THE PSOCOPTERA OF THE KRAKATAU ISLANDS, INDONESIA

by

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SUMMARY

At least 80 species of Psocoptera are represented in recent collections from the Krakatau Islands, Sunda Strait. They represent 15 families, and 29 species are described as new. Twenty four species are known only from the Krakataus but others are widespread in nearby regions of Sumatra and Java and a few are known to be more broadly distributed. Numbers of species recorded from each of the Krakatau Islands are : Rakata 58, Panjang 48, Sertung 27, Anak Krakatau 27.

INTRODUCTION

This paper is an account of the systematics of Psocoptera collected on the Krakatau Islands, Sunda Strait, on recent expeditions, predominantly during the three (1984 — 1986) La Trobe University/Bogor Zoological Museum Expeditions. The background to the biological importance of the Krakataus and to the aims of the expeditions is given by Thornton & Rosengren (1988), and an overview of the Psocoptera and their ecology by Thornton *et al.* (1988). Extensive collecting of these insects by beating and sweeping, together with litter and Malaise trap samples on all four islands, yielded a possible 80 species (80 are recognised in this paper, and several other anomalous specimens noted) — a sample which is believed to be a realistic estimate of the fauna present at the times of our visits. It is clear that many taxa found on one or both sides of the Sunda Strait are not yet present on the Krakataus, and the fauna may be expected to increase substantially in the future. Several families, predominantly those associated with late succession forest habitats appear to be either rare or absent from the Krakataus, and are clearly under-represented in relation to other parts of Indonesia. The species found range from some which are widespread in the Old World tropics to others which are, so far, known only from the Krakataus, reflecting the general lack of knowledge of the Psocoptera of many parts of Indonesia and of nearby countries.

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In this paper, 29 new species are described, and a number of notable range extensions documented. A number of other species are recognised as undescribed but are represented by few or damaged specimens, and are therefore not described here. They are noted and in some cases illustrated, to aid perspective as knowledge increases.

A companion paper (Vaughan *et al.* 1990) is an appraisal of the taxa found on areas of Java and Sumatra bordering the Sunda Strait but which were not found on the Krakataus during our work. These may be taken to reflect the faunas of likely source areas for colonisation of the Krakatau Islands, but the collections to hand are by no means definitive.

Collecting sites on the Krakataus are indicated in Fig. 1. The three older islands (Rakata, Sertung, Panjang) all support areas of advanced secondary forest on their upper levels, and many higher parts of these islands are difficult to reach or traverse (Thornton & Rosengren 1988). Collecting on Sertung was concentrated on and near the northern spit which is progressively moving eastwards because of differential accretion and erosion on the two sides. The vegetation of the spit is dominated by *Casuarina equisetifolia*, and the more floristically diverse and mature parts of the island, and of southern Panjang, may have been undersampled. In contrast, virtually all of the limited vegetation on Anak Krakatau has been sampled, and most of the species of Psocoptera resident there are likely to be represented in our collections. The numbers of species from each island are Rakata 58(59), Panjang 48(48), Sertung 27(27), Anak Krakatau 27(27) (figures in parentheses are earlier estimates by Thornton *et al.* 1988). Twenty four species are at present known only from the Krakataus.

All specimens were preserved in 70% ethanol for examination in Australia, using standard techniques (New 1977). Measurements and scale lines on figures are given in mm. Holotypes of the new species are to be deposited in the Zoological Museum, Bogor and, where possible, paratypes in the Australian Museum, Sydney. In the lists of 'material examined', detailed data are given only for the rarer species; 'n' denotes associated nymphs recognisable on distinctive body markings. Many nymphs can not be identified, and are not included in the general totals.

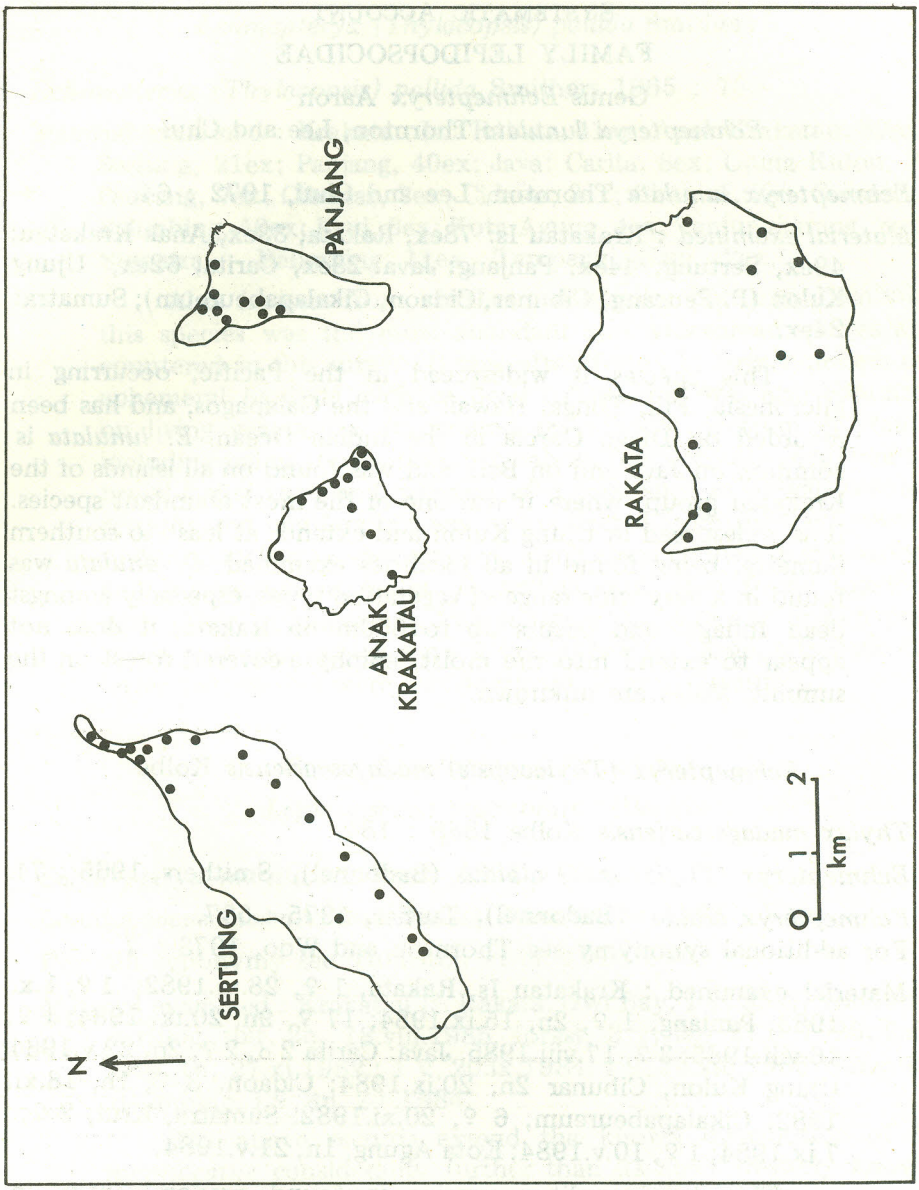


Figure 1. The Krakatau Islands, Sunda Strait; collecting sites for Psocoptera indicated.

SYSTEMATIC ACCOUNT

FAMILY LEPIDOPSOCIDAE

Genus *Echmepteryx* Aaron

Echmepteryx lunulata Thornton, Lee and Chui

Echmepteryx lunulata Thornton, Lee and Chui, 1972 : 64.

Material examined : Krakatau Is: 78ex, Rakata; 33ex, Anak Krakatau; 49ex, Sertung; 44ex, Panjang; Java: 23ex, Carita; 62ex, Ujung Kulon (P. Peucang, Cibunar, Cidaon, Cikalapabeureum); Sumatra: 24ex.

This species is widespread in the Pacific, occurring in Micronesia, Fiji, Tonga, Hawaii and the Galapagos, and has been recorded on Diego Garcia in the Indian Ocean. *E. lunulata* is common on Java and on Bali, and was found on all islands of the Krakatau group, where it was one of the most abundant species. It is widespread in Ujung Kulon and extends at least to southern Sumatra, being found in all localities examined. *E. lunulata* was found in a very wide range of vegetation types, especially amongst dead foliage, and occurs up to 550m on Rakata, it does not appear to extend into the moist, epiphyte-covered forest on the summit. Males are unknown.

Echmepteryx (Thylacopsis) madagascariensis Kolbe

Thylax madagascariensis Kolbe 1885 : 184.

Echmepteryx (Thylacopsis) albidus (Badonnel), Smithers, 1965 : 74.

Echmepteryx albida (Badonnel), Turner, 1975 ; 537.

For additional synonymy see Thornton and Woo, 1973 : 7.

Material examined : Krakatau Is, Rakata, 1 ♀, 28.xi.1982; 1 ♀, 1.x. 1983; Panjang, 1 ♀, 2n, 15.ix.1984; 17 ♀, 9n, 20.ix. 1984; 1 ♀, 16.viii.1985; 3 ♀, 17.viii.1985. Java: Carita 2 ♂, 2 ♀, 2n, 22.v.1984; Ujung Kulon, Cibunar 2n, 20.ix.1984; Cidaon, 3 ♀, 1n, 18.xi. 1982; Cikalapabeureum, 6 ♀, 20.xi.1982. Sumatra, Krui, 2 ♀, 7.ix.1984; 1 ♀, 10.v.1984; Kota Agung, 1n, 21.v.1984.

This tropicopolitan species is found predominantly in ephemeral habitats, particularly on drying leaves of monocotyledons and palms, and amongst coastal vegetation. It is the only species of the Lepidopsocidae for which males were collected in this survey, and was not found on Sertung or Anak Krakatau. Its scarcity on Rakata is also anomalous.

Echmepteryx (Thylacopsis) pallida Smithers

Echmepteryx (Thylacopsis) pallida Smithers 1965 : 75.

Material examined : Krakatau Is.: Rakata, 41ex; Anak Krakatau, 82ex; Sertung, 21ex; Panjang, 40ex; Java: Carita, 8ex; Ujung Kulon, P. Peucang, 7ex; Cibunar, 7ex; Cidaon, 3ex; Ciramea, 2ex; Sumatra: Belimbing, 40ex; Krui, 3ex; Kota Agung, 4ex; Tanjungkarang, 2ex. Sumatra : Belimbing 11ex, Tampang, Krui, 2ex.

Also known from northern Australia, Bali and Lombok, this species was the most abundant and widespread species encountered in this survey. It was often found in large numbers on ephemeral habitats such as dead foliage, but was also common on living vegetation. It occured on a wide spectrum of plants including palms, ferns, rattan, bamboo, herbaceous coastal plants, broad-leafed trees and narrow-leafed trees such as *Casuarina equisetifolia* and conifers but was not collected from the finer grasses such as *Saccharum spontaneum*, alang alang *(Imperata cylindrica)* and *Ischaemum muticum*. *E. pallida* was often found together with other lepidopsocids, *Echmepteryx lunulata* and/or *Lepidopsocus pretiosus*, which have a similar habitat range, although the latter two species were less dominant at most localities.

Genus *Lepidopsocus* Enderlein

Lepidopsocus marmoratus (Banks)

Echmepteryx marmorata Banks 1931 : 439.

Lepidopsocus marmoratus (Banks) Zimmerman 1948 : 225.

For full synonymy see Thornton *et al.* 1972 : 70.

Material examined : Krakatau Is. Rakata, Owl Bay, 1 ♀, 25-27.viii.1985; Sertung, spit, 2n, 18.viii.1985, forest, 3 ♀, 5n, 27.ix.1986; Panjang, 1n, 27.xi.1982.; 1 ♀, 20.ix.1984; 1 ♀, 16.viii.1985. Sumatra: Belimbing, 1 ♀, 4n. 2.v.1984.

The above records extend the known distribution of *L. marmoratus* considerably further than its most westerly known locality, Bali. It occurs also in Hawaii, Fiji and the southern Marianas.

Lepidopsocus pretiosus Banks

Echmepteryx pretiosa Banks 1942 : 28.

Lepidopsocus pretiosus (Banks) Thornton *et al.* 1972 : 70, 71, Figs. 3a-c.

Material examined : Krakatau Is.:Rakata, 41ex; Anak Krakatau, 82ex; Sertung, 21ex; Panjang, 40ex. Java: Carita, 8ex; Ujung Kulon, P. Peucang, 7ex; Cibunar, 7ex; Cidaon, 3ex; Ciramea, 2ex. Sumatra: Belimbing, 40ex; Krui, 3ex; Kota Agung, 4ex; Tanjungkarang, 2ex.

This is a common inhabitant of dry vegetation and ephemeral habitats, and is widespread in Micronesia and the lowlands of Fiji and Tonga. It was recorded from Bali by Thornton (1984). See further comments under *Echmepteryx pallida.* Many of the above individuals are nymphs, which are clearly diagnosed on head pattern.

Lepidopsocus sudarmani new species

(Figs. 2 — 6)

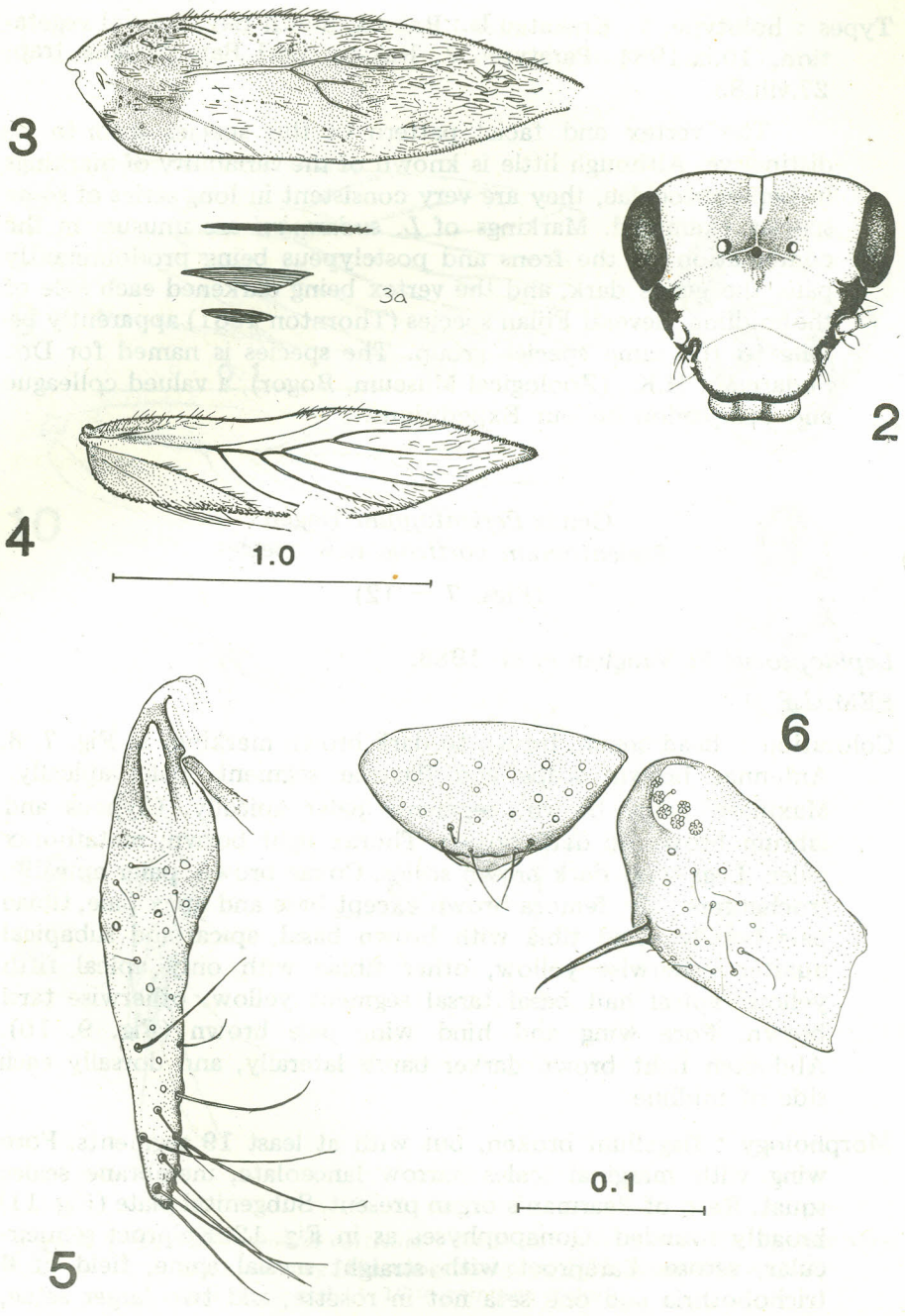
Lepidopsocus H, Vaughan *et al.* 1988.

Coloration : pale buff to white. Eyes black. Genae dark brown to black, band extended across anterior of postclypeus; anteclypeus and labrum dark (Fig. 2). Ocelli widely spaced, black. Vertex with broad greyish brown triangle behind, and incorporating, ocellar region. Palpi and antennae pale. Thorax and abdomen predominantly pale; traces of brown pleural stripe along thorax and abdomen. Legs pale, except traces of 2 tibial bands, that near base of T_{III} more pronounced; trace of band on t_1. Fore wing with pale grey bands as in Fig. 3; hind wing hyaline except near base, venation pale greyish brown.

Morphology : head rather broad. Wing venation as in Figs 3, 4 : both wings with narrow tapered apex.

Female : gonapophyses (Fig. 5) long and narrow. Epiproct (Fig. 6) broad. Paraproct (Fig. 6) with spine slightly curved, a field of 6 trichobothria and one seta without defined basal rosette.

Dimensions : I0/D 2.5, B 1.6, FW 1.7, HW 1.45, F 0.38, T 0.66, t_1 0.29, t_2 0.05, t_3 0.07, t_1/t_2 5.8, t_2/t_3 0.7, ct 14.



Figures 2—6. *Lepidopsocus sudarmani* : facial pattern (2), fore wing (3), hind wing (4), gonapophyses (5), female eppiproct and paraproct (6). Figs. 3, 4, and 5, 6, to common scales.

Types : holotype, ♀, Krakatau Is.: Rakata, South Bay, coastal vegetation, 10.ix.1984. Paratype, ♀, Rakata, Owl Bay, Malaise trap, 27.viii.85.

The vertex and facial pattern of this species seem to be distinctive. Although little is known of the variability of markings in Lepidopsocidae, they are very consistent in long series of some species examined. Markings of *L. sudarmani* are unusual in the combination of the frons and postclypeus being prodominantly pale, the genae dark, and the vertex being darkened each side of the midline. Several Fijian species (Thornton 1981) apparently belong to the same species group. The species is named for Drs. Sudarman, H.K., (Zoological Museum, Bogor), a valued colleague and companion on our Expeditions.

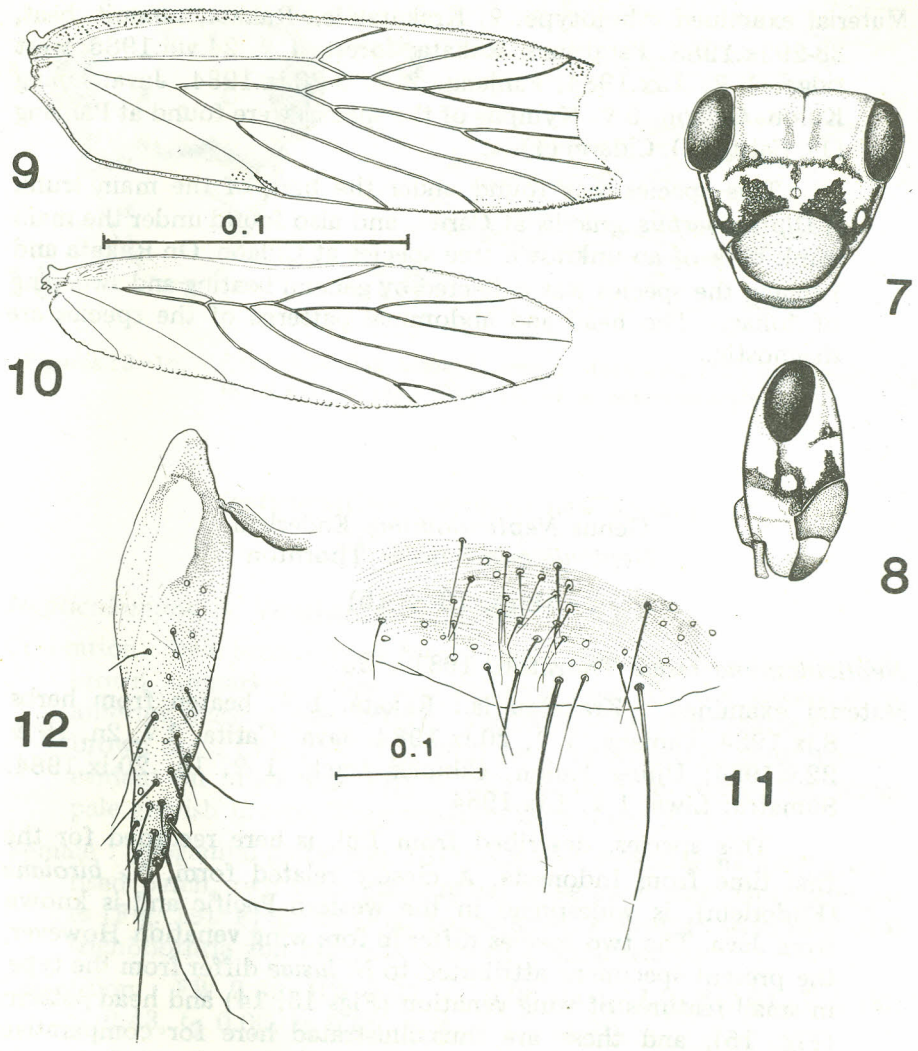
Genus *Perientomum* Hagen
Perientomum corticola new species
(Figs. 7 — 12)

Lepidopsocus F, Vaughan *et al.* 1988.

FEMALE

Coloration : head cream, brown to dark brown markings as Fig. 7, 8. Antennae brown, scape and flagellar segments paler apically. Maxillary palps brown, segments paler apically. Clypeus and labrum brown to dark brown. Thorax light borwn, metathorax paler. Legs with dark brown scales. Coxae brown, paler apically, trochanters pale, femora brown except base and apex pale, tibiae pale basally; hind tibia with brown basal, apical and subapical quarter otherwise yellow, other tibiae with only apical fifth yellow, apical half basal tarsal segment yellow, otherwise tarsi brown. Fore wing and hind wing pale brown (Fig. 9, 10). Abdomen light brown darker bands laterally, and dorsally each side of midline.

Morphology : flagellum broken, but with at least 19 segments. Fore wing with marginal scales narrow lanceolate, membrane scales squat. Rasp of Pearman's organ present. Subgenital plate (Fig. 11) broadly rounded. Gonapophyses as in Fig. 12. Epiproct semicircular, setose. Paraproct with straight mesial spine, field of 6 trichobothria and one seta not in rosette, and two larger setae, one distal and one ventral to trichobothrial field.



Figures 7—12. *Perientomum corticola* : facial and head pattern (7, 8), fore wing (9), hind wing (10), subgenital plate (11), gonapophyses (12). Figs. 9, 10 and 11, 12 to common scales.

Male : unknown.

Dimensions : B 2.4, FW 2.2, HW 1.93, f_1 0.099, f_2 0.099, f_1/f_2 1.0, F 0.53, T 0.96, t_1 0.438, t_2 0.11, t_3 0.087, t_1/t_2 4.00, t_2/t_3 1.26, ct 18, 3, 0.

Material examined : holotype, ♀, Krakatau Is.: Rakata, summit, beat, 28-29.ix.1983. Paratypes, Rakata, forest, 1 ♀, 24.viii.1985; west ridge, 1 ♀, 1.ix.1984; Panjang, 2 ♀, 3-20.ix.1984. Java: Ujung Kulon, Cidaon, 5 ♀. Nymphs of the species were found at Panjang (1), Carita (1), Cidaon (1).

This species was found under the bark of the main trunk of *Dipterocarpus gracilis* at Carita, and also found under the main trunk bark of an unknown tree species at Cidaon. On Rakata and Panjang the species was collected by general beating and sweeping of foliage. The head and abdominal patterns of the species are diagnostic.

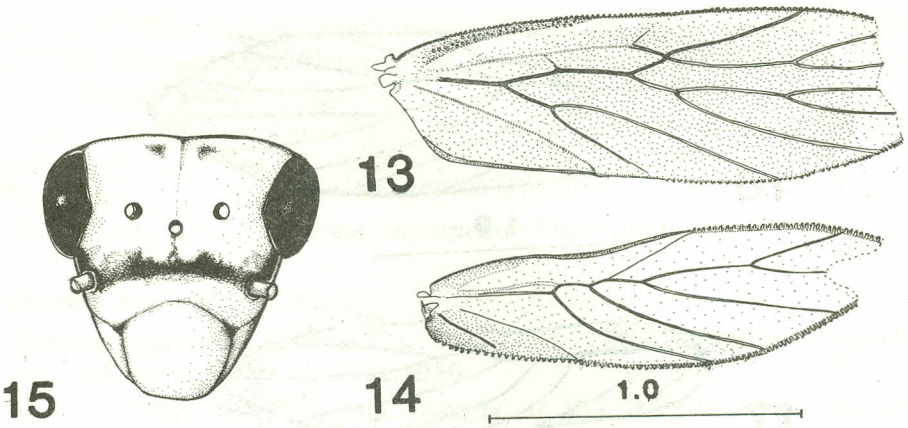
Genus *Nepticulomima* Enderlein
Nepticulomima lusiae Thornton

(Figs. 13 — 15)

Nepticulomima lusiae Thornton, 1981 : 35.

Material examined : Krakatau Is.: Rakata, 1 ♀, beaten from herbs 8.ix.1984; Panjang, 1 ♀, 20.ix.1984. Java: Carita, 2 ♀, 2n, 16 & 22.v.1984; Ujung Kulon, Cibunar track, 1 ♀, 1n, 20.ix.1984. Sumatra: Liwa, 1 ♀, 1.ix.1984.

This species, described from Fiji, is here recorded for the first time from Indonesia. A closely related form, *N. biroiana* (Enderlein), is widespread in the western Pacific and is known from Java. The two species differ in fore wing venation. However, the present specimens attributed to *N. lusiae* differ from the type in small features of wing venation (Figs 13, 14) and head pattern (Fig. 15), and these are thus illustrated here for comparative purposes, as the range of intraspecific variation of such features is unknown. By analogy with other Lepidopsocidae, it is likely to be small, and considerably more material is needed to validly assess the status of Indonesian forms of *Nepticulomima*.



Figures 13—15. *Nepticulomima lusiae* Thornton : fore wing (13), hind wing (14), facial pattern (15). Figs. 13, 14 to common scale.

Nepticulomima uniformis new species
(Figs. 16 — 20)

Nepticulomima B, Vaughan *et al.* 1988.

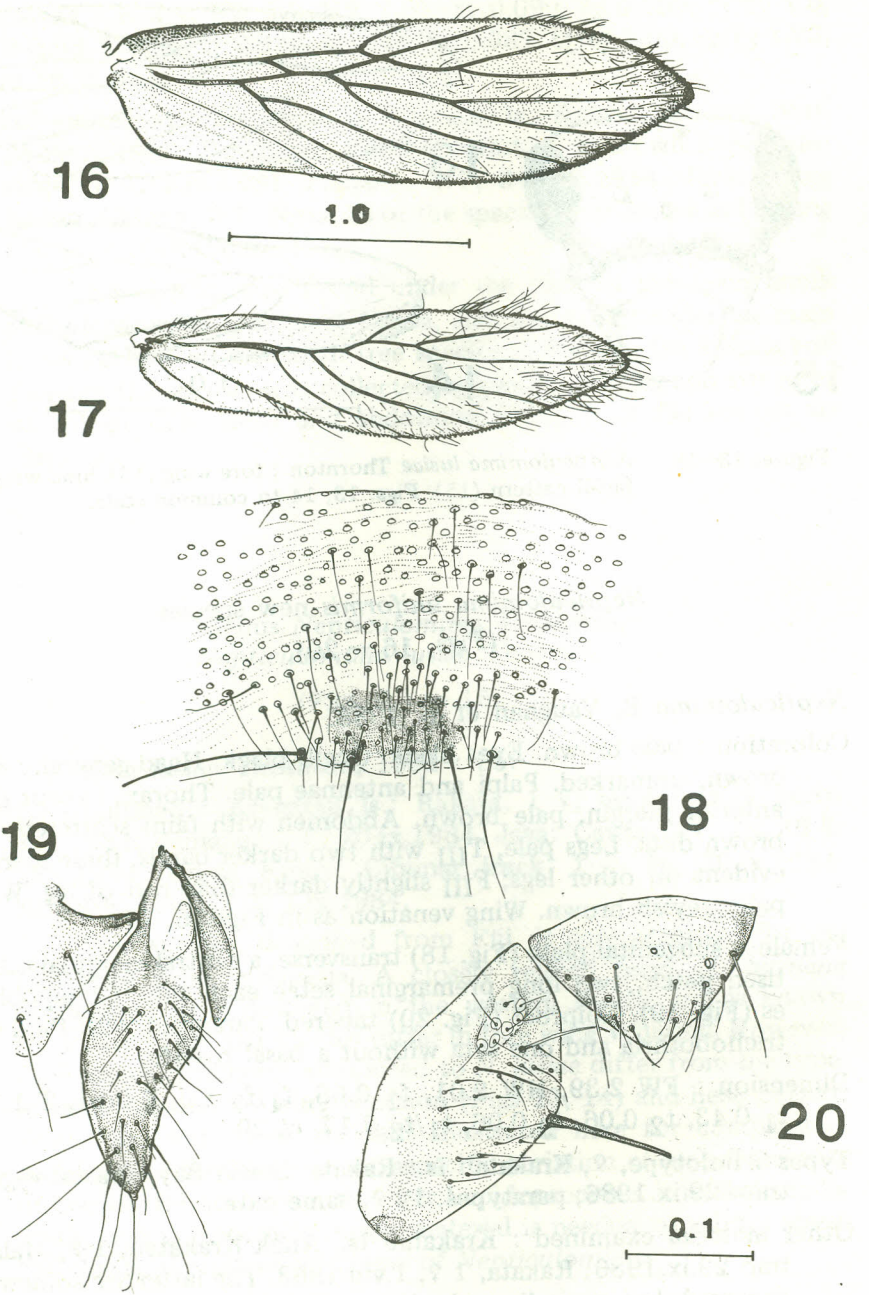
Coloration : pale brown. Eyes black. Ocelli black. Head generally dark brown, unmarked. Palpi and antennae pale. Thorax, except dark anterior margin, pale brown. Abdomen with faint scattered dark brown dots. Legs pale, T_{III} with two darker bands, these scarcely evident on other legs; F_{III} slightly darker than rest of leg. Wings pale greyish brown. Wing venation as in Figs 16, 17.

