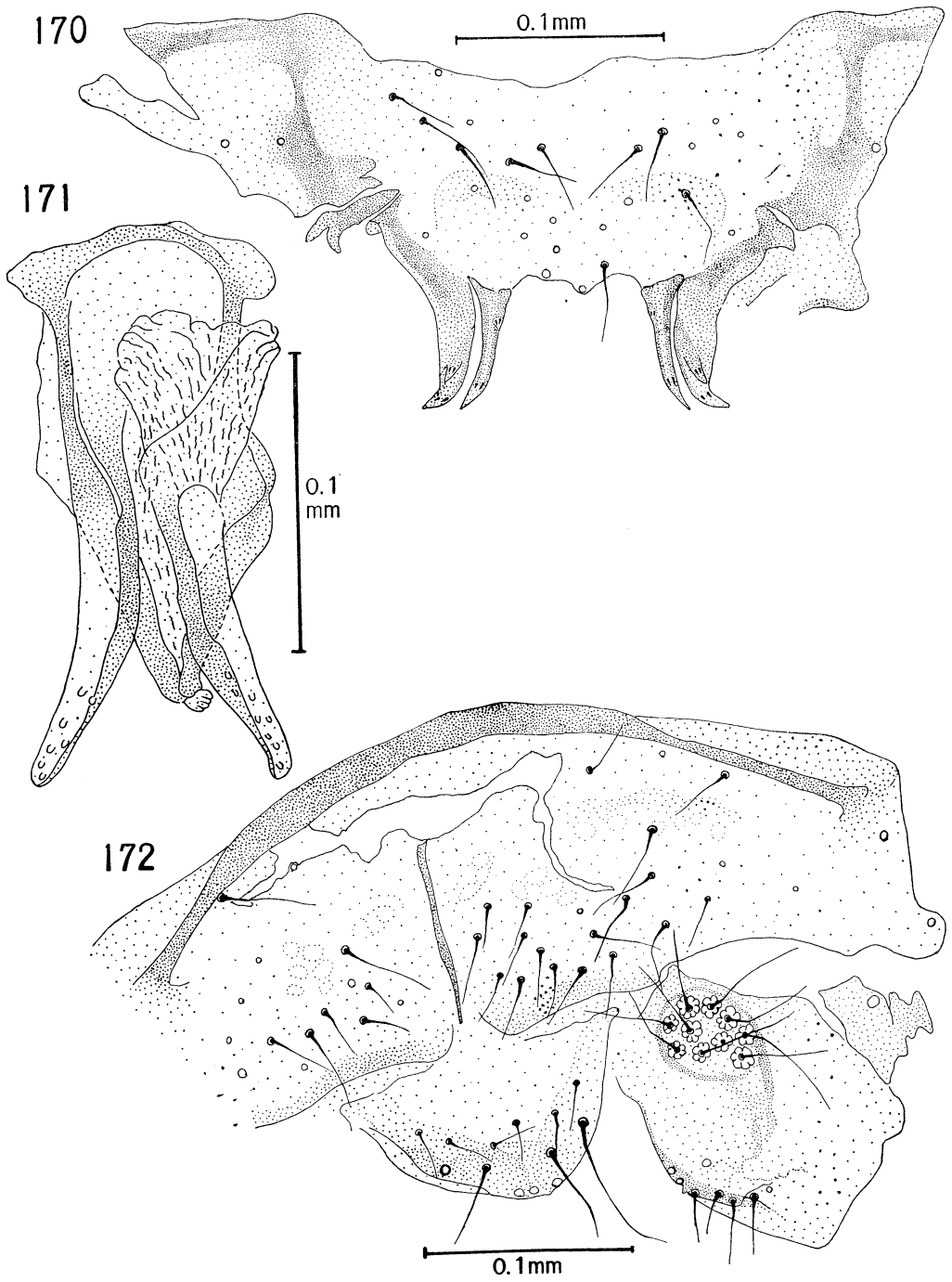
**Lobocaecilius nigrens** Lee and Thornton, new species Figs. 166-172.

♀. *Coloration* (after 25 years storage in alcohol): General color light buff. Eyes coffee brown, ocelli pale. Maxillary palp light buff. Antenna light yellowish brown. General color of thorax as head with darker sutures. Fore wing (fig. 166) hyaline with yellowish brown veins and pigmentation at distal tips of veins and apical angles of cells  $Cu_1$  and  $Cu_2$ . Hind wing hyaline with slightly darker veins. Legs uniformly light yellowish brown. Abdomen very pale brown.

*Morphology*: I.O.:D.=2.4. Fore wing (fig. 166): veins *rs* and *m* fuse for a short distance;  $r_{2+3}$  and  $r_{4+5}$  rather long; radial stem short; pterostigma tapering distally. Hind wing: vein  $r_{2+3}$ ,  $r_{4+5}$  and *m* setose;  $r_{2+3}$  inclined at an angle with anterior edge of wing. Number of ctenidiobothria on proximal tarsal segment of hind leg: 15; no preapical tooth on claw. *Subgenital plate* (fig. 167): apically bilobed, lobes rounded, a terminal seta and another at approximately mid-point of mesial border of each lobe. Anterior margin of plate at base of apical lobes with a row of long setae arranged in a shallow crescent. *Gonapophyses* (fig. 168): ventral valve lobate, with a bristled styliform point; dorsal valve with an elongate lobe bearing a long bristled stylet projecting some distance beyond lobe; outer valve somewhat oblong with distal side oblique and a notch on posterior longer side near base, with several long setae. *Tergite 9* (fig. 169) with sclerotized band at anterior margin. Paraproct with a field of 10 trichobothria.



**Figs. 166-169.** *Lobocacilius nigrens*, ♀: 166, fore wing; 167, subgenital plate; 168, gonapophyses; 169, apex of abdomen.



**Figs. 170-172.** *Lobocaccilius nigrens*, ♂: 170, hypandrium; 171, penis frame; 172, apex of abdomen.

*Dimensions*: Body length (in alcohol): 2.2 mm. Dimensions of other characters in Table XXIII.

♂. *Coloration* (after 26 years storage in alcohol): General coloration, antenna and maxillary palp as ♀. Eypes black, ocelli pale with brown inner borders. Thorax generally light brown with dorsum and antedorsum of mesothorax and metathorax slightly darker. Wings and legs as ♀. Abdomen as ♀.

*Morphology*: I.O.:D.=1.1:1. Wings similar to ♀. Hind leg with 16 ctenidobothria on proximal tarsal segment; no preapical tooth on claw. *Hypandrium* (fig. 170) with 4 pairs of sclerotized rods each bearing a terminal fingernail-like spine; innermost pair very small and closely applied to its neighbor. *Penis frame* (fig. 171) apically broad; flat and divergent outer parameres; inner parameres convergent and united at apex, point of fusion serrated; radula without rod sclerites, spines present on membrane. *Tergite* 9 (fig. 172) with sclerotized band on anterior margin; posterior margin with a field of papillae. Paraproct with 10 trichobothria.

*Dimensions*: Body length (in alcohol): 1.7 mm. Dimensions of other characters as in Table XXIII.

Holotype ♀ (BISHOP 7188), Mango, Ima (Lau Group), S. Marona, 697 m, Fiji, 14. VIII. 1948, E. C. Zimmerman. Allotype ♂ (BISHOP), Mvana, Vanua Mbalavu (Lau Group), 61 m, Fiji, 9 VIII. 1938, Zimmerman.

