

**Insects of Samoa and other Samaan terrestrial arthropoda. Pt. 6, Fasc. 2,  
Nematocera / by F.W. Edwards.**

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Edwards, F. W. 1888-1940.

**Publication/Creation**

[Place of publication not identified] : [publisher not identified], [1928?]

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INSECTS OF SAMOA  
AND OTHER SAMOAN TERRESTRIAL  
ARTHROPODA

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NEMATOCERA

By F. W. EDWARDS, M.A.

[Reprinted from "Insects of Samoa," Part VI., Fascicle 2—Diptera, published by the Trustees of the  
British Museum, 23rd June, 1928]





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# INSECTS OF SAMOA

PART VI. FASC. 2

NEMATOCERA\*

BY F. W. EDWARDS, M.A.

(With 20 Text-figures.)

UNTIL 1926 the Nematocerous Diptera of Samoa were practically unknown, the only published records relating to six species of Culicidae and five of Tipulidae.† The material obtained by the Buxton and Hopkins expedition, together with that in the possession of the Bishop Museum, Honolulu, raises the total number of species of Nematocera to 100. Although this total is certainly far short of the number which exist on the islands, it is sufficiently large to enable us to draw provisional conclusions as to the nature and origin of the fauna. These conclusions may require modification when the Nematocera of adjoining regions are better known; unfortunately, except in the case of mosquitoes, this suborder has been very little collected as yet in Polynesia, Fiji, Melanesia, or Papua.

The general evidence provided by the Nematocera is entirely in accord with that which has been deduced from the study of other groups; that is to say that the Samoan fauna is purely of Austro-Malayan origin, and shows no connection whatever with New Zealand or South America, nor even with Australia, except in so far as the tropical Austro-Malayan fauna extends into the northern part of that continent. There are considerable resemblances, but almost equally

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\* This report embraces all groups of Nematocera except the gall-midges of the subfamily Cecidomyiinae, which are discussed by H. F. Barnes in a separate paper in this fascicle. The four Cecidomyiinae, however, are included in the total of 100 species mentioned in the introduction to this paper.

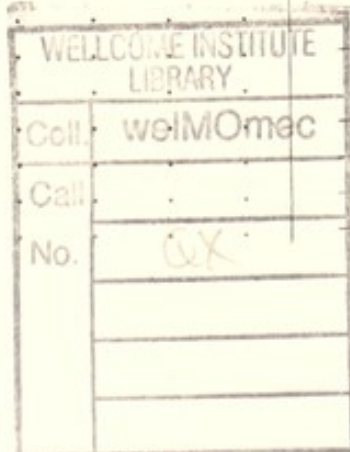
† I am informed by Dr. W. Horn that no Samoan Nematocera are contained in the collection of the German Entomological Institute; and Prof. G. Enderlein writes that the only species represented in the Berlin Zoological Museum is *Aedes kochi* Dön. var. *samoana* Grünb.



noteworthy differences between the Nematocerous fauna of Samoa and of Fiji; from which we may probably conclude that a large part of the fauna has reached Samoa directly and not through Fiji.

The following summary indicates the genera hitherto found in Samoa, with the number of species of each arranged according to their known distribution:

Family, genus or subgenus.	Undeter- mined.	Samoa only.	Samoa and Fiji only.	Wider external distribu- tion.	Total Samoan species.
<b>MYCETOPHILIDAE.</b>					
<i>Macrocera</i> . . . . .	—	1	—	—	1
<i>Platyura</i> . . . . .	—	1	—	—	1
<i>Manota</i> . . . . .	—	1	—	—	1
<i>Zygophronia</i> . . . . .	—	1	—	—	1
<i>Exechia</i> . . . . .	—	1	—	—	1
<i>Delopsis</i> . . . . .	—	2	—	—	2
<i>Sciara</i> . . . . .	2	—	—	1	3
<i>Phorodonta</i> . . . . .	—	1	—	1	2
<i>Plastosciara</i> . . . . .	—	—	1	1	2
<i>Scythropochroa</i> . . . . .	—	—	1	—	1
<i>Dodecasciara</i> . . . . .	—	—	1	—	1
<b>CECIDOMYIIDAE.</b>					
<i>Anarete</i> . . . . .	—	1	—	—	1
<i>Lestremia</i> . . . . .	—	1	—	—	1
<i>Lestodiplosis</i> . . . . .	1	—	—	—	1
<i>Allobremia</i> . . . . .	—	1	—	—	1
<i>Liebeliola</i> . . . . .	—	1	—	—	1
<i>Phaenepidosis</i> . . . . .	—	1	—	—	1
<b>SCATOPSIDAE.</b>					
<i>Swammerdamella</i> . . . . .	—	—	1	—	1
<b>ANISOPODIDAE.</b>					
<i>Mesochria</i> . . . . .	—	1	—	—	1
<b>CULICIDAE.</b>					
<i>Aedes</i> ( <i>Stegomyia</i> ) . . . . .	—	—	—	2	2
„ ( <i>Finlaya</i> ) . . . . .	—	—	—	1	1
„ ( <i>Aëdimorphus</i> ) . . . . .	—	—	—	1	1
<i>Culex</i> . . . . .	—	1	—	2	3
<b>CERATOPOGONIDAE.</b>					
<i>Forcipomyia</i> . . . . .	—	3	—	2	5
<i>Lasiohelea</i> . . . . .	—	1	—	—	1
<i>Atrichopogon</i> . . . . .	—	2	—	1	3
<i>Dasyhelea</i> . . . . .	—	1	—	1	3
<i>Culicoides</i> . . . . .	—	—	1	—	1
<i>Ceratopogon</i> . . . . .	—	1	—	—	1
<i>Stilobezzia</i> . . . . .	—	1	—	—	1
<i>Bezzia</i> . . . . .	—	1	—	—	1