Female : subgenital plate (Fig. 18) transverse, a central marginal sclerotised patch, two long premarginal setae each side. Gonapophyses (Fig. 19). Epiproct (Fig. 20) tapered. Paraproct with field of 6 trichobothria and one seta without a basal rosette.

Dimension : FW 2.39, HW 2.01, f_1 0.08, f_1/f_2 1.0, F 0.51, T 1.12., t_1 0.43, t_2 0.06, t_3 0.06, t_1/t_2 7.17, ct 20.

Types : holotype, ♀, Krakatau Is.: Rakata, South Bay, coastal vegetatrap, 29.ix.1986; paratypes, 12 ♀, same data.

Other material examined : Krakatau Is., Anak Krakatau, 1 ♀, Malaise trap 29.ix.1986; Rakata, 1 ♀, 1.viii.1983. The latter are somewhat damaged, but genitalia and wing venation are very similar to those of the type series.



Figures 16—20. *Nepticulomima uniformis* : fore wing (16), hind wing (17). subgenital plate (18), gonapophyses (19), female epiproct (20). Figs. 16, 17 and 18 — 20 to common scales.

This rather plain species differs in wing venation from *N. biroiana* (Enderlein) which has been recorded from Java, New Guinea and Samoa.

Genus *Parasoa* Thornton

Parasoa haploneura Thornton

Parasoa haploneura Thornton, 1962b : 452.

Material examined : Krakatau Is.: Panjang, 1 ♀, brachypterous, 14.ix.84, 1 ♀, brachypterous, 25.ix.1986.

The only previous records of this distinctive species are from the Batu Caves, Malaya (Thornton 1962b) and Singapore (New 1975). On Panjang, single specimens were found on coastal vegetation and in secondary rainforest.

Genus *Soa* Enderlein

Soa sp.

(Figs. 21 — 25)

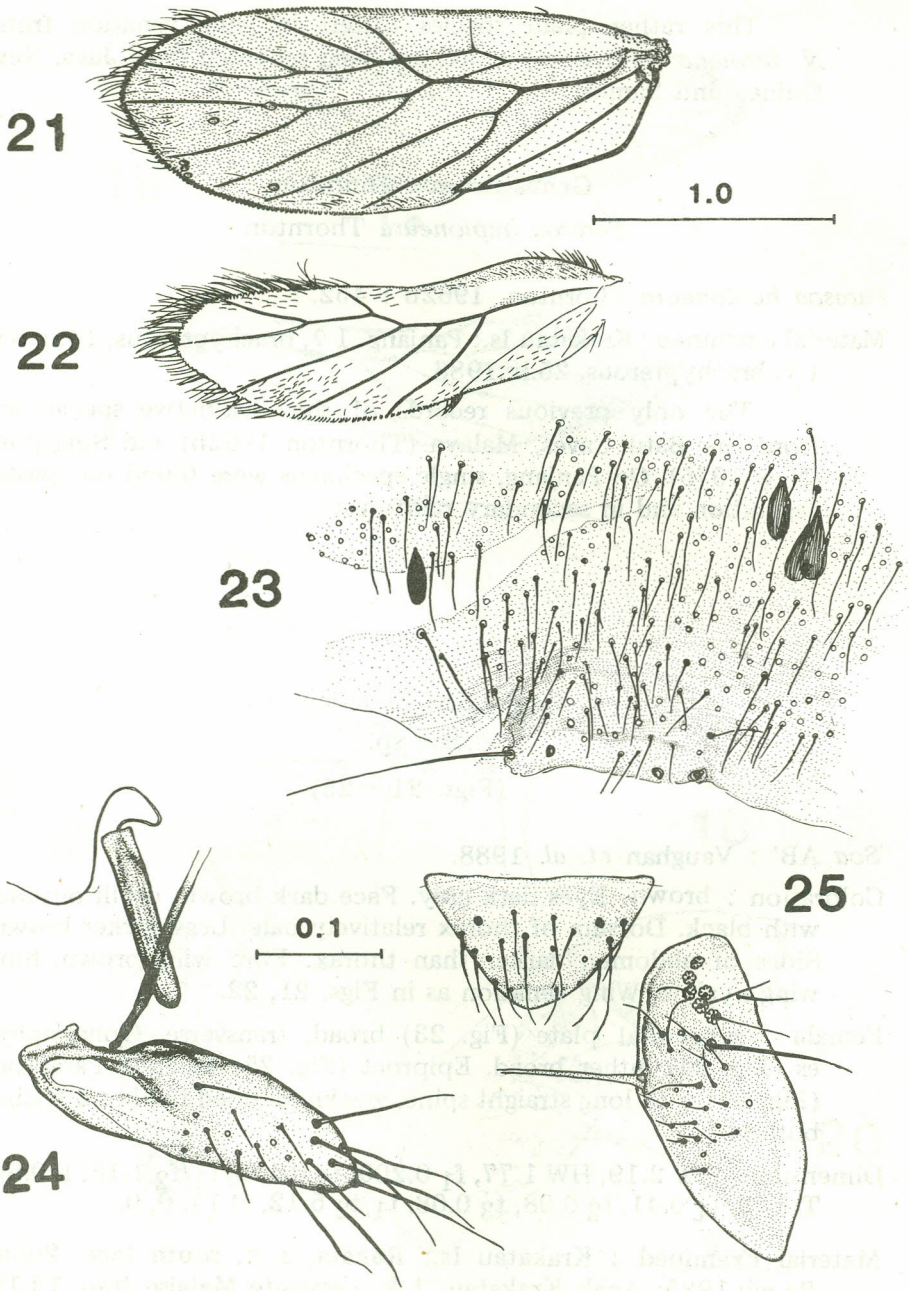
'*Soa* AB' : Vaughan *et. al.* 1988.

Coloration : brown. Eyes dark grey. Face dark brown, ocelli outlined with black. Dorsum of thorax relatively pale. Legs darker brown. Sides of abdomen darker than thorax. Fore wing brown, hind wing hyaline. Wing venation as in Figs. 21, 22.

Female : subgenital plate (Fig. 23) broad, transverse. Gonapophyses (Fig. 24) rather broad. Epiproct (Fig. 25) tapered. Paraproct (Fig. 25) with long straight spine, weakly-defined field of 6 trichobothria.

Dimensions : FW 2.19, HW 1.77, f_1 0.200, f_2 0.170, f_1/f_2 1.18, F 0.64, T 1.03, t_1 0.41, t_2 0.08, t_3 0.08, t_1/t_2 5.12, ct 17, 0, 0.

Material examined : Krakatau Is.: Rakata, 1 ♀, south face, 200m, 24.viii.1985; Anak Krakatau, 1 ♀, campsite Malaise trap, 13-19. viii.1985; Panjang, 1 ♀, central ridge, 25.ix.1986.



Figures 21—25. *Soa* sp. : fore wing (21), hind wing (22), subgenital plate (23). gonapophyses (24), female epiproct and paraproct (25). Figs. 21, 22 and 23 — 25 to common scales.

All three individuals are somewhat damaged, but their genitalia are very similar, and the specimens appear to be conspecific. The species may be new, as it appears to differ from described species on small details of wing venation. We prefer not to name it until more material becomes available, but note it here to indicate the presence of this widespread genus on the Krakatau Is. It appears to be rather rare.

FAMILY AMPHIENTOMIDAE

Seopsis harveyi new species

(Figs. 26 — 31)

Seopsis LA, Vaughan *et al.* 1988.

Coloration : pale brown. Eyes black. Labrum dark brown, anteclypeus pale, postclypeus with 8 narrow parallel striae each side of midline; frons dark; vertex pale posteriorly. Thorax dorsally dark brown, sutural areas pale. Abdomen pale. Fore wing greyish brown; hind wing paler. Legs : I, F ivory except slight brown tinge, T with 2 dark brown bands, t_1 basal 2/3 brown, t_2 and t_3 brown. Other legs similar but basal F band also more pronounced.

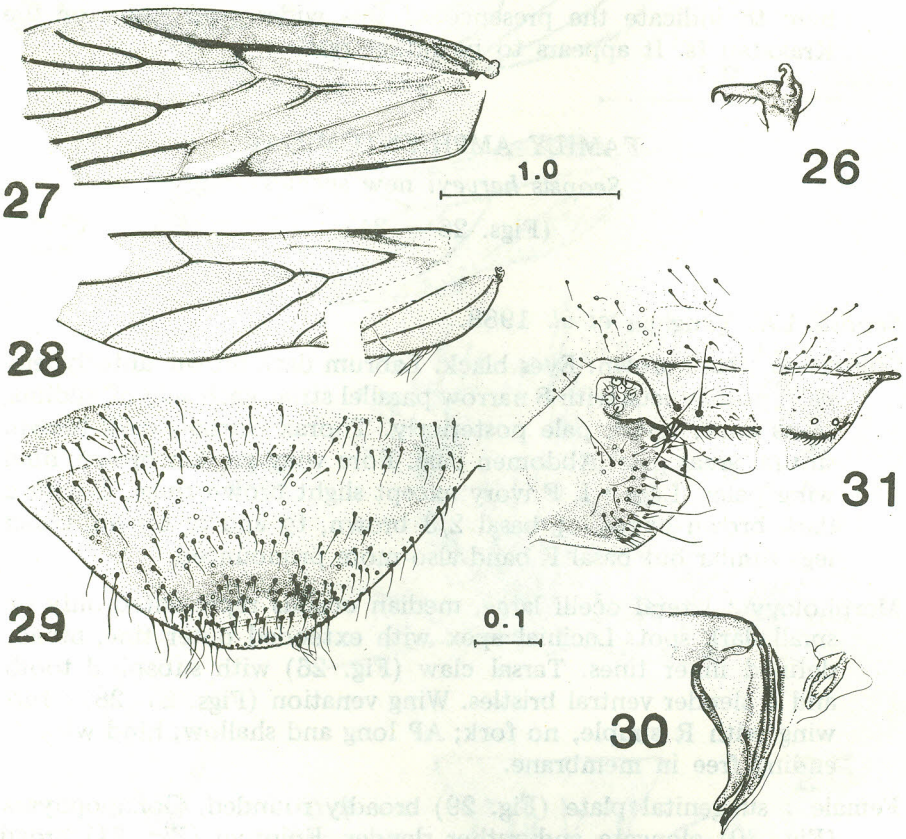
Morphology : lateral ocelli large, median ocellus represented only by small dark spot. Lacinial apex with extended outer tine, broad, defined inner tines. Tarsal claw (Fig. 26) with subapical tooth and 6 slender ventral bristles. Wing venation (Figs. 27, 28) : fore wing with R simple, no fork; AP long and shallow; hind wing R ending free in membrane.

Female : subgenital plate (Fig. 29) broadly rounded. Gonapophyses (Fig. 30) elongate and rather slender. Epiproct (Fig. 31) broad and shallow. Paraproct (Fig. 31) with small field of 8 trichobothria.

Dimensions : B. 2.80; both wings broken at tip; F 0.658, T 1.291, t_1 0.729, t_2 0.089, t_3 0.101.

Type : holotype, ♀, Krakatau Is.: Rakata, from Winkler sample, litter extraction, 12.ix.1984.

Wing venation of this species is rather similar to that of *S. brunnea* New (1975) (Singapore), in which the venation closely resembles that of some species of *Paramphientomum* Enderlein. The tarsal claw, however, has only a single subapical tooth, unlike members of the latter genus. Details of coloration and of ocellar



Figures 26—31. *Seopsis harveyi* : tarsal claw (26), fore wing (27), hind wing (28). subgenital plate (29), gonapophyses (30), female epiproct and paraproct (31). Figs. 27, 28 and 29 — 31 to common scales.

size, suggest that this species is distinct from *S. brunnea*, but only the male of that species is known. Both species appear to be ground-dwellers. This is the first amphientomid recorded from the Krakatau Is. *Paramphientomum striatum* Thornton (1984), from Bali, has the fore wing vein R forked.

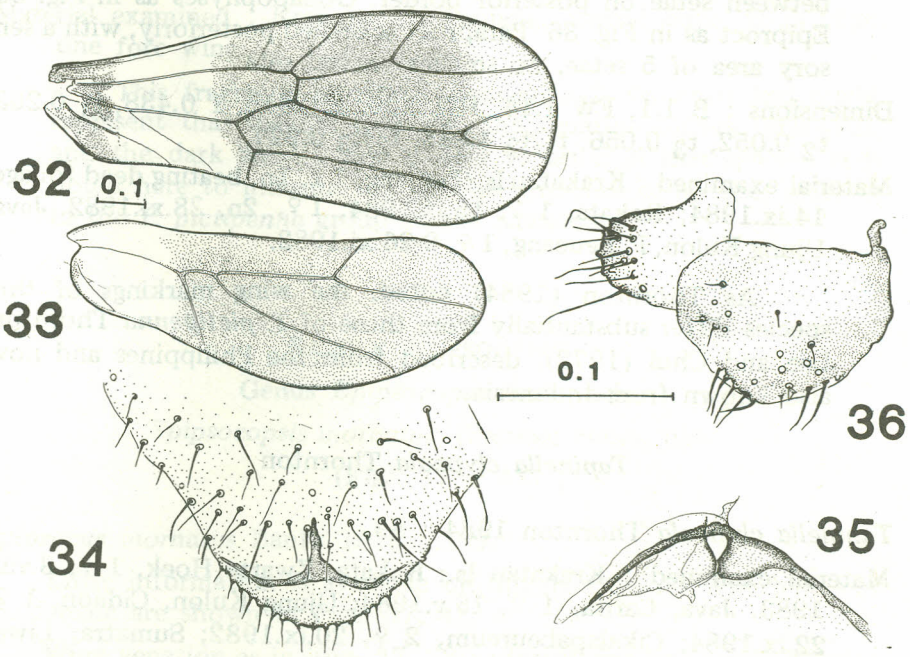
FAMILY PACHYTROCTIDAE
Genus *Tapinella* Enderlein
Tapinella baliensis Thornton
(Figs. 32 — 36)

Tapinella baliensis Thornton, 1984 : 89.

This species was originally described from Bali by Thornton (1984), but due to mutilation of the specimen its genitalia were not described. The following description is of specimens from Panjang, the females being consistent with the available undamaged parts of the holotype, which we have re-examined.

FEMALE

Coloration (after 3 months in alcohol) : head generally light brown (considerable variation in the head and body coloration, some specimens being much darker in general coloration than described



Figures 32—36. *Tapinella baliensis* Thornton : fore wing (32), hind wing (33), subgenital plate (34) gonapophyses (35) female epiproct (36). Figs. 32, 33 and 34 — 36 to common scales.

here); epicranial suture dark brown; eyes brown to black. Ocelli colourless with dark brown internal borders; median ocellus subtended by two diverging brown lines. Dark brown line from orbit through antennal socket to fronto-clypeal suture and along posterior margin of clypeus. Brown striae distinct on posterior third of clypeus, very faint on anterior two-thirds. Anteclypeus pale. All head markings barely discernible in darker speciments. Maxillary palpi pale. Antennae brown; flagellar segments with cream apices; secondary annulations of segments f_5 onwards cream. Thorax brown, paler mid-dorsally. Dark brown band along lateral thorax continued on abdomen. Legs : coxa brown along basal margin, remainder of coxa, trochanter and basal 1/5 of femur (not basal 1/5 of tibia as in original description) cream, rest of leg brown, though tibia somewhat paler apically. Fore wing (Fig. 32), hind wing (Fig. 33). Abdomen brown dorsally, darker brown band laterally and paler ventrally.

Morphology : wing venation as in Figs. 32, 33. Subgenital plate (Fig. 34) with long slender curved arms and pointed apex; fine papillae between setae on posterior border. Gonapophyses as in Fig. 35. Epiproct as in Fig. 36. Paraproct sclerified posteriorly, with a sensory area of 5 setae, no smaller central seta.

Dimensions : B 1.1, FW 1.14, HW 0.95, F 0.315, T 0.438, t_1 0.253, t_2 0.052, t_3 0.056, t_1/t_2 4.865, t_2/t_3 0.927.

Material examined : Krakatau Is.: Panjang, 7 ♀, 1n, beating dead foliage, 14.ix.1984; Rakata, 1 ♀, 15.ix.1984; 1 ♀, 2n, 28.xi.1982. Java, Ujung Kulon, P. Peucang, 1 ♀, 9-26.xi.1982.

As Thornton (1984) noted, the wing markings of this species differ substantially from those of *T. pictipenna* Thornton, Lee and Chui (1972), described from the Philippines and now also known from Indonesia.

Tapinella clypeola Thornton

Tapinella clypeola Thornton 1984 : 89.

Material examined : Krakatau Is.: Rakata, Zwarte Hoek, 1 ♀, 8.viii. 1983. Java, Carita, 1 ♀, 15.v.1984; Ujung Kulon, Cidaon, 1 ♀, 22.ix.1984; Cikalapabeureum, 2 ♀, 20.ix.1982; Sumatra, Liwa, 2 ♀, 1.ix.1984, Pemekuhan, 1 ♀, 2.v.1984.

The markings, wing venation, and genitalia of these specimens tally closely with those of the types, which we have reexamined. *T. clypeola* was described from Lombok.

Tapinella spinosa Thornton

Tapinella spinosa Thornton, 1984 : 91.

This species was described from Bali. The following additional information is provided on the holotype.

Dimensions : IO:D 3.7, B 1.1, FW 1.35, HW 1.14, f_1 0.10, f_2 0.10, F 0.366, T 0.467, t_1 0.27, t_2 0.059, t_3 0.065, t_1/t_2 4.56, t_2/t_3 0.91.

Material examined : Krakatau Is.: Anak Krakatau, 1 ♀, 21.viii.1985.

Only a single specimen of *T. spinosa* was collected from broad leaved plants on Anak Krakatau. It is one of few apparently rare and localised species to have reached Anak Krakatau, the usual early colonising species being more generally tropicopolitan.

Tapinella sp ?

Material examined : Krakatau Is.: Panjang, central ridge, 25.ix.1986, one fore wing.

This fragment is overall similar to *T. baliensis* and might represent that species. However, the venation differs somewhat, and the dark band is not as dark as usual in that species. It is noted here to indicate the possible presence of another member of the *T. pictipenna* group on the Krakataus.

FAMILY EPIPSOCIDAE

Genus *Epipsocopsis* Badonnel

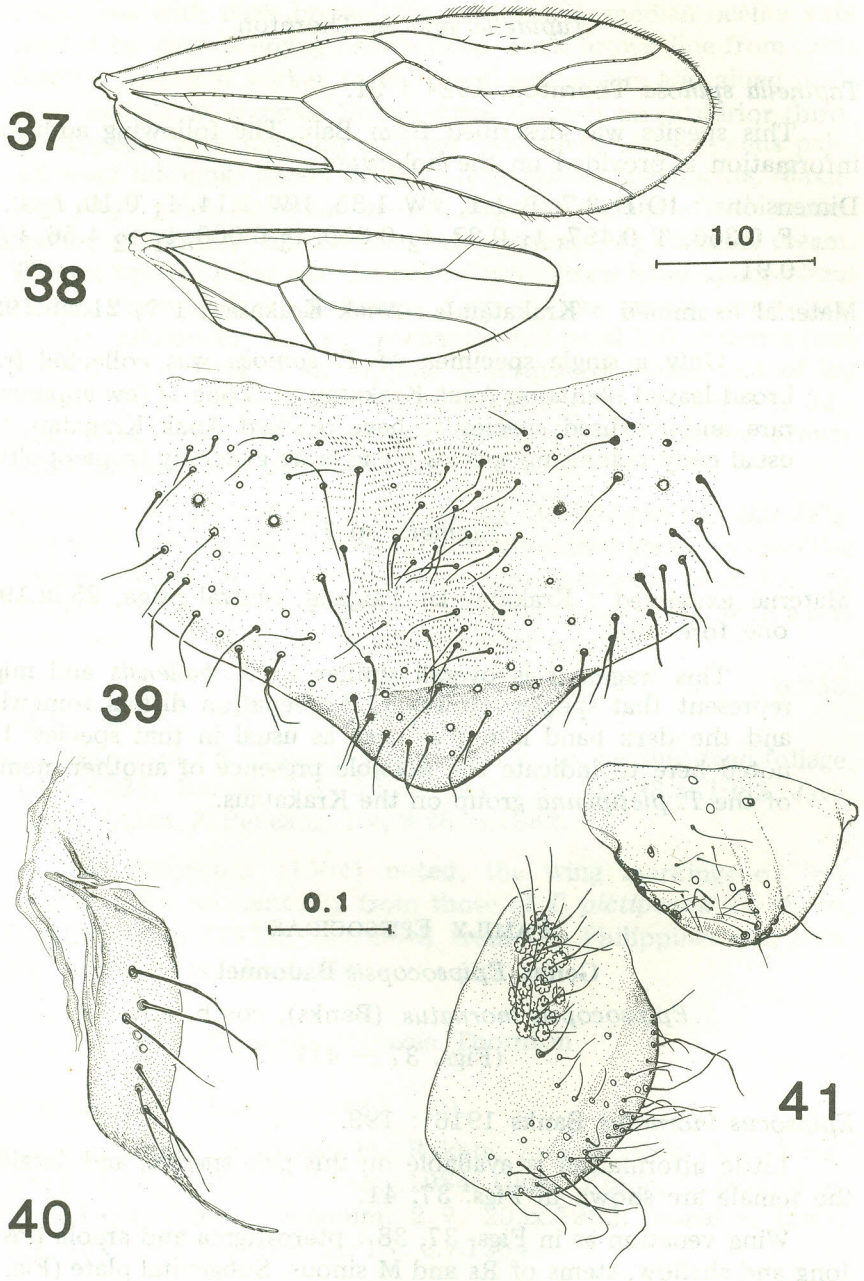
Epipsocopsis inornatus (Banks), comb. nov.

(Figs. 37 — 41)

Epipsocus inornatus Banks 1916 : 199.

Little information is available on this pale species, and details of the female are shown in Figs. 37, 41.

Wing venation as in Figs. 37, 38 : pterostigma and areola postica long and shallow, stems of Rs and M sinous. Subgenital plate (Fig. 39) with apex slightly tapered. Gonapophyses (Fig. 40). Epiproct (Fig. 41) rounded. Paraproct (Fig. 41) with elongate field of about 20 trichobothria.



Figures 37—41. *Epipsocopsis inornatus* (Banks) : fore wing (37), hind wing (38), subgenital plate (39), gonapophyses (40), female epiproct and paraproct (41).
Figs. 37, 38 and 39 — 41 to common scales.

Material examined : Krakatau Is.: Rakata, Zwarte Hoek, 1 ♀, 31.viii. 1984; South Face, 1 ♀, 4.ix.1984; 1 ♀, 24.viii.1985.

E. inornatus was described from the Philippines. The unusual shape of the areola postica in the present specimens closely resembles that shown by Banks (1916). Both *E. sclerota* New & Thornton (1975) (Singapore) and *E. setosa* New & Thornton (W. Malaysia) are pale winged species, and the latter appears to be very similar to the Krakatau specimens. Both these, however, have a pronounced thoracic pleural stripe.

Epipsocopsis paraselena new species

(Figs. 42 — 46)

Epipsocopsis UK, Vaughan *et al.*, 1988a.

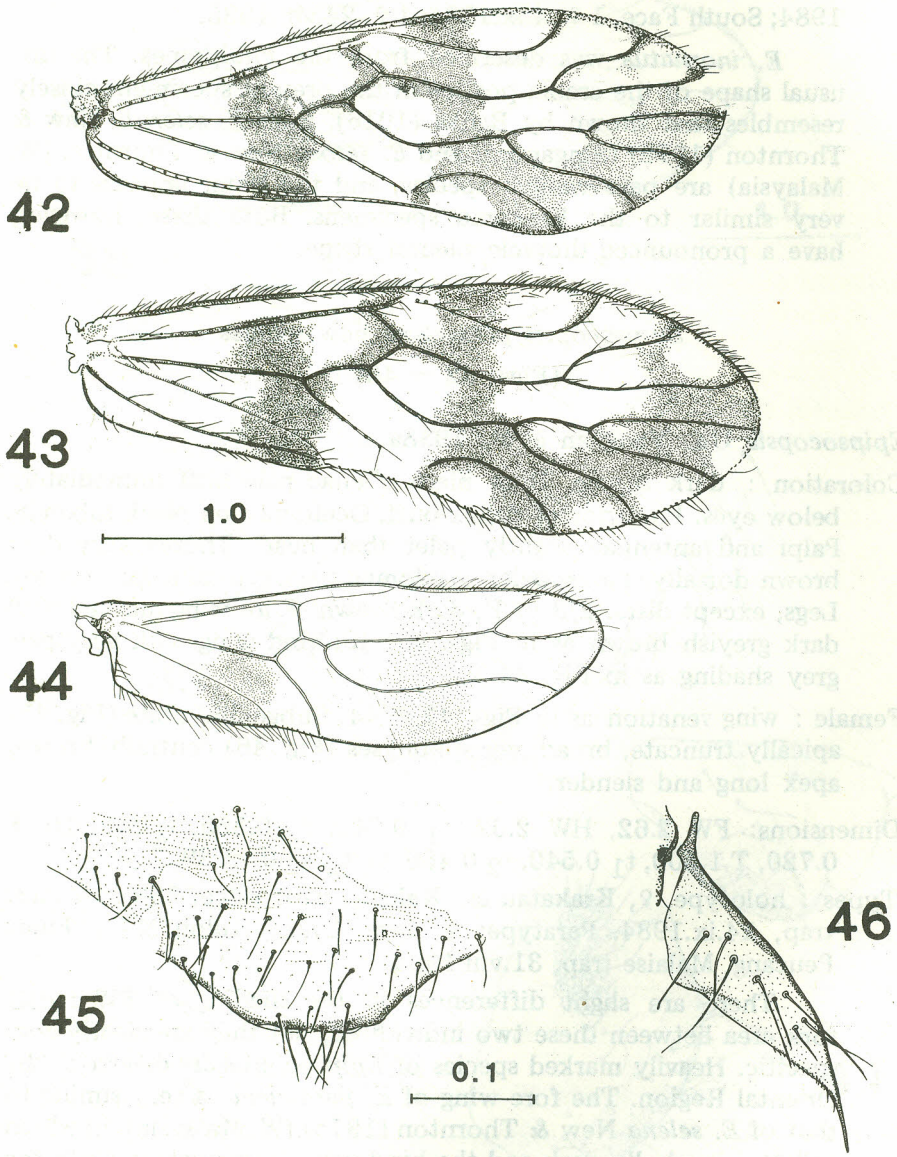
Coloration : dark brown. Eyes black. Genae pale buff immediately below eyes. Posterior of vertex buff. Ocelli pale on black tubercle. Palpi and antennae slightly paler than head. Thorax very dark brown dorsally, pleura paler. Abdomen pale, genitalia dark brown. Legs, except distal 2/3 of F, dark brown. Fore wing marked with dark greyish brown as in Figs. 42, 43; hind wing with very pale grey shading as in Fig. 44.

Female : wing venation as in Figs. 42 — 44. Subgenital plate (Fig. 45) apically truncate, broad; gonapophyses (Fig. 46) centrally brown, apex long and slender.

Dimensions: FW 2.62, HW 2.02, f_1 0.645, f_2 0.555, f_1/f_2 1.16, F 0.720, T 1.200, t_1 0.540, t_2 0.450, t_1/t_2 3.60, ct 29, 7.

Types : holotype, ♀, Krakatau Is.: Rakata, west ridge, 280m, Malaise trap, 14.ix.1984. Paratype: ♀, Java, Ujung Kulon N.P., Pulau Peucang, Malaise trap, 31.viii.1984.

There are slight differences in the shading of FW radial fork area between these two individuals, but they are clearly conspecific. Heavily marked species of *Epipsocopsis* are diverse in the Oriental Region. The fore wing of *E. paraselena* is very similar to that of *E. selena* New & Thornton (1975) (W. Malaysia), in which cell M_1, is wholly dark and the hind wing is unmarked. Only the male of *E. selena* has been described.



Figures 42—46. *Epipsocopsis paraselena* : fore wing (42, 43), hind wing (44), subgenital plate (45), gonapophyses (46).
Figs. 42 — 44 and 45, 46 to common scales.

FAMILY CAECILIIDAE

Genus *Caecilius* Curtis

Caecilius andinus new species

(Figs. 47 — 51)

Caecilius C. Vaughan *et al.* 1988.

Coloration : pale brownish yellow. Eyes black. Ocellar tubercle black. Postclypeus with 5 or 6 narrow convergent striae each side of midline; anteclypeus and labrum pale. Apical segment of maxillary palp very slightly darkened. Antennae pale. Thorax and abdomen paler ventrally than dorsally. Legs pale. Fore wing slightly tawny. Hind wing paler. Wing venation as in Figs. 47, 48 : areola postica small.

Female : subgenital plate (Fig. 49) rounded. Gonapophyses (Fig. 50) short. Epiproct (Fig. 51) rounded, with strong band of long setae across apical half. Paraproct (Fig. 51) with field of about 18 trichobothria.

Male : unknown.

Dimensions.: B 1.5, FW 2.07, HW 1.57, f_1 0.33, f_2 0.22, f_1/f_2 1.50, F 0.41, T 0.74, t_1 0.26, t_2 0.09, t_1/t_2 2.88, ct 13, 0.

Types : holotype, ♀, Indonesia, Java, Ujung Kulon, Cidaon, 22.ix.1984. Paratypes, 4 ♀, Krakatau Is., Rakata, 850 feet, 16.ix.1984.