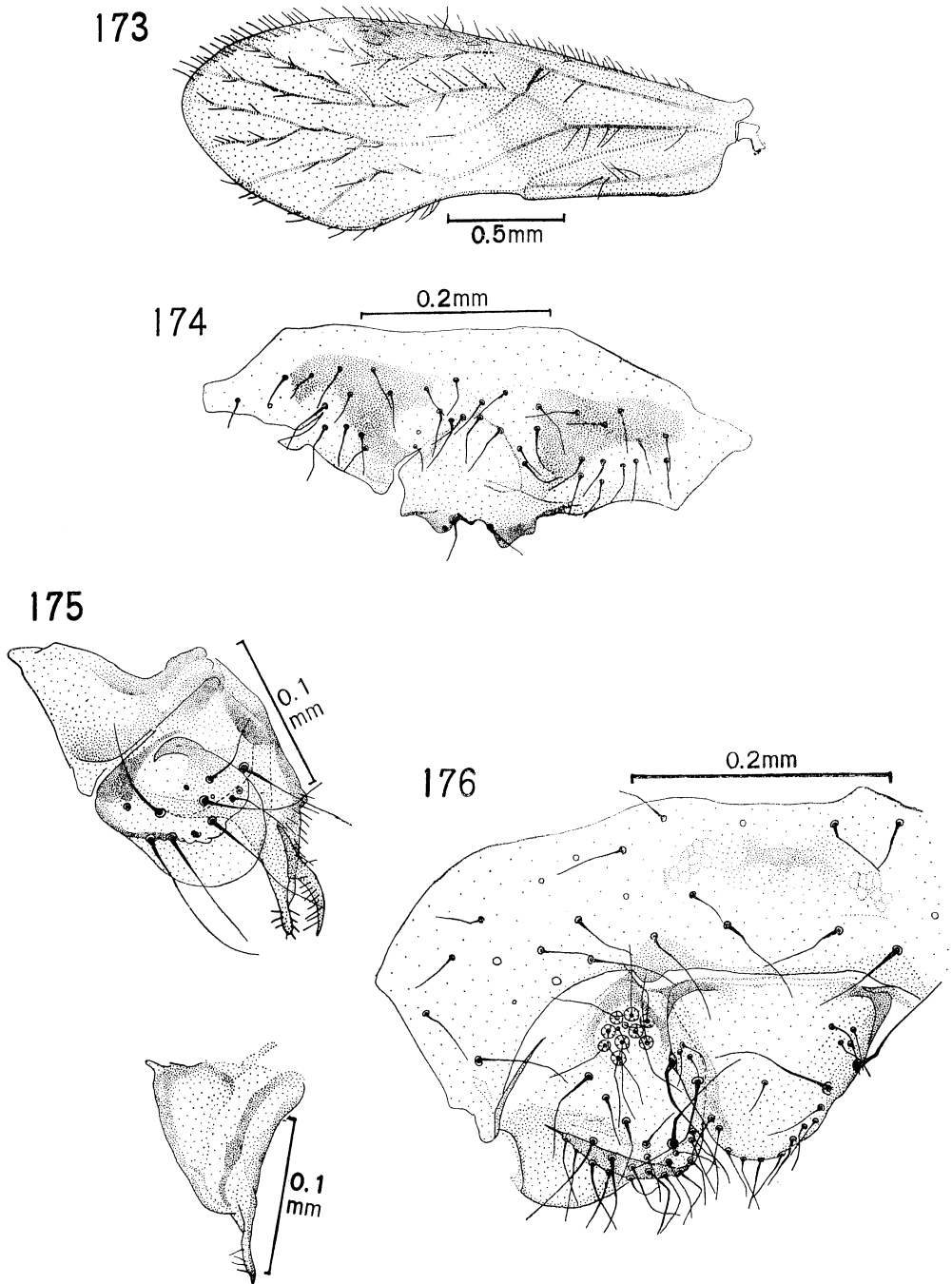
***Heterocaecilius greenwoodi*** (Karny), new combination Figs. 173-179.

*Pseudocaecilius greenwoodi* Karny, 1926, Bull. Ent. Res. 16: 290.—Thornton, 1961, Proc. R. Ent. Soc. Lond. B 30(11-12): 149.

♀. *Coloration* (after 25 years storage in alcohol): Head generally buff. Suture between anteclypeus and clypeus brown and distinct. Eyes brown, ocelli pale, on brown protuberance. Maxillary palp light buff. Antenna fawn. Thorax with dorsum and antedorsum of mesothorax brown, rest buff with brown sutures. Fore wing (fig. 173)

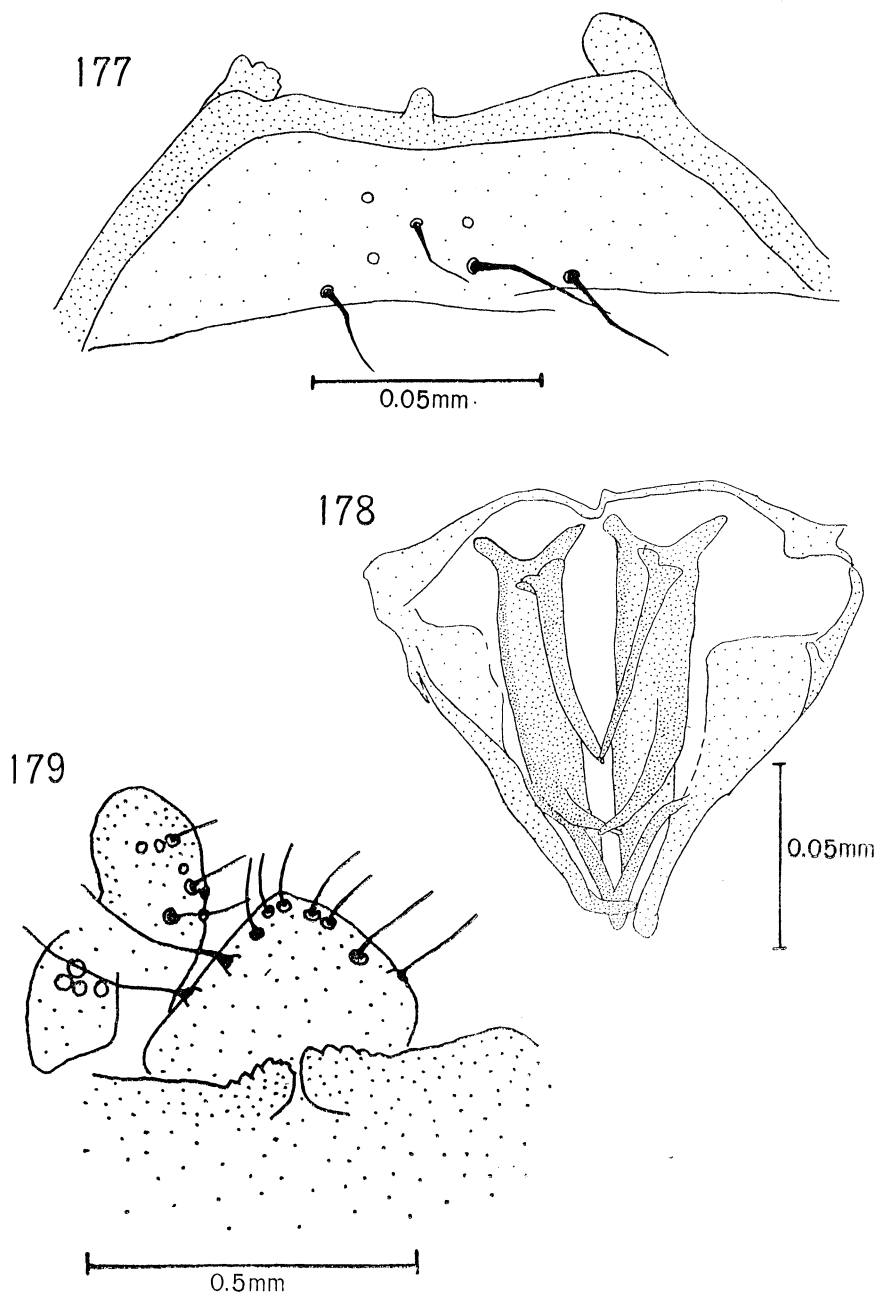
**Table XXV.** Length (in mm) of various characters of *Heterocaecilius greenwoodi* Karny.

Characters	Female	Karny's measurement of male
A	—	—
f <sub>1</sub>	0.480	—
f <sub>2</sub>	0.360	—
f <sub>1</sub> /f <sub>2</sub>	1.34	—
Fw	2.450	1.8
Hw	1.900	—
Hf	0.560	—
Ht	1.020	—
t <sub>1</sub>	0.380	0.22
t <sub>2</sub>	0.140	0.11
t <sub>1</sub> /t <sub>2</sub>	2.70	2.00
No. ctenidio.	19	15



**Figs. 173-176.** *Heterocaccilius greenwoodi* (Karny), ♀: 173, fore wing; 174, subgenital plate; 175, gonapophyses; 176, apex of abdomen.