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Family, genus or subgenus.	Undetermined.	Samoa only.	Samoa and Fiji only.	Wider external distribution.	Total Samoan species.
CHIRONOMIDAE.					
<i>Ablabesmyia</i> . . . . .	1	1	—	1	3
<i>Thalassomyia</i> . . . . .	—	1	—	—	1
<i>Clunio</i> . . . . .	—	1	—	—	1
<i>Orthocladus</i> . . . . .	—	1	—	—	1
<i>Tanytarsus</i> . . . . .	—	3	—	—	3
<i>Pontomyia</i> . . . . .	—	1	—	—	1
<i>Chironomus</i> . . . . .	2	2	—	—	4
PSYCHODIDAE.					
<i>Brunettia</i> . . . . .	—	—	1	—	1
<i>Lepidopsychoda</i> . . . . .	—	—	1	—	1
<i>Psychoda</i> . . . . .	—	2	—	2	4
TIPULIDAE.					
<i>Dicranomyia</i> (s. str.) . . . . .	—	2	1	—	3
„ ( <i>Idioglochina</i> ) . . . . .	—	1	—	—	1
„ ( <i>Alexandriaria</i> ) . . . . .	—	1	—	—	1
<i>Thrypticomys</i> . . . . .	—	—	1	1	2
<i>Pseudoglochina</i> . . . . .	—	1	—	—	1
<i>Libnotes</i> . . . . .	—	1	1	4	6
<i>Rhipidia</i> . . . . .	—	1	—	—	1
<i>Geranomyia</i> . . . . .	—	1	—	—	1
<i>Helius</i> . . . . .	—	1	—	—	1
<i>Toxorhina</i> . . . . .	—	1	—	—	1
<i>Styringomyia</i> . . . . .	—	—	—	1	1
<i>Empeda</i> . . . . .	—	1	—	—	1
<i>Gonomyia</i> ( <i>Lipophleps</i> ) . . . . .	—	4	—	—	4
<i>Trentepohlia</i> ( <i>Mongoma</i> ) . . . . .	—	8	1	—	9
Total . . . . .	7	60	11	22	100

It is probable that the proportion of endemic species indicated is somewhat too high, because some of these regarded provisionally as endemic will no doubt be found to occur in Fiji or elsewhere. But it is very remarkable that the proportions indicated are exactly the same as those found by Meyrick (*Ins. Samoa*, Pt. III, Fasc. 2, p. 65, May, 1927) to exist among the Microlepidoptera: 6 endemic species to 1 Polynesian and 2 apodemic. Of the 51 genera represented, 39 contain endemic species, a similar proportion to that in the Microlepidoptera; the average number of species per genus in both groups is less than two. The great majority of the genera are of universal distribution, most



of the remainder being palaeotropical. Only four of the genera appear to be endemic to the Pacific, *Zygophronia* and *Dodecasciara* among the Mycetophilidae, *Allobremia* among the Cecidomyiidae and *Pontomyia* among the Chironomidae. Of these three *Dodecasciara* has been found in Fiji and may perhaps prove to be an introduction; the other three have at present been found only in Samoa. All are monotypic.

Only one genus (*Trentepohlia*) has undergone an extensive local development; in most other cases where several species of a genus occur (e.g. *Chironomus*, *Libnotes*) they are unrelated, and evidently reached Samoa independently.

Hopkins (*Ins. Samoa*, Pt. III, Fasc. 1, p. 5, April, 1927) has suggested in his account of the butterflies that the fauna of Western Samoa (Upolu and Savaii) may have come in part directly from New Guinea, and that of American Samoa (Tutuila and the Manua group) mainly by way of Fiji and Tonga. The collections of Nematocera afford little evidence for or against this suggestion, largely because of the scantiness of the material from the American islands. Only three species in the collection have been obtained on Tutuila and not on Upolu or Savaii; one of these (*Plastosciara flavibasis*) has also been found in Fiji. Seven others (apart from apodemic species) have been found on Tutuila as well as on the other islands, and two of these (*Dodecasciara debilis* and *Trentepohlia brevicellula*) are also known from Fiji.

There is no indication in the material studied of any tendency to the formation of distinct island races within the Samoan group. A large number of species have been obtained from more than one island, but so far as observed the variation which occurs is individual only and not local.

As regards local distribution, two conclusions seem to be indicated from a study of the available data: (1) most of the apodemic species are found chiefly at the low levels, although several (e.g. *Plastosciara pacifica*, *Aedes variegatus*, *Atrichopogon jacobsoni*) have penetrated into the mountains; (2) many more species are found in the higher forests than in the coastal belt.