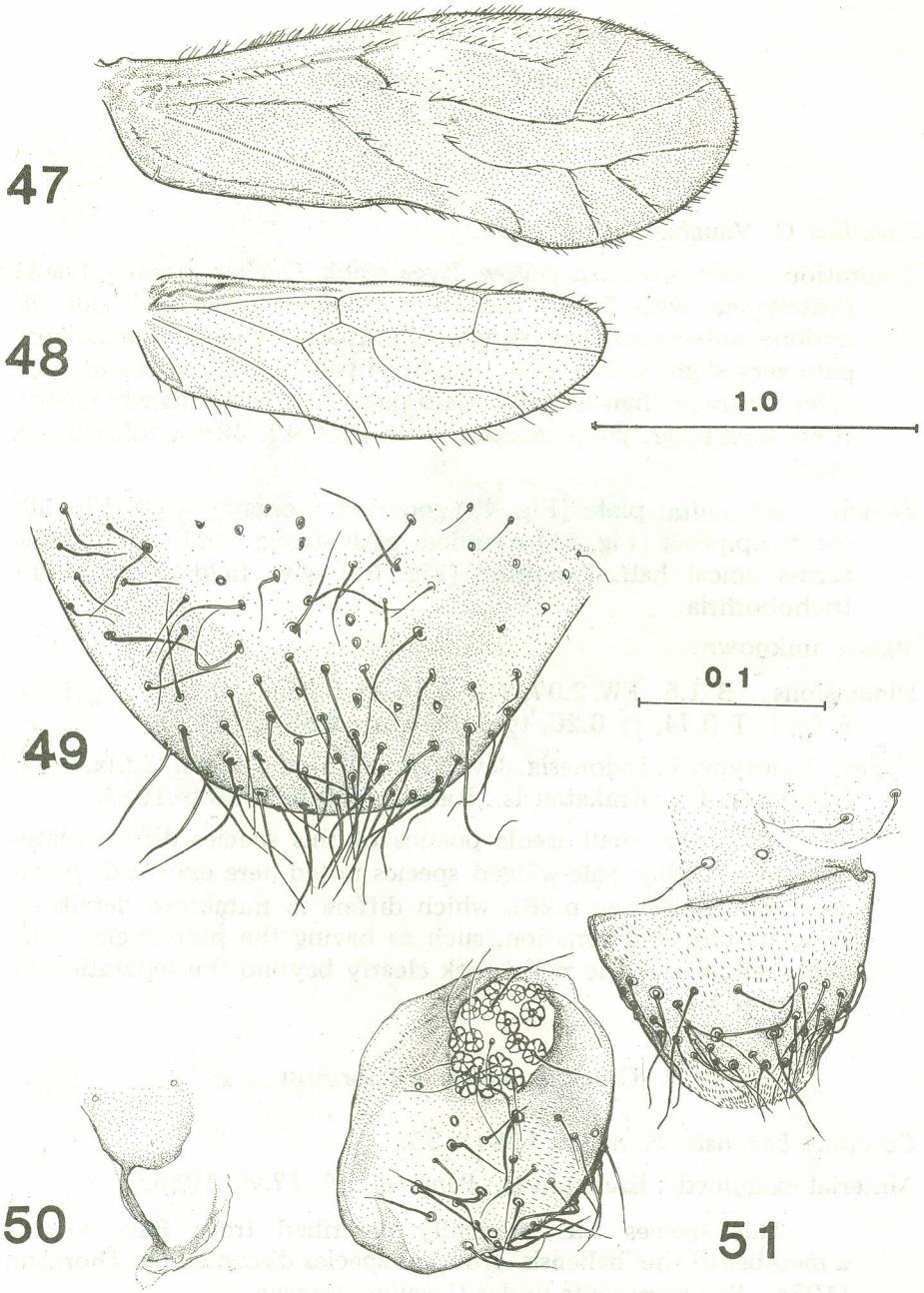
The very small areola postica of this species differentiates it from all other pale-winged species noted here except *C. parviarola* Enderlein (see p.28), which differs in numerous details of wing pattern and venation, such as having the pterostigma long and shallow and the radial fork clearly beyond the separation of M_3 from M.

Caecilius baliensis Thornton

Caecilius baliensis Thornton 1984 : 95.

Material examined : Krakatau Is.: Panjang, 1 ♀, 17.viii.1985.

This species was originally described from Bali, and is a member of the 'baliensis' group of species discussed by Thornton (1984). See comments under *Caecilius traceus.*



Figures 47—51. *Caecilius andinus* : fore wing (47), hind wing (48), subgenital plate (49), gonapophyses (50), female epiproct and paraproct (51). Figs. 47, 48 and 49 — 51 to common scales.

Caecilius casarum Badonnel

Caecilius casarum Badonnel, 1931 : 234.

Material examined : Krakatau Is.: Anak Krakatau, 1 ♀, 15.viii.85; Rakata, 1 ♀, 28.xi.1982. Java, Carita, 1 ♀, 2n, 27.v.1984; Ujung Kulon N.P., Cikalapabeureum, 3 ♀, 4n, 20.xi.1982; Ciramea, 10 ♂, 12 ♀, 10n, 19.xi.1982; Cibunar, 3 ♀, 12n, 16.xi.1982.

Caecilius casarum has been recorded from Mozambique, Hong Kong, New Guinea, Micronesia, Fiji, Tonga, Samoa, Hawaii, Easter Island, the southern United States and coastal areas of the New World tropics and subtropics. It is a lowland form which is sometimes spread by commerce. In this survey it was found in association with dry coastal vegetation, palms and rattan, and was found on *Saccharum spontaneum* on Anak Krakatau.

Caecilius hivesi new species

(Figs. 52 — 56)

Caecilius F, Vaughan *et al.* 1988.

Coloration : yellow to buff. Eyes black. Head unmarked. Palpi pale except dark apical segment. Antennae slightly browned. Thoracic nota brown, except sutural areas, cream. Abdomen and legs pale, except T and t darker than F. Wings pale, fore wing tinged with tawny brown except anteriorly.

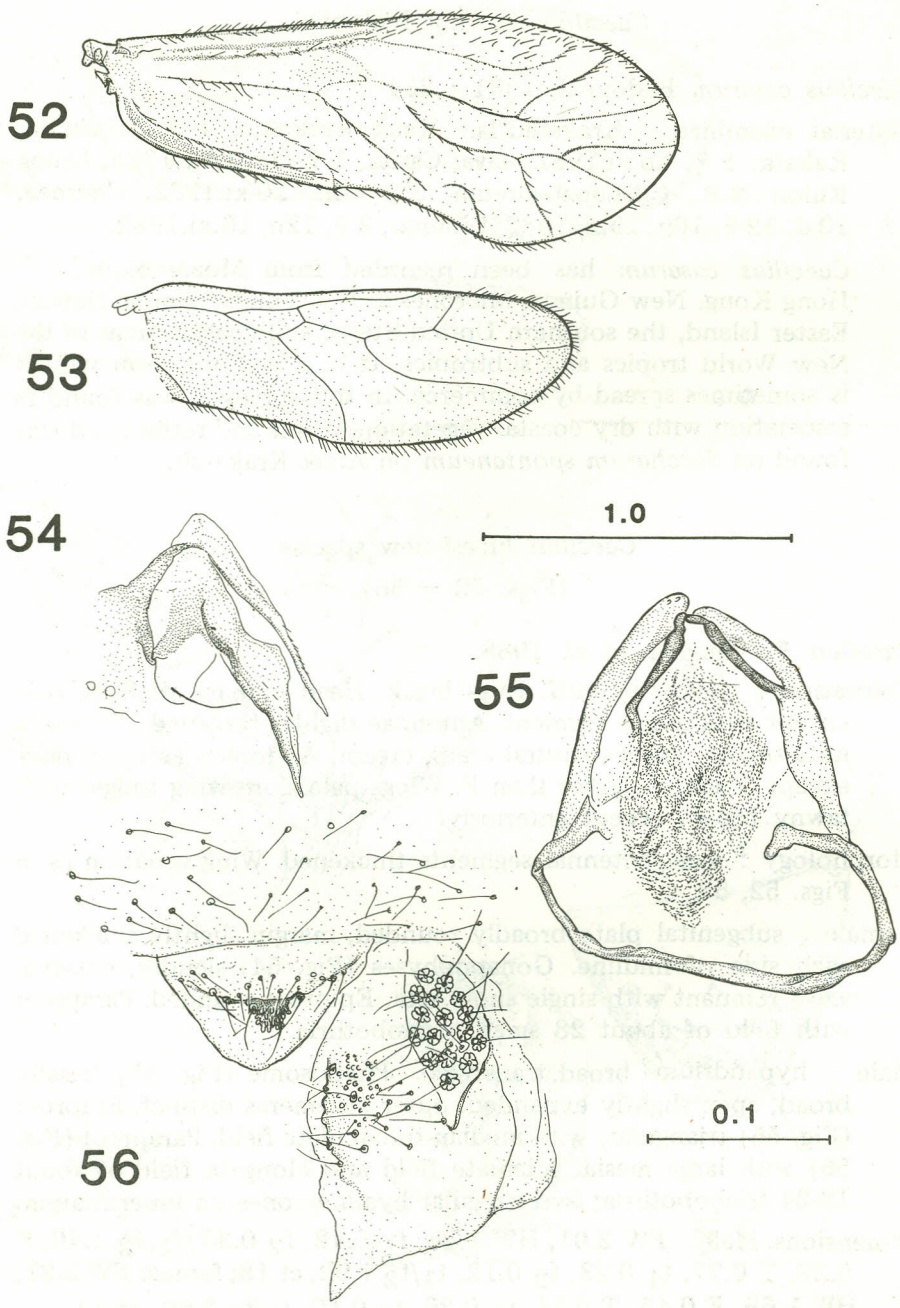
Morphology : male antennal segments thickened. Wing venation as in Figs. 52, 53.

Female : subgenital plate broadly rounded, margin slightly thickened each side of midline. Gonapophyses (Fig. 54) slender, external valve remnant with single short seta. Epiproct rounded. Paraproct with field of about 28 small trichobothria.

Male : hypandrium broad, transverse. Phallosome (Fig. 55) basally broad; apex slightly expanded; outer parameres distinct. Epiproct (Fig. 56) triangular, with median tuberculate field. Paraproct (Fig. 56) with large mesial spiculate field and elongate field of about 18-24 trichobothria; two irregular hyaline cones on inner margin.

Dimensions. Male FW 2.01, HW 1.45, f_1 0.42, f_2 0.30, f_1/f_2 1.40, F 0.39, T 0.77, t_1 0.23, t_2 0.12, t_1/t_2 1.92, ct 18; female FW 2.21, HW 1.69, F 0.45, T 0.74, t_1 0.26, t_2 0.10, t_1/t_2 2.60, ct 14.

Types : holotype, ♂, Indonesia, Krakatau Is., Sertung, *Casuarina*, 11.ix. 1984. Paratypes : Anak Krakatau, 1 ♀, 2.ix.1984; 1 ♂, 1 ♀, 15.viii.



Figures 52—56. *Caecilius hivesi* : fore wing (52), hind wing (53), gonapophyses (54), phallosome (55), male epiproct and paraproct (56). Figs. 52, 53 and 54 — 56 to common scales.

1985; 1 ♂, 21.viii.1985. The following are not paratypes but are believed to be this species. There is some variation in wing markings and body coloration, as well as in the shape of the areola postica, and it is possible that a small complex of species is present. Anak Krakatau, 30ex; Panjang 7ex; Rakata, summit, 1ex; Java, Ujung Kulon, Cidaon, 4ex; P. Peucang, 1ex; Carita, 2ex; Sumatra, Belimbing, 1 ♂, 4 ♀.

This species is very similiar in appearance to *C. caltus* Thornton 1984 (Bali, Lombok) in having the anterior of the forewing pale and a small areola postica. Males of *C. caltus* (examined) lack the tubercular field of the epiproct, and the ventral valve of the female gonapophyses is unusually short: it is of normal length in the present species.

Caecilus laleus Thornton

(Figs. 57—61)

Caecilius laleus Thornton, 1984 : 99.

Material examined. Krakatau Is.: Rakata, 1 ♂, 31.viii.1984, 1 ♀, 15.ix.1984; 1 ♂, 200m, 24.viii.1985; Sertung, 1 ♀, 27.ix.1986; Panjang, 1♂, 1♀, 3.ix.1984; 1♂, 1♀, 20.ix.1984; 1♂, 5♀, 17.viii.1985; 1♀, 25.ix.1986. Java: Carita, 300m, beating bamboo, 1♂, 26.viii.1984.

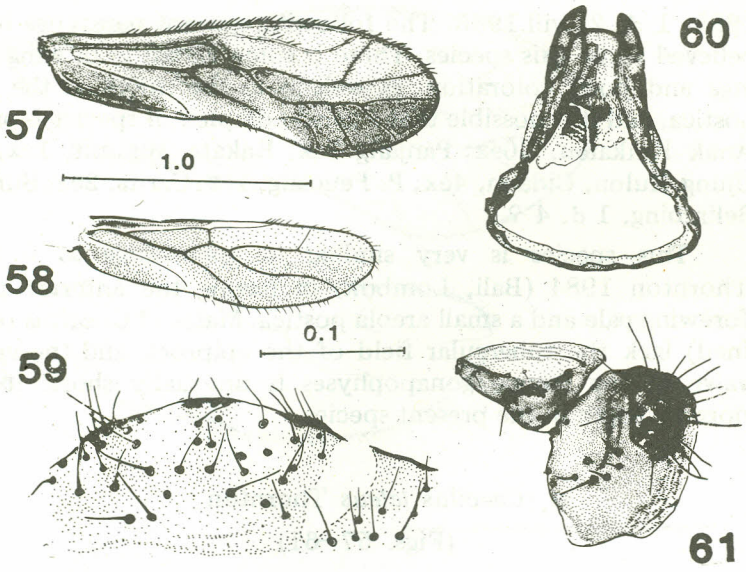
MALE

Coloration : as female but tibiae and tarsi brown and hind wing (Fig. 58) light brown. Fore wing (Fig. 57) patterned.

Morphology : hypandrium (Fig. 59) broadly rounded; phallosome as in Fig. 60, anteriorly broad, outer parameres extending beyond apex of arch; epiproct (Fig. 61) with central field of small tubercles; paraproct with field of about 20 trichobothria.

Dimensions : IO/D 1.33, B 1.5, FW 1.80, HW 1.30, f_1 0.28, f_2 0.24, f_1/f_2 1.17, F 0.31, T 0.48, ct, 19.0.

The female of this species was described from material from Lombok and Bali, and the male has not previously been described. The species now appears likely to be widespread in Indonesia.



Figures 57—61. *Caecilius laleus* Thornton : fore wing (57), hind wing (58), hypandrum (59), phallosome (60), male epiproct (61). Figs. 57, 58 and 59 — 61 to common scales.

Caecilius muggenburgi Enderlein

Caecilius muggenburgi Enderlein, 1903 : 26.

Material examined. Krakatau Is.: Rakata, 7 ♀, 4 ♂, 4n, 31.viii.1984; 1 ♂, 12.ix.1984; 2 ♀, 16.ix.1984; Sertung, 1 ♀, 1n, 11.ix.1984; Panjang, 5 ♀, 3 ♂, 20.ix.1984; 1 ♀, 16.viii.1985. Java: Ujung Kulon, NP, P. Peucang, 1 ♀, 15.ix.1984.

Recorded from Singapore, the Philippines, Taiwan, Java, Bali and Lombok, this is evidently a widespread Oriental species.

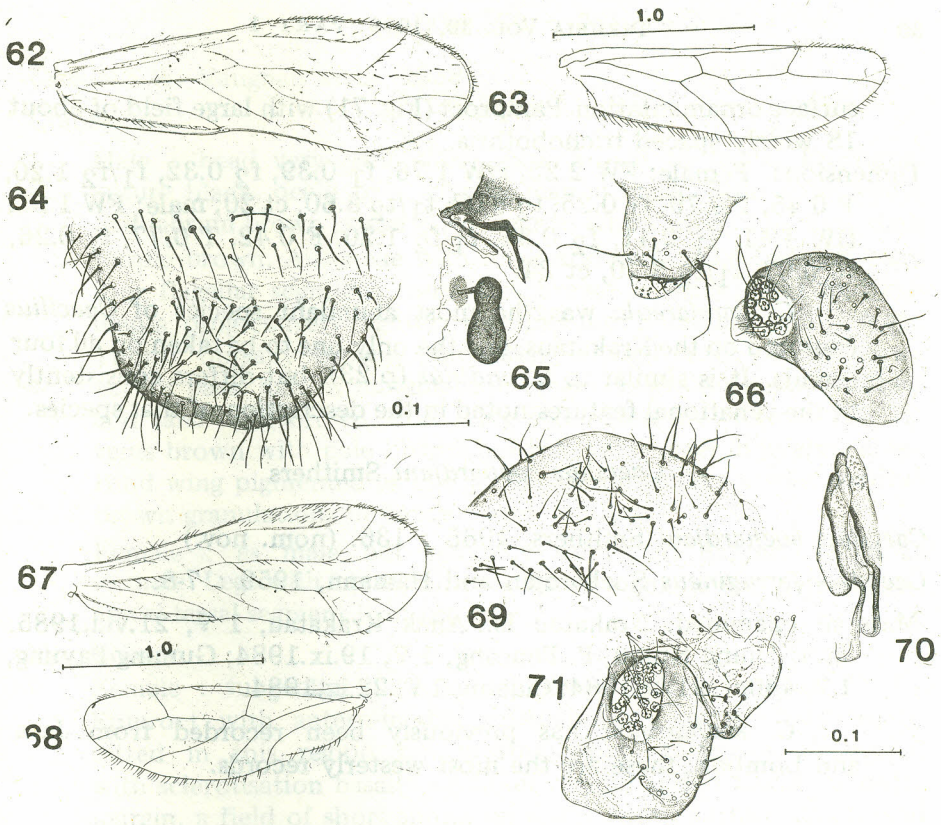
Caecilius parviareola Enderlein

(Figs. 62—71)

Caecilius parviareola Enderlein, 1926 : 59.

This species, described from Java, and recorded from Bali and Lombok by Thornton (1984), has not been fully diagnosed, and a description and figures are thus provided here.

Material examined. Indonesia, Krakatau Is.: Rakata 27ex; Anak Krakatau, 9ex; Sertung, 1ex; Panjang, 18ex. Java: Carita, 5ex; Ujung Kulon N.P., P. Peucang, 2ex; G. Payung, 1ex; nr Cibunar, 3ex.



Figures 62—71. *Caecilius parviareola* Enderlein female (62—66), male (67—71) : fore wing (62, 67), hind wing (63, 68), subgenital plate (64), gonapophyses (65), epiproct and paraproct (66, 71), hypandrum (69), phallosome (70).
Figs. 62, 63, 67, 68 and 64 — 66, 69 — 71 to common scales.

Wing venation (Figs. 62, 63, 67, 68) : stem of fore wing R_5 very long and straight, areola postica very small, venation in parts almost indistinct, pterostigma long and shallow.

Female : subgenital plate (Fig. 64) broadly rounded. Gonapophyses (Fig. 65) short, external valve remnant with single long seta. Spermatheca (Fig. 65) with shallow medial constriction, dilated apically. Epiproct (Fig. 66). Paraproct (Fig. 66) with field of about 13 trichobothria.

Male : hypandrium (Fig. 69) broad, simple. Phallosome (Fig 70) with narrow medial arch, outer parameres projecting beyond this. Epiproct (Fig. 71) with narrow rounded apex, no spicules or other

surface ornamentation. Paraproct (Fig. 71) with large field of about 18 widely spaced trichobothria.

Dimensions. Female: FW 2.25, HW 1.76, f_1 0.39, f_2 0.32, f_1/f_2 1.20, F 0.45, T 0.79, t_1 0.25, t_2 0.07, t_1/t_2 3.60, ct 20; male: FW 1.91, HW 1.41, f_1 0.41, f_2 0.34, f_1/f_2 1.20, F 0.42, T 0.77, t_1 0.26, t_2 0.07, t_1/t_2 3.70, ct 24.

C. parviareola was the most abundant species of *Caecilius* captured on the Krakataus, and the only one to be taken on all four islands. It is similar to *C. andinus* (p.23), but differs consistently in the venational features noted in the description of that species.

Caecilius soehardjani Smithers

Caecilius soehardjani Smithers, 1965 : 136. (nom. nov.)

Caecilius ferrugineus Soehardjan and Hamann, 1959 : 7-8.

Material examined. Krakatau Is.: Anak Krakatau, 1 ♀, 21.viii.1985. Java: Ujung Kulon, P. Peucang, 1 ♀, 19.ix.1984; Gunung Payung, 1 ♀, 480m, 21.ix.1984; Cidaon, 1 ♀, 22.ix.1984.

C. soehardjani has previously been recorded from Java and Lombok; these are the most westerly records.

Caecilius traceus Thornton

Caecilius traceus Thornton, 1984 : 107.

Material examined. Krakatau Is.: Rakata, Sex; Anak Krakatau, 1 ♀, 21.viii.1985; Panjang, 6ex.

This species was described from several females from Bali. It differs from *C. velectus* Thornton, described from the male, in several rather small features of wing markings, most notably in the much narrower stripe across the pterostigma. The single male in the present series (Panjang, 17.viii.1985) is badly damaged, and does not warrant formal description, but the epiproct appears to have a larger median spiculate field than that of *C. velectus.*

Caecilius veletus Thornton

Caecilius velectus Thornton, 1984 : 108.

Material examined. Panjang, 1 ♂, 15.ix.1984.

This is another member of the *'baliensis'* group of species described by Thornton (1984) from Bali. See comments under *Caecilius traceus.*

Caecilius hornei new species

(Figs. 72 — 78)

Caecilius W. Vaughan *et al.* 1988.

Coloration

Male : head very dark shiny dark brown to black. Epicranial suture black, ocelli pale, clypeal margin black. Both anteclypeus and labrum brown posteriorly, clear to white anteriorly. Eyes dark purple brown. Antennae with scape and pedicel light brown, basal four flagellar segments, very dark brown to black, next four segments progressively lighter, rest missing. Maxillary palpi cream. Thorax dorsally brown, paler along sutural areas, pleura brown except basal half of metapleuron cream. Legs cream except tibiae and tarsi light brown. Fore wing pigmented brown as in Fig. 72; veins brown with pale brown borders, veins paler in hyaline areas. Hind wing pigmented as in Fig. 73. Abdomen cream with purplish brown granulations in bands across tergites.

Female : as male but generally somewhat darker. Antennae as male. Legs with tibiae and basal tarsal segment very pale brown; apical tarsal segment light brown.

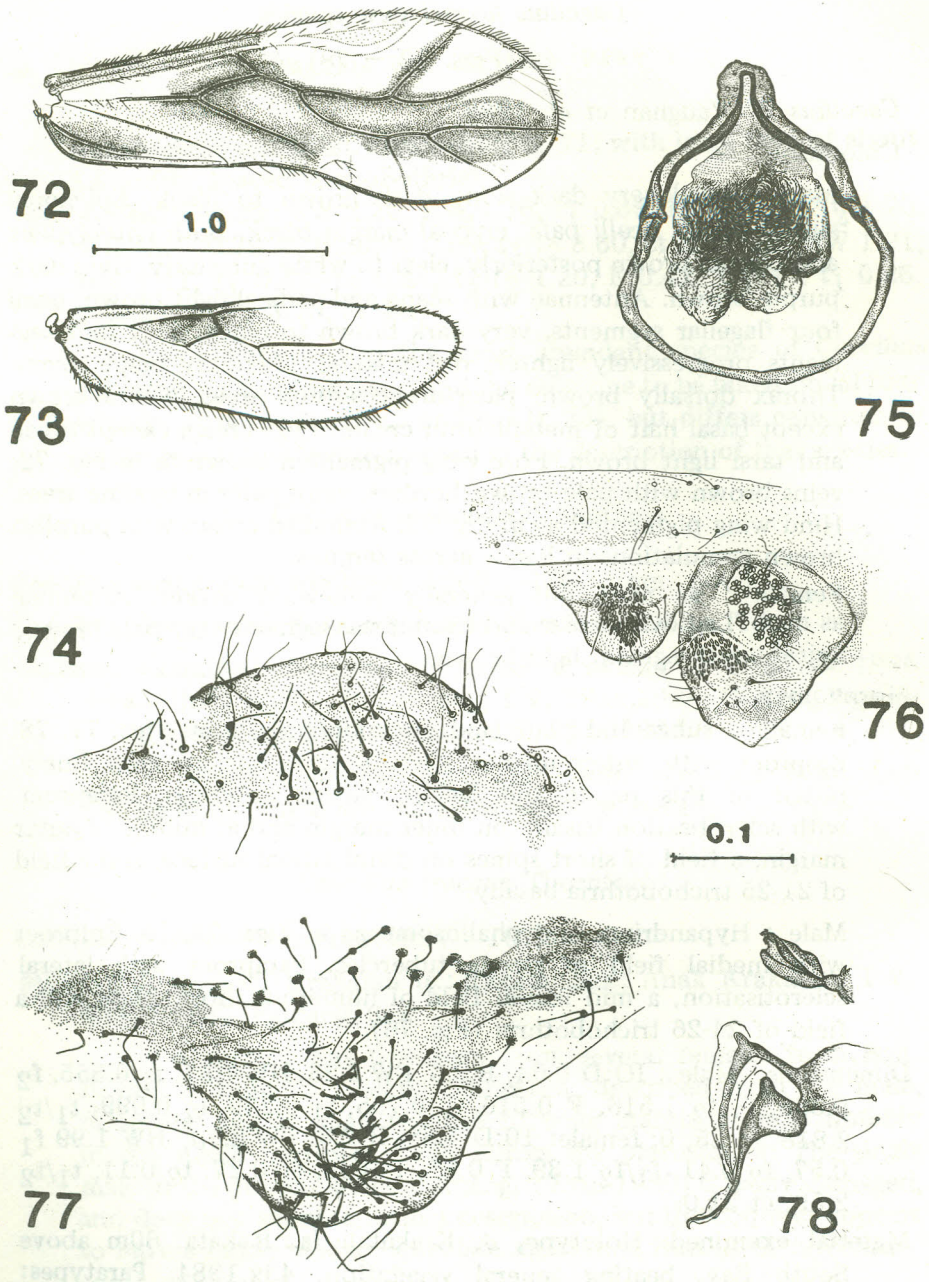
Morphology.

Female : subgenital plate and gonapophyses as in Figs. 77. 78. Epiproct with antero-medial sclerotisation, surface very finely pitted in this region but lacking strong tubercles. Paraproct with sclerotisation basally on inner margin and at middle of outer margin, a field of short spines on distal lateral surface, and a field of 21-25 trichobothria basally.

Male : Hypandrium and phallosome as in Figs. 74, 75. Epiproct with medial field of strong tubercles. Paraproct with lateral sclerotisation, a mid lateral field of numerous short spines and a field of 24-26 trichobothria (Fig. 76).

Dimensions. Male : IO:D 0.64, B 2.0, FW 2.28, HW 1.81, f_1 0.555, f_2 0.366, f_1/f_2 1.516, F 0.516, T 0.795, t_1 0.279, t_2 0.099, t_1/t_2 2.818, ct 25, 0; female: 10:D 1.85, B 2.3, FW 2.70, HW 1.99 f_1 0.57, f_2 0.41, f_1/f_2 1.39, F 0.57, T 0.89, t_1 0.27, t_2 0.11, t_1/t_2 2.59, ct 21.0.

Material examined. Holotype, ♂, Krakatau Is.: Rakata, 60m above South Bay, beating general vegetation, 4.ix.1984. Paratypes: 1 ♀, same data as holotype; Rakata, South Face, 2 ♀, 5.ix.1984; 1 ♀, 3 ♂, 24.viii.1985; 5 ♀, 2 ♂, 25.viii.1985.



Figures 72—78. *Caecilius hornei* : fore wing (72), hind wing (73), subgenital plate (77), gonapophyses (78), hypandrium (74), phallosome (75), male paraproct (76).
Figs. 72, 73 and 74—78 to common scales.

C. hornei is similar in body colour and fore wing pattern to *C. confusus* Banks (1937) from Taiwan, but is smaller and there is more extensive pigmentation at the apex of cell R_5 and less pigment posteriorly in cells M_1 and M_2. The male epiproct has a distinctive medial field of tubercles, somewhat like that of *C. laleus*. This species occured up to 600m on the southern slope of Rakata but was found nowhere else.

Caecilius bushi new species

(Figs. 79 — 88)

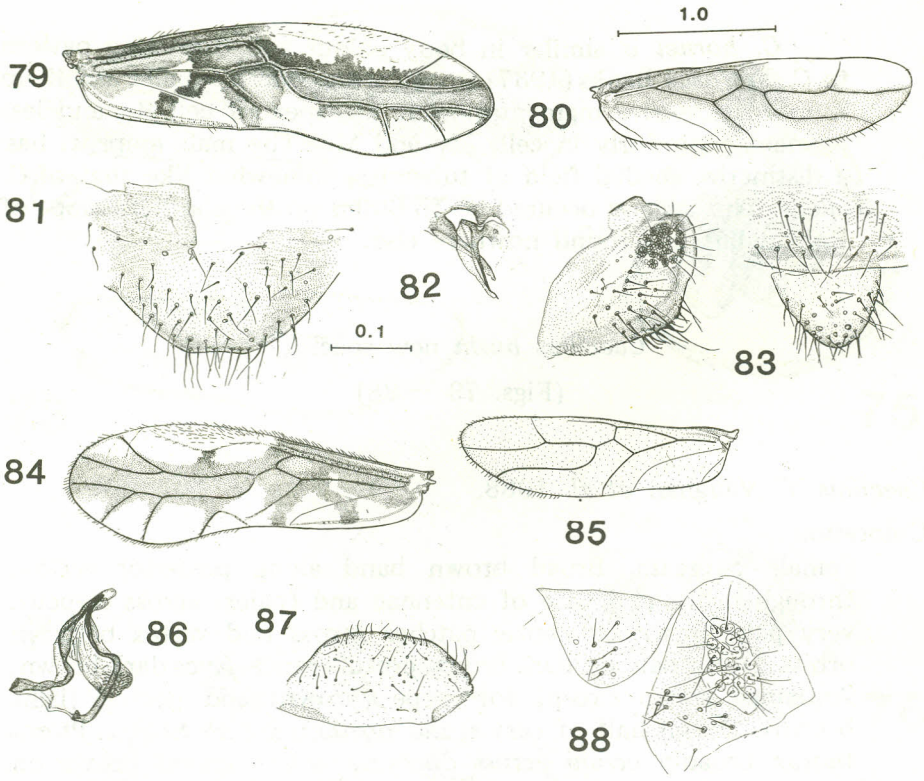
Caecilius Y, Vaughan *et al.* 1988.