**Figs. 177-179.** *Heterocaecilius greenwoodi*, ♂ holotype: 177, hypandrium; 178, penis frame; 179, apex of abdomen.

yellowish brown with darker veins; 2 hyaline areas, one stretching from anterior part of distal end of pterostigma to  $r_{2+3}$ , the other between proximal part of areola postica and distal end of cell  $Cu_1$ , spreading to region bounded by middle part of  $rs$ . Hind wing very light yellowish brown with darker anterior edge and veins. Legs fawn with slightly darker distal tarsal segment, brown claws. Abdomen very light yellowish brown with darker terminal segment.

*Morphology*: Fore wing (fig. 173):  $rs$  and  $m$  fused for a very short distance; areola postica rather large. In hind wing  $r_{4+5}$  and  $m$  setose. Hind leg with 19 ctenidiobothria on proximal tarsal segment; preapical tooth present on claw. *Subgenital plate* (fig. 174): with a pair of apical lobes, each lobe with 2 sub-apical setae, and distinct sclerotization pattern. *Gonapophyses* (fig. 175): ventral valve triangular with broad base and apical stylet beset with bristles; dorsal valve lobate, with broad base and bristled stylet, at base of stylet lobe covered with thick short bristles; outer valve with thin flat portion lacking setae and a smaller piece bearing more than 8 long setae and some shorter ones. *Tergite 9* (fig. 176) with medial short band of sclerotization near anterior margin; other sclerotized areas on posterior margin near basal corners of epiproct. Paraproct with a field of 9 trichobothia.

*Dimensions*: Body length (in alcohol): 2.2 mm. Dimensions of other characters as in Table XXV.

Mt Victoria, W. slope, 909 m, Viti Levu, on 16. IX. 1938, E. C. Zimmerman. This specimen is referred to *H. greenwoodi* on the basis of characters of pattern and venation of the fore wing. The species was described from Fiji. Karny's single male specimen in the British Museum (Nat. Hist.) has been examined and dissected by Thornton. Sketches were made of the genitalia, which are reproduced in figures 177-179.

### ***Pseudocaecilius marshalli* Karny**

*Pseudocaecilius marshalli* Karny, 1924, Bull. Ent. Res. **16**: 288—Banks, 1942, Bull. B. P. Bishop Mus. **172**: 27 (distribution).—Thornton, 1961, Proc. R. Ent. Soc. Lond. B. **30** (11-12): 149.

Banks recorded this species (described from Fiji) from Guam. It is not represented in these collections. (See also page 86).

### ***Pseudocaecilius veitchi* Karny**

*Pseudocaecilius veitchi* Karny, 1926, Bull. Ent. Res. **16**: 289.—Thornton, 1961, Proc. R. Ent. Soc. Lond. B. **30** (11-12): 149.

DISTRIBUTION: Fiji. Not represented in these collections.

All 6 Fijian species studied here differ from the other 2 Fijian species of pseudo-caeciliids (*P. marshalli* Karny and *P. veitchi* Karny) in the shape of the pterostigma and the areola postica, and in the pigmentation, and shape of the fore wing. Karny provided no genitalic information, so comparison of male genitalia is not yet possible.

Apart from *L. nigrens*, the other 5 species (*H. panicus*, *H. dardanus*, *H. volatus*, *H. simplex* and *H. greenwoodi*) have the following characters in common: pterostigma short and rounded at distal end (narrow, tapering distally in *L. nigrens*); stem of radial fork longer than prongs (shorter in *L. nigrens*); distal tips of veins without diffuse pigmentation (present in *L. nigrens*); general shape of apical lobes of subgenital plate, apical portion not distinct from plate (apical portion in *L. nigrens* well developed, distinctly marked off from plate, lobes rounded); outer valve of gonapophyses two lobed with

ciliation restricted to smaller basal lobe (valve is single and ciliation is over entire surface in *L. nigrens*); chitinized band when present on 9th abdominal tergite short and median in position (longer and marginal in *L. nigrens*).

These 5 species are probably endemic to Fiji. Neither any of these nor any related forms are known to occur outside Fiji, except *H. fasciatus* from Palawan, which differs from them in a number of respects. They can be distinguished from one another by the nature of their fore wings and their genitalia. *H. simplex* and *H. dardanus* differ in that the former has a hyaline area at the distal end of the pterostigma. Their genitalia are very different. *H. greenwoodi* can be distinguished by the 2 hyaline areas in the fore wing; *H. panicus* by the peculiar shape of the fore wing with its wide basal region, the narrow hyaline band along the posterodistal region, the curved m vein and its short branches; *H. volatus* by the shape of the pterostigma and the hyaline band stretching from apex of areola postica to the junction of veins  $m_1$  and  $m_2$ .

*H. greenwoodi* and *H. dardanus* resemble each other in the structure of their subgenital plate and their gonapophyses; their hypandrium and penis frame also conform to the same general plan.

*L. nigrens* is the only Fijian species studied here to bear any really close resemblance to species groups outside Fiji. It has the following characters in common with *L. cynara* and *L. fennecus* from Micronesia (see above) and *L. carinifex* from Rapa and Tahiti (see below): fore wing with stem of radial fork much shorter than extremely long prongs; distal regions of  $Cu_1$  and  $Cu_2$  cells in fore wing pigmented; diffuse brown pigment at distal ends of fore wing veins (in *L. fennecus* compact); shape and general form of subgenital plate, outer valve of female gonapophyses, the 9th abdominal tergite, epiproct and paraprocts; structure of the penis frame and hypandrium (that of *L. carinifex* unknown). The resemblance of *L. nigrens* to *L. carinifex* is especially close but they may be distinguished by the shape of cell *Rs* and by characteristics of the female genitalia.

The only other known species with a radial stem shorter than the prongs is *P. lachlani* End. 1903, from Australia. No genitalic information is available but the figure of its fore wing shows it to be very darkly pigmented with several hyaline spots. It is therefore different from any of the species described here.

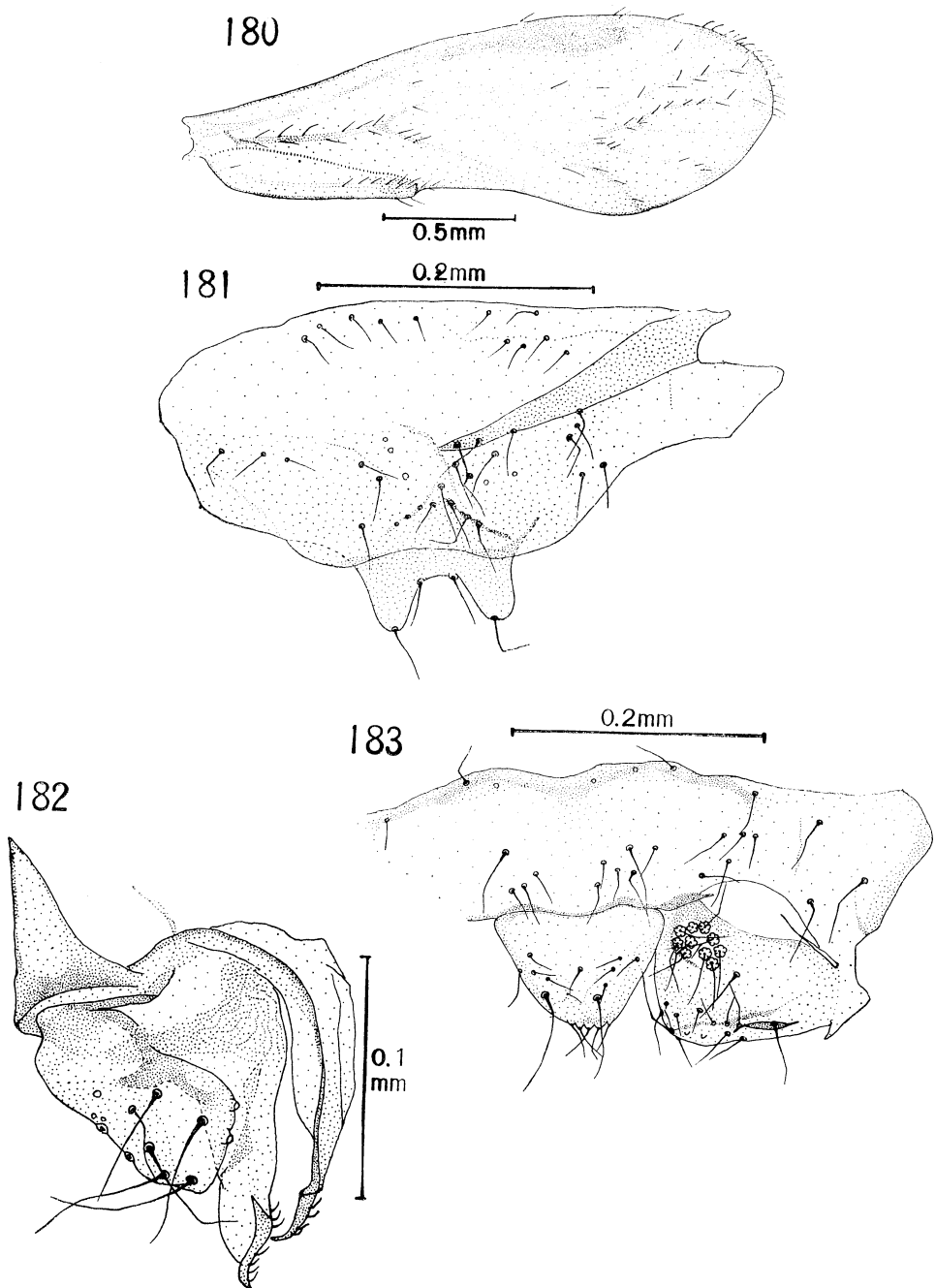
It seems, then, that 2 species groups of pseudocaecilids are represented in Fiji—an endemic group of 5 quite closely related species which differ in several respects from other *Heterocaecilius* species, except possibly *H. fasciatus* from Palawan, and a second group with a very wide Pacific distribution extending from the Palaus (of Micronesia) to Rapa, and represented in Fiji by *L. nigrens*.