By far the greater number of species belong to genera whose members are known to breed in decaying or fermenting organic matter. This applies to all the Sciarinae, some at least of the Cecidomyiidae, the single Scatopsid and Anisopodid, all the Ceratopogonidae except *Stilobezzia* and *Bezzia*, all the Psychodidae, and also *Dicranomyia*, *Libnotes*, *Rhipidia*, *Styringomyia* and probably others among the Tipulidae. Such species would readily find lodgment



in small collections of humus in ships or canoes, especially those carrying cattle, and this has no doubt been the means of transport of most of the apodemic species. It is known that before the coming of the white man Samoa was definitely a centre of dispersion for Polynesians, who used big canoes holding up to 100 men and carrying roots and food for long voyages. There are some indications that certain insects spread during these early voyages may have been differentiated since into definite local races (*e.g.* *Aedes variegatus* var. *pseudocutellaris* and *A. kochi* var. *samoana*). In prehuman times humus-feeding species may very well have made use of driftwood.

Wind has also with little doubt been an important factor in the colonisation of the islands. Buxton (*Researches in Polynesia and Melanesia*, p. 50, 1927) has pointed out that in the upper air there is a constant strong wind blowing from the west or north, although the surface air currents are more variable and mainly in the opposite direction. It will be noted that all the Samoan Nematocera are either small or very lightly built; the more heavily-built forms, such as the Bibionidae and the larger Tipulidae, are absent.

The distribution and affinities of the Samoan Nematocera are further discussed below under the separate families.

Except where otherwise stated, the types of new species are in the British Museum (Natural History); a few unique specimens from the Bishop Museum collection have been returned to that institution.

### MYCETOPHILIDAE

No species of this family have been recorded from Samoa, but sixteen are represented in the collection before me. This is not a large number, but probably represents a fair proportion of those existing in the islands, because at my request Mr. Buxton paid special attention to this family. The fungus-gnats have been well collected in New Zealand, where they form a dominant element of the fauna throughout the country, and it was thought possible that there might be some northward extension of this fauna into the Pacific. The collections obtained show that if there is any such northward extension it has certainly not reached Samoa. Excluding the Sciarinae, which are humus feeders and therefore easily spread, only seven species were found, most of which show affinities with Malayan forms.



The predominance of the subfamily Sciarinae (56 per cent. of the total number of species collected) is in accordance with findings in other parts of the tropics, but affords a striking contrast with the New Zealand fauna, where only 7.5 per cent. of the total number of species belong to the Sciarinae. All the other subfamilies appear to attain their full representation only in temperate regions.

Eleven of the species are described as new, two of them being placed in new genera. In both cases the characters on which the new genera are founded are striking but of no fundamental importance, and indicate a recent origin.

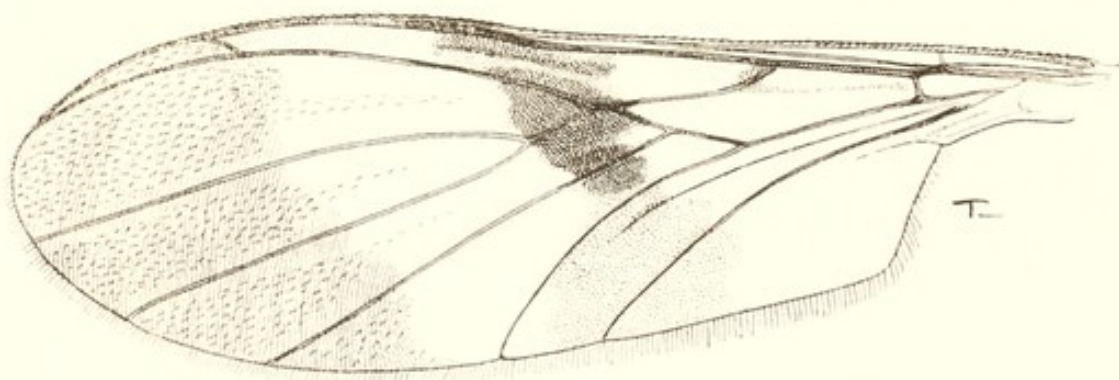
In addition to the species recorded below, the following are known from Fiji: *Leia* (*Rhymoleia*) *fijiensis* Edw.; *Delopsis greenwoodi* Edw.; *Sciara distigma* Edw.

#### MACROCERINAE.

##### 1. *Macrocera nitens*, sp. n.

Text-fig. 1.

*Head* blackish, front very broad. Antennae ochreous at the base, shading to dark brown; about four times as long as body in ♂, three times in ♀; first



TEXT-FIG. 1.—*Macrocera nitens*, sp. n. Wing.

segment much enlarged, especially in ♂. *Thorax* shining black, shoulders more or less yellowish. *Abdomen* with segments 1–3 (♂) or 1 and 2 (♀) yellow, 2 with a narrow blackish basal band, the rest entirely shining black. *Legs* ochreous. Wings hyaline with the apex broadly dark brown, as far back as  $R_4$ ; a second dark brown band, rather irregular in outline, across middle of wing, just touching tip of basal cell and base of median fork, rather broader towards costa. A small

dark patch at base of *Rs*. *R*<sub>1</sub> swollen apically, its tip pale. Costa reaching nearly half-way from *R*<sub>5</sub> to *M*<sub>1</sub>. *R*<sub>4</sub> short, nearly vertical. Anal lobe large and right-angled in ♂, smaller and rather obtuse in ♀. Macrotrichia numerous in apical third of wing, practically none towards base. Halteres ochreous. Wing-length, 4 mm.; antennae, ♂ 13, ♀ 10 mm.