Coloration

Female : cream. Broad brown band along posterior vertex, through orbits and base of antennae and (paler) across clypeus; very pale brown crescentic patches across mid vertex between orbits. Ocelli pale on dark brown protuberance. Eyes dark brown. Antennae cream except for scape (brown) and pedicel (light brown). Dorsal half of cervix and prothorax dark brown. Pterothorax broadly cream across dorsum, dark chestnut brown on anterior and lateral sloping surfaces of mesonota and paler brown on lateral slope of metanota; a thin brown mid dorsal line; pleura chestnut brown with dark brown sutures along dorsal half, cream below. Legs and abdomen cream. Fore wing pigmented brown as in Figs. 79, 84, veins brown with paler borders in pigmented areas and hyaline where pigment absent. Hind wing with very pale pigmentation as in Figs. 80, 85.

Male : generally paler than in female. Head pattern : band through orbits and antennal bases not discrete dorsally but merging into the wholly brown vertex and paler brown frons coloration, and barely discernible on clypeus. Epicranial suture dark brown.

Morphology. Female : subgenital plate (Fig. 81). Gonapophyses as in Fig. 82. Epiproct and paraproct as in Fig. 83; paraproct with field of 25 trichobothria; male : Phallosome as in Fig. 86. Hypandrium (Fig. 87) simple, rounded. Epiproct and paraproct as in Fig. 88; paraproct with about 20 trichobothria.



Figures 79—88. *Caecilius bushi* female (79—83), male (84—88) : fore wing (79, 84), hind wing (80, 85), subgenital plate (81), gonapophyses (82), epiproct and paraproct (83, 88), phallosome (86), hypandrium (87).
Figs. 79, 80, 84, 85 and 81 — 83, 86 — 88 to common scales.

Dimensions. Female : IO:D 1.55, B 2.3, FW 2.65, HW 2.00, f_1 0.62, f_2 0.44, f_1/f_2 1.40, F 0.50, T 0.94, t_1 0.320, t_2 0.080, t_1/t_2 4.00, ct 22; male : IO:D 0.42, B 1.65, FW 2.36, HW 1.75, f_1 0.6, f_2 0.38, f_1/f_2 1.579; F 0.525, T 0.945, t_1 0.330, t_2 0.094, t_1/t_2 3.51, ct 22.

Material examined. Holotype, ♀, Krakatau Is.: Panjang, beating vegetation, 16.viii.1985; paratype: ♂, Panjang, beating vegetation, 100-200ft, 15.ix.1984.

The very distinct head banding of this species differentiates it from all described Indonesian taxa. The pale pterostigma is also unusual, and further separates this species from others with a heavily patterned fore wing, such as *C. traceus*, *C. velectus*, *C. albipes* Thornton and others.

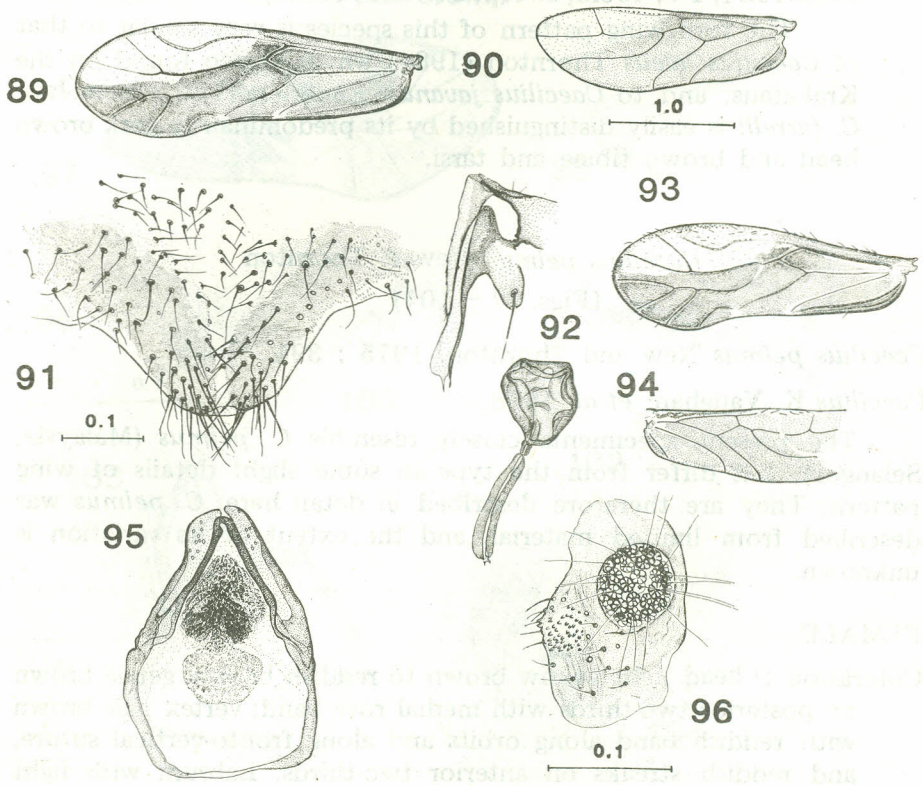
Caecilius farrelli new species

(Figs. 89 — 96)

Caecilius 40 Vaughan *et al.* 1988.

Coloration

Female : vertex, frons, clypeus and genae dark brown; anteclypeus pale; labrum dark brown on basal two-thirds, cream distally. Eyes dark chocolate brown. Antennae light brown. Maxillary palpi with basal segment cream. Thorax dorsally and laterally dark brown. Thoracic sterna, coxae, trochanters and femora pale brown. Tibiae and tarsi brown. Abdomen damaged, coloration lost except for genitalia brown. Fore wing with brown pattern (Fig. 89). Hind wing (Fig. 90).



Figures 89—96. *Caecilius farrelli* female (89—92), male (93—96) : fore wing (89, 93), hind wing (90, 94), subgenital plate (91), gonapophyses and spermatheca (92), phallosome (95), paraproct (96). Figs. 89, 90, 93, 94 and 92, 95, 96 to common scales.

Male (damaged specimen) : as female, terminal segments of maxillary palp brown. Fore wing (Fig. 93), hind wing (Fig. 94).

Morphology : female subgenital plate (Fig. 91) broad. Gonapophyses and spermatheca as in Fig. 92. Epiproct broad, trapezoidal. Paraproct with field of about 18 trichobothria; male : hypandrium transverse. Phallosome as in Fig. 95. Paraproct (Fig. 96) with medial tuberculate field; a large round field of about 28 trichobothria.

Dimensions Female : IO:D 2.0, B 2.2, FW 2.5, HW 1.97, f_1 0.64, F 0.57, T 0.09, t_1 0.38, t_2 0.10, t_1/t_2 3.8, ct 27; male : IO : D 0.66, B 1.7, FW 2.2, F 0.46, T 0.62, t_1 0.09, t_1/t_2 2.2, ct 11.

Material examined. Holotype, ♀, Krakatau Is.: Rakata, Summit, litter, 19.ix.1984; paratypes, Rakata, 1 ♂, Zwarte Hoek, Malaise trap, 11.ix.1984; 1 ♀, 400m, sweep, 24.viii.1985.

The fore wing pattern of this species is very similar to that of *Caecilius laleus* Thornton (1984) which is also found on the Krakataus, and to *Caecilius javanus* Enderlein (1907) from Java. *C. farrelli* is easily distinguished by its predominantly dark brown head and brown tibiae and tarsi.

Caecilius pelmus New & Thornton
(Figs. 97 — 104)

Caecilius pelmus New and Thornton, 1975 : 391.

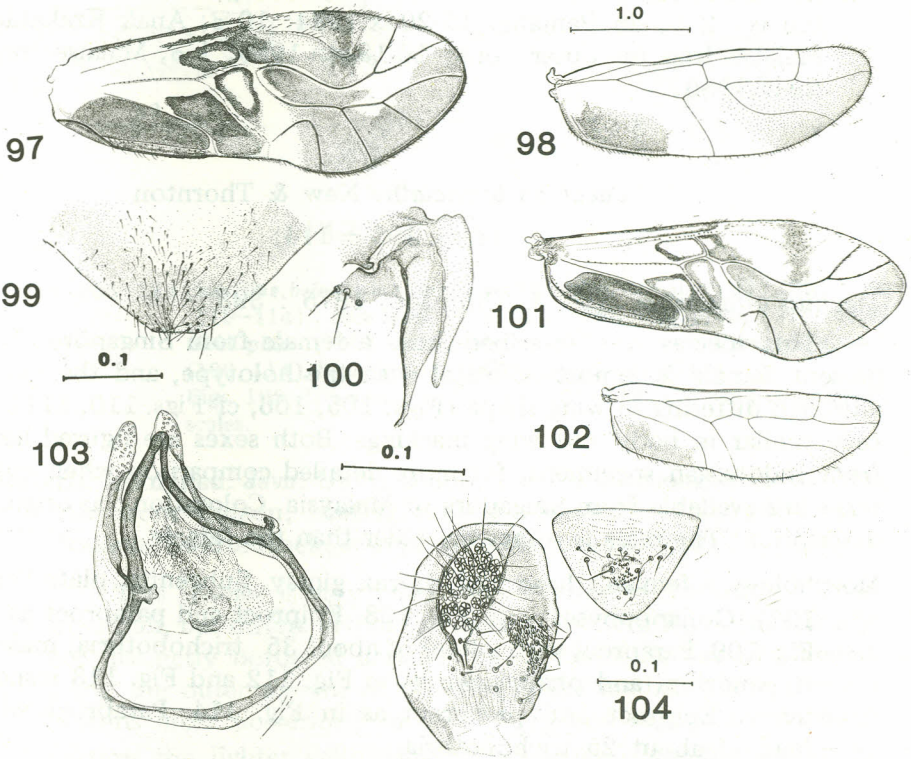
Caecilius K, Vaughan *et al.* 1988.

The present specimens closely resemble *C. pelmus* (Malaysia, Selangor), but differ from the type in some slight details of wing pattern. They are therefore described in detail here. *C. pelmus* was described from limited material, and the extent of its variation is unknown.

FEMALE

Coloration : head light yellow brown to reddish brown, genae brown on posterior two-thirds with medial rose band; vertex pale brown with reddish band along orbits and along fronto-vertical suture, and reddish streaks on anterior two-thirds. Labrum with light brown longitudinal band either side of midline; anteclypeus pale; clypeus light brown proximally, light yellow brown on distal third, striae indistinct; frons light brown; ocelli pale on black protuberance; a thick black curved line each side of frons from mid ocellus

to frontoclypeal suture and above antennal socket. Eyes dark brown to black. Antennae pale, dark brown tips to flagellar segment beyond f_1. Mesothorax brown, sutures pale, very indistinct pale medial line on antedorsum. Metathorax brown, anterior lobe and scutellum plae. Thoracic pleura brown, dark brown sutures. Legs cream, except coxae pale brown. T and t_1 light brown, t_2 brown on distal two-thirds. Fore wing (Fig. 97) strongly patterned, cell Cu_2 thickened dark shiny brown to black; cell Cu_1 and base of veins M_3 and R less heavily thickened; brown band round margin from vein R_{4+5} to apical third of areola postica and to the basal half of cell R_5 and anteriorly through spur vein of pterostigma to anterior margin. Veins hyaline basally, light brown apically. Hind wing (Fig. 98) pale brown on apical half, darker brown in cell Cu_2, otherwise hyaline. Abdomen granulate cream dorsally, rose to pale brown vertically, last three tergites cream medially. Genitalia pale brown.



Figures 97—104. *Caecilius pelmus* New and Thornton female (97—100), male (101—104) : fore wing (97, 101), hind wing (98, 102), subgenital plate (99), gonapophyses (100), phallosome (103), epiproct and paraproct (104).
Figs. 97, 98, 101, 102, and 103, 104 to common scales.

Morphology : pterostigma strongly broadened apically with narrowly rounded posterior margin. Subgenital plate (Fig. 99) with narrowly rounded posterior margin, strong medial ciliation, fine setae laterally, and broad lateral sclerotisation. Gonapophyses as in Fig. 100. Epiproct semicircular, setose, with two strong setae posterioly. Paraproct with field of 25-27 trichobothria, small narrow spines along outer ventral margin, setose medially, one strong setae on outer mesial margin.

Male : fore wing as Fig. 101. Hind wing as Fig. 102. Hypandrium broadly rounded. Phallosome as in Fig. 103. Epiproct (Fig. 104) with medium tuberculate field. Paraproct (Fig. 104) with field of about 28 trichobothria and mesial tuberculate field.

Dimensions : IO:D 1.08, B 2.7, FW 3.53, HW 2.67, f_1 1.0, f_2 0.75, f_1/f_2 1.33, F 0.9, T 1.46, t_1 0.486, t_2 0.126, t_1/t_2 3.860, ct 29.

Material examined. Java: 1 ♀, Carita, 150m, beating, 23.v.1984. Krakatau Is.: 2 ♀, 2n Panjang, 15-20.ix.1984: 10 ♂; Anak Krakatau, Malaise trap on outer cone, 16-18-viii.1985; 1 ♂, Malaise trap, 29.ix.1986.

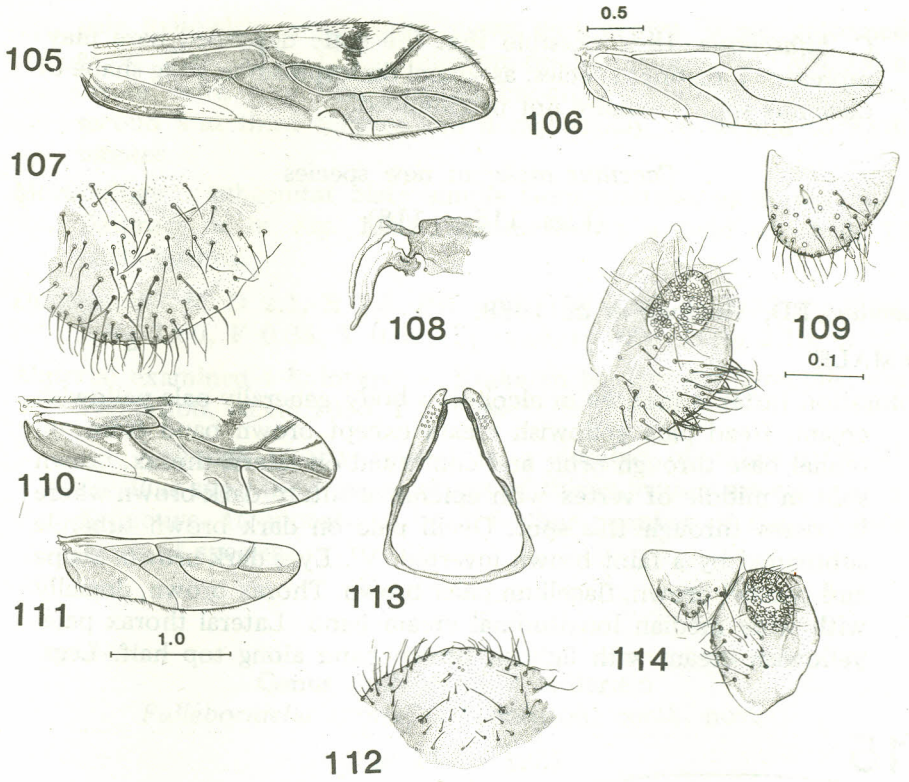
Caecilius bifasciatus New & Thornton
(Figs. 105 — 114)

Caecilius bifasciatus New & Thornton, 1975 : 393.

This species was described from a female from Singapore. The present female is almost identical with the holotype, and the male, although differing in wing shape (Figs. 105, 106, cf Figs. 110, 111), is very similar in body and wing markings. Both sexes are figured here from Indonesian specimens, for more detailed comparison when both sexes are available from Singapore or Malaysia. Coloration : as original description. The male is somewhat paler than the female.

Morphology : female : head and thorax glossy. Subgenital plate (Fig. 107). Gonapophyses as in Fig. 108. Epiproct and paraproct as in Fig. 109. Paraproct with a field of about 35 trichobothria; male : Hypandrium and phallosome as in Fig. 112 and Fig. 113 respectively. Epiproct and paraproct as in Fig. 114. Paraproct with field of about 25 trichobothria.

Dimension. Female : IO:D 1.8, B 3.25, FW 3.36, HW 2.46, F 0.69, T 1.12, t_1 0.37, ct 23, f_1 0.98, rest missing; male : IO:D 1.55, B 1.85, FW 2.6, HW 2.0, F 0.60, T. 0.92, f_1 0.54, rest missing.



Figures 105—114. *Caecilius bifasciatus* New and Thornton female (105—109), male (110—114) : fore wing (105, 110), hind wing (106, 111), subgenital plate (107), gonapophyses (108), epiproct and paraproct (109, 114), hypandrium (112), phallosome (113).
Figs. 105, 106 and 110, 111 and 107—109, 112—114 to common scales.

Material examined. Java: Ujung Kulon, 1 ♀, 3½ km along track to Cibunar from Cidaon, beating general vegetation, 15.ix.1984, 1 ♂, Rakata, Zwarte Hoek, sweeping vegetation, 16.ix.1984.

This species is very close to *C. albonigrus* Thornton (1984) from Bali, but differs in that the apex of the vein R_{4+5} is narrowly but distinctly bordered dark brown; it lacks the line of pigment along the outer margin of cell R_{2+3}; the median pigment band extends more posteriorly in cells M_{2+3} and M_{4+5}; and in head pattern the lighter yellowish patches extend laterally on to the anterior region of the genae. The species is also very close to *C. bataviensis* Enderlein (1926) in fore wing pattern but Enderlein makes no mention of the head pattern, which is so distinctive in

C. bifasciatus. It is possible that the male described here may represent a distinct species, as sexual dimorphism in wing shape of *Caecilius* spp. is usually not pronounced.

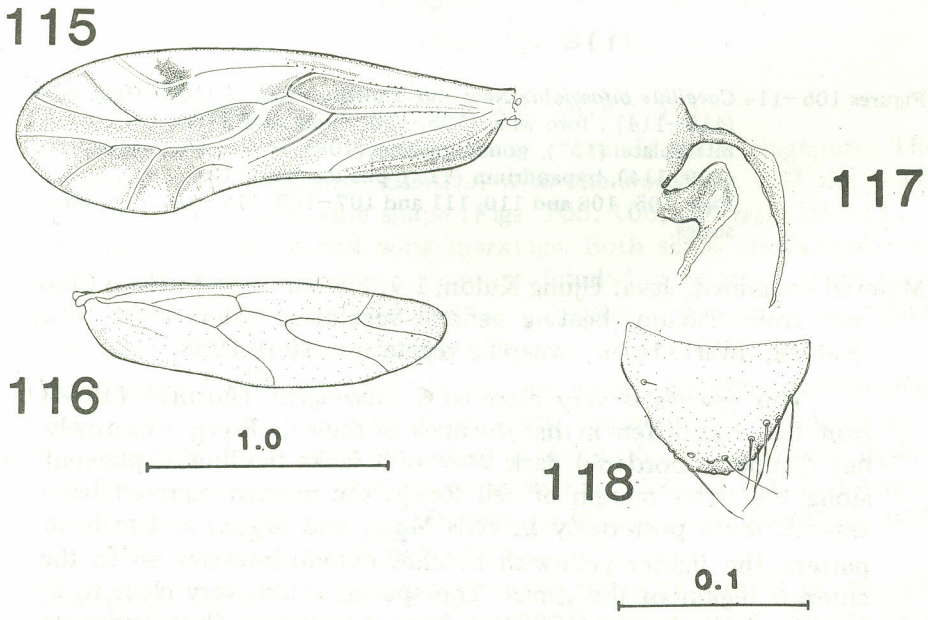
Caecilius mclareni new species

(Figs. 115 — 118)

Caecilius ED, Vaughan *et al.* 1988.

FEMALE

Coloration (after 4 months in alcohol) : body generally pale yellowish cream. Head pale yellowish cream except brown band from antennal base through orbit and continued on lateral thorax, brown spot in middle of vertex with epicranial suture dark brown where it passes through this spot. Ocelli pale on dark brown tubercle subtended by a faint brown inverted 'V'. Eyes dark brown. Scape and pedicel brown, flagellum paler brown. Thorax brown, dorsally with wide median longitudinal cream band. Lateral thorax pale yellowish cream with lightish brown band along top half. Legs



Figures 115—118. *Caecilius mclareni* : fore wing (115), hind wing (116), subgenital plate and gonapophyses (117), epiproct (118).
Figs. 115, 116 and 117, 118 to common scales.

pale yellowish cream; tarsal claws dark brown. Wings patterned as in Figs. 115, 116. Abdomen predominantly pale yellowish cream, with very fine purplish brown granulations dorsally on second and third tergites and dorsolaterally on second to sixth tergites.

Morphology : subgenital plate simple Gonapophyses as in Fig. 117. Epiproct as in Fig. 118. Paraproct with a field of about 18 trichobothria.

Dimensions: IO:D 2.1, B 1.5, FW 1.95, HW 1.49, f_1 0.32, f_2 0.20, f_1/f_2 1.60, F 0.38, T 0.68, T_1 0.25, t_2 0.08, t_1/t_2 3.13, ct 19.

Material examined : holotype, ♀, Krakatau Is., Panjang, sweeping low vegetation, 16.viii.1985, T.R. New.

Although clearly related to a number of other Oriental *Caecilius* spp., the wing markings of this individual are apparently distinctive. It appears to be a further member of the *baliensis* group of species.

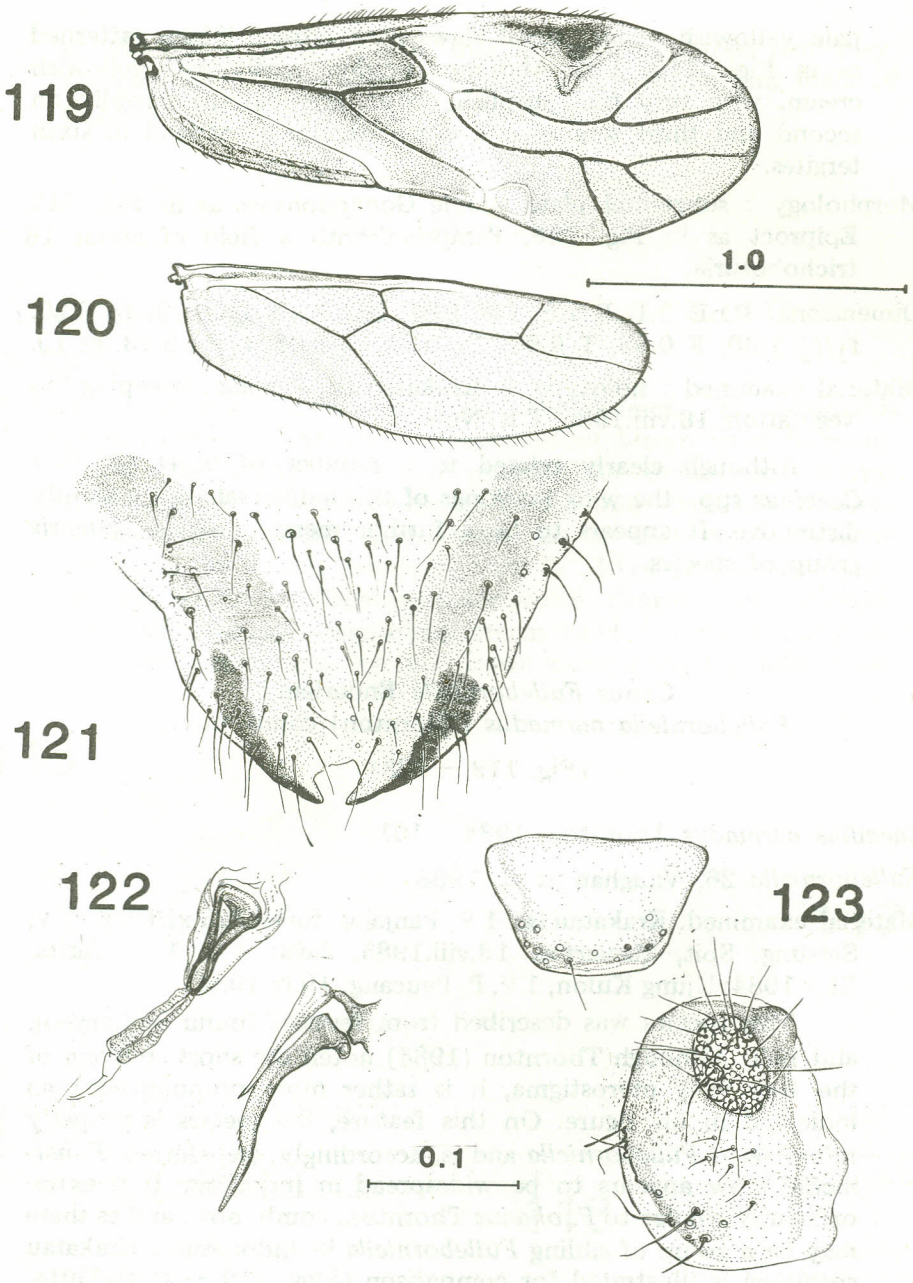
Genus *Fulleborniella* Enderlein
Fulleborniella narmadus (Thornton) comb. nov.,
(Fig. 119 — 123)

Caecilius narmadus Thornton, 1984 : 101.

Fulleborniella 26, Vaughan *et al.* 1988.

Material examined. Krakatau Is.: 1 ♀, Panjang, forest, 25.xi.1986; 1 ♀, Sertung, Spit, *Casuarina*, 18.viii.1985. Java: 4 ♂, 1 ♀, Carita, 21.v.1984; Ujung Kulon, 1 ♀, P. Peucang, 19.ix.1984.

This species was described from females found in Lombok and Bali. Although Thornton (1984) noted the short spurvein of the fore wing pterostigma, it is rather more pronounced than indicated in his figure. On this feature, the species is properly referable to *Fulleborniella* and is, accordingly, transferred. *F. narmadus* now appears to be widespread in Indonesia. It is extraordinarily similar to *F. okanus* Thornton, comb. nov., and as there may be a group of sibling *Fulleborniella* in Indonesia, a Krakatau specimen is illustrated for comparison (Figs. 119 — 123). Differences between *narmadus* and *okanus* are mainly in body coloration, which is individually somewhat variable. The Krakatau specimens have the head rather darker than as described for either of



Figures 119—123. *Fulleborniella narmadus* (Thornton) : fore wing (119), hind wing (120), subgenital plate (121), gonapophyses and spermatheca (122), female epiproct and paraproct (123).
Figs. 119, 120 and 121 — 123 to common scales.

the above species, and 5-7 narrow but distinct postclypeal striae each side of the midline. Traces of these are present in the types of both the other species but, from the available material, *okanus* is consistently larger than *narmadus*. The Krakatau specimens are somewhat smaller than the *narmadus* types, and the areola postica also differs slightly.

Genus *Paracaecilius* Badonnel
Paracaecilius hallae new species
(Figs. 124 — 129)

Paracaecilius 22D, Vaughan *et al.* 1988.

Coloration : pale yellowish buff. Eyes pinkish brown. Dorsal half of head brown; postclypeus, anteclypeus, labrum pale. Palpi and antennae pale. Body and legs pale, unmarked. Wings slightly tawny; fore wing pterostigma and basal anterior region pale. Wing venation as in Figs. 124, 125 : fore wing pterostigma long, areola postica very small.

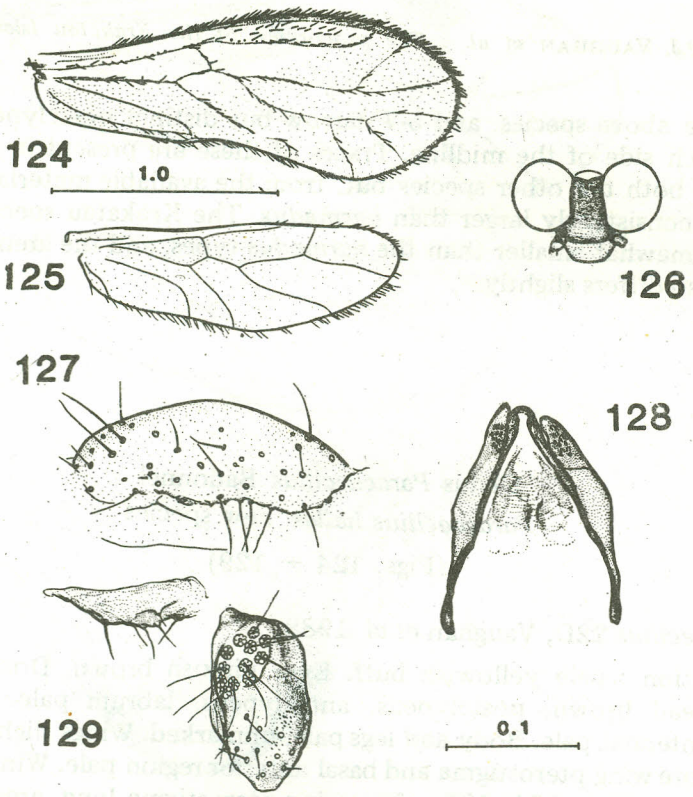
Female : unknown.

Male : eyes extremely large (Fig. 126). Hypandrium (Fig. 127) broadly rounded. Phallosome (Fig. 128) apex broadly arched, outer parameres prominent. Epiproct shallow, rounded. Paraproct (Fig. 129) with field of 12 widely spaced trichobothria.

Dimensions : FW 1.95, HW 1.49, f_1 0.39, f_2 0.37, f_1/f_2 1.05, F 0.39, T 0.68, t_1 0.24, t_2 0.06, ct 24.0.

Type : holotype, ♂, Indonesia, Krakatau Is., Rakata, Zwarte Hoek, on forest edge, 1.viii.1983, E. Hall.

This distinctive male is very similar to that of the Madagascan *P. megops* Badonnel (1967) in having the eyes enormously enlarged. The wings of *P. megops* are wholly pale. This small genus has not hitherto been reported from Indonesia. It is predominantly African, but one species from Australia is known (Smithers 1977).



Figures 124—129. *Paracaecilius hallae* : fore wing (124), hind wing (125), male head (126), hypandrium (127), phallosome (128), male paraproct (129).
Figs. 124, 125 and 127 — 129 to common scales.