It is interesting to note that the 5 species of the *greenwoodi* group were all captured on the large island Vitilevu, as was *P. marshalli* (*P. veitchi* was taken on the adjacent large island of Vanualevu), whilst *L. nigrens*, the only species dealt with here with strong relationships outside Fiji, was not captured there, but was taken on 2 small islands of the eastern Lau group.

#### *SE Polynesia*

**Lobocaecilius carinifex** Lee and Thornton, new species Figs. 180-183.

♀. *Coloration* (after 29 years storage in alcohol): General color of head light brown, clypeus brown, anteclypeus lighter. Eyes coffee brown, ocelli pale. Maxillary



**Figs. 180-183.** *Lobocaccilius carinifex*, ♀: 180, fore wing; 181, subgenital plate; 182, gonapophyses; 183, apex of abdomen.

palp light brown. Antenna with pedicel, scape and proximal portion of basal flagellar segment light brown, rest darker. Thorax with dorsa and pleura light brown. Fore wing (fig. 180) yellowish hyaline, slightly darker at tips of veins and apical portions of areola postica, cells  $Cu_1$ ,  $Cu_2$  and  $An$  and pterostigma; veins light yellowish brown. Hind wing hyaline with slightly darker veins. Legs light brown. Abdomen light brown.

*Morphology*: I.O.:D.=2.0:1 (ratio for paratype=2.2:1). In fore wing (fig. 180)  $r_s$  and  $m$  meet at point (joined by a short cross vein in paratype); stem of radial fork short; veins  $r_{2+3}$ ,  $r_{4+5}$  very long. Hind wing with  $r_{2+3}$  inclined at an angle with leading edge of wing,  $r_{4+5}$  and  $m$  setose. Hind leg with 13 ctenidiobothria on proximal tarsal segment; no preapical tooth on claw. *Subgenital plate* (fig. 181): apical lobes well developed, rounded, each bearing a fine apical seta and another at base of mesial edge; a V-shaped sub-apical row of setae. *Gonapophyses* (fig. 182): ventral valve lobate, terminal stylet covered with fine bristles; dorsal valve smaller, stylet short, bristles projecting just beyond lobe; outer valve elongate, oblong, a slight constriction in middle, covered with several long setae. *Tergite 9* (fig. 183) with a band of sclerotization along median part of anterior and posterior margins; paraproct with a field of 10 trichobothria.

*Dimensions*: Body length (in alcohol): 1.4 mm. Dimensions of other characters as in Table XXII.

♂. Unknown.

Holotype ♀ (BISHOP 7189), near Area, 3 m, Rapa, 30. VI. 1934, E. C. Zimmerman. Paratype ♀, near Tiupi Bay, Papeari, Tahiti, Society Is., 3. V. 1934, E. C. Zimmerman.

*Lobocaecilius carinifex* bears a resemblance to *L. cynara* and *L. fennecus* of Micronesia. It is similar to them in the venation and pigmentation in cells  $Cu_1$ ,  $Cu_2$  and  $An$  and the areola postica of the fore wing; the general structure of the outer valve; the epiproct and the paraprocts. It differs from them in the nature of the subgenital plate and the dorsal and ventral valves. *L. carinifex* may be distinguished from *Heterocaecilius diogenes* by the venation and pigmentation of the fore wing.

**Pseudocaecilius tahitiensis** (Karny) (See also page 79). Figs. 127-132.

Described from Tahiti, also occurs in the S. Marianas.

## AUSTRALIAN REGION

### AUSTRALIAN SUBREGION

#### **Pseudocaecilius lachlani** Enderlein

*Pseudocaecilius lachlani* Enderlein, 1903, Ann. Hist.-Nat. Mus. Hung. **1**: 263; 1906, Zool. Jahrb. **23**: 404.—Thornton, 1961, Proc. R. Ent. Soc. Lond. B. **30** (11-12): 149.

DISTRIBUTION: Australia.

#### **Cladioneura pulchripennis** Enderlein

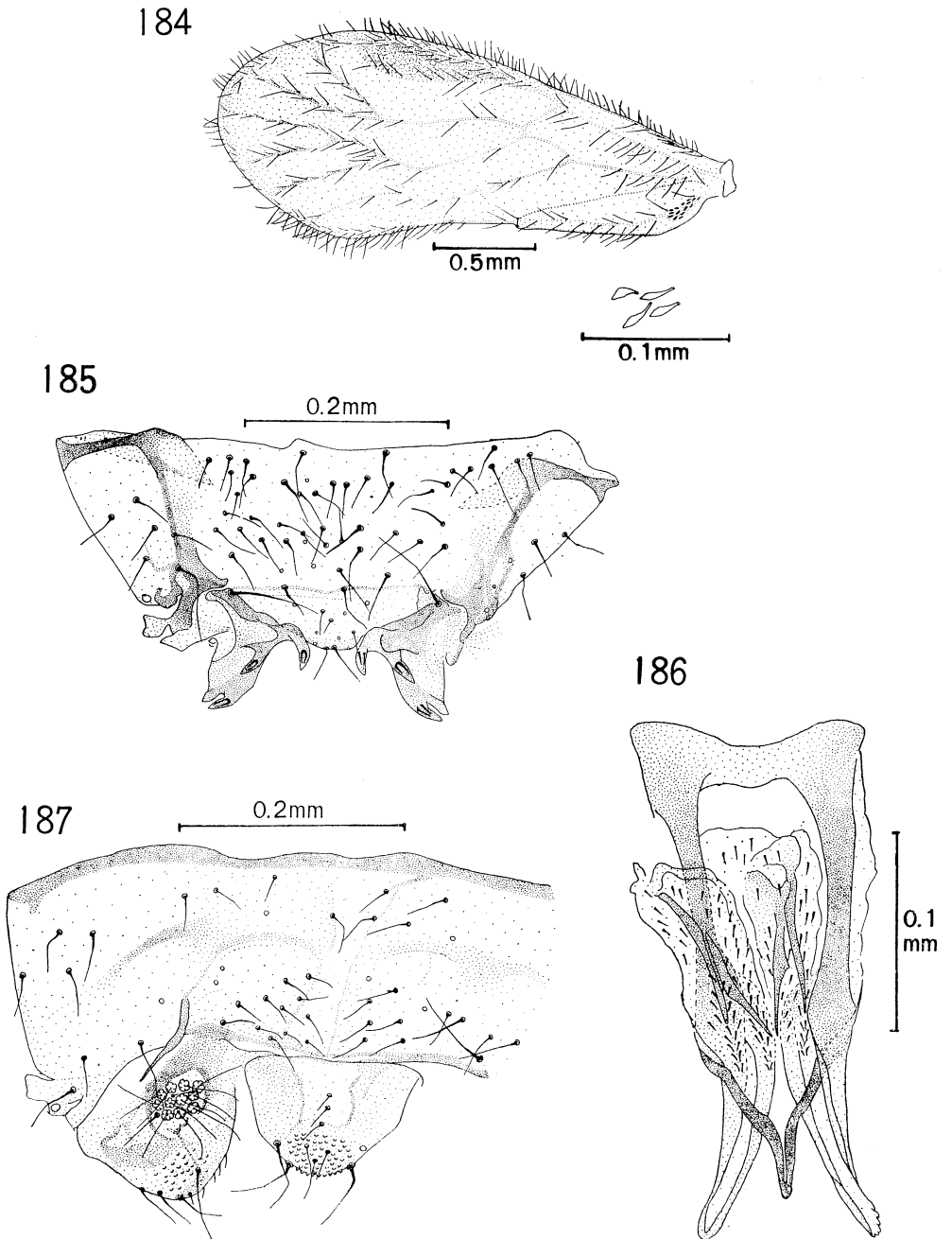
*Cladioneura pulchripennis* Enderlein, 1906, Zool. Jahrb. **23**: 405.