Tutuila: Pago Pago, type ♂ and ♀, 14.xii.1925. Upolu: Malololelei, 2,000 ft., 1 ♀, xii.1925; Sliding Rock, 1 ♂, 16.ix.1923 (Swezey and Wilder).

A very distinct species which need only be compared with *M. egregia* de Meij. (= *bifasciata* Edw.) of Sumatra and Borneo, which is very similar in colouring but has bare wings.

#### CEROPLATINAE.

### 2. *Platyura hopkinsi*, sp. n.

♀. *Head* dark brown above, face ochreous. Antennae with the scape ochreous, flagellum dark brown, segments hardly longer than broad. Palpi brownish, rather long. Middle ocellus small, slightly in front of the others. *Thorax* brown, with very little grey dusting; scutum with three darker brown stripes, which are almost fused; pronotum and hypopleurite yellow. No spiracular bristles; postnotum and pleurotergites bare; postnotum flattened above, rather small and not much produced. Fine setae of mesonotum evenly distributed. *Abdomen* dark brown, posterior margins of tergites ochreous. *Legs* with coxae and femora ochreous, tarsi darkened. First segment of front tarsus about as long as the tibia. Fine tibial setae rather irregularly arranged on basal half of tibia, but forming regular rows on the apical third or half. Outer spur of posterior tibiae scarcely half as long as the inner. *Wings* nearly hyaline, indistinctly darkened on apical half. *Sc* ending above base of *Rs*. *R*<sub>4</sub> rather short, situate somewhat before the middle point between tips of *R*<sub>1</sub> and *R*<sub>5</sub>. Costa produced more than a third of the way from *R*<sub>5</sub> to *M*<sub>1</sub>. *An* reaching margin. Halteres ochreous, base of knob darkened. Wing-length 4 mm.

Upolu: Apia, 1 ♀, 3.viii.1925.

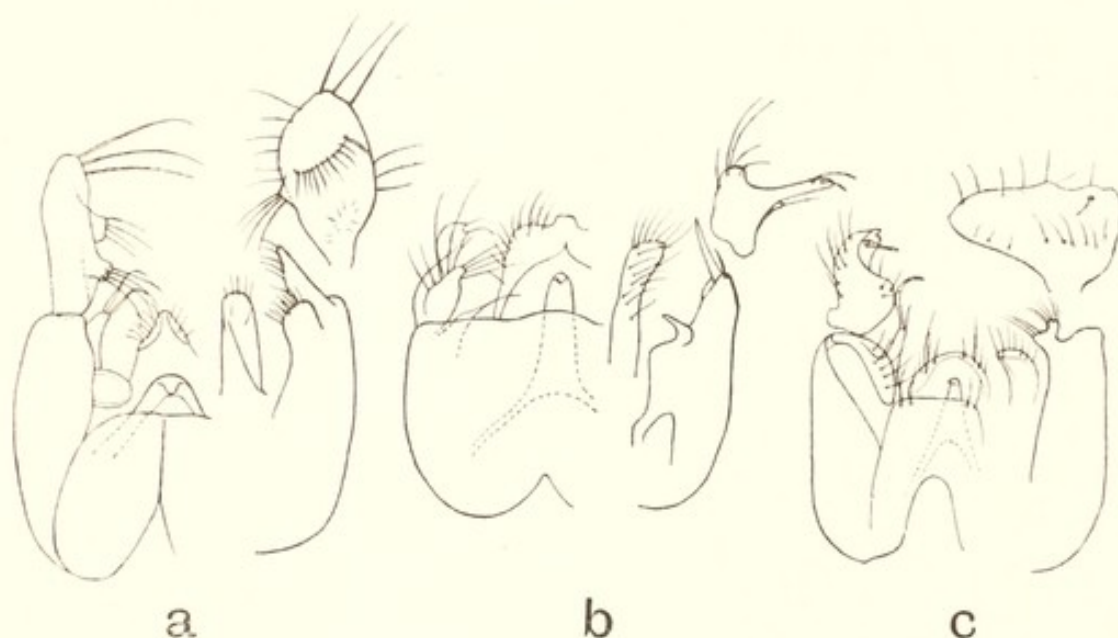


## MANOTINAE.

3. *Manota pacifica*, sp. n.

Text-fig. 2, c.

♂. Very similar to *M. flavipes* End. (Seychelles) and *M. orientalis* White (Ceylon), agreeing with both in having the orbital bristles yellow, legs yellow with scarcely any darkening at bases of posterior femora, and wings entirely clear; differing from each in having the flagellar segments (except the last) scarcely longer than broad, with shorter pubescence which is only about half as long as the diameter of the segments. The hypopygia of the three species show considerable differences, as is indicated in the accompanying figures.



TEXT-FIG. 2.—Hypopygium of *Manota*, spp.: (a) *M. orientalis* Senior-White; (b) *M. flavipes* End.; (c) *M. pacifica*, sp. n. Left half from beneath; right half from above, with clasper detached and seen in side view.

Savaii: Safune, rain forest above 2,000 ft., type ♂ (unique—in the Bishop Museum), 9.v.1924 (Bryan).

One other species of *Manota* has been recorded from the Australasian region, viz. *M. maorica* Edw. (New Zealand). This differs from *M. pacifica* and the two other species above mentioned in having the orbital bristles black; posterior femora blackish at base; and wings smoky on apical half. In other details all species of this genus are extremely similar.