FAMILY STENOPSOCIDAE

Genus *Stenopsocus* Hagen

Stenopsocus adisoemartoi new species

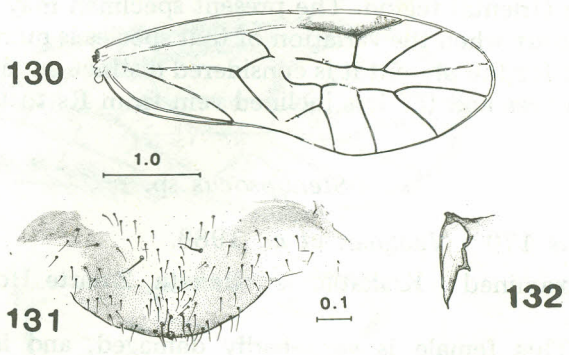
(Figs. 130 — 132)

Stenopsocus A, Vaughan *et al.* 1988.

FEMALE

Coloration : head very light brown with broad dark brown band between orbits through ocelli; vertex pattern light brown. Clypeus pale brown anteriorly, faint white striae. Labrum brown on anterior half. Maxillary palpi light brown, apical segment brown on

distal half. Eyes black. Antennae with pale scape and pedicel; basal flagellar segment pale, darkening to brown apically; second segment brown, darker brown apically; remaining segments dark brown, white at joints, lighter towards apex of flagellum. Thorax dorsally with dark brown nota, margins broadly light brown to cream; mesopleura brown, pro- and meta- pleura white. Coxa, trochanter and femur pale brown, tibia and basal tarsal segment light brown, apical tarsal segment brown. Fore wing (Fig. 130) hyaline; brown band along posterior margin of pterostigma; veins hyaline at Rs-M fork and base of areola postica. Abdomen cream.



Figures 130—132. *Stenopsocus adisoemartoi* : fore wing (130), subgenital plate (131), gonapophyses (132).
Figs. 131, 132 to common scales.

Morphology : fore wing (Fig. 130) with vein Cu_2 bare. Pearman's organ present. Subgenital plate and gonapophyses as in Figs. 131, 132, respectively. Paraproct with field of 25 trichobothria and 2 setae without basal rosettes.

Dimensions : IO:D 2, B 3.0, FW 4.26, HW 2.88, f_1 0.615, f_2 0.546, f_1/f_2 1.126, F 0.9, T 1.455, t_1 0.396, t_2 0.129, t_1/t_2 3.069, ct 24.

Material examined. Holotype, ♀, Java, Bogor, Kebun Raya, beating, 16.iv.1984, P.J. Vaughan; paratypes: Krakatau Is., Rakata, 1 ♀, 25.viii.1985, Panjang, 1 ♀, 17.viii.1985.

Several Oriental species of *Stenopsocus* have a pronounced dark posterior border to the pterostigma. The present individual is rather similar to S. *jocosus* Banks (1939) (Philippines), which also has a dark facial band and pale antennae. The Japanese species described by Enderlein (1906) apparently have the pterostigma shallower and not angled, and the crossvein to the Rs stem meets it at right angles in both *S. aphidiformis* and *S. pygmaeus*. A Malaysian specimen was tentatively referred to *S. jocosus* by New & Thornton (1975), and *rubellus* Thornton (1984) (Bali) has an additional patch of pigment at the separation of fore wing Rs from R_1. There is undoubtedly a complex of marked-wing *Stenopsocus* in the Oriental region. The present specimen may be referable to *S. jocosus* when the variation of that species is more clearly understood: for the present it is considered distinct on minor venational differences and the less inclined vein from Rs to the pterostigma.

Stenopsocus sp.

Stenopsocus 170 : Vaughan *et al.* 1988.

Material examined : Krakatau Is.: Rakata, Zwarte Hoek, 1 ♀, 15.ix. 1984.

This female is very badly damaged, and is therefore not named. The fore wing appears to be wholly pale, and the subgenital plate not as broadly rounded as in *S. adisoemartoi*. It clearly represents a second species of *Stenopsocus* on the Krakataus, and appears to be rather scarce.

Genus *Taeniostigma* Enderlein

Taeniostigma ? elongatum (Hagen)

Psocus elongatus Hagen, 1858: 474; 1859 : 200.

Psocus clarus McLachlan, 1872 : 75.

Taeniostigma elongatum (Hagen) Enderlein, 1901 : 546.

Taeniostigma clarum (McLachlan) Enderlein, 1901 : 546.

Material examined : Krakatau Is.: Sertung Forest, 19.viii.1985, 1 ♀; Rakata, 5n.

Recognition of this species is discussed by Thornton (1984). It is widespread in the Oriental region and, in Indonesia, is known from Java and Bali. Although specific identification of the Rakata nymphs cannot be taken as absolute, the nymphs

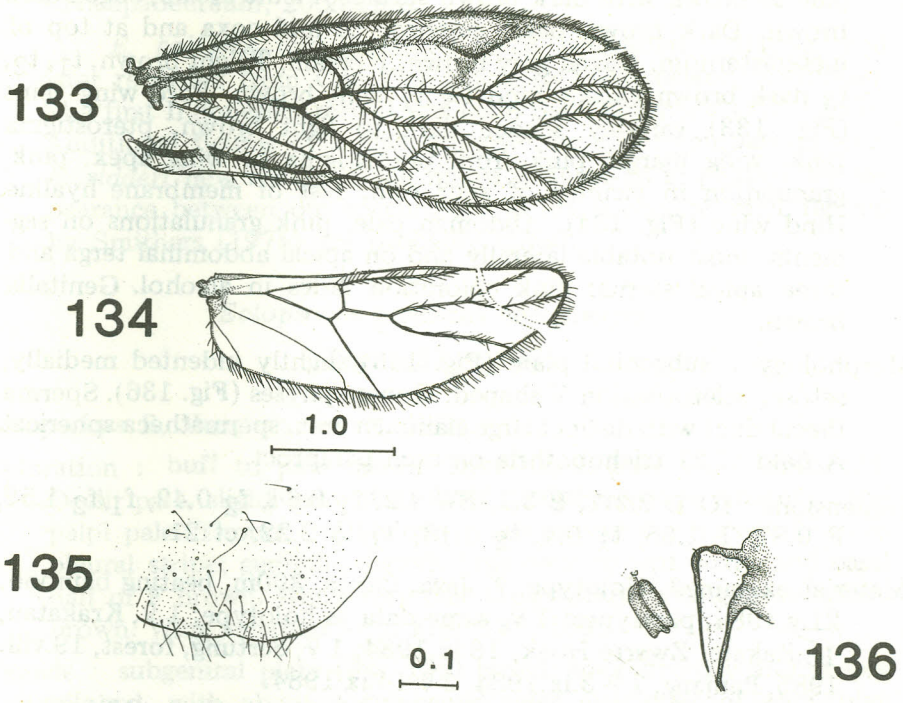
closely resemble those associated with adults of *T. elongatum* elsewhere, and are recorded here to indicate the presence of this genus of Stenopsocidae on two islands of the Krakatau group.

FAMILY AMPHIPSOCIDAE

Genus *Amphipsocus* McLachlan

Amphipsocus javensis new species

(Figs. 133 — 136)



Figures 133—136. *Amphipsocus javensis* : fore wing (133), hind wing (134), subgenital plate (135), gonapophyses (136).
Figs. 133, 134 and 135, 136 to common scales.

Amphipsocus A, Vaughan *et al.* 1988.

FEMALE

Coloration : head, thorax and legs pale pink (most noticeable in fresh specimens). Vertex cream, with pattern of brown patches near each eye, along occiput and each side of dark brown epicranial

suture on black protuberance; frons buff to cream with median brown triangular mark; ocelli pale. Clypeus buff with dark brown striae, suffused pink, anterior margin pale. Anteclypeus pale pink to white. Labrum dark brown, buff along anterior border, with median dark pink patch basally. Maxillary palpi with basal two segments cream, third light brown with cream tip, fourth brown, darkening to apex; all suffused pink. Genae cream, brown streak near base of eye. Eye dark brown to black. Antennae with scape and pedicel grey brown, basal flagellar segment light brown, darker distally, remaining segments dark brown with cream tips. Thorax dorsally dark brown to black, sutural areas cream, scutella pale to brown with dark brown sutures. Pleura cream, edged dark brown. Dark brown patch anterior to mid coxa and at top of metepisternum. Coxae grey brown, F cream, T light brown, t_1, t_2, t_3 dark brown except hind leg t_1 light brown. Fore wing veins (Fig. 133) variably shaded dark to light brown, pterostigma pink, wing margin pink from pterostigma to wing apex, pink granulation in vicinity of spur vein, rest of membrane hyaline. Hind wing (Fig. 134). Abdomen pale, pink granulations on segments, most notable laterally and on apical abdominal terga and three apical sterna; pink coloration fades in alcohol. Genitalia brown.

Morphology : subgenital plate (Fig. 135) slightly indented medially, setose, sclerotisation V-shaped. Gonapophyses (Fig. 136). Spermathecal duct with distinct large glandular area, spermatheca spherical. A field of 21 trichobothria on each paraproct.

Dimensions : IO:D 2.2:1, B 3.1, FW 4.2, f_1 0.64, f_2 0.42, f_1/f_2 1.52, F 0.87, T 1.55, t_1 0.4, t_2 0.18, t_1/t_2 2.22, ct 21.

Material examined. Holotype, ♀, Java, Carita, 300m, beating bamboo, 21.v.1984; paratypes: 1 ♀, same data as holotype; 1 ♀, Krakatau, Is.: Rakata, Zwarte Hoek, 16.ix.1984; 1 ♀, Sertung, forest, 19.viii. 1985; Panjang, 1 ♀ 3.ix.1984. 2 ♀ 14.ix.1984.

This species is close to *Amphipsocus pilosus* McLachlan (1872), differing in the absence of a black spot in the pterostigma and having brown coloration on the tarsi and antennae. It differs from the two other species recorded from Indonesia, *A. heterothrix* Thornton and Wong (1966) and *A. minor* Thornton (1984) in head pattern and coloration.

FAMILY ECTOPSOCIDAE

Genus *Ectopsocus* McLachlan

Ectopsocus baliosus Thornton and Wong

Ectopsocus baliosus Thornton and Wong 1968 : 47; Smithers, 1975 : 243.

Material examined. Krakatau Is.: Rakata, 3ex, 28.ix.1982, 28-29.ix. 1983; Anak Krakatau, 5ex, 27.ix.1982. 16-18.viii.1985, 23.ix. 86, 29.ix.1986; Panjang, 1 ♀, 20.ix.1984. Java: Carita, 1 ♂, 26.viii.1984; Ujung Kulon, P. Peucang, 1 ♀, 9-26.xi.1982; 2 ♀, Cikalapabeureum, 20.xi.1982.

E. baliosus was described from peninsular Malaysia, and later recorded from One Tree Island (off Queensland, Australia). The first Indonesian record was from Bali (Thornton 1984 : 167). Additional figures of a male are given here, for comparison with *E. ridderi* new species : the minor differences in phallosome appearance between our specimens and the Australian male figured by Smithers (1975) are probably trivial.

Ectopsocus predanus new species

(Figs. 137 — 143)

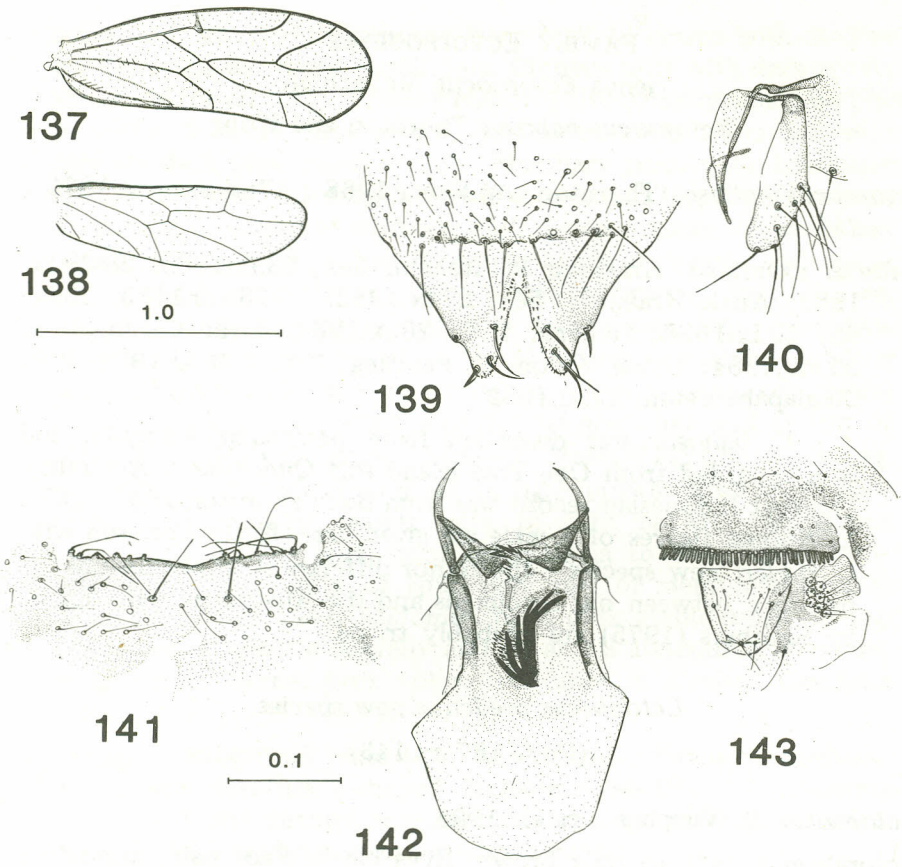
Ectopsocus B, Vaughan *et al.* 1988.

Coloration : buff to pale brown. Eyes black. Face pale, unmarked. Ocelli pale, slight browning along medial margins. Antennae and palpi pale. Thorax and abdomen pale except for traces of brown pleural stripe; genitalia darker. Legs pale, except coxae and basal half of F brown. Wings very pale brown, scarcely tinged, venation brown. Wing venation as in Figs. 137, 138.

Female : subgenital plate (Fig. 139) broad, apex strongly and deeply bilobed, with about 4 thickened setae near apex of each lobe; a strong transverse row of setae basal to lobes. Gonapophyses (Fig. 140) : external valve long and strongly setose. Paraproct with field of about 10 trichobothria.

Male : hypandrium (Fig. 141) transverse. Phallosome (Fig. 142) with strong lateral apical hooks, and a complex inner sclerite; anteriorly broad. Clunium (Fig. 143) with strong transverse row of about 30 teeth. Epiproct (Fig. 143) rather small, simple; paraproct with field of 8-10 trichobothria.

Dimensions : B 1.30-1.45, FW 1.30-1.40, f_1 0.24, f_2 0.16, f_1/f_2 1.50, F 0.32, T 0.50, t_1 0.16, t_2 0.06, t_1/t_2 2.67, ct 10, 0.



Figures 137—143. *Ectopsocus predanus* : fore wing (137), hind wing (138), subgenital plate (139), gonapophyses (140), hypandrium (141), phallosome (142), male elunium and epiproct (143)
Figs. 137, 138 and 139 — 143 to common scales.

Types : holotype, ♂, Krakatau Is.: Panjang, dead foliage, 14.ix.1984; paratypes : 1 ♂, 2 ♀, same data as holotype; Rakata, 1 ♀, 31.viii. 1984; Sertung, 1 ♂, 11.ix.1984; Anak Krakatau, 1 ♀, 21.viii.1985; Sumatra, Tampang, 1 ♂, 23.iv.1984; W. Belimbing, 1 ♂, 2 ♀, 29.iv. & 2.v.1984.

The male radular sclerites are somewhat similar to those of *E. drepanus* Thornton, and the clunium is of the same basic form in these two species. Both structures differ in details, and the subgenital plate of these species differs markedly : the lobes of *E. drepanus* are very short, and the setae are marginal. The two species are clearly very closely related, and may prove to be conspecific when more information on variability becomes available.

Ectopsocus cinctus Thornton

Ectopsocus cinctus Thornton, 1962a. : 114 (♀) ; Thornton and Wong, 1966 : 18 (♂).

Material examined. Krakatau Is.: 11, Rakata; 7, Anak Krakatau; 27, Sertung; 11, Panjang; Java: Ujung Kulon (Cibunar, Cidaon, G. Payung), 36ex; Sumatra: Tanjung Karang, 1ex.

Thornton (1984), in recording this widely distributed species from Lombok and Bali, noted that it was closely related to *E. salpinx* Thornton and Wong and *E. hypandrus* Thornton, both of which also occur on Bali and on the Krakataus. This is one of the more common *Ectopsocus* species on the Krakataus, and was found on all four islands.

Ectopsocus coccophilus Ball

Ectopsocus coccophilus, Ball, 1943 : 22

Material examined. Krakatau Is. : 19, Rakata; 1, Anak Krakatau; 6, Sertung; 6, Panjang; Java : 4, Carita; 4, Ujung Kulon (P. Peucang, Cibunar).

These are the first records in the Oriental region of this species, originally described from Africa.

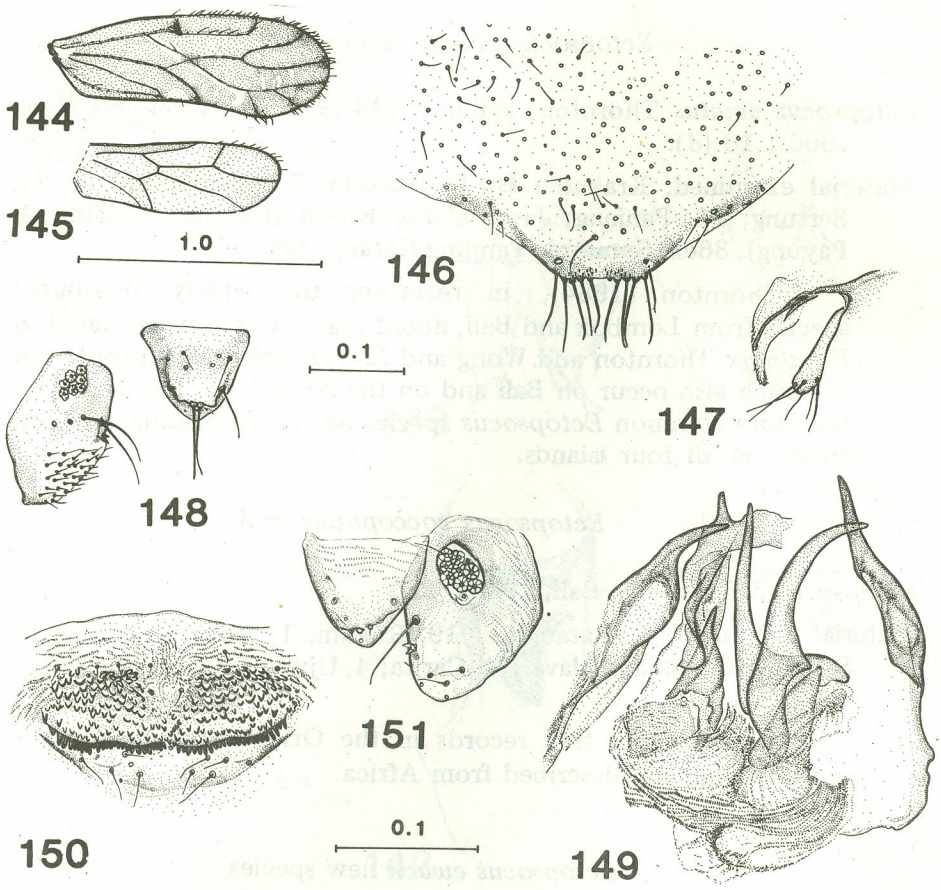
Ectopsocus ewarti new species

(Figs. 144 — 151)

Ectopsocus J, Vaughan *et al.* 1988.

Coloration : pale buff to yellowish brown. Eyes black. Ocellar region pale, but inner borders of ocelli sometimes slightly reddened. Face pale, faint traces of postclypeal striae and of labral darkening. Vertex incipiently darkened each side of midline. Palpi and antennae pale. Thorax and abdomen pale except for traces of pleural stripe. Fore wing pale brown; slight darker spots at apex of major veins (Fig. 144). Hind wing pale. Wing venation as in Figs. 144, 145.

Female : subgenital plate (Fig. 146) apically transverse, not lobed; apex with row of about 10 long setae in incipient lateral groups. Gonapophyses (Fig. 147) : external valve long and slender. Epiproct (Fig. 148) with pair of long preapical median setae. Paraproct (Fig. 148) broad, with field of 7 or 8 trichobothria.



Figures 144—151. *Ectopsocus ewarti* : fore wing (144), hind wing (145), subgenital plate (146), gonapophyses (147), female epiproct and paraproct (148), phallosome (149), male clunium (150), male epiproct and paraproct (151). Figures 144, 145 and 146—148 and 149—151 to common scales.

Male : hypandrium simple, transverse. Phallosome (Fig. 149) broad, apex with complex hooked and rod-like sclerites. Clunium (Fig. 150) with arcuate row of about 54 teeth; surface of tergite IX with numerous posteriorly directed papillae. Epiproct (Fig. 151) tapered, with basal rows of fine spicules. Paraproct large, a divided marginal hyaline cone and field of about 8 trichobothria.

Dimensions : B 1.10, FW 1.10-1.30, F 0.28, T 0.43, t_1 0.15, t_2 0.05, ct 13, 0.

Types : holotype, ♀, Krakatau Is.: Rakata, 100m, 1.ix.1984; paratypes, 7 ♂, 9 ♀, same data as holotype; 1 ♂, 1 ♀, Zwarte Hoek, 12.ix. 1984; 1 ♂, 1 ♀, W. Ridge, 16 & 19.ix.1984; 1 ♂, 1 ♀, Anak Krakatau, 2.ix.1984; 1 ♂, Sertung, 19.viii.1985; 7 ♂, 11 ♀, Panjang, ix.1984 & viii.1985.

This species apparently belongs to the cosmopolitan *'briggsi group'* of *Ectopsocus*, and the ground colour of the fore wing is darker than many related species. The very large radula sclerites are reminiscent of those of *E. hirsutus* Thornton (1962), and *E. ornatus* Thornton (1962), both of which are widely distributed in the Oriental Region and elsewhere. Members of the *'ornatus'* group of species lack setae around the fore wing margin.

Ectopsocus cluniatus new species

(Figs. 152 — 155)

Ectopsocus 220, Vaughan *et al.* 1988.

Coloration : buff to pale brown. Eyes black. Ocelli pale, with inner margins reddish brown. Genae and frons pale, but dense setae grey. Posterior half of postclypeus incipiently darkened, anteclypeus, labrum, palpi, antennae pale. Vertex with traces of grey spotting above eyes and across posterior border. Thorax darker dorsally than ventrally; traces of pleural stripe, more pronounced along anterior half of abdomen. Legs pale, tibiae slightly darker than femora and coxae. Wings very slightly fumose, hind wing paler than fore wing. Wing venation as in Figs. 152, 153 : fore wing Rs and M meeting at point of fused for short distance; no marginal setae on either wing.

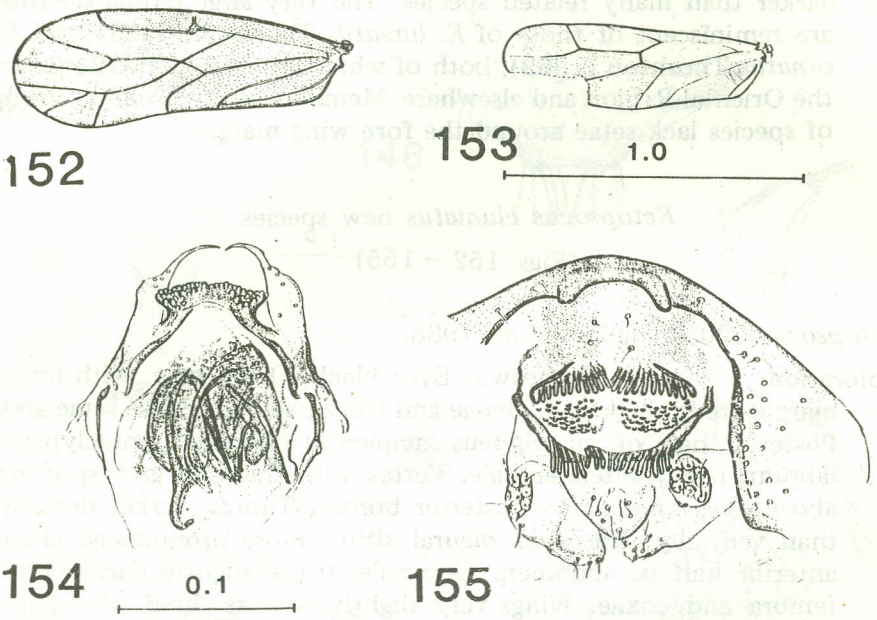
Female : unknown.

Male : hypandrium simple. Phallosome (Fig. 154) apex complex : a transverse tuberculate ridge; outer parameres slender, hooked; central sclerites slender and curved; clunium (Fig. 155) elaborate : an apical row of 18 digitate processes; a divided medial row of about 22 similar processes; small papilae in field between these rows; margin of tergite VIII with bilobed medial projection. Epiproct (Fig. 155) simple; paraproct (Fig. 155) with field of 9 trichobothria.

Dimensions : IO/D 2.5, B 0.90, FW, 1.20, HW 0.96, f_1 0.175, f_2 0.103, f_1/f_2 1.70, F 0.276, T 0.420, t_1 0.175, t_2 0.084, t_1/t_2 2.08, ct 14, 0.

Types : holotype, ♂, Indonesia, Krakatau Is., Sertung, forest, 30m, 11.ix.1984; paratype, 1♂, same data.

The clunial ornamentation of this species is particularly distinctive, and differentiates it from all other Krakatau *Ectop-*



Figures 152—155. *Ectopsocus cluniatus* : fore wing (152), hind wing (153), phallosome (154), male clunium, apiproct and paraproct (155). Figures. 152, 153 and 154; 155 to common scales.

socus. It does not fit clearly into any species group delimited by Thornton & Wong (1968), and seems not to have any close relatives described from the Oriental Region.

Ectopsocus hypandrus Thornton

Ectopsocus hypandrus Thornton 1984 : 118.

Material examined. 17ex, Krakatau Is. : 6, Rakata; Java : 2, Carita; 9, Ujung Kulon (P. Peucang, Cibunar, G. Payung).

This species was described from Bali and also occurs on Lombok. As Thornton (1984) noted, it resembles both *E. salpinx* Thornton & Wong (1968) and *E. cinctus* Thornton, but differs from both in genitalic features.

Ectopsocus maindroni Badonnel

Ectopsocus maindroni Badonnel, 1935 : 81.

Material examined. Krakatau Is. : 6ex, Sertung.

This species is extremely widespread, perhaps tropicopolitan, and was recorded from Bali by Thornton (1984).

Ectopsocus ornatus Thornton

Ectopsocus ornatus Thornton, 1962a : 308.

Material examined. Krakatau Is. : Panjang, n.e. shore, 27.x.1982, 1 ♀; Java : Ujung Kulon, Citerjun, 17.xi.1982, 1 ♀.

This species, described from Hong Kong, is known also from Taiwan and North America. It has not previously been recorded from Indonesia.

Ectopsocus paraplesius Thornton and Wong

Ectopsocus paraplesius Thornton and Wong, 1968: 106.

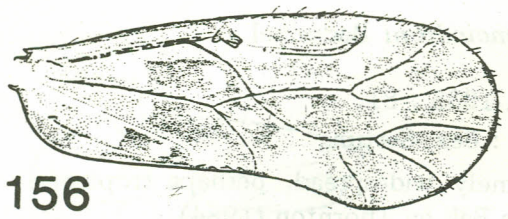
Material examined. Krakatau Is. : Rakata, 28.xi.1982, 2 ♀.

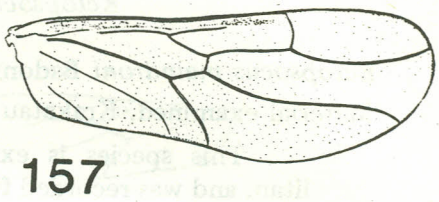
This small pale brown species, described from Micronesia (Caroline Is.) has not previously been recorded from Indonesia. The Krakatau specimens differ in small details, but appear to represent this species.

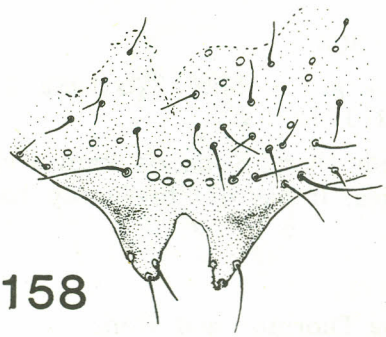
Ectopsocus ridderi new species
(Figs. 156 — 161)

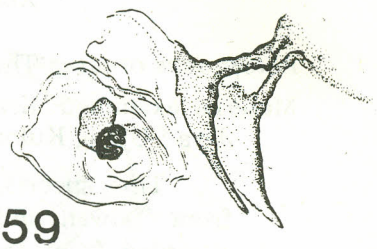
Ectopsocus A, Vaughan *et al.* 1988.

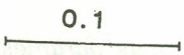
Coloration : pale brown. Eyes black. Face uniform, except anteclypeus slightly paler than postclypeus or labrum. Ocellar region and vertex pale. Palpi and antennae pale. Thorax : dorsum slightly darker than pleura. Abdomen and legs pale. Fore wing strongly maculated with pale greyish brown (Fig. 156). Hind wing paler, uniform except for costal cell darkening. Wing venation as in Fig. 156 — 157.

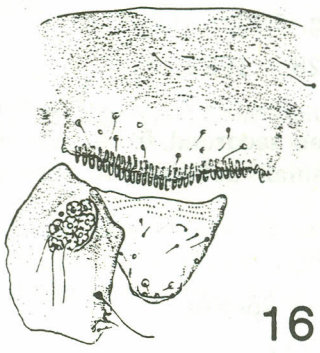












Figures 156—161. *Ectopsocus ridderi* : fore wing (156), hind wing (157), subgenital plate (158), gonapophyses (159), phallosome (160), male clunium and paraproct (161).
Figures 156, 157 and 158—161 to common scales.

Female : subgenital plate (Fig. 158) strongly bilobed, each lobe with about 3 setae. Gonapophyses (Fig. 159). Paraproct with field of about 8 — 9 trichobothria.

Male : hypandrium simple. Phallosome (Fig. 160) with tapered posterior arch, strongly spined interior sclerites. Clunium (Fig. 161) with broad transverse sinuous posterior comb; epiproct simple, trapezoidal; paraproct (Fig. 161) with field of about 8-10 trichobothria, 1 or 2 with weakly defined basal rosettes.