DISTRIBUTION: Australia. We have not studied any collections from Australia.

### NEW ZEALAND SUBREGION

#### **Heterocaecilius diogenes** Lee and Thornton, new species Figs. 184-187.

♂. *Coloration* (after 3 years storage in alcohol): Head generally yellowish brown,



**Figs. 184-187.** *Heterocaccilius diogenes*, ♂: 184, fore wing; 185, hypandrium; 186, penis frame; 187, apex of abdomen.

with clypeus and anteclypeus lighter. Eyes black, ocelli pale. Maxillary palp light brown, darkening apically. Antenna (damaged) with brown scape and pedicel, basal 2 flagellar segments light brown. Pleura of thorax light brown, terga of meso- and meta-thorax brown. Fore wing (fig. 184) light brown, veins and pterostigma slightly darker. Hind wing hyaline, veins brown. Legs light brown, tarsus brown. Abdomen very light brown.

*Morphology*: I.O.:D.=1.9:1. Value for paratype: 1.8. Bristles on vertex long and thick. Fore wing (fig. 184) with veins *rs* and *m* joined by a short cross vein (meet at a point in paratype); veins  $r_{2-3}$  and  $r_{4+5}$  diverge; areola postica large, rather long; proximal angle of *An* cell with cluster of sensory papillae. Hind wing with long, inclined  $r_{2-3}$ ;  $r_{4+5}$  and *m* setose. Hind leg with 17 ctenidiobothria on proximal tarsal segment; preapical tooth present on only one of the pairs of claws. *Hyandrium* (fig. 185) posteriorly bearing 3 pairs of pointed sclerites bearing fingernail-like spines; largest and most lateral pair bifurcating apically into 2 spines each; ciliation of plate profuse. *Penis frame* (fig. 186) with broad base, sclerotized sides; inner parameres heavily sclerotized, distal halves running close together before fusing apically, forming a Y-shaped structure; outer parameres broad, divergent; radula with 2 pairs of narrow sclerotized rods, covered with membrane bearing spinelets arranged in 3 tracts. *Tergite 9* (fig. 187) with anterior margin heavily sclerotized. Paraproct with a field of 11 trichobothria and an apical field of papillae. Epiproct with apical field of papillae.

*Dimensions*: Body length (in alcohol): 1.9 mm. Value for paratype: 2.0 mm. Dimensions of other characters as in Table XXII.

♀. Unknown.

Holotype ♂ (BISHOP 7190), Pohangina Valley, 24 km NE of Palmerston North, North I., New Zealand, 29. III. 1950, C. W. O'Brien. Paratopotype ♂, same data as type.

This species is apparently very similar to *Caecilius brunellus* Tillyard 1923, taken at Hamilton, which, on the basis of wing venation and ciliation, is a pseudocaeciliid. Examination of the type of *P. brunellus* (Tillyard) may reveal identity, in which case the name *diogenes* will lapse.

*Heterocaecilius diogenes* bears a close resemblance to *Lobocaecilius cynara* and *L. fennecus* (see above) from Micronesia in the following characters: the shape of the penis frame and the spinelets on the membrane covering the radula; the general shape of the hypandrium and its apical sclerites; the general structure of the 9th abdominal tergite; and the presence of a field of papillae on the epiproct. It differs from *L. cynara* and *L. fennecus* in the venation of the fore wing, especially its shorter  $r_{2-3}$  and  $r_{4+5}$ ; the presence of penial sclerites; the presence of an additional pair of hypandrial sclerites; and the presence of an apical field of papillae on the paraprocts.

***Pseudocaecilius apicipunctatus*** (Tillyard), new combination

*Caecilius apicipunctatus* Tillyard, 1923, Trans. N. Z. Inst. 54: 188, 189.

Collected at York Bay, Wellington, New Zealand, this species is apparently a pseudocaeciliid, being most similar in wing characters to *H. stiliger* (New Guinea).

***Pseudocaecilius brunellus*** (Tillyard), new combination

*Caecilius brunellus* Tillyard, 1923, Trans. N. Z. Inst. 54: 188, 190.

See above, under *P. diogenes*.

## NEOTROPICAL REGION

**Scytopsocus coriaceus** Roesler

*Scytopsocus coriaceus* Roesler, 1940b, Zool. Anz. **130** : 12.

DISTRIBUTION : Brazil.

**Scytopsocus difficilis** Roesler

*Scytopsocus difficilis* Roesler, 1940b, Zool. Anz. **130** : 13.

DISTRIBUTION : Brazil.

These two species differ in several respects from the Indian species of *Scytopsocopsis* described above (p. 20).

**Pseudocaecilius elutus** End.

DISTRIBUTION : Galapagos Islands. (See also pp. 14, 40, 47, 83).

Two ♀♀ collected on Fernandina Is., Punta Espinosa, 29. I. 1954 by R. L. Usinger, proved to be of this widespread species.

## NEARCTIC REGION

**Pseudocaecilius citricola** (Ashmead)

*Psocus citricola* Ashmead, 1878, Canad. Ent. **11** : 288.

*Caecilius pretiosus* Banks, 1920, Bull. Mus. Comp. Zool. Harv. **64** : 311.

*Pseudocaecilius wolcottii* (Banks, 1924), Bull. Mus. Comp. Zool. Harv. **65** : 423.

*Pseudocaecilius pretiosus* Chapman, 1930, J. N.Y. Ent. Soc. **38** : 332. (genitalia).

*Pseudocaecilius citricola* (Ashmead) Mockford & Gurney, 1956, J. Wash. Acad. Sci. **46** (11) : 364 (synonymy).—

Thornton, 1961, Proc. R. Ent. Soc. Lond. (B) **30** (11-12) : 142.

Possibly synonymous with *P. elutus* (see p. 83). From the Southern U.S.A. and Puerto Rico.

## PALAEARCTIC REGION

**Pseudocaecilius maculosus** Enderlein

*Pseudocaecilius maculosus* Enderlein, 1907, Stettin. Ent. Ztg. **68** : 94; Okamoto, 1910, Ann. Hist.-Nat. Mus. Hung. **8** : 201.

DISTRIBUTION : Japan.

**Pseudocaecilius solocipennis** Enderlein

*Pseudocaecilius solocipennis* Enderlein, 1907, Stettin. Ent. Ztg. **68** : 95.—Okamoto, 1910, Ann. Hist.-Nat. Mus. Hung. **8** : 202.

DISTRIBUTION : Japan.

## ACKNOWLEDGMENTS

This work was supported by research grants from the University of Hong Kong. The collections dealt with in this paper were made possible through the support of the United States Office of Naval Research, the Pacific Science Board (National Research



Council), the National Science Foundation, and Bernice P. Bishop Museum. Some of the collections were made possible by grants to Bishop Museum from the National Science Foundation (G-251, G-555, G-4774 and G-10734) and a contract between the Office of Naval Research, Department of the Navy, and the National Academy of Sciences, NR 150-175. We are indebted to the many collectors and especially to Mr J. V. Pearman, who critically read through this manuscript and made many helpful suggestions.