## MYCETOPHILINAE.

*Zygophronia*, gen. n.

Characters as in *Phronia*, but vein *Cu* simple; the genus therefore bears the same relation to *Phronia* as *Zygomyia* does to *Mycetophila*.

4. *Zygophronia pusilla*, sp. n.

♀. *Head* dark brown, face and area round antennae, also the scape, yellowish; flagellum and palpi blackish, flagellar segments about as long as broad. *Thorax* ochreous, bristles black; dorsocentral bristles distinct; scutellum with four marginal bristles; four anepisternal bristles. Mesonotum with a pair of sublateral brown lines, and another pair converging posteriorly along the rows of dorsocentral bristles. *Abdomen* brown, segments 1-5 lighter at base laterally. *Legs* ochreous, including the whole of the coxae; tips of hind femora and tibiae rather indistinctly darkened. *Wings* faintly brownish tinged, unmarked. Costa produced slightly beyond tip of *R*<sub>5</sub>, which is almost straight; median fork rather widely open, its stem a little longer than *r-m*. Halteres with ochreous stem and brown knob. Wing-length 1.7 mm.

Upolu: Malololelei, 2,000 ft., 1 ♀, 30.xi. 1924.

5. *Exechia lutacea*, sp. n.

Text-fig. 3.

♂. *Head* dark greyish, with fine pale hairs. Antennae with the first three or four segments ochreous, the rest dark; flagellar segments not longer than broad. Palpi yellow. No median ocellus. *Thorax* entirely ochreous, sides of scutum with slight grey reflections when seen from above. Two propleural bristles. Two long terminal scutellar bristles, and two other shorter ones in the middle.

Discal bristles of scutum short and indistinct. *Abdomen* dark brown; first segment, base of second, lateral margins of tergites and hypopygium ochreous. Hypopygium constructed as in Text-fig. 3. *Legs* ochreous, tarsi darker; no



TEXT-FIG. 3.—Hypopygium of *Exechia lutacea*, sp. n. Left half from above, also middle part of ninth sternite.



dark mark beneath base of hind femora. Front tibiae on the outer side with a regular close-set row of 15–20 very short blunt bristles, the row occupying outer half of tibia or rather more. Middle tibiae with a similar external row of bristles, but the 12–15 bristles rather less regular, rather more widely spaced, and pointed. Hind tibiae with about 12 external, 6 dorsal and 6 short internal bristles. *Wings* slightly brownish. *Rs* almost straight, its base very short, not a quarter as long as *r-m*; base of median fork about half as long as *r-m*. Cubital fork very short, both branches equally distinct. *An* absent. Halteres ochreous. Wing-length 2.2 mm.

Upolu: Malololelei, 2,000 ft., type ♂, 25.xi.1924. Savaii: Salailua, 2 ♂, 23.v.1924 (Bryan).

This species belongs to a group of closely allied forms, which has a wide distribution in the tropics of the old world; I have seen a number of representatives from various parts of the Oriental region and also from Africa, Australia, and New Zealand.

#### 6. *Delopsis buxtoni*, sp. n.

♂ ♀. *Head* ochreous. First few antennal segments ochreous, rest brownish. Palpi ochreous. *Thorax* mainly shining black above, but a broad ochreous collar on front of scutum, and the depressions on each side of scutellum also ochreous. Prothoracic sclerites ochreous, rest of pleurae dark brown. Five propleural bristles. Anepisternal suture distinct. Pleurotergite and pterotergite very small, together barely a quarter as large as the anepisternite. *Abdomen* black dorsally, sides of tergites broadly ochreous, this colour extending upwards at base of segment 3 and more so at bases of 4 and 5, but not so far as to form a complete transverse band. Genitalia small and hidden. *Legs* ochreous, tarsi and tibial bristles and spurs dark. Mid-tibial bristles: 5 dorsal, 2 (rarely 3) subdorsal, 3 external, 3 rather long ventral, 0 internal. Hind-tibial bristles in three rows, middle row with 2–3 bristles. *Wings* brownish, costa extending slightly beyond tip of *Rs*. Halteres ochreous. Wing-length 3.5 mm.

Upolu: Malololelei, 2,000 ft., 5 ♂, 1 ♀, including type ♂, 10.iii.1924, 25.xi.1924 and xii.1925. Upolu: Vaea, 1,100 ft., 1 ♂, 25.iv.1924 (Bryan). Savaii: Salailua, two specimens, 19.v.1924 (Bryan). Sexes not readily distinguishable.

*Delopsis buxtoni* much resembles *D. greenwoodi* Edw. (Fiji), *D. collaris* (End.) (Seychelles) and several other species, but differs in the chaetotaxy of the legs.

Two specimens from New Hebrides (Espiritu Santo I., Hog Harbour) are very similar to *D. buxtoni* as described above, but are smaller, and the middle tibiae have only one subdorsal bristle.

The genus *Delopsis* is widely distributed, but is most extensively developed in the tropics of the old world. The peculiar case-bearing larvae have been reported as having been found on the leaves of bamboo and other plants; presumably they feed upon moulds and not upon the leaf itself, but observations on this point are desirable.