Dimensions : B 0.90, FW 1.00-1.15, HW 0.86-0.99, f_1 0.14, f_2 0.09, f_1/f_2 1.55, F 0.25, T 0.41, t_1 0.16, t_2 0.06, t_1/t_2 2.66, ct 13, 0.

Types : holotype, ♀, W. Java, Carita, 100m, beaten, 21.v.1984; paratypes, 3 ♂, 5 ♀, same data as holotype; 1 ♀, Krakatau Is., Rakata, S. Bay, coastal vegetation, 10.ix.1984.

This very distinctly marked species resembles *E. fenestratus* Thornton and Wong (1968) and *E. erosus* Enderlein (1903) on the 'keel-like' fusion of the inner parameres, but differs from both in wing pattern. In this feature it more resembles *E. baliosus* Thornton and Wong (1968) (see p.36), but that species lacks the keel and has a rather broader apical phallosome structure (Smithers 1975). The row of clunial teeth is also longer in *E. baliosus*. *E. ridderi* is, nevertheless, close to *E. fenestratus* in the unusual form of the dorsal and ventral gonapophysis valves, but the clunial comb is an additional feature for separation of males of all these species : *E. ridderi* lacks the basal lateral tubercle fields present in both *E. fenestratus* and *E. erosus*, and is thus more akin to *E. baliosus* in this feature.

Ectopsocus salpinx Thornton and Wong

Ectopsocus salpinx Thornton and Wong, 1968 : 70.

Material examined. Krakatau Is.: Rakata, 7ex, 1-10.ix.1984; Sertung, 9ex, 11.ix.1984; Panjang, 2ex, 14.ix.1984 and 16.viii.1985. A specimen from Anak Krakatau beating foreland vegetation, 21.ix. 1984 is probably also this species, but is not included in the totals given by Thornton *et al.* (1988).

Although *E. salpinx* is known from Malaysia, Guam and the Philippines, the only previous Indonesian record appears to be from Bali (Thornton 1984).

Ectopsocus titschacki Jentsch

Ectopsocus titschacki Jentsch, 1939 : 120.

Material examined. Krakatau Is.: Rakata, 46ex; Anak Krakatau, 6ex; Panjang, 15ex, Sertung, 26ex; Java, Ujung Kulon, 9ex (P. Peucang,

Cibunar, Gunung Payung); Sumatra, Belimbing, 2ex, Krui, 2ex.

This was the most abundant species of *Ectopsocus* found on the Krakataus, and was widely distributed on all four islands.

FAMILY PERIPSOCIDAE

Genus *Peripsocus* Hagen

Peripsocus bifidus Thornton

(Figs. 162 – 164)

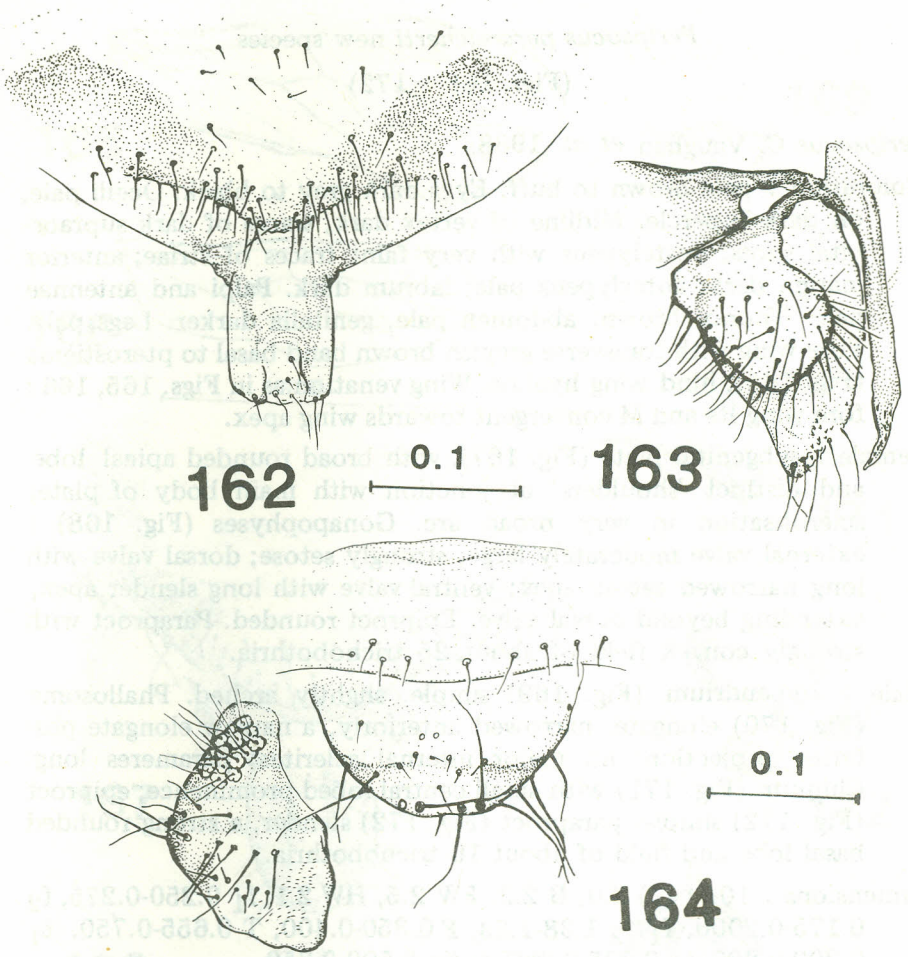
Peripsocus bifidus Thornton, 1984 : 121.

Material examined. Krakatau Is.: Rakata, Zwarte Hoek, 1 ♂, 1.viii.1983; Owl Bay, 1 ♀, 27.xi.1982; Anak Krakatau, *Casuarina*, 2 ♀, 27.viii. 1983.

Female : brown. Eyes and ocellar region black. Labrum dark brown; anteclypeus pale except dorsal border; postclypeus with 4-6 broad convergent striae each side of midline. Vertex with median and lateral groups of dark brown spots. Apical segment of maxillary palpi dark. Antennae pale. Thorax dark brown, sutural areas pale. Abdomen pale. Legs pale : T slightly darker than F or t. Fore wing with pale greyish brown mottling; hind wing pale except slight shading at apex of most veins. Subgenital plate (Fig. 162) with long truncate apical lobe; a well-defined setose ridge across main body of plate. Gonapophyses (Fig. 163) : dorsal valve narrowed dorsally, external valve large, strongly setose. Epiproct transverse, paraproct (Fig. 164) with field of about 18 trichobothria.

Dimensions : FW 1.63, HW 1.28, f_1 0.21, f_2 0.15, f_1/f_2 1.40, F 0.27, T 0.59, t_1 0.17, t_2 0.06.

P. bifidus was hitherto known only from the holotype male, from Bali. As Thornton (1984) noted, it is not easily allocated to any of the recognised species groups of *Peripsocus*.



Figures 162—164. *Peripsocus bifidus* Thornton : subgenital plate (162), gonapophyses (163), female paraproct (164).
Figs. 162—164 to common scale

Peripsocus circinus Thornton and Wong

Peripsocus circinus Thornton and Wong, 1968 : p. 34.

Material examined. Krakatau Is.: Sertung, n.e. coast, 1 ♀, 28.xi.1982.

P. circinus, described from Malaysia, is clearly related to several other *Peripsocus* species found in Malaysia and Indonesia, but differs from all in details. It is most similar to *P. reicherti* Enderlein, but differs in having more extensive wing pigmentation and in details of female genitalia.

Peripsocus parareicherti new species

(Figs. 165 – 172)

Peripsocus C, Vaughan *et al.* 1988.

Coloration : pale brown to buff. Eyes dark grey to black. Ocelli pale, on dark tubercle. Midline of vertex dark, traces of dark supraorbital spots; postclypeus with very faint traces of striae; anterior margin dark; anteclypeus pale; labrum dark. Palpi and antennae pale. Thorax brown; abdomen pale, genitalia darker. Legs pale. Fore wing with transverse greyish brown band basal to pterostigma (Fig. 165); hind wing hyaline. Wing venation as in Figs. 165, 166 : fore wing Rs and M convergent towards wing apex.

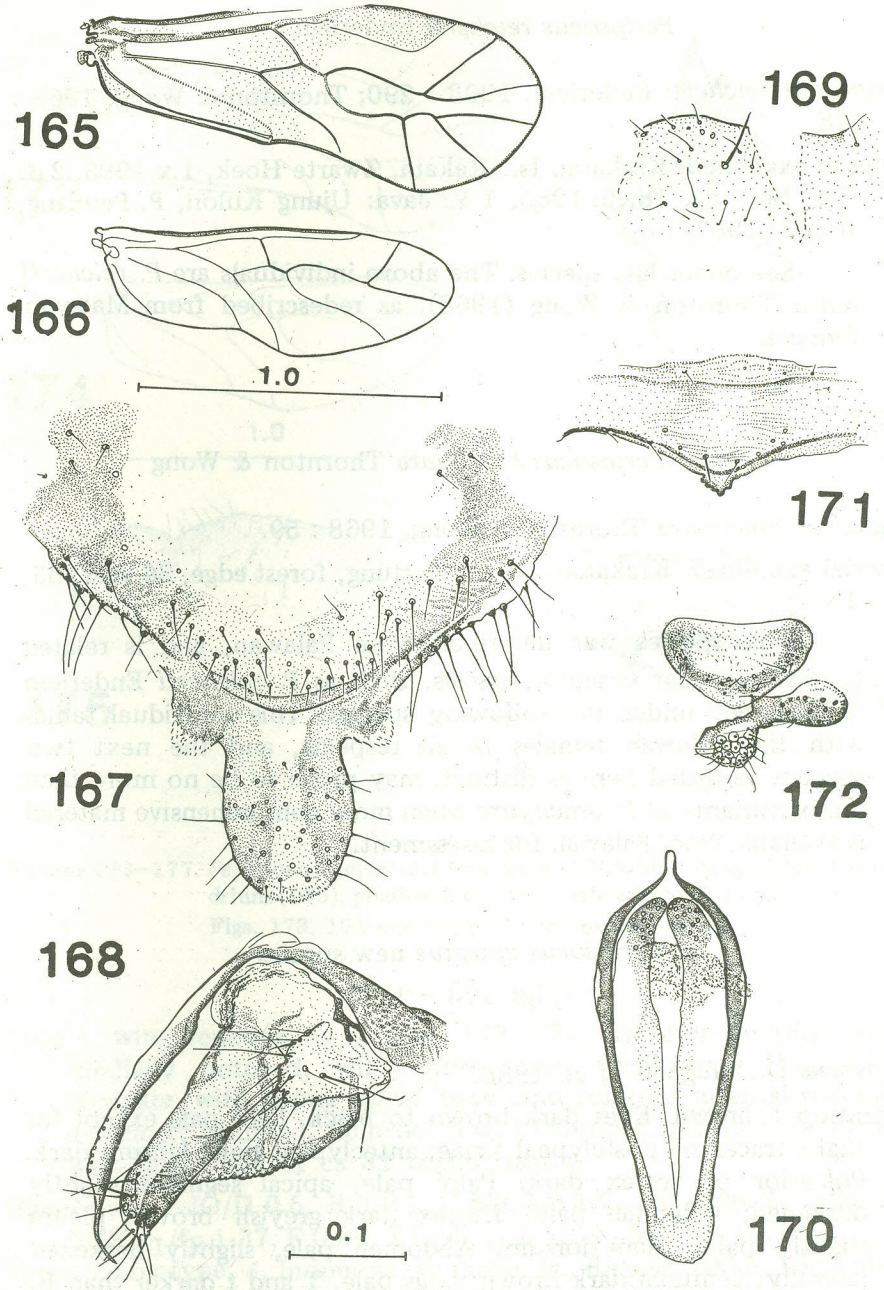
Female : subgenital plate (Fig. 167), with broad rounded apical lobe and distinct 'shoulders' at junction with main body of plate; sclerotisation in very broad arc. Gonapophyses (Fig. 168) : external valve moderately large, strongly setose; dorsal valve with long narrowed setose apex; ventral valve with long slender apex, extending beyond dorsal valve. Epiproct rounded. Paraproct with strongly convex field of about 25 trichobothria.

Male : hypandrium (Fig. 169) simple, slightly arched. Phallosome (Fig. 170) elongate, narrowed anteriorly, a narrow elongate posterior projection; no major internal sclerites; parameres long. Clunium (Fig. 171) with small central lobed prominence; epiproct (Fig. 172) simple; paraproct (Fig. 172) slender, a strong rounded basal lobe and field of about 16 trichobothria.

Dimensions : 10/D (♀) 2.0, B 2.2, FW 2.5, HW 2.1, f_1 0.250-0.275, f_2 0.175-0.2000, f_1/f_2 1.38-1.53, F 0.350-0.400, T 0.655-0.750, t_1 0.200-0.220, t_2 0.075-0.080, t_1/t_2 2.500-2.750.

Types : holotype, ♀, Indonesia, Krakatau Is., Panjang, 17.viii.1985. Paratypes ; 1♂, same data as holotype; 2♀, Panjang 3.ix.1984; 1♂, 1♀, Panjang 14.ix.1984; Java: Carita, 2♂, 24.v. and 26.viii.1984. Other specimens (non-types) from Rakata (4), Anak Krakatau (2), Sertung (5), Panjang (3), Carita (1).

This species is the same as *P. reicherti* Enderlein *sensu* Thornton (1984), but apparently differs from *P. reicherti sensu* Thornton and Wong (1968) in the form of the subgenital plate, which is similar to that of *P. quadripunctatus* Badonnel (1955) (Angola). The sides of the apical lobe are much more convex than in 'true' *reicherti*, and the 'shoulders' are more pronounced.



Figures 165—172. *Peripsocus parareicherti* : fore wing (165), hind wing (166), subgenital plate (167), gonapophyses (168), hypandrium (169), phallosome (170), clunium (171), male epiproct and paraproct (172).
Figs. 165, 166 and 167—172 to common scales

Peripsocus reicherti Enderlein

Peripsocus reicherti Enderlein, 1903 : 290; Thornton & Wong, 1968 : 33.

Material examined. Krakatau Is.: Rakata, Zwarte Hoek, 1.x.1983, 2 ♂, 1 ♀; Sertung, 18.viii.1985, 1 ♀, Java: Ujung Kulon, P. Peucang, 9-26.xi.1982, 1 ♂.

See under last species. The above individuals are *P. reicherti sensu* Thornton & Wong (1968), as redescribed from Malayan females.

Peripsocus brachyura Thornton & Wong

Peripsocus brachyura Thornton & Wong, 1968 : 59.

Material examined. Krakatau Is.: s.e. Sertung, forest edge, 26.vii.1983, 1 ♀.

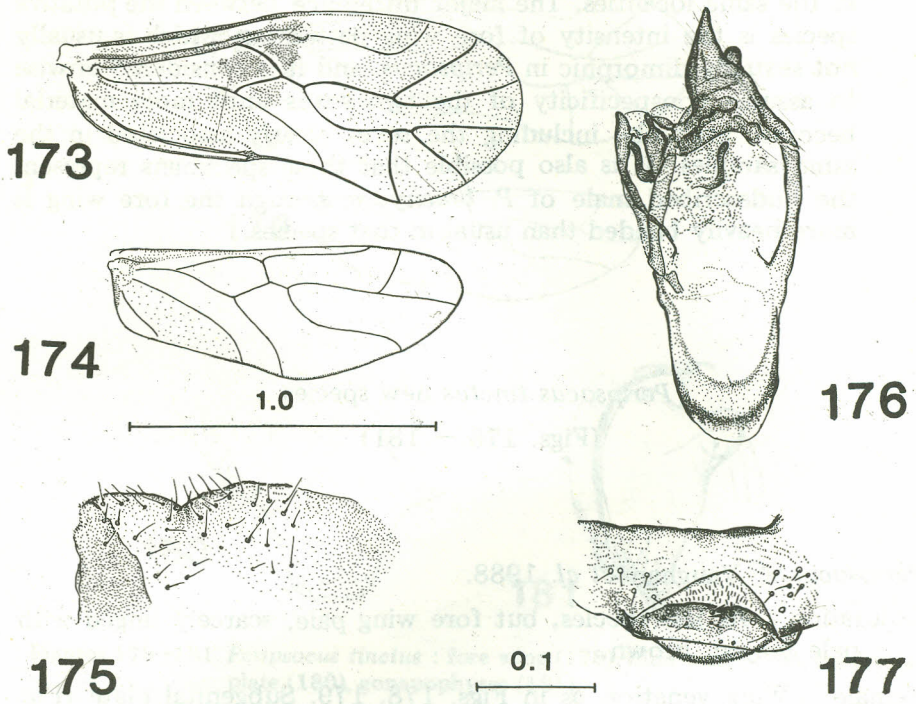
This species was described from Palawan, and is related to several other Oriental species, such as *P. reicherti* Enderlein (1903). See under the following species. This individual tallies with the Palawan females in all respects, and the next two species, regarded here as distinct, may prove to be no more than minor variants of *P. brachyura* when more comprehensive material is available from Palawan for assessment.

Peripsocus apicatus new species

(Figs. 173 — 177)

Peripsocus D, Vaughan *et al.* 1988.

Coloration : brown. Eyes dark brown to black. Face pale except for slight traces of postclypeal striae; anteclypeus pale; labrum dark. Posterior of vertex dark. Palpi pale, apical segment slightly darkened; antennae pale. Thorax dark greyish brown, pleura slightly paler than dorsum. Abdomen pale, slightly darkened laterally; genitalia dark brown. Legs pale, T and t darker than F. Fore wing with much of apex slightly shaded with greyish brown; more intense shading on basal half of wing (Fig. 173); hind wing shaded on posterior basal half (Fig. 174).



Figures 173—177. *Peripsocus apicatus* : fore wing (173), hind wing (174), hypandrium (175), phallosome (176), male epiproct (177).
Figs. 173, 174 and 175—177 to common scales

Male : wing venation as in Figs. 173, 174. Hypandrium (Fig. 175) medially notched, with short setae. Phallosome (Fig. 176) elongate, with strong apical 'beak' and complex internal sclerites, anteriorly rounded. Epiproct (Fig. 177) small, spiculate. Paraproct with large field of ca 32 trichobothria.

Dimensions : IO/D 0.5, B 1.2-1.3, FW 1.8-1.9, HW 1.26, f_1 0.26, f_2 0.19, f_1/f_2 1.37, F 0.30, T 0.65, t_1 0.18, t_2 0.09, ct 14, 0.

Types : holotype, ♂, Indonesia, Krakatau Is., Rakata, 200m, 1.ix.1984. Paratypes, 2 ♂, Panjang, 17.viii.1985.

These males may prove to be the same species as the next described, known only from females, and taken predominantly

in the same localities. The major difference between the putative species is the intensity of fore wing patterning, which is usually not sexually dimorphic in *Peripsocus*, and it is considered unwise to assume conspecificity of the two sexes until more material becomes available, including the sexes clearly associated in the same samples. It is also possible that these specimens represent the undescribed male of *P. brachyura*, though the fore wing is more heavily banded than usual in that species.

Peripsocus tinctus new species

(Figs. 178 – 181)

Peripsocus E, Vaughan *et al.* 1988.

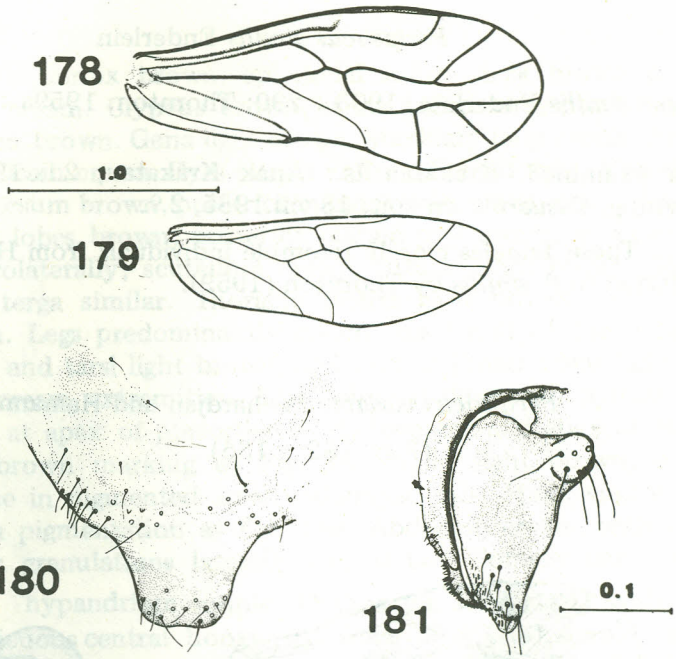
Coloration : As last species, but fore wing pale, scarcely tinged with pale greyish brown.

Female: Wing venation as in Figs. 178, 179. Subgenital plate (Fig. 180) with short broad truncate apex. Gonapophyses (Fig. 181) : external valve very small, round; dorsal valve broad, about 10 long setae near slightly tapered apex; ventral valve shorter than dorsal valve, spiculate. Epiproct broad, rounded. Paraproct with field of ca 25 trichobothria.

Dimensions : IO/D 1.8, B 1.30, FW 1.90, HW 1.46, F 0.35, T 0.66, t_1 0.15, ct 14, 0.

Types : Holotype, ♀, Indonesia, Krakatau Is., Rakata, Zwarte Hoek, 1.ix.1984. Paratypes (all ♀) 2, Rakata, 31.viii.1984; 4, Panjang, 3-20.ix.1984. 1, Java, Ujung Kulon, Cidaon, 22.ix.1984.

See under last species. These females are very similar to *P. brachyura* Thornton & Wong, found on Sertung during our work. *P. brachyura* typically has the fore wing marked (but not as discretely as in the males described as the last species), and there are small differences in female genitalia : the apex of the subgenital plate of *P. tinctus* is slightly longer, and the dorsal gonapophysis valve more strongly tapered.



Figures 178—181. *Peripsocus tinctus* : fore wing (178), hind wing (179), subgenital plate (180), gonapophyses (181).
Figs. 178, 179 and 180,181 to common scales.

Peripsocus elongatus New & Thornton

Peripsocus elongatus New & Thornton, 1975 : 405.
Peripsocus H, Vaughan *et al.* 1988.
Material examined. Indonesia, Krakatau Is.: Rakata, 5.ix.1984, 1 ♀.

P. elongatus was described from a single distinctive female from Selangor (Malaysia). The present specimen is identical in all essential features. Two further individuals from Rakata, noted as 'Peripsocus I' by Vaughan *et al.* 1988, differ from the above in slight details of coloration and structure. The coxae are cream rather than light brown, the genae are dark-tinged, and the fore wing lacks distinct patches of pigment in the apical cells. The subgenital plate lobe is relatively shorter than in 'typical' *elongatus*, as is the dorsal gonapophysis lobe. Three damaged individuals from Panjang (14.ix.1984, 15.ix.1984, 16.viii.1984) noted as *Peripsocus* I (Vaughan *et al.* 1988) are also probably referable to this species. The subgenital plate resembles that of *P. quercicola* Enderlein (1906), in which the external gonapophysis valve is quadrangular, rather than rounded.

Peripsocus similis Enderlein

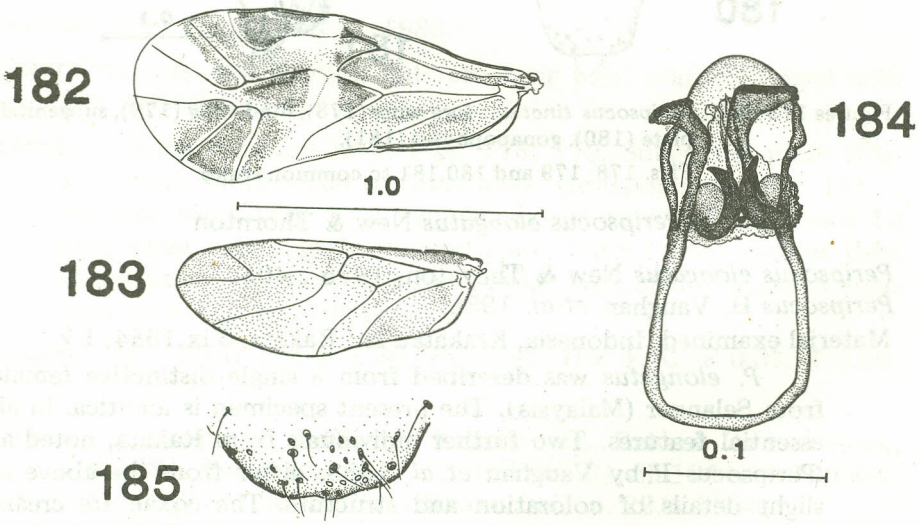
Peripsocus similis Enderlein, 1903 : 290; Thornton. 1959a : 37.

Material examined. Krakatau Is.: Anak Krakatau, 2.ix.1984, 1 ♀, Sertung, *Casuarina* on spit, 18.viii.1985, 2 ♀.

These females closely resemble individuals from Hong Kong referred to *P. similis* by Thornton (1959).

Peripsocus variatus Soehardjan and Hamann

(Figs. 182 — 185)



Figures 182—185. *Peripsocus variatus* Soehardjan and Hamnn : fore wing (182), hind wing (183), phallosome (184), male epiproct (185). Figs. 182, 183 and 184, 185 to common scales.

Peripsocus variatus Soehardjan and Hamann, 1959 : 4.

For redescription of female see Thornton and Wong 1968 : 23.
The following is a description of the previously unrecorded male.

MALE

Coloration : vertex brown, epicranial suture dark brown to black. Frons cream. Clypeus brown, striae indistinct. Anteclypeus pale. Labrum brown. Gena light brown. Maxillary palp cream. Antennae pale. Ocelli cream. Eyes purple under reflected light. Mesothoracic antedorsum brown, posterior margins pale, cream posteromedially; dorsal lobes brown; posterior margin pale cream, more extensive posterolaterally; scutellum cream; sutures dark brown. Metathoracic terga similar. Thoracic pleura light brown, margins dark brown. Legs predominantly cream, basal half of fore coxa, fore tibiae and tarsi light brown, and mid and hind tibiae light brown with cream extremities. Fore wing hyaline with reddish brown patch at apex of pterostigma, at stigmasac and apex of anal cell, pale brown marking as Fig. 182; veins light brown, bordered hyaline in pigmented areas, otherwise pale. Hind wing with pale brown pigmentation as Fig. 183. Abdomen cream, with purplish brown granulations laterally and at base dorsally and ventrally.

Genitalia : hypandrium simple. Phallosome (Fig. 184) with pair of conspicuous central hooks. Epiproct (Fig. 185) simple, unornamented. Paraproct with elongate field of about 26 trichobothria.

Dimensions : IO:D 0.3:1, FW 1.4, HW 1.1, F 0.22, T 0.42, t_1 0.12, t_2 0.06, t_1/t_2 2.0, ct 15.

Material examined. Krakatau Is.: Rakata, 1 ♀, 24.viii.1985; 1 ♀, 26.viii. 1985; Panjang, 1 ♀, 16.viii.1985; 1 ♂, 1 ♀, 17.viii.1985; Java: Carita, 1 ♂, 21.v.1984; 3 ♂, 4 ♀, 26.viii.1984; Ujung Kulon N.P., Cibunar, 1 ♀, 20.ix.1984.

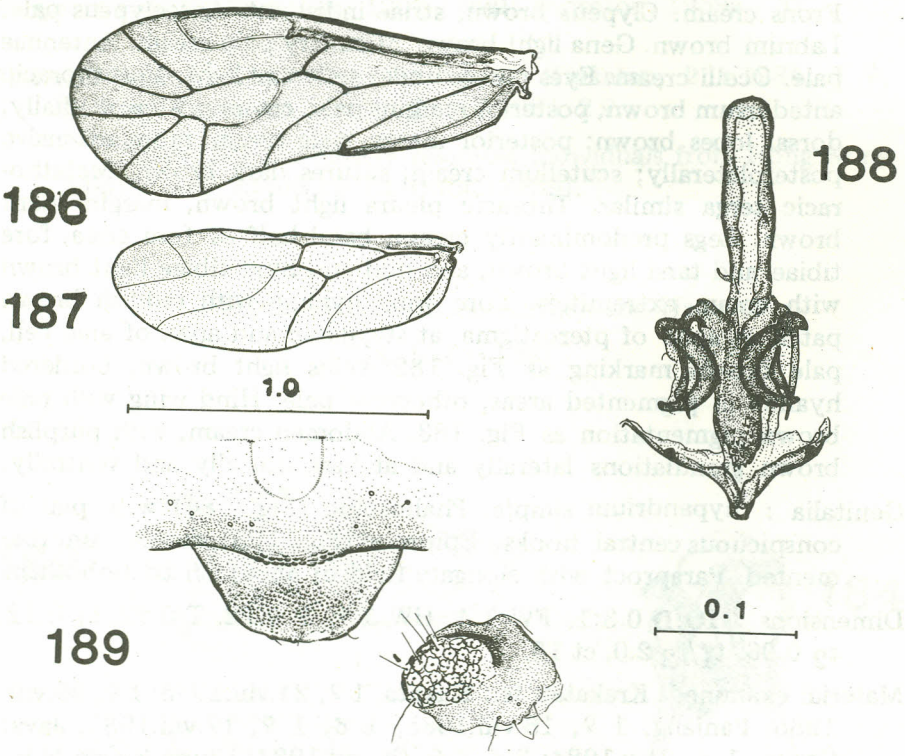
The unusual phallosome of this species confirms its distinctiveness. The species was described from Java (Bogor) and later recorded from Hong Kong.

Peripsocus papillatus new species

(Figs. 186 – 189)

Peripsocus AE, Vaughan *et al.* 1988.

Coloration : pale brown. Eyes black. Slight traces of postclypeal striae, head otherwise unmarked. Apical segment of maxillary palpi slightly darkened. Antennae pale. Thorax pale brown, nota slightly darker than pleura. Legs pale : T and t darker than F. Abdomen pale. Fore wing pale greyish brown (Fig. 186). Hind wing pale.



Figures 186—189. *Peripsocus papillatus* : fore wing (186), hind wing (187), phallosome (188), male clunium, epiproct and paraproct (189).

Figs. 186, 187 and 188, 189 to common scales.

Female : unknown.