## REFERENCES

- Ashmead, W. H. 1879. On a new *Psocus*. *Canad. Ent.* **11** : 228-9.
- Badonnel, A. 1931. Contribution a l'etude de la faune du Mozambique. 4<sup>e</sup> note-Copeognathes. *Ann. Sci. Nat. Bot. Zool.* **14** : 229-60.
1946. Psocoptères du Congo belge. *Rev. Zool. Bot. Afr.* **39** : 137-96.
1948. Psocoptères du Congo belge (2<sup>e</sup> note). *Ibid.* **40** : 266-321.
1951. Ordre des Psocoptères. In Grassé, P.-P., *Traité Zool.* **10** (2). Paris.
1955. Psocoptères de l'Angola. *Publ. Cult. Cia. Diamant. Angola* **26** : 1-267.
1956. Psocoptera. In Tuxen, S.L., *Taxonomist's glossary of genitalia in insects*. Copenhagen.
1959. Parc National Albert I. Mission G. F. de Witte (1933-1935) **95** (1) : 3-26.
- Ball, A. 1943. *Ectopsocus* du Congo belge, avec une remarque sur le rapport I.O./D. *Bull. Mus. Roy. Hist. Nat. Belg.* **19** (38) : 1-28.
- Banks, N. 1908. Neuropteroid insects—notes and descriptions. *Trans. Amer. Ent. Soc.* **34** : 255-67.
1916. Neuropteroid insects of the Philippine Islands. *Philip. J. Sci.* (D) **11** : 195-217.
1920. New neuropteroid insects. *Bull. Mus. Comp. Zool. Harv.* **64** : 299-362.
1924. Descriptions of new neuropteroid insects. *Bull. Mus. Comp. Zool. Harv.* **65** : 421-5.
1931. Some oriental neuropteroid insects. *Psyche Camb., Mass.* **38** : 56-70.
- 1937 a. Neuropteroid insects from Formosa. *Philip. J. Sci.* **62** : 255-68.
- 1937 b. Philippine neuropteroid insects. *Ibid.* **63** : 125-74.
1942. Neuropteroid insects from Guam. Corrodentia. *Bull. B. P. Bishop Mus.* **172** : 25-9.
- Chapman, P. J. 1930. Corrodentia of the United States of America: 1. Suborder Isotecnomera. *J. N.Y. Ent. Soc.* **38** : 219-90, 319-403.
- Enderlein, G. 1903. Die Copeognathen des Indo-Australischen Faunengebietes. *Ann. Hist.-Nat. Mus. Hung.* **1** : 179-344.
1906. Die australischen Copeognathen. *Zool. Jahrb. Abt. Syst.* **23** : 401-12.
1907. Neue Beiträge zur Kenntnis der Copeognathen Japans. *Stett. Ent. Ztg.* **68** : 90-106.
1908. Die Copeognathenfauna der Insel Formosa. *Zool. Anz.* **33** : 759-79.
1913. Beiträge zur Kenntnis der Copeognathen. II. Über einige Copeognathen an Zitronenbäumen in Ostafrika. *Ibid.* **41** : 358-60.
1926. Die Copeognathenfauna Javas. *Zool. Meded.* **9** : 50-70.
1931. Die Copeognathen-Fauna der Seychellen. *Trans. Linn. Soc. Lond.* (Zool.) **19** (2) : 207-40.
- Gressitt, J. L. 1961. Problems in the zoogeography of Pacific and Antarctic insects. *Pac. Ins. Mon.* **2** : 1-94.
- Hagen, H. A. 1859. Synopsis der Neuroptera Ceylons (Pars II.) *Verh. Zool. Bot. Ges. Wien.* **2** : 199-205.
1866. Psocinorum et Embidinorum Synopsis synonymica. *Verh. Zool. Bot. Ges. Wien.* **16** : 201-22.
1882. Beiträge zur Monographie der Psociden. *Stett. Ent. Ztg.* **43** : 276-300.
- Karny, H. H. 1926. On some tropical Copeognatha, especially from the Fiji Islands. *Bull. Ent. Res.* **16** : 285-90.
- Mockford, E. L. 1955. Studies on the Reuterelline psocids (Psocoptera). *Proc. Ent. Soc. Wash.* **57** (3) : 97-108.
- Mockford, E. L. and Gurney, A. B. 1956. A review of the psocids, or booklice and barklice, of Texas (Psocoptera). *J. Wash. Acad. Sci.* **46** : 353-68.

- Navas, R. P. L. 1934. Insectos de la India. *Rev. Acad. Cienc. Zaragoza* **17** (1933) : 29-48.
- Okamoto, H. 1910. Die Caeciliiden Japans. *Ann. Hist.-Nat. Mus. Hung.* **8** : 185-212.
- Pearman, J. V. 1936. The taxonomy of the Psocoptera: preliminary sketch. *Proc. R. Ent. Soc. Lond.* (B) **5** (3) : 58-62.
- Roesler, R. 1940a. Neue Copeognathen. *Arb. Morphol. Taxon. Ent. Berlin-Dahlem* **7** (3) : 236-44.
- 1940b. Neue und wenig bekannte Copeognathengattungen. II. *Zool. Anz.* **130** : 1-25.
1944. Die Gattungen der Copeognathen. *Stett. Ent. Ztg.* **105** : 117-66.
- Smithers, C. N. 1960. A collection of Psocoptera from Australian chestnut trees in Natal, South Africa. *J. Ent. Soc. S. Afr.* **23** (1) : 218-22.
- 1964a. Notes on the relationships of the genera of Elipsocidae (Psocoptera). *Trans. R. Ent. Soc. Lond.* **116** (9) : 211-24.
- 1964b. On the Psocoptera of Madagascar. *Rev. Zool. Bot. Afr.* **70** (3-4) : 209-94.
- Soehardjan, M. 1958. First contribution to a study of Copeognatha (Corrodentia) of the Indonesian Archipelago. *Idea* **11** (1) : 25-32.
- Thornton, I. W. B. 1961. Comments on the geographical distribution of *Pseudocaccilius elutus* End. (Psocoptera), and descriptions of related new species from Hong Kong. *Proc. R. Ent. Soc. Lond.* (B) **30** (11-12) : 141-52.
- Tillyard, R. J. 1923. A monograph of the Psocoptera, or Copeognatha, of New Zealand. *Trans. N. Z. Inst.* **54** : 170-96.
- Usinger, R. L. 1963 (1964). Animal distribution patterns in the tropical Pacific. In J. L. Gressitt (ed.), *Pacific Basin Biogeography*, Bishop Museum Press.

## GENERAL INDEX

New names are indicated by **bold face** type, synonyms by *italics*.