#### 7. *Delopsis scutellaris*, sp. n.

Sex (?). *Head* brownish-ochreous. First five or six antennal segments ochreous, the rest dark brown. Palpi ochreous. *Thorax* shining black above, scutum without pale collar. Scutellum wholly yellow. Prothoracic sclerites brownish-ochreous, rest of pleurae black. Three propleural bristles, only one pteropleural. Anepisternite very large, as in *D. buxtoni*, but the suture dividing it from the sternopleurite much less distinct. (*Abdomen* missing in case of type.) *Legs* ochreous, bristles, spurs and tarsi dark. Mid-tibial bristles: 5 dorsal, 0 subdorsal, 3 external, 2 very long and 1 short ventral, 0 internal. (Hind legs missing in case of type.) *Wings* yellowish-tinged; costa more distinctly produced than in *D. buxtoni*. Halteres ochreous. Wing-length 2.3 mm.

Upolu: Malololelei, 2,000 ft., one broken specimen, xii.1925.

Although the type is unfortunately imperfect, the species should be recognised easily by the colour of the thorax and the chaetotaxy of the middle tibiae.

### SCIARINAE.

#### 8. *Sciara radicum* Brunetti.

*Fauna Brit. Ind., Dipt. Nemat.*, p. 139, 1913.

Tutuila: Pago Pago, 1 ♂, 1 ♀, 2.xii.1924, 14.xii.1925. Upolu: Apia, 2 ♀, bred from rotten grass, iv.1925. Savaii: Safune, 1 ♂, 4.v.1924 (Bryan). Fiji: Vanua Levu, Savusavu, 2 ♀, 22.vii.1923 (C. L. Edwards). Recorded by Brunetti from Calcutta, the larvae attacking lily bulbs in gardens.

I have compared the Samoan series with Indian specimens received from Brunetti, and can find no constant differential characters. All the Indian specimens have vein  $M_1$  indistinct at the base; most, but not all, of those from Samoa have it distinct throughout. Brunetti has somewhat understated



the size of both male and female. The species is rather well distinguished by the six scutellar bristles, and the ochreous thorax with five rather narrow blackish stripes; these stripes, however, are much more distinct in some specimens than in others. The male claspers are very short; the antennal flagellum is entirely dark, and the segments are not much longer than broad.

9. *Sciara*, sp. inc.

Upolu: Malololelei, 1 ♂, 25.iv.1924.

A small species something like the last, but the mesonotum more shining and less distinctly striped; antennae longer, flagellum pale at base.

10. *Sciara*, sp. inc.

Tutuila: Pago Pago, 1 ♂, 14.xii.1925. Savaii: Matavanu Crater, 1 ♀ (Bryan).

Another small species, dark-coloured and with no special distinctive features.

11. *Phorodonta politicollis*, sp. n.

♀. *Head* black, slightly shining. Eye-bridges touching and 5 facets wide. Middle ocellus touching eyes. Palpi dark brownish. Antennae black, flagellar segments fully twice as long as broad, without necks, pubescence short. *Thorax* brightly shining black. Dorsocentral and acrostichal bristles unusually long and stiff, in single rather irregular rows, black. Scutellum bare above, margin with 6-8 strong black bristles. Abdomen dark brown, black-haired, not so short as usual in this genus; lateral membrane ochreous. *Legs* yellowish, tibiae and tarsi darkened; spurs yellowish, nearly twice as long as the tibial diameter. First segment of front tarsi barely two-thirds as long as the tibia. Claws very small, with median thickening. Coxae long, as in other species of the genus. *Wings* rather narrow, membrane rather dark brownish, all veins darker; branches of *M* and *Cu* setose. Costa reaching two-thirds of the distance from *Rs* to *M*<sub>1</sub>. *R*<sub>1</sub> and *R* subequal in length. *R*<sub>1</sub> ending above *fM*. *An* absent. (Base of cubital fork below middle of basal section of *M* in the type, but below base of *r-m* in the second specimen.) Halteres black, base of stem ochreous. Wing-length 3.5 mm.; body 3 mm.

Upolu: Apia, 1 ♀ (type), 29.iii.1924. Savaii: Salailua, 1 ♀, 13.v.1924 (Bryan).

A very distinct species owing to the shining black thorax and long costa.

12. *Phorodonta pacifica* Edwards.

*Ann. Mag. Nat. Hist.* (9), xiv, p. 569, 1924.

Upolu : Apia, Vaea, Vailima, Malololelei ; Savaii : Safune, Salailua ; Tutuila : Pago Pago ; Manua : Tau ; 84 specimens in all, various dates. Also New Hebrides : Espiritu Santo, Hog Harbour, 1 ♀, 18.vi.1925.

First recorded from Fiji (Lautoka) ; not known elsewhere, although several very closely allied species exist in the Oriental region.

13. *Plastosciara flavibasis*, sp. n.

♀. *Head* shining black. Eye-bridges in contact, three facets wide ; ocelli well removed from the eyes. Antennae short, black, flagellar segments scarcely as long as broad. Palpi yellow, two-segmented, second segment very small and nipple-like. *Thorax* shining black, dorsocentral and acrostichal hairs dark, in double irregular rows. Scutellum with two bristles and some shorter hairs. *Abdomen* with tergite 1 and sternites 1-4 yellow ; tergites 2-4 large, black, 5-7 ochreous, with darker lateral and posterior margins ; sternites 5-7 narrow, brown ; cerci blackish. *Legs* brownish-ochreous, coxae lighter, tarsi darker. Tibial spurs yellowish, fully as long as the tibial diameter ; posterior legs each with two spurs as usual. *Wings* slightly greyish, anterior veins dark. No macrotrichia on *M* or *Cu*.  $R_1$  much shorter than *R* and ending well before *fM*. Costa reaching quite three-quarters of the distance from  $R_5$  to  $M_1$  ;  $R_5$  ending about middle of  $M_2$  or hardly beyond. Median fork rather narrow, about as long as its stem. Stem of cubital fork about half as long as basal section of *M*. Halteres with yellow stem and black knob. Wing-length 2 mm.