Male : wing venation as in Figs. 186, 187. Hypandrium simple. Phallosome (Fig. 188) with elongate radular sclerites including large curved hooks each side of midline. Clunium (Fig. 189) papillate. Epiproct (Fig. 189) with large field of small papillae, transverse. Paraproct (Fig. 189) with large field of about 25 trichobothria.

Dimensions : FW 1.55, HW 1.20, f_1 0.22, f_2 0.18, f_1/f_2 1.22, F 0.26, T 0.56, t_1 0.16, t_2 0.09, t_1/t_2 1.78, ct 16.

Type : holotype, ♂, Krakatau Is.: Panjang, forest, 16.viii.1985.

This unusual male differs from all described species in phallosome and epiproct form.

FAMILY PSEUDOCAECILIIDAE

Genus *Lobocaecilius* Lee & Thornton

Lobocaecilius arcuatus new species

(Figs. 190 — 194)

Lobocaecilius G, Vaughan *et al.* 1988.

Coloration : buff. Eyes black. Ocelli pale, medial margins with dark brown arcs, small. Face wholly pale. Vertex very slightly greyed dorsal to eyes. Antennae and palpi pale. Thorax and abdomen dorsally pale; a broad reddish brown pleural stripe along thorax and anterior half of abdomen, where broadened. Legs pale. Fore wing with pale greyish brown mottling (Fig. 190), apices of veins darker brown. Hind wing hyaline.

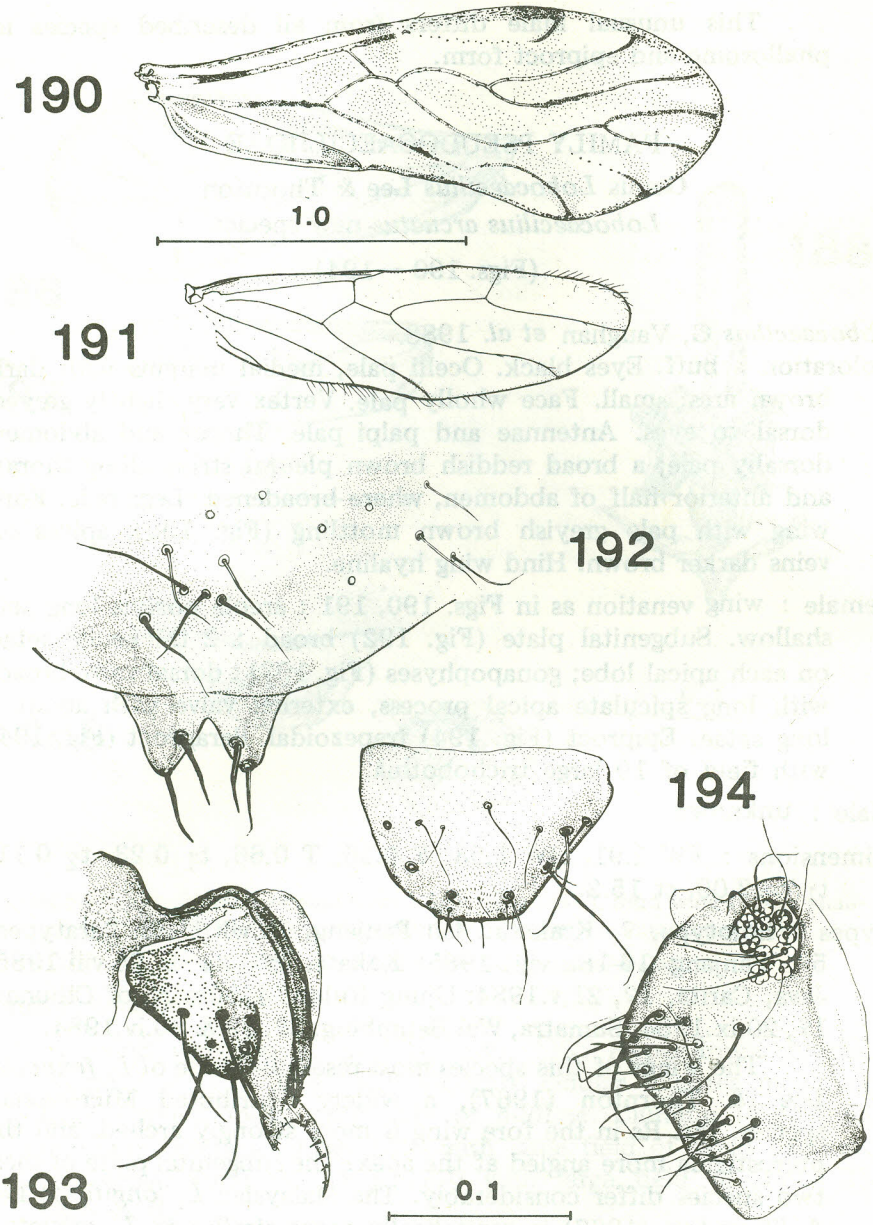
Female : wing venation as in Figs. 190, 191 : areola postica long and shallow. Subgenital plate (Fig. 192) broad : 2 thickened setae on each apical lobe; gonapophyses (Fig. 193) : dorsal valve broad, with long spiculate apical process, external valve with about 7 long setae. Epiproct (Fig. 194) trapezoidal. Paraproct (Fig. 194) with field of 10 large trichobothia.

Male : unknown.

Dimensions : FW 1.91, HW 1.53, F 0.36, T 0.66, t_1 0.23, t_2 0.11, t_1/t_2 2.09, ct 15.2.

Types : holotype, ♀, Krakatau Is.: Panjang, 16.viii.1985. Paratypes, 5♀, Panjang 16-18. viii. 1985; Rakata, 2♀, 24 & 25.viii.1985; Java, Carita, 1♀, 21.v.1984; Ujung Kulon, 4250m N. of Cibunar, 1♀, 20.ix.1984; Sumatra, Wai Belimbing, 2♀. 29 & 30.iv.1984.

The wings of this species most resemble those of *L. fennecus* Lee & Thornton (1967), a widely distributed Micronesian species, but Rs in the fore wing is more strongly arched, and the pterostigma more angled at the apex. The subgenital plate of these two species differ considerably. The Malaysian *L. longifurca* Lee & Thornton (1967) is genitalically more similar to *L. arcuatus*, though the apical lobes of the subgenital plate are more widely separated. The fore wing of *L. longifurca* is less heavily marked than in the present species.



Figures 190—194. *Lobocaecilius arcuatus* : fore wing (190), hind wing (191), subgenital plate (192), gonapophyses (193), female epiproct and paraproct (194).

Figs. 190, 191 and 192—194 to common scales.

Genus *Phallocaecilius* Lee & Thornton

Phallocaecilius hirsutus (Thornton)

(Figs. 195 — 201)

Pseudocaecilius hirsutus Thornton, 1959 : 148.
Phallocaecilius hirsutus (Thornton). Lee & Thornton, 1967 : 26.
Pseudocaecilius 17 : Vaughan *et al.* 1988.

Material examined. Krakatau Is.: Rakata, 20ex; Sertung, 5ex; Panjang, 2ex; Java; Carita, 1ex; Ujung Kulon (Cibunar, Ciramea, Cikalapa-beureum, G. Payung), 12ex; Sumatra, (Liwa) 39ex.

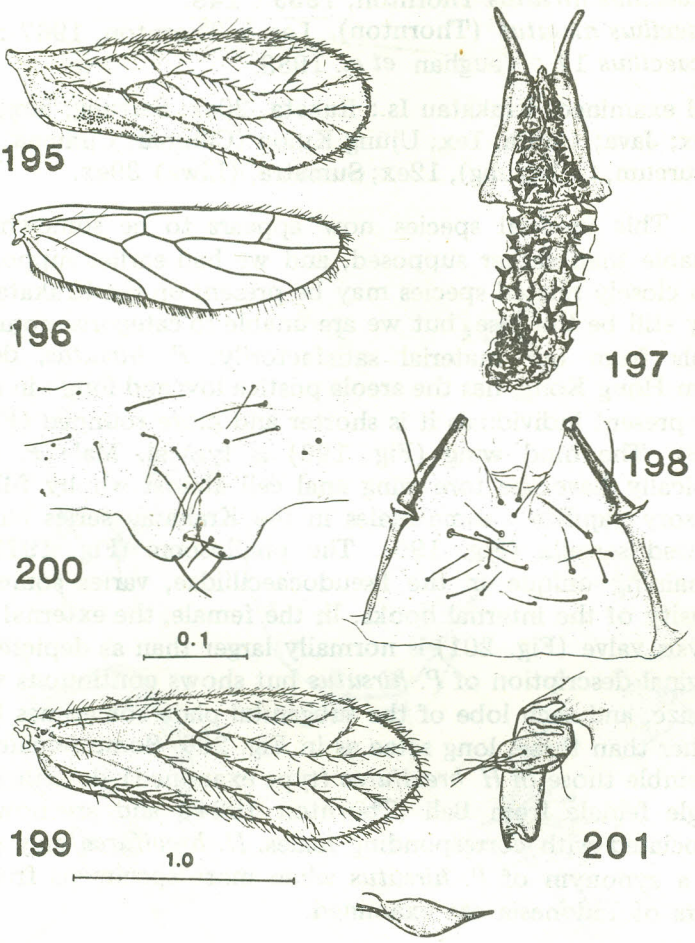
This unusual species now appears to be somewhat more variable than earlier supposed, and we had earlier supposed that two closely related species may be present on the Krakataus. This may still be the case, but we are unable to categorise some individuals from our material satisfactorily. *P. hirsutus*, described from Hong Kong, has the areola postica low and long : in many of the present individuals it is shorter and more rounded (Figs. 195, 199). The hind wing (Fig. 196) is typical. Male *P. hirsutus* typically have the fore wing anal cell almost wholly filled with sensory papillae : some males in the Krakatau series have more limited sensilla (Fig. 195). The phallosome (Fig. 197), whilst remaining unique in the Pseudocaeciliidae, varies somewhat in density of the internal hooks. In the female, the external gonapophysis valve (Fig. 201) is normally larger than as depicted in the original description of *P. hirsutus* but shows continuous variation in size, and each lobe of the subgenital plate sometimes has two, rather than three, long setae as in Fig. 200. Some females closely resemble those of *H. brevifurca* (type examined), described from a single female from Bali (Thornton 1984), and are now clearly associated with corresponding males. *H. brevifurca* may prove to be a synonym of *P. hirsutus* when more specimens from other parts of Indonesia are examined.

Genus *Pseudocaecilius* Enderlein

Pseudocaecilius citricola (Ashmead)

Psocus citricola Ashmead, 1879 : 228.
Elipsocus criniger Perkins, 1899 : 85.
Pseudocaecilius elutus Enderlein, 1903 : 261.

Material examined. Krakatau Is.: Rakata, 1 ♀, 28.ix.1982; Panjang, 1 ♀, 14.ix.1984; 1 ♀, 20.ix.1984; 1 ♀, 16.viii.1985; Java, Carita, 1 ♂, 21.v.1984; Ujung Kulon, P. Peucang, 3 ♀, 9-26.xi.1982; G. Payung, 1 ♂, 23.xi.1982.



Figures 195—201. *Phallocaecilius hirsutus* (Thornton) : fore wing (195, 199), hind wing (196), phallosome (197), hypandrium (198), subgenital plate (200), gonapophyses (201); insert of wing papilla near (199).

Figs. 195, 196, 199 and 197, 198, 201 to common scales

FAMILY ARCHIPSOCIDAE

Genus *Archipsocus* Hagen

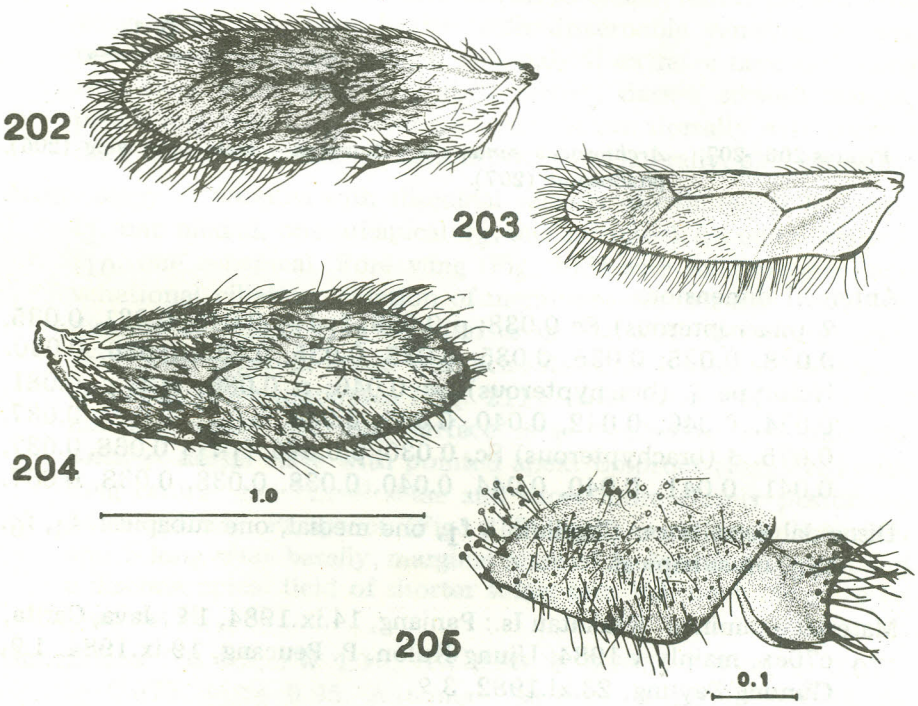
Archipsocus sanurensis Thornton

(Figs. 202 – 207)

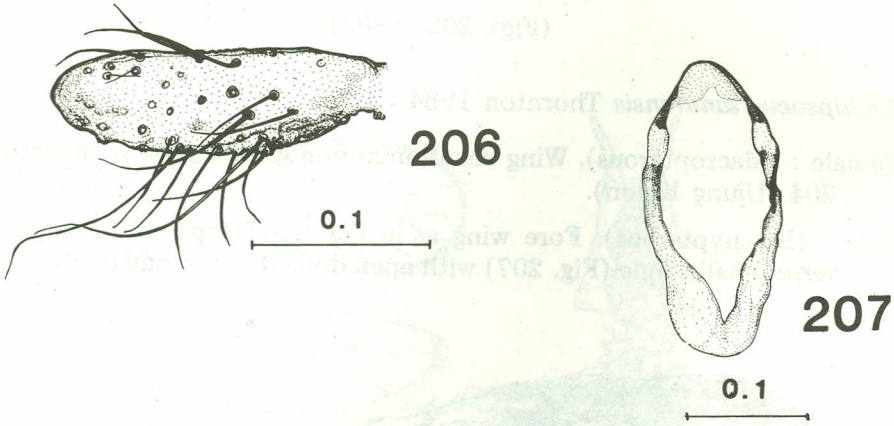
Archipsocus sanurensis Thornton 1984 : 137.

Female : (Macropterous). Wing venation as in Figs. 202, 203 (Panjang), 204 (Ujung Kulon).

Male : (Brachypterous). Fore wing as in Fig. 206. Hypandrium transverse. Phallosome (Fig. 207) with apex domed, unornamented.



Figures 202–205. *Archipsocus sanurensis* Thornton : fore wing (202, 204), hind wing (203), subgenital plate and gonapophyses.
Figs. 202–204 to common scale.



Figures 206—207. *Archipsocus sanurensis* Thornton : male fore wing (206), phallosome (207).

Antennal dimensions.

♀ (macropterous) Sc 0.038; p 0.069; f_1-f_{11} 0.048, 0.031, 0.035, 0.038, 0.035, 0.035, 0.035, 0.035, 0.035, 0.036, 0.060. Holotype ♀ (brachypterous) Sc 0.046; p 0.086; f_1-f_{11}, 0.081, 0.034, 0.046, 0.042, 0.040, 0.037, 0.040, 0.037, 0.039, 0.037, 0.075. ♂ (brachypterous) Sc, 0.030; p 0.076; f_1-f_{11} 0.068, 0.037, 0.041, 0.041, 0.040, 0.044, 0.040, 0.038, 0.038, 0.038, 0.067.

Discoidal sensilla on flagellum : f_1, one medial, one subapical; f_4, f_6, f_{10}, on subapical.

Material examined. Krakatau Is.: Panjang, 14.ix.1984, 1 ♀; Java, Carita, c70ex, mainly v.1984; Ujung Kulon, P. Peucang, 19.ix.1984. 1 ♀, Gunung Payung, 23.xi.1982, 3 ♀.

This species was described from two brachypterous females from Bali. Our material agrees in all essential respects with the types (examined), and the above additional data on this species will enable a fuller diagnosis to be made when the Oriental Archipsocidae are fully assessed.

Archipsocus alternatus new species

(Figs. 208 – 212)

Archipsocus E, Vaughan *et al.* 1988.

FEMALE

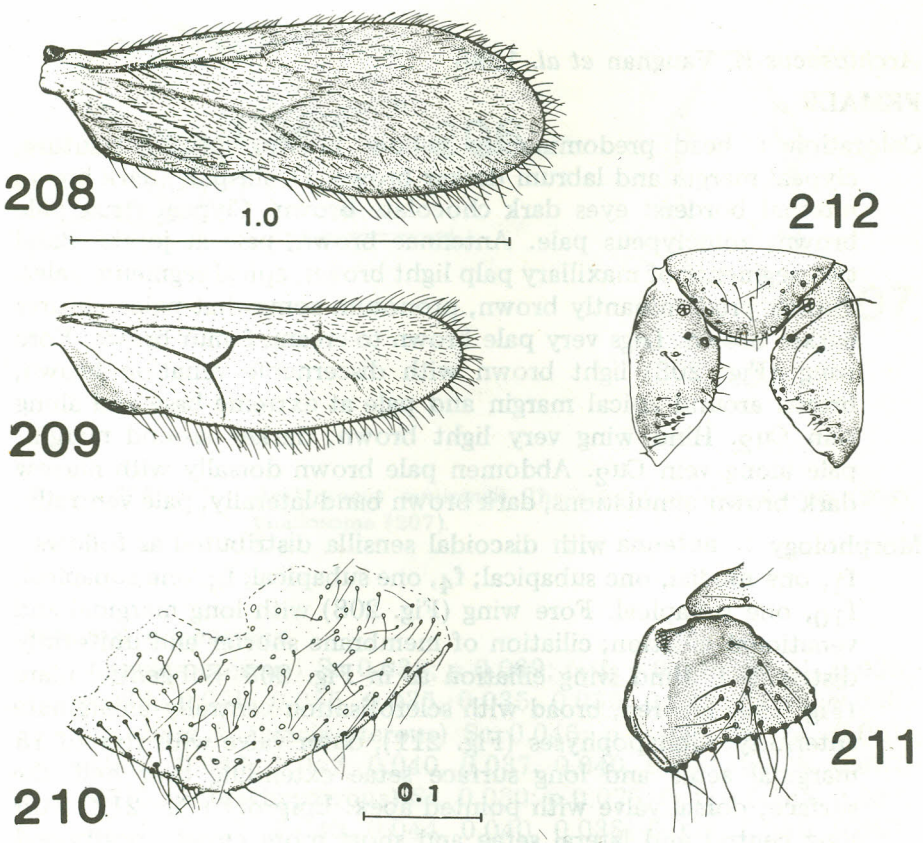
Coloration : head predominantly yellow brown, epicranial suture, clypeal margin and labrum darker brown. Ocelli pale, dark brown internal borders: eyes dark chocolate brown. Clypeal striae pale brown, anteclypeus pale. Antennae brown, pale at joints. Basal two segments of maxillary palp light brown, apical segments paler. Thorax predominantly brown, pronotum somewhat paler, sutures darker brown. Legs very pale brown to cream, femur brown. Fore wing (Fig. 208) light brown with discernable venation brown, brown around apical margin and pale at extreme base and along vein Cu_2. Hind wing very light brown, darker around margin, pale along vein Cu_2. Abdomen pale brown dorsally with narrow dark brown annulations, dark brown band laterally, pale ventrally.

Morphology : antenna with discoidal sensilla distributed as follows : f_1, one medial, one subapical; f_4, one subapical; f_6, one subapical; f_{10}, one subapical. Fore wing (Fig. 208) with long marginal and venational ciliation; ciliation of membrane shorter and uniformly distributed. Hind wing ciliation as in Fig. 209. Subgenital plate (Fig. 210) tapered, broad with sclerotisation centrally emarginate anteriorly. Gonapophyses (Fig. 211), outer valve with row of 13 marginal setae and long surface setae extending over half the surface; dorsal valve with pointed apex. Epiproct (Fig. 212) with long central and lateral setae and short more closely positioned setae apically. Paraproct (Fig. 212) with single trichobothrium and 5 long setae basally, marginal setae of intermediate length and a discrete apical field of shorter setae; seta Md much closer to La than to Mv.

Dimensions : B 1.3, FW 1.16, HW 0.98, F 0.285, T 0.41, t_1 0.071, t_2 0.075, t_1/t_2 0.95. Antenna : sc 0.04, p 0.071, f_1 0.78, f_2 0.059, f_3 0.059, f_4 0.062, f_5 0.039, f_6 0.059, f_7 0.037, f_8 0.047, f_{10} 0.047, f_{11} 0.78.

MALE : unknown.

Material examined : holotype, ♀, Indonesia, Krakatau Is., Panjang, 100m, general beating, 15.ix.1984.



Figures : 208 — 212 : *Archipsocus alternatus* : fore wing (208), hind wing (209), subgenital plate (210), gonapophyses (211), female epiproct and paraproct (212).

Figs. 208, 209 and 210 — 212 to common scales.

This species appears to be closely related to a species group defined by Badonnel (1977 : 133) which is characterised by having t_1 t_2, f_1 p, the antennal flagellum 'en dents de scie' (i.e. with antennal segments between f_4 and f_{10} alternating long and short), and having paraprocts with the seta Md closer to La than to Mv. Male characters are also used to characterise the group, so placement of this species is provisional.

Genus *Archipsocopsis* Badonnel

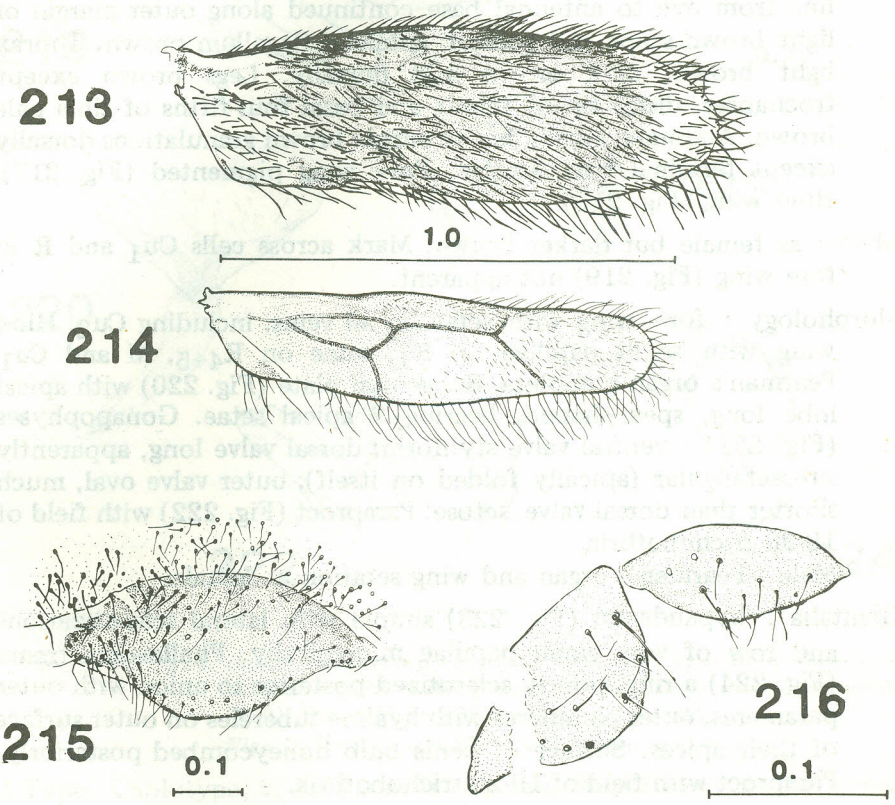
Archipsocopsis fernandi (Pearman)

(Figs. 213 — 216)

Archipsocus fernandi Pearman 1934 : 112.
Archipsocopsis fernandi (Pearman) Smithers 1967 : 77.

Material examined. Krakatau Is.: Rakata, 8ex; Panjang, 13ex; Sertung, 3ex; Anak Krakatau, 3ex; Java: Carita, 8ex; Sumatra, Pemekuhan, 1ex.

These individuals are clearly conspecific with females from Bali identified as this species by Thornton (1984). The fore wing markings appear to be distinctive. No males were collected.



Figures 213—216. *Archipsocus fernandi* (Pearman) : fore wing (213), hind wing (214), subgenital plate (215), epiproct and paraproct (216). Figs. 213, 214 to common scale.

FAMILY PHILOTARSIDAE

Genus *Haplophallus* Thornton

Haplophallus comptoni new species

(Figs. 217 — 224)

Haplophallus C, Vaughan *et al.* 1988.

Coloration

Female : vertex cream, diffuse brown markings above eye, on occiput and along either side of black epicranial suture. Ocellar protuberance black. Frons pale, median brown mark. Clypeus pale with brown striae, anterior margin brown. Anteclypeus pale, labrum dark brown. Maxillary palps black. Eyes black. Brown line from eye to antennal base continued along outer margin of light brown scape and pedicel; antennal flagellum brown. Thorax light brown, dark brown mid dorsally. Legs brown except trochanter, distal tip of femur and basal four-fifths of tibia pale brown. Abdomen cream, heavy purple brown granulations dorsally, except terminal two tergites. Fore wing pigmented (Fig. 217). Hind wing (Fig. 218).

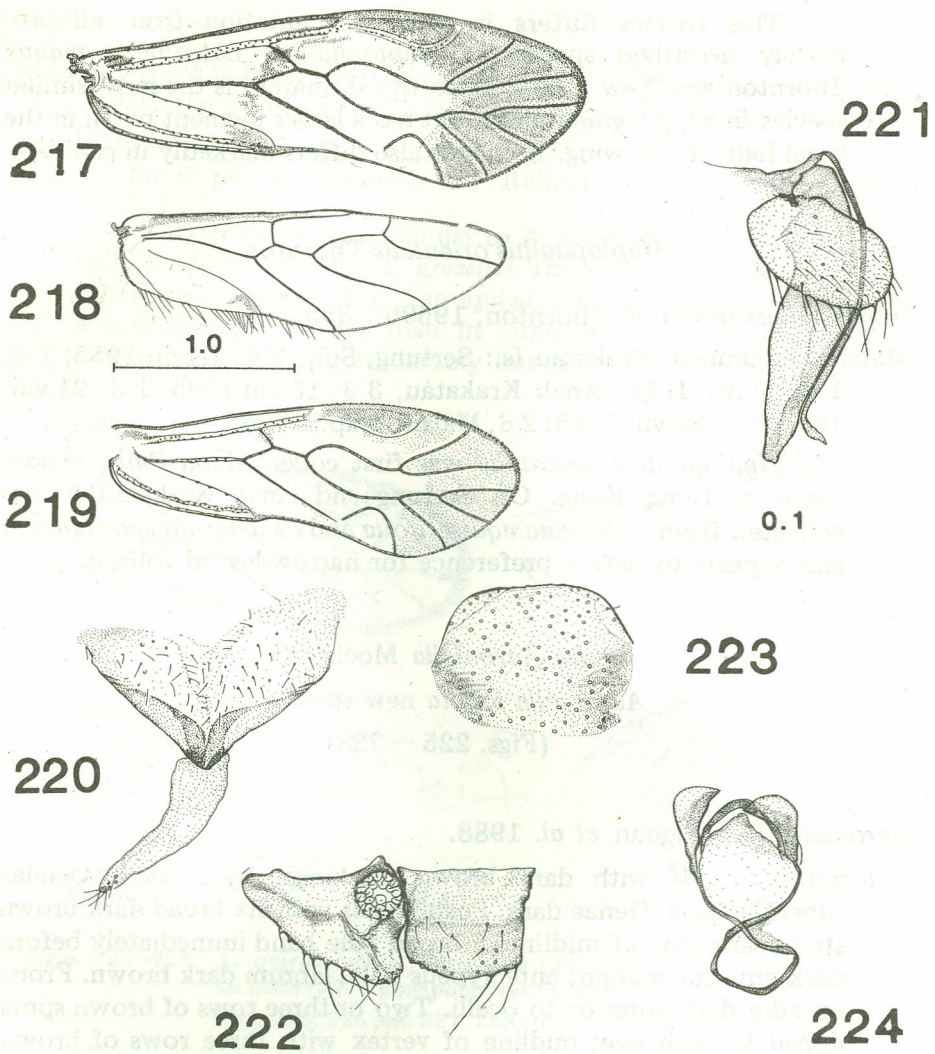
Male : as female but darker brown. Mark across cells Cu_1 and R in fore wing (Fig. 219) not apparent.

Morphology : fore wing with setae on all veins, including Cu_2. Hind wing with small papillae on R_1, setae on R_{4+5}, M and Cu_1. Pearman's organ complete. Subgenital plate (Fig. 220) with apical lobe long, spear-shaped, bearing 7 apical setae. Gonapophyses (Fig. 221) : ventral valve styliform; dorsal valve long, apparently subrectangular (apically folded on itself); outer valve oval, much shorter than dorsal valve, setose. Paraproct (Fig. 222) with field of 19-20 trichobothria.

Male : Pearman's organ and wing setation as female.

Genitalia : hypandrium (Fig. 223) simple with lateral sclerotizations and row of very small papillae mid-apically. Phallosome frame (Fig. 224) a ring, poorly sclerotized posterior to union with outer parameres, outer parameres with hyaline tubercles on outer surface of their apices. Surface of penis bulb honeycombed posteriorly. Paraproct with field of 19-20 trichobothria.

Dimensions. female B 2.0, FW 2.7, HW 2.2. F 0.39, T 0.82, t_1 0.24, t_2 0.04, t_3 0.04, t_1/t_2 6.00, t_2/t_3 1.00, ct 18. Male : B 1.6, FW 2.3, HW 1.75, F 0.33, T 0.66, t_1 0.21, t_2 0.06, t_3 0.04, t_1/t_2 3.5, t_2/t_3 1.5, ct 18.