- adamsi** ..... 13, **59**  
**Allocaecilius** ..... **12**, 14  
 anomalus ..... 4, 6, 13, **26**  
 apicipunctatus ..... 6, **111**  
 Archipsocinae ..... 2
- brevicornis ..... 4, **15**  
 brunellus ..... 6, **111**
- Caecilius ..... 2, 3, 9, 10, 11, 12, 43  
**campanula** ..... 13, **63**, 70  
 capricornis ..... 28  
**carinifex** ..... 12, **107**, 109  
 citricola (*Pseudocaecilius*) .....  
 ..... 3, 4, 6, 10, 85, 86, **112**
- Cladioneura ..... 2, 3, **10**  
 compta ..... 4  
 coriaceus ..... 4, 11, 14, 22, 40, **112**  
**cornutus** ..... 10, 28, **53**, 57  
**cynara** ..... 12, 13, **70**, 75, 77, 79, 107, 109, 111
- dardanus** ..... 13, **90**, 106, 107  
 decolor ..... 4  
 difficilis ..... 4, 11, 22, **112**  
**diogenes** ..... 13, **109**, 111  
 dybasi ..... 13, 65, **67**
- Ectopsocinae ..... 2-3  
 Electropsocinae ..... 2  
 Ellipsocidae ..... 3  
**elongatus** ..... 12, **33**  
 elutus ..... 2, 3, 4, 6, 10,  
 14, 40, 47, 57, 80, **83**, 85, 86, **90**, **112**  
*elutus* var. *africanus* ..... 83  
 Epipsocus ..... 2, 6
- fasciatus** ..... 13, **40**, 107  
 fasiicornis ..... 6  
**fennecus** ..... 12, 13, **74**, 77, 79, 107, 109, 111  
 formosanus ..... 4, **26**, 85  
**fusciceps** ..... 12, **33**  
**fuscipalpus** ..... 13, 14, **15**  
 funestus ..... 6
- gressitti** ..... 13, 14, **50**, 57  
 greenwoodi ..... 4, 13, 14, **103**, 106
- Hageniella* ..... 2, 3, 4  
**helicoides** ..... 10, **26**, 28  
 Heterocaecilius ..... 6, 9, **13**, 14, 63, 65, 107  
**heterothorax** ..... 12, **17**  
 hieroglyphica ..... 3, 10, 11, 20, **22**  
 hirsuticornis ..... 4  
 hirsutus ..... 4, 6, 12, **26**, 63  
**hirtipenna** ..... 12, **20**  
 hispidus ..... 4, **14**  
 hyalina ..... 4, 14
- immaculata ..... 4  
 inaequalis ..... 6  
 innotatus ..... 4, **47**
- kagoshimensis ..... 6  
**kobus** ..... 13, **38**, **47**, 57
- Lachesillidae ..... 2  
 Lachesillinae ..... 2  
 lachlani ..... 4, 107, **109**  
 lanatus ..... 4, **22**  
 Lobocaecilius ..... **12**, 13, 89  
**longifurca** ..... 12, 13, **28**  
**longipenna** ..... 13, **38**  
**longispinus** ..... 13, 14, **40**
- machadoi ..... 3, 4, 6, 10, **14**  
**maculatus** ..... 12, **31**  
 maculifrons ..... 4, 6, 13, **26**, 65  
 maculosus ..... 4, **112**  
 marginata ..... 6  
 marginatus ..... 6  
 marshalli ..... 4, **86**, **106**, 107  
 megops ..... 4, 14  
 Mesocaecilius ..... 2, 3, **11**, 13, 14  
 micans ..... 4  
**minotus** ..... 13, **59**  
 molestus ..... 6, **22**  
**monicus** ..... 12, 13, 14, **86**, 89  
 morstatti ..... 3, 4, 6, 10, **14**  
 multipunctata ..... 3, 10, 11, **22**, **47**, 57
- nigrens** ..... 12, 13, **100**, 106, 107
- Ophiopelma ..... 2, 3, **10**, 14, 20, 45, 47

ornatipenne.....	3, 10, 11, <b>26</b> , 45, 55, 57
ornatus .....	4, 11, <b>38</b>
otiosus .....	6
<b>panicus</b> .....	13, <b>97</b> , 106, 107
Peripsocinae .....	2
<b>permaculatum</b> .....	10, 11, <b>55</b>
<b>Phallocaecilius</b> .....	<b>12</b> , 13
<b>pictipenna</b> .....	10, <b>43</b>
pinnata .....	6
<i>pretiosus</i> .....	3, 4, 86, 112
Pseudocaeciliidae .....	<b>2</b> , 3, 6, 14
pseudocaeciliids .....	9, 10, 106, 111
Pseudocaeciliinae.....	2
Pseudocaeciliini .....	2
Pseudocaecilius .....	<b>2</b> , 3, 4, 6, <b>9</b> , 11, 12, 13, 83
Pseudoscottiella.....	3, 4, 13, 14, 89
pulchripennis .....	3, 10, <b>109</b>
pusillus .....	4, <b>47</b>
quadrimaculatus.....	3, 4, 11, 14, <b>26</b> , 40
Reuterellinae .....	2, 3
Scottiella .....	2, 3, 4, 14
<b>Scytopsocopsis</b> .....	<b>11</b> , 13, 14, 112
Scytopsocus.....	2, 3, 4, <b>11</b> , 12, 13, 22
<b>semiceps</b> .....	10, <b>45</b>
<b>simplex</b> .....	13, 14, <b>93</b> , 106, 107
<b>sinensis</b> .....	12, <b>22</b>
solocipennis.....	4, <b>112</b>
<b>stiliger</b> .....	13, <b>53</b> , 57, 111
tahitiensis .....	10, <b>79</b> , 80, 83, 85, 86, <b>109</b>
tenellus .....	4, <b>40</b>
testaceus.....	4, <b>55</b>
Trichopsocinae .....	2
tuberculata .....	4
veitchi .....	4, <b>106</b> , 107
viiv .....	6
villosus .....	6
<b>volatus</b> .....	13, <b>97</b> , 106, 107
<i>walcotti</i> .....	112
zonatus .....	4, 22

### PLANT INDEX

Acacia koa .....	89	Juniperus.....	89
Antidesma .....	89	Macadamia .....	89
Araucaria .....	89	Metrosideros .....	89
Calamus .....	50	Pisonia sandwicensis .....	89
Cheirodendron .....	89	Pritchardia .....	89
Cibotium .....	89	Psidium guajava .....	89
Cryptomeria .....	20	Sadleria cyathodes .....	89
Eucalyptus .....	89		
Euphorbia .....	89		

## BISHOP MUSEUM PUBLICATIONS IN ENTOMOLOGY

(EXCLUDING THOSE OUT OF PRINT)

### BULLETINS

GENERAL: Adamson: Marquesan insects: environment (139) \$ 2.50; Marquesan Insects—I (98) \$ 5.00; II (114) \$ 9.00; III (142) \$ 5.00; Society Islands insects (113) \$ 4.00; Index to Bulletins 98, 113, 114, 142, \$ 1.25. Adamson: Review of fauna of Marquesas Is. and its origin (159) \$ 3.00. ACARINA: Jacot: Hawaiian Oribatoidea (121) \$ 3.00. HEMIPTERA: Osborn: Cicadellidae of Hawaii (134) \$ 2.25; Usinger: Nysius and allies in Hawaiian Is. (173) \$ 4.50; Fennah: Fulgoroidea of Fiji (202) \$ 3.50. DIPTERA: G. Bohart and Gressitt: Filth-inhabiting flies of Guam (204) \$ 4.00. COLEOPTERA: Zimmerman: Cryptorhynchinae of Rapa (151) \$ 2.50; Dillon and Dillon: Cerambycidae of Fiji (206) \$ 3.50; Park: Pselaphidae of Oceania, with special reference to Fiji (207) \$ 2.25; Gressitt: Coconut rhinoceros beetle (*Oryctes rhinoceros*) with particular reference to Palau (212) \$ 4.00.

### BISHOP MUSEUM OCCASIONAL PAPERS

Four papers on spiders, scorpions, chelonethida and oribatids by Berland, Chamberlin, Sellnick. Total price \$ 4.50.

Five papers on Hemiptera by Drake & Poor, Metcalf, Tuthill; \$ 3.25. Five on neuropteroid insects, termites, etc. by Esben-Petersen, Friederichs, Gurney, Light & Zimmerman, H. Ross; \$ 2.00. Three on Thysanoptera by Moulton; \$ 3.50. One on Mallophaga by Thompson; \$ 0.25.

Eleven papers on Diptera by Alexander, Barnes, Bequaert, Hull, Malloch, Marks, Souza Lopes, Steyskal and Wirth; \$ 6.25.

Twenty-five papers on Coleoptera by Balfour-Browne, Beeson, Blair, Britton, Cameron, Corporaal, Horn, Kleine, Marshall, Ochs, Ohaus, d'Orchymont, Ray, Schedl, Steel, Van Dyke, Van Zwaluwenburg; \$ 19.00. Twenty-five papers on weevils and other Coleoptera by Zimmerman; \$ 19.25.

Ten papers on Hymenoptera by Banks, Cockerell, Fouts, Fullaway, Timberlake, Wheeler, Williams; \$ 12.50.