♂. Similar to ♀, but scape of antennae yellow ; second segment of palpi larger ; flagellum rather longer, the segments with short necks. Hypopygium yellow at the base ; claspers rather small, broad at base, but pointed, with two bristly spines at tip.

Tutuila : Pago Pago, type ♀, 14.xii.1925. Fiji : Labasa, 1 ♀, 11.viii.1922 (Greenwood) ; Lautoka, 3 ♂, reared from larvae in fermenting sugar-cane, 12.viii.1926.

The yellow base of the abdomen suffices to separate this species from the other members of the genus.



14. *Plastosciara pernicioso* Edwards.

*Ent. Mo. Mag.* (3), viii, p. 160, 1922.

Upolu: Apia, 1 ♂, 8 ♀, bred from rotten grass, iv.1925. Fiji: Labasa, 8 ♀, 28.ix.1922 (Veitch).

The specimens agree well with British examples. First described from material from Worthing, Sussex, the species has since been found occurring as a hothouse pest at other places in England, but has not hitherto been reported from any other country. It is probable that *P. pernicioso* and many other Sciarine species are more or less cosmopolitan in their distribution.

15. *Scythropochroa samoana*, sp. n.

♀. *Head*, including antennae and palpi, black, vertex scarcely shining. Eye-bridges four facets wide and almost touching. Ocelli in a very flat triangle, the middle one about its own diameter distant from the eyes. Flagellar segments about 1.7 times as long as broad, with short necks; pubescence nearly as long as the diameter. *Thorax* black, slightly shining, dorsocentral and acrostichal hairs short, inconspicuous, dark, the former numerous, the latter in a double row. Scutellum with numerous short hairs but without stiff marginal bristles. *Abdomen* long, slender, black, with black hair. Cerci rather large and nearly round. *Legs* entirely dark brown; tibial spurs dark, about as long as diameter of tibia. *Wings* with a rather strong brown tinge, anterior veins dark, posterior veins not darker than the membrane; branches of *M* and *Cu* bare as usual. *R*<sub>1</sub> a little longer than *R* and ending a little beyond *fM*. Costa reaching nearly three-quarters of the distance from *R*<sub>5</sub> to *M*<sub>1</sub>. Stem of median fork nearly 1.5 times as long as the lower branch. *R*<sub>5</sub> ending distinctly beyond level of tip of *M*<sub>2</sub>. Basal section of *M* and *r-m* about equal in length; *fCu* below middle of *r-m*. *An* short and very faint. Halteres blackish. Wing-length 4.5 mm.; body 5.5 mm.

Upolu: Malololelei, 2,000 ft., 1 ♀ (type), 20.vi.1924.

This species is closely allied to the genotype, *S. latefurcata* End. (Seychelles Is.), but differs in its larger size and darker legs.

A second ♀ taken at the same place, 14.xi.1924, differs from the type as follows: Ocelli in a sub-equilateral triangle, the middle one nearly touching the eyes; eye-bridges separated by about the width of one facet. Thorax brownish

(perhaps on account of immaturity). Median fork longer, about as long as its stem.

Another ♀ from Fiji, Tamavau, 19.vii.1922 (Simmonds) probably belongs to the same species, but differs slightly in venation:  $r-m$  is considerably longer than the basal section of  $M$ , and  $fCu$  is only a little beyond the base of  $r-m$ .

### Dodecasciara, gen. n.

Eyes with scanty pubescence; dorsal bridges distinct. Antennae with 2+10 segments. Palpi composed of a single segment. Coxae short. Posterior tibiae each with two short spurs; no combs. Claws simple. Wings well developed, venation as in *Sciara*; no macrotrichia on membrane.

The reduction in the number of antennal segments necessitates the erection of a new genus for the species described below, which otherwise might be placed in *Scythropochroa* or *Plastosciara*. No such reduction has previously been found in the Sciarinae. It is true that Schiner's Colombian genus *Pseudosciara* is also described as having 2+10 segments in the antennae; but this differs in many respects from the present genus, and probably does not belong to the same subfamily.

#### 16. *Dodecasciara debilis*, sp. n.

♀. *Head* blackish, antennae and palpi dark. Eye-bridges narrow, only 1-2 facets wide, ocelli not far removed from them. Antennae short, flagellar segments scarcely as long as broad, pubescence short, no distinct necks. *Thorax* small but rather strongly arched above, brown; hairs inconspicuous. *Abdomen* long, light brown, ovipositor darker. Tergites 1-7 all well-developed, broader than long. Cerci rather elongate oval. *Legs* short, brownish-ochreous. Femora, tibiae and tarsi all about equal in length. Spurs shorter than the tibial diameter. *Wings* rather narrow, nearly clear, veins not very dark. Costa reaching nearly two-thirds of the distance from  $R_5$  to  $M_1$ .  $R_1$  about equal to  $R$  and ending well before  $fM$ . Basal section of  $M$  longer than  $r-m$ ;  $fCu$  a little before base of  $r-m$ . Anal angle very obtuse. Halteres dark. Wing-length 2 mm.; body (extended) 3 mm.

Upolu: Apia, type ♀, 26.i.1925. Tutuila: Pago Pago, 2 ♀, 18.iv. Fiji: Natava, 1 ♀, 1916; Lautoka, 1 ♀, 3.xi.1925 (Greenwood).

The remarkably short antennae are the most striking feature of this small,



obscurely coloured species. The antennal flagellum is evidently in a somewhat unstable condition, some specimens showing a tendency to fusion of the segments either in the middle or at the tip of the antenna. One specimen has 11 segments in one flagellum, 10 in the other. Enderlein's *Ceratosciara corniculata*, of the Seychelles is a similar-looking insect with very short antennae, although the flagellum has the normal number of 14 segments. Perhaps this or some nearly allied species may be the parent of *D. debilis*.

### BIBIONIDAE.

No species of this family have yet been reported from Samoa or indeed from any part of Polynesia. This is somewhat surprising, since the larvae are known to be humus-feeders and as such might be easily transported by man. On the other hand, their somewhat heavy build might prevent them from being carried far by wind. *Plecia amplipennis* Skuse, a common species of North Australia and Papua, occurs in the New Hebrides, and Buxton also took an indeterminable species of *Bibio* in the same islands.

### SCATOPSIDAE.

It is rather surprising that *Scatopse notata* L. and *S. fuscipes* Mg., which have been introduced into most parts of the world, do not appear to be established in any part of the Pacific. The only species obtained by Buxton and Hopkins is endemic to this region.

#### 17. *Swammerdamella albimana* Edwards.

*Ann. Mag. Nat. Hist.* (9), xiv, p. 571, 1924.

Upolu : Apia, 100 specimens preserved, 5.xi.1924 : "congregating in great numbers on under sides of pine-apple leaves." Previously recorded only from Lautoka, Fiji, where it was found by Greenwood and Veitch in great swarms on laboratory windows. Other specimens from Fiji (Nausori, xii.1920, Evans) are in the British Museum.

### CECIDOMYIIDAE.

The six species collected probably represent but a fraction of the number occurring in the islands, as no special attention was paid to this family. None have been recorded previously from any part of Polynesia.

## LESTREMINAE.

18. *Anarete pallida*, sp. n.

♀. *Head* (lost in mounting in case of type) light ochreous, including antennae and the rather short palpi. Ocelli not distinguishable in the dry specimen. Antennae with 2+9 (? 2+10) segments, second segment enlarged as usual, flagellar segments not sharply separated, not much longer than broad, with very short hairs. *Thorax* dull brownish-ochreous, rather darker above, scutellum paler. Mesonotal hairs short and inconspicuous, pale. *Abdomen* light brownish-ochreous, including the cerci. *Legs* light brownish-ochreous. Empodia small, not much more than half as long as the simple claws. First segment of hind tarsi slightly more than half as long as the tibia. *Wings* pale, but not distinctly milky-white; anterior veins light brownish. Macrotrichia present in the tips of cells  $R_5$ ,  $M_1$  and  $M_2$ . Anal lobe large, right-angled. Costa reaching well beyond middle of  $M_1$ , but ending before level of tip of  $Cu_1$ . Stem and both branches of median fork distinct;  $Cu_1$  widely interrupted at the base. Halteres pale. Wing-length 1.7 mm.

Tutuila, 760-900 ft., 1 ♀, 18.iv. (Kellers).

The genus *Anarete* has hitherto been recorded only from Europe.\* The specimen before me (unfortunately damaged during examination) differs from the four British species with which I am acquainted in its pale colour and also in having more segments in the antennae (11 or 12, as far as could be ascertained, whereas the British species have only 8-10). Different opinions have been held as to the relationships of the genus; I regard it as closely allied to *Lestremia*, from which it differs chiefly in having the macrotrichia of the wings absent or confined to the tip, and the antennae shorter, alike in the two sexes, and generally with fewer segments.

19. *Lestremia* (*Anaretella*) *nitida*, sp. n.

♀. *Head* dark brown, with dark hair. Eye-bridges four facets broad. Antennae 11-segmented, with the scape ochreous, flagellum blackish. Segment 2 not much enlarged, 3-7 rather shortly oval, with very short necks, 8-10 nearly globular, 8 rather larger than 9 or 10; 11 rather pointed, nearly as long as 9

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\* The North American *Microcerata* Felt is similar in many respects and may be synonymous with *Anarete*, but Felt omits to state whether or not the wings are hairy in his genus.



and 10 together. First seven flagellar segments with basal verticils about as long as the segments, and with subapical sense organs, which are short and split to the base into four or five subequal branches. Last two segments hairy all over, without sense-organs. Palpi long; second segment about 4 times, third about 6 times and fourth about 8 times as long as broad. *Thorax* ochreous, mesonotum rather brightly shining, with three broad and almost confluent dark brown stripes, hair long and dark; dorsocentral hairs biserial; no acrostichal hairs. *Abdomen* dark brown, cerci lighter. *Legs* brownish-ochreous, tarsi darker. *Wings* rather densely hairy, anterior veins dark. Costa ending well before middle of  $M_1$  and much before level of tip of