Figures 217—224. *Haplophallus comptoni* : fore wing (217, 219), hind wing (218), subgenital plate (220), gonapophyses (221), female paraproct (222), hypandrium (223), phallosome (224).
Figs. 217 — 219 and 220 — 224 to common scales.

Types : holotype, ♀, Krakatau Is.: Rakata, West Ridge, 200m, beating, 1.ix.1984. Paratypes : 1 ♂, same data as holotype. Rakata, 1 ♀, 5.ix.1984; 250m, 1 ♂, 12.ix.1984; 1 ♂, 25.viii.1985; Anak Krakatau, 1 ♀, 21.viii.1985; Panjang, 1 ♂, 1 ♀, 3.ix.1984; 1 ♀, 16.viii. 1985; 1 ♀, 17.viii.1985.

This species differs in wing pigmentation from all previously described species of *Haplophallus*. *Latrobiella manus* Thornton and New (1977) from the Bismarcks is the most similar species in wing pigmentation, but has a larger pigment patch in the basal half of the wing. *L. manus* also differs markedly in genitalia.

Haplophallus orientalis Thornton

Haplophallus orientalis Thornton, 1959b : 336.

Material examined. Krakatau Is.: Sertung, Spit, 2 ♀, 18.viii.1985; 1 ♂, 1 ♀, 19.viii.1985; Anak Krakatau, 3 ♂, 15.viii.1985; 1 ♂, 21.viii. 1985; 1 ♂, 22.viii.1985; 2 ♂, Malaise trap.ix.1986.

Haplophallus orientalis was first collected on *Pinus massoniana* in Hong Kong. On Sertung and Anak Krakatau it was collected from *Casuarina equisetifolia* and *Saccharum spontaneum* and appears to have a preference for narrow-leaved foliage.

Genus *Aaroniella* Mockford

Aaroniella lobata new species

(Figs. 225 — 228)

Aaroniella B, Vaughan *et al.* 1988.

Coloration : buff with dark brown markings. Eyes black. Ocellar tubercle black. Genae dark. Postclypeus with six broad dark brown striae each side of midline, a broad pale band immediately before dark anterior margin; anteclypeus pale; labrum dark brown. Frons broadly dark anterior to ocelli. Two or three rows of brown spots dorsal to each eye; midline of vertex with three rows of brown spots, these enlarged posteriorly. Palpi and antennae dark brown, intersegmental areas pale. Thorax dorsally dark brown, sutural lines and pleura pale. Legs dark brown, extremities of F and F irregularly pale. Abdomen pale. Fore wing (Fig. 225) with greyish brown shading. Hind wing hyaline. Wing venation as in Figs. 225, 226.

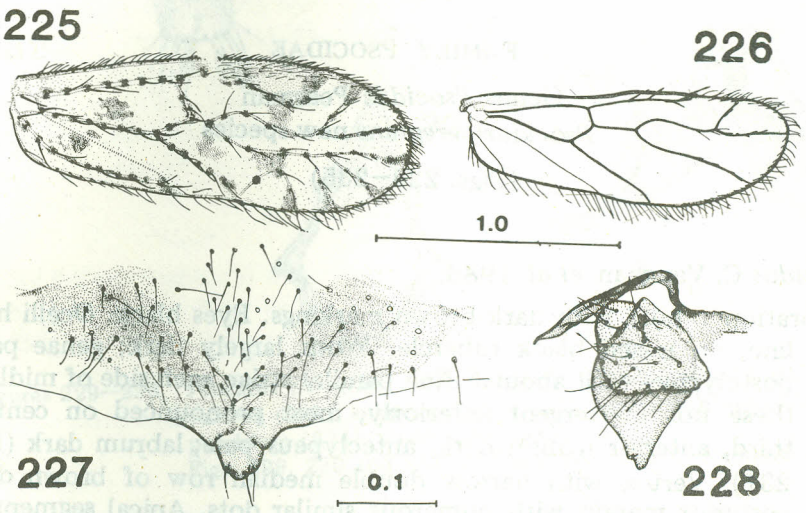
Female : subgenital plate (Fig. 227) with short rounded apical insert with four setae, sclerotisation pattern rather broad. Gonapophyses (Fig. 228): external valve large, dorsal valve with narrow rounded apex, ventral valve rather short.

Male : unknown.

Dimensions : FW 1.63, HW 1.35, F_1 0.150, f_2 0.100, f_1/f_2 1.5, F 0.33, T 0.61, t_1 0.19, t_2 0.04, t_3 0.04, t_1/t_2 4.75, t_2/t_3 0.80, ct 11, 0, 0.

Type : holotype, ♀, Krakatau Is.: Rakata, Owl Bay, 27.xi.1982.

This species is rather similar to *A. lombokensis* Thornton *et al.* (1981) (Lombok) and *A. gressitti* Thornton Lee & Chui (1972) (Micronesia, Manus Is.). The apical lobe of the subgenital plate is considerably shorter than in either of these species, and the fore wing markings considerably less extensive than in *A. gressitti*.



Figures 225—228. *Aaroniella lobata* : fore wing (225), hind wing (226), subgenital plate (227), gonapophyses (228).
Figs. 225, 226 and 227, 228 to common scales.

FAMILY HEMIPSOCIDAE

Genus *Hemipsocus* Selys-Longchamps

Hemipsocus africanus Enderlein

Hemipsocus africanus Enderlein, 1907 : 33.

Material examined. Krakatau Is.: Rakata, 6ex, 24 and 25.viii.1985; Java, Ujung Kulon, Cidaon, 1ex, 22.ix.1984.

This is very widely distributed species, and may be expected to occur on the other islands of the Krakatau archipelago.

Hemipsocus luridus Enderlein

Hemipsocus chloroticus (Hagen) var. *luridus* Enderlein, 1903 : 235.

Hemipsocus luridus Enderlein : Karny, 1932 : 126.

For full synonymy, see Thornton, 1984 : 124.

Material examined. Krakatau Is.: Rakata, Owl Bay, 22.ix.1984, 2ex; Panjang, 14.ix.1984 and 16.viii.1985, 4ex; Java, Ujung Kulon, Gunung Payung, 23.ix.1982. 1ex.

This widely distributed oriental species has been recorded from Malaysia, Singapore, Sumatra, Java and Lombok, inter al.

FAMILY PSOCIDAE

Genus *Psocidus* Pearman

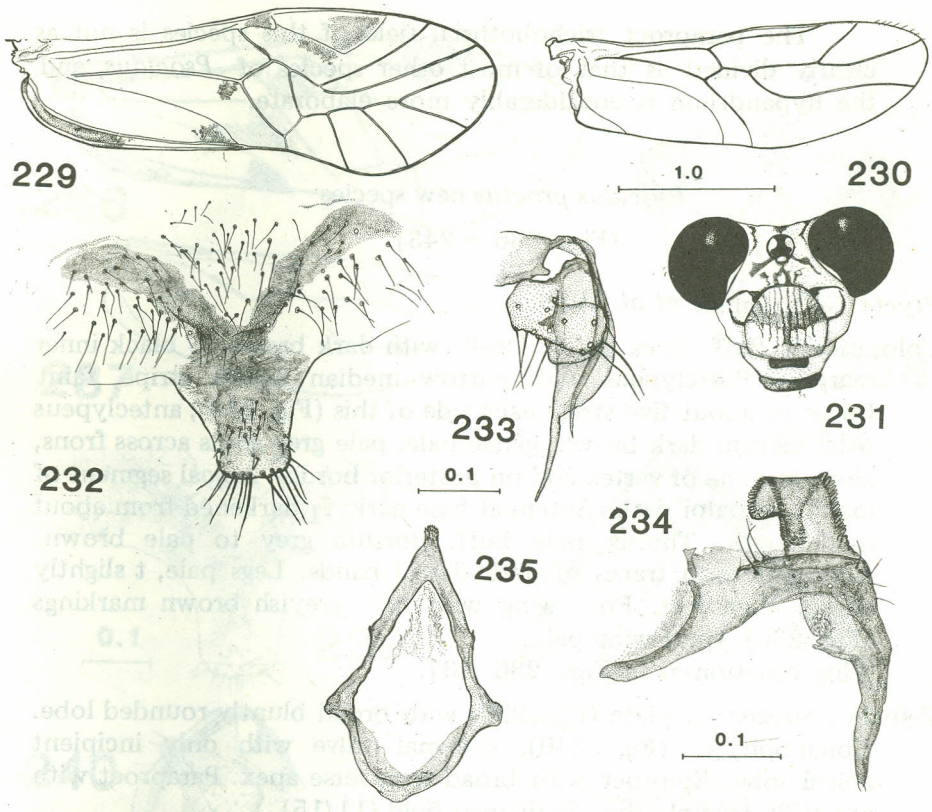
Psocidus peregrans new species

(Figs. 229—235)

Psocidus C, Vaughan *et al.* 1988.

Coloration : buff, with dark brown markings. Eyes black. Ocelli hyaline, on raised black tubercle. Frons largely dark; genae pale; postclypeus with about 6 fine parallel striae each side of midline, these not convergent anteriorly, most pronounced on central third, anterior margin dark; anteclypeus pale; labrum dark (Fig. 231). Vertex with narrow double median row of brown dots, posterior margin with numerous similar dots. Apical segment of maxillary palp dark brown. Antennal base and f_1 pale, remainder black to dark brown. Thorax dorsally dark brown, a pale median streak along much of mesoscutum; anterior of metanotum pale; pleura pale. Abdomen pale, traces of dark bands and lateral stripe, genitalia dark brown. Legs buff; apex of T, whole of t dark brown. Fore wing slightly fumose, shading dark brown. Hind wing hyaline. Wing venation as in Figs. 229, 230.

Female : subgenital plate (Fig. 232) with broad transverse apical lobe and row of strong apical setae. Gonapophyses (Fig. 233): external valve large, dorsal valve with long apical process. Epiproct trapezoidal. Paraproct with about 19 trichobothria, mainly widely spaced.



Figures 229—235. *Psocidus peregrans* : fore wing (229), hind wing (230), facial pattern (231), subgenital plate (232), gonapophyses (233), hypandrium (234), phallosome (235).
Figs. 229, 230 and 232, 233 and 234, 235 to common scales.

Male : hypandrium (Fig. 234) with long laterally toothed dorsal process. Phallosome (Fig. 235) with slender tuberculate apex, lateral flanges prominent at about one third distance from base. Epiproct broadly rounded. Paraproct with about 30 trichobothria, field incipiently divided.

Dimensions : FW 2.65-2.85, HW 1.99-2.25, (♂) f_1 0.77, f_2 0.06, f_1/f_2 1.28, F 0.65, T 1.30, t_1 0.44, t_2 0.16, t_1/t_2 2.75, ct 26, 2.;(♀) f_1 0.48, F 0.05, T 1.07, t_1 0.32, t_2 0.11, t_1/t_2 2.91, ct 18, 0.

Types : holotype, ♂, Krakatau Is.: Anak Krakatau, Malaise trap on rim of outer cone, 24.viii.1985. Paratypes : 4 ♂, 2 ♀, same data as holotype; 1 ♀, Malaise trap on inner cone, 23-24.viii.1985; 1♂, water trap on SW shore, 14-24.viii.1985; 4♀, beat ex *Casuarina* 2.ix.1984 (2), 15.viii.1985 (2).

The paraproct trichobothrial field of this species is not as clearly divided as that of most other species of *Psocidus*, and the hypandrium is considerably more elaborate.

Psocidus proctus new species

(Figs. 236 — 243)

Ptycta C, Vaughan *et al.* 1988.

Coloration : Buff. Eyes black. Ocelli with dark brown to black inner margins. Postclypeus with narrow median brown stripe, faint traces of about five striae each side of this (Fig. 238); anteclypeus pale; labrum dark brown; genae pale; pale grey spots across frons, along midline of vertex and on posterior border. Apical segment of maxillary palpi dark. Antennal base dark; f_1 darkened from about half length. Thorax pale buff, dorsum grey to pale brown. Abdomen with traces of dark dorsal bands. Legs pale, t slightly darker than rest. Fore wing with pale greyish brown markings (Fig. 236). Hind wing pale.
Wing venation as in Figs. 236, 237.

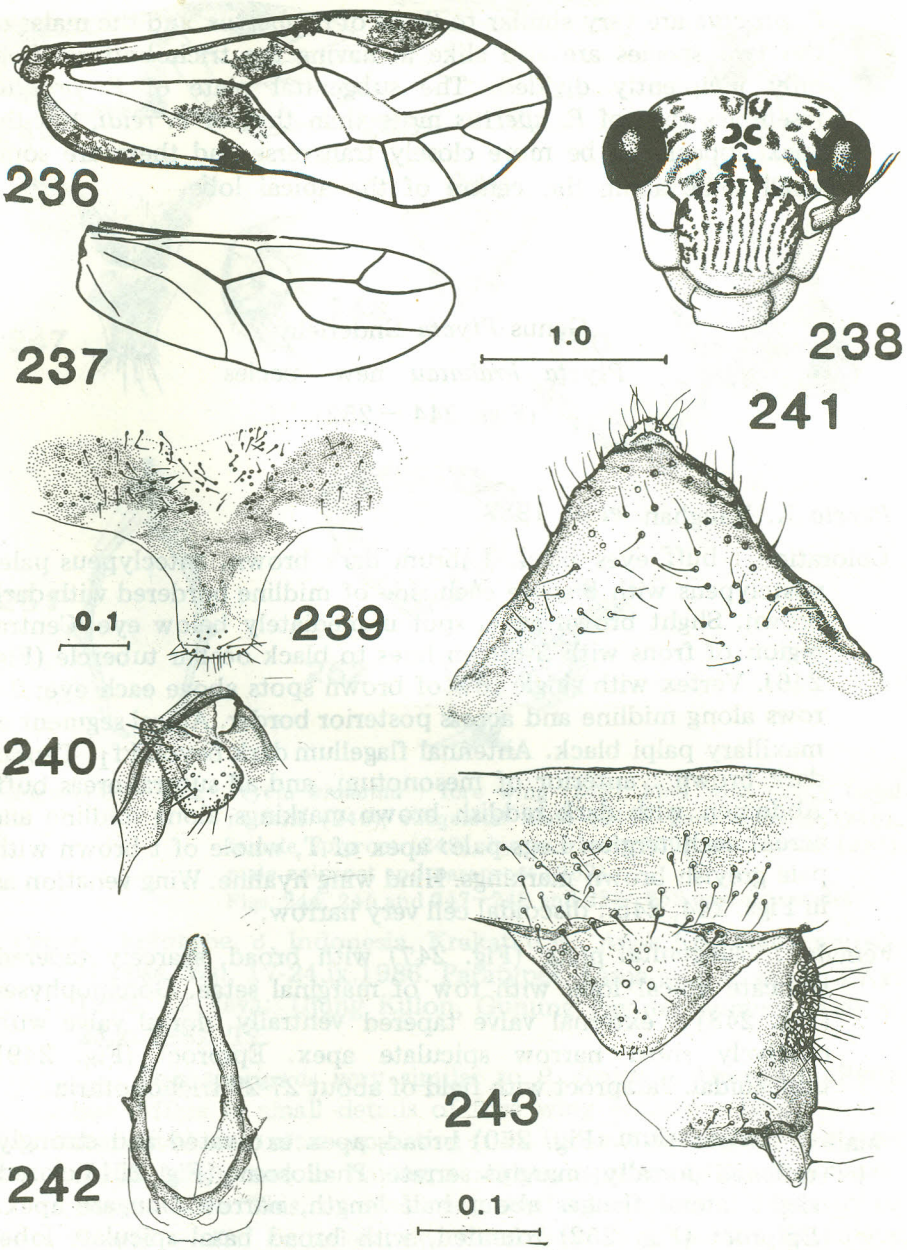
Female : subgenital plate (Fig. 239) with broad bluntly rounded lobe. Gonapophyses (Fig. 240); external valve with only incipient apical lobe. Epiproct with broad transverse apex. Paraproct with about 26 trichobothria in divided field (11/15).

Male : hypandrium (Fig. 241) with unsclerotised symmetrical apex. Phallosome frame (Figs. 242) elongate, open, arms very close at apex. Epiproct (Fig. 243) strongly tapered. Paraproct (Fig. 243) with about 25 trichobothria arranged in elongate incipiently divided field.

Dimensions : FW 2.66, HW 2.03, f_1 0.540, f_2 0.450, f_1/f_2 1.20, F 0.490, T 1.090, t_1 0.350, t_2 0.090, t_1/t_2 3.90, ct 19,0.

Types : holotype, ♂, Krakatau Is.: Anak Krakatau, w.shore, Malaise trap, 29.ix.1986. Paratypes, 14 ♂, 14 ♀, same data; 1 ♀, beaten from *Casuarina*, 15.viii.1985; 1 ♀, Rakata, summit, 28-29.ix.1983.

This species is clearly related to other Oriental species of *Psocidus* s.str., including *P. apertus* Thornton (1984) (Bali) and *P. reidi* Thornton (1984) (Lombok, Bali, Madura). The subgenital plate lobe is shorter than in either of these species, and the fore wing of both is hyaline. The phallosome and hypandrium of



Figures 236—243. *Psocidus proctus* : fore wing (236), hind wing (237), facial pattern (238), subgenital plate (239), gonapophyses (240), hypandrium (241), phallosome (242), male epiproct and para proct (243).

Figs. 236, 237 and 239, 240 and 241-243 to common scales.

P. proctus are very similar to those of *P. apertus*, and the males of the two species are also alike in having the trichobothrial field only incipiently divided. The subgenital plate of *P. proctus* resembles that of *P. apertus* more than that of *P. reidi*, but the apex appears to be more closely transverse and there are some small setae along the centre of the apical lobe.

Genus *Ptycta* Enderlein

Ptycta krakatau new species

(Figs. 244 — 252)

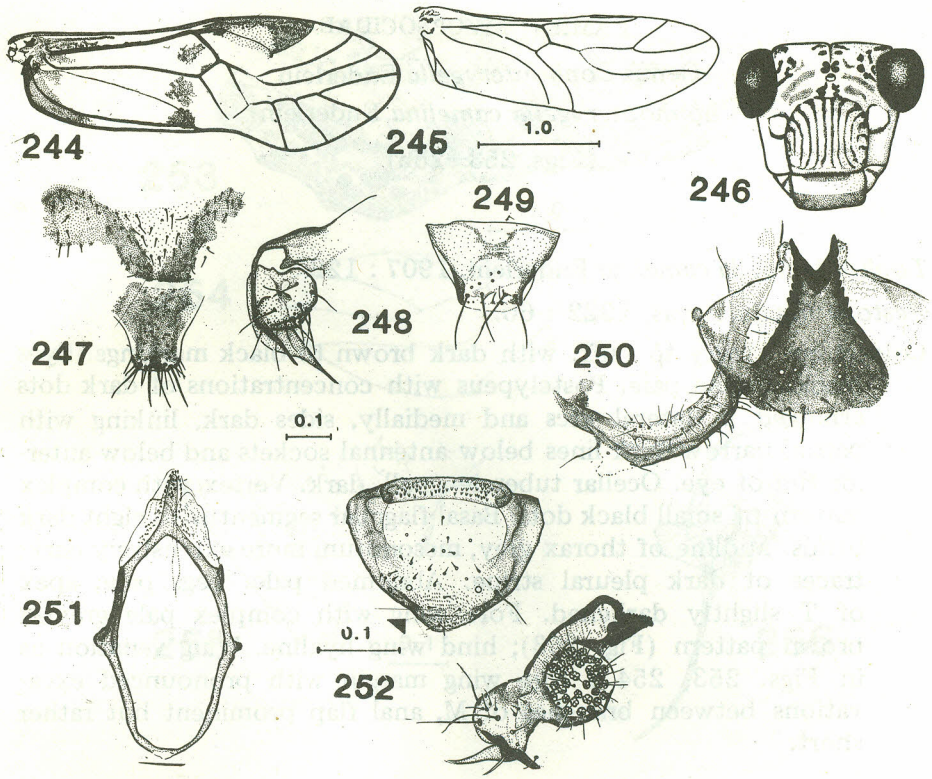
Ptycta K, Vaughan *et al.* 1988.

Coloration : buff eyes black. Labrum dark brown; anteclypeus pale; postclypeus with 5 striae each side of midline bordered with dark brown. Slight brown genal spot immediately below eye. Central region of frons with 2 brown lines to black ocellar tubercle (Fig. 246). Vertex with single row of brown spots above each eye; 2-3 rows along midline and across posterior border. Apical segment of maxillary palpi black. Antennal flagellum dark beyond f_1. Thorax dark brown : anterior of mesonotum, and all sutural areas buff. Abdomen with dark reddish brown markings along midline and across each tergite. Legs pale: apex of T, whole of t brown with pale greyish brown markings. Hind wing hyaline. Wing venation as in Figs. 244, 245 : discoidal cell very narrow.

Female : subgenital plate (Fig. 247) with broad, scarcely tapered truncate apical lobe with row of marginal setae. Gonapophyses (Fig. 248) : external valve tapered ventrally, dorsal valve with relatively short narrow spiculate apex. Epiproct (Fig. 249) trapezoidal. Paraproct with field of about 27-29 trichobothria.

Male : hypandrium (Fig. 250) broad, apex excavated and strongly reflexed dorsally, margins serrate. Phallosome (Fig. 251) closed, slight lateral flanges about half length, narrow elongate apex. Epiproct (Fig. 252) rounded, with broad basal spiculate lobe. Paraproct (Fig. 252) with field of about 38 small trichobothria.

Dimensions : FW 3.29, HW 2.54, f_1 0.98, f_2 0.74, f_1/f_2 1.32, F 0.72, T 1.56, t_1 0.48, t_2 0.15, t_1/t_2 3.20, ct 24, 2.



Figures 244—252. *Ptycta krakatau* : fore wing (244), hind wing (245), facial pattern (246), subgenital plate (247), gonapophyses (248), female epiproct (249), hypandrium (250), phallosome (251), male epiproct and paraproct (252).
Figs. 244, 245 and 247—249 and 250—252 common scales

Types : holotype, ♂, Indonesia, Krakatau Is., Anak Krakatau, campsite Malaise trap, 17-24.ix.1986. Paratypes, Panjang, n.e. shore, 27.xi. 1982, 1♀; Java: Ujung Kulon, Gunung Payung, summit, 480 m, 23.xi.1982, 1♀.

This species is very similar to *P. frontalis* Thornton (Bali), but differs in small details of fore wing venations (such as the straight M stem after separating from Rs, and the slightly narrower radial fork), and in having a slightly smaller external gonapophyses valve. This, or other very similar Indonesian forms may be *Ptycta schillei* Enderlein, described from Java and the Krakataus, but because of the complexity of this generic group, this cannot be decided unless the type can be traced and examined in detail. Although the male epiproct grossly resembles that of *P. precincta* Thornton (Bali, Lombok), and other genitalic features of the two species are also similar, the fore wings differ considerably.

FAMILY MYOPSOCIDAE

Genus *Lophopterygella* Enderlein

Lophopterygella camelina Enderlein

(Figs. 253—256)

Lophopterygella camelina Enderlein, 1907 : 122.

Festona lunata Navas, 1922 : 60.

Coloration : ivory to buff, with dark brown to black markings. Eyes black. Genae pale. Postclypeus with concentrations of dark dots arranged in lateral arcs and medially, sides dark, linking with partial narrow dark lines below antennal sockets and below anterior rim of eye. Ocellar tubercle small, dark. Vertex with complex pattern of small black dots. Basal flagellar segment with eight dark bands. Midline of thorax grey, mesonotum more extensively dark; traces of dark pleural stripe. Abdomen pale. Legs pale, apex of T slightly darkened. Fore wing with complex pale greyish brown pattern (Fig. 253); hind wing hyaline. Wing venation as in Figs. 253, 254 : fore wing margin with pronounced excavations between branches of M, anal flap prominent but rather short.

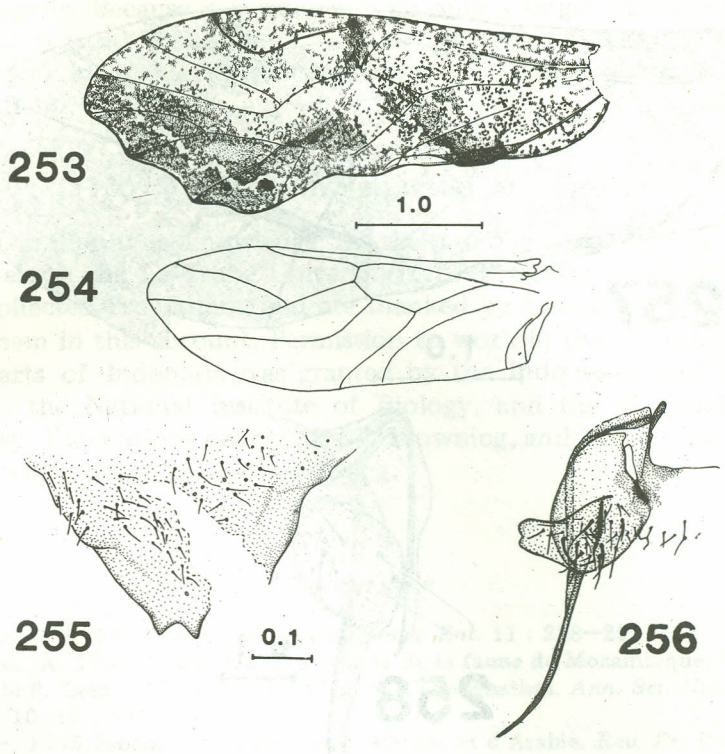
Female : subgenital plate (Fig. 255) broad, with slight apical notch. Gonapophyses (Fig. 256).

Male : not available.

Dimensions : B 3.6, FW 4.17, HW 3.16, f_1 1.390, f_2 0.820, f_1/f_2 1.695; F 0.860; T 1.670; t_1 0.55; t_2 0.08; t_3 0.10; t_1/t_2 6.87; t_2/t_3 0.80; ct 27, 1, 2.

Material examined : 1 ♀, Krakatau Is.: Panjang, beaten, 30—60m, 15.ix.1984.

Although the type of *L. camelina* has not been examined this specimen corresponds closely to details given in Enderlein's (1907) description. The fore wing is very distinctively patterned, and overall much lighter than that of the following species.



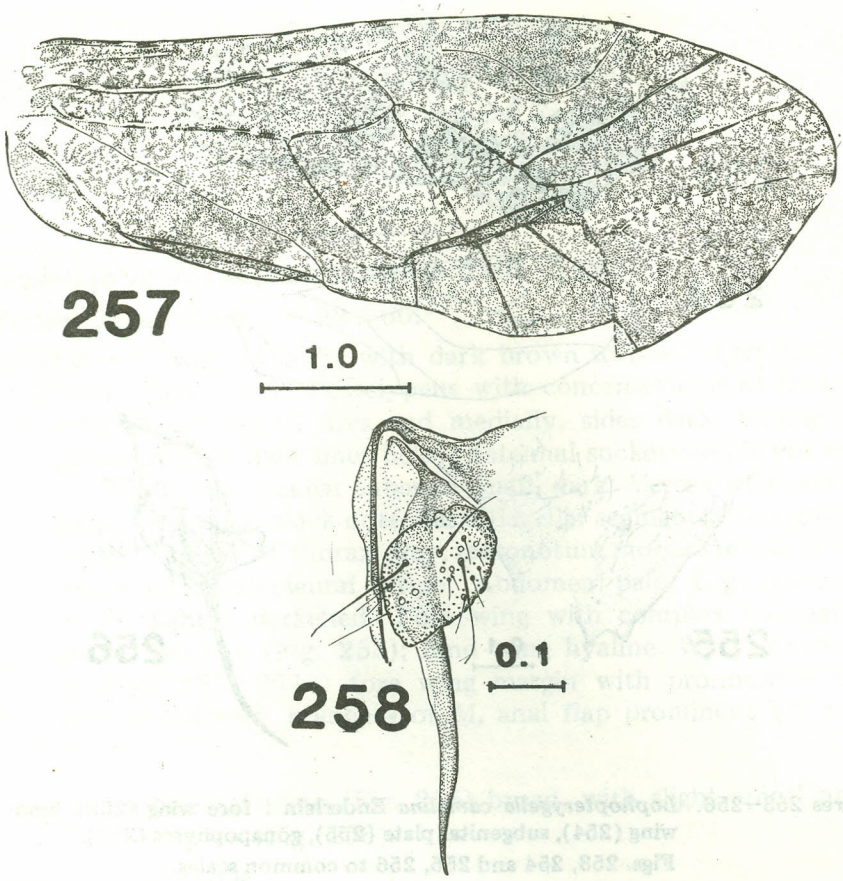
Figures 253—256. *Lophopterygella camelina* Enderlein : fore wing (253), hind wing (254), subgenital plate (255), gonapophyses (256). Figs. 253, 254 and 255, 256 to common scales.

Lophopterygella sp.

(Figs. 257, 258)

Lophopterygella D, Vaughan *et al.* 1988.

Coloration : buff with brown markings. Eyes black. Genae, posterior of anteclypeus, labrum dark brown; anterior of postclypeus striated; vertex midline dark, arcs of darker brown dorsal to each eye and flanking ocellar tubercle. Antennae pale, apex of flagellar segments dark brown. Thorax dorsally dark, pleura with extensive white/buff areas. Legs : coxa I pale, coxae II, III darker brown; F with extensive brown banding; apex of T and t_1, whole of t_2 and t_3 dark brown. Abdomen pale brown. Fore wing with fine greyish brown mottling (Fig. 257).



Figures 257—258. *Lophopterygella* sp. : fore wing (257), gonapophyses (258).

Female : (subgenital plate broken). Gonapophyses (Fig. 258) : external valve large, angled; ventral valve very short.

Male : unknown.

Dimensions : FW 5.64, f_1 0.90, f_2 0.88, f_1/f_2 1.02, F 1.10, T 2.04, t_1 0.66, t_2 0.08, t_3 0.08, t_1/t_2 8.25, t_2/t_3 1.00, ct 24.1.1.

Material examined. 1 ♀, Krakatau Is.: Rakata, Zwarte Hoek, 12.ix.1984.

This species differs clearly in fore wing pattern from *L. camelina*, as well as having a much darker body. The fore wing marginal excavations are also less pronounced than in *L. camelina*, but clearly sufficient to include this unusual individual in *Lophop-*

terygella. Because it is known from only a single damaged individual, it is not named here, but the description and figures provided should enable its recognition when further material comes to hand.

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