### SPECIAL PUBLICATIONS

O. H. Swezey: Forest Entomology in Hawaii (44) \$ 7.50.

J. L. Gressitt, ed.: Pacific Basin Biogeography: A Symposium. x+563 pp., maps, illustr. 1964. \$ 12.00.

### PACIFIC INSECTS

A quarterly journal devoted primarily to systematics and zoogeography of terrestrial arthropods of the Pacific area, including E. Asia, Australia and Antarctica. Vol. 1 (1959) of 505 pages; Vol. 2 (1960) of 461 pages; Vol. 3 (1961) of 589 pages; \$ 7.00 per volume to institutions, \$ 5.00 to individuals. Vol. 4 (1962) of 996 pages; Vol. 5 (1963) of 945 pages; Vol. 6 (1964) of 770 pages; Vol. 7 (1965) of 922 pages; Vol. 8 (1966) of 983 pages; Vol. 9 (1967) \$ 10.00 per volume to institutions and book-dealers, \$ 7.00 to individuals. Vol. 10 (1968): \$ 12.00 to institutions and agents; \$ 9.00 to individuals.

### JOURNAL OF MEDICAL ENTOMOLOGY

Quarterly journal devoted to all phases of medical entomology from the world standpoint. Vol. 1 (1964) of 402 pages; Vol. 2 (1965) of 396 pages; Vol. 3 (1966) of 361 pages; Vol. 4 (1967); \$ 10.00 to institutions and book-dealers, \$ 7.00 to individuals. Vol. 5 (1968): \$ 13.00 to institutions and agents; \$ 10.00 to individuals.

## INSECTS OF MICRONESIA

- Vol. 1. Introduction. Gressitt. i-ix, 1-257. 1954. \$ 7.50.
- Vol. 2. Bibliography. Esaki, Bryan, and Gressitt. 1-68. 1955. \$ 2.50.
- Vol. 3. No. 1. Pseudoscorpionida. Beier. 1-64. 1957. \$ 2.50. No. 2. Scorpionida. Chapin. 65-70. Opiliones. Goodnight and Goodnight. 71-83. 1957. \$ 0.50. No. 3. Ixodoidea. Kohls. 85-104. 1957. \$ 1.00. No. 4. Araneina: Orthognatha, Labidognatha. Roewer. 105-132. 1963. \$ 1.75. No. 5. Acarina: Mesostigmata: Dermanyssidae, Laelapidae, Spinturnicidae parasitic on vertebrates. Wilson. 133-148. Macrochelidae. Krantz. 149-154. 1967. \$ 1.25.
- Vol. 4. No. 1. Pauropoda, Remy. 1-12. 1957. \$ 0.50. No. 2. Crustacea: Amphipoda (Strand and terrestrial Talitridae). Barnard. 13-30. 1960. \$ 1.00.
- Vol. 5. No. 1. Odonata. Liefwinck. 1-95. 1962. \$ 3.00.
- Vol. 6. No. 1. Aleyrodidae. Takahashi. 1-13. 1956. \$ 0.50. No. 2. Aphididae. Essig. 15-37. 1956. \$ 1.25. No. 3. Fulgoroidea. Fennah. 39-211. 1956. \$ 4.50. No. 4. Cercopidae. Synave. 213-230. 1957. \$ 1.00. No. 5. Cicadellidae. R. Linnavuori. 231-344. Membracidae. M. Kato. 345-351. 1960. \$ 3.50. No. 6. Psyllidae. L. D. Tuthill. 353-376. 1964. \$ 1.25. No. 7. Coccoidea. Beardsley. 377-562. 1966. \$ 4.50.
- Vol. 7. No. 1. Miridae. Carvalho. 1-100. 1956. \$ 3.50. No. 2. Tingidae. Drake. 101-116. 1956. \$ 1.00. No. 3. Aradidae. Matsuda and Usinger. 117-172. 1957. \$ 2.25. No. 4. Lygaeidae. Barber. 173-218. 1958. \$ 1.75. No. 5. Enicocephalidae. Usinger and Wygodzinsky. 219-230. Reduviidae. Wygodzinsky and Usinger. 231-283. Cimicidae. Usinger and Ferris. 285-286. 1960. \$ 2.25. No. 6. Saldidae. Drake. 287-305. 1961. \$ 1.00. No. 7. Pentatomoidea. Ruckes. 307-356. Coreidae (Alydini by Schaffner), Neididae, Nabidae. Gross. 357-390. 1963. \$ 3.00.
- Vol. 8. No. 1. Embioptera. E. Ross. 1-8. 1955. \$ 0.50. No. 2. Anoplura. Ferris. 9-12. Neuroptera: Myrmeleontidae and Chrysopidae. Adams. 13-33. 1959. \$ 1.25. No. 3. Neuroptera: Hemerobiidae. Carpenter. 35-43. 1961. \$ 0.50.
- Vol. 12. No. 1. Culicidae. R. Bobart. 1-85. 1957. \$ 2.50. No. 2. Bibionidae and Scatopsidae. Hardy. 87-102. 1957. \$ 1.00. No. 3. Ceratopogonidae. Tokunaga and Murachi. 103-434. 1959. \$ 9.00. No. 4. Psychodidae. Quate. 435-484. 1959. \$ 2.25. No. 5. Chironomidae. Tokunaga. 485-628. Simuliidae. Stone. 629-635. 1964. \$ 4.00. No. 6. Mycetophilidae. Colless. 637-667. 1966. \$ 1.25.
- Vol. 13. No. 1. Dorilidae. Hardy. 1-9. 1956. \$ 0.50. No. 2. Omphralidae. Hardy. 11-13. Sarcophagidae. Souza Lopes. 15-49. 1958. \$ 1.75. No. 3. Tabanidae. Stone. 51-53. Empididae. Quate. 55-73. 1960. \$ 1.00. No. 4. Stratiomyidae, Calliphoridae. James. 75-127. 1962. \$ 2.25. No. 5. Syrphidae. Shiraki. 129-187. Sarcophagidae (suppl). Souza Lopes. 189-190. 1963. \$ 2.50. No. 6. Muscidae. Snyder. 191-327. 1965. \$ 4.00. No. 7. Phoridae. Beyrer. 329-360. 1967. \$ 1.25.
- Vol. 14. No. 1. Tephritidae. Hardy and Adachi. 1-28. 1956. \$ 1.25. No. 2. Asteiidae. Sabrosky. 29-40. Coelopidae. Hardy. 41-46. 1957. \$ 1.00. No. 3. Neriidae and Micropezidae. Aczel. 47-90. 1959. \$ 1.75. No. 4. Siphonaptera. Hopkins. 91-107. 1961. \$ 1.00. No. 5. Sphaeroceridae (Borboridae). Richards. 109-134. Agromyzidae. Spencer. 135-162. 1963. \$ 2.25. No. 6. Drosophilidae. Wheeler and Takada. 163-242. 1964. \$ 2.50. No. 7. Clusiidae. Steyskal and Sasakawa, 243-249. Hippobosidae; Streblidae. Maa. 251-274. Nycteribiidae. Theodor. 275-279. 1966. \$ 1.75.
- Vol. 16. No. 1. Elateridae. Van Zwaluwenburg. 1-66. 1957. \$ 2.50. No. 2. Lampyridae, Cantharidae, Malachiidae, and Prionoceridae. Wittmer. 67-74. Anobiidae. Ford. 75-83. Bostrychidae. Chûjô. 85-104. Endomychidae. Strohecker. 105-108. 1958. \$ 1.75. No. 3. Dermestidae. Beal. 109-131. 1961. \$ 1.25. No. 4. Nitidulidae. Gillogly. 133-188. 1962. \$ 2.25. No. 5. Coccinellidae. Chapin. 189-254. Anthicidae. Werner. 255-269. 1965. \$ 2.50.
- Vol. 17. No. 1. Chrysomelidae. Gressitt. 1-60. 1955. \$ 2.25. No. 2. Cerambycidae. Gressitt. 61-183. 1956. \$ 3.50. No. 3. Tenebrionidae. Kulzer. 185-256. 1957. \$ 2.50.
- Vol. 18. No. 1. Platypodidae and Scolytidae. Wood. 1-73. 1960. \$ 2.50.
- Vol. 19. No. 1. Trichogrammatidae and Mymaridae. Doutt. 1-17. 1955. \$ 1.00. No. 2. Eucharidae. Watanabe. 19-34. Ichneumonidae, Stephanidae, and Evanidae. Townes. 35-87. 1958. \$ 2.50. No. 3. Eucoilinae (Cynipoidea). Yoshimoto. 89-107. 1962. \$ 1.00. No. 4. Chalcidoidea: Eulophidae, Encyrtidae (part), Pteromalidae. Yoshimoto and Ishii. 109-178. 1965. \$ 2.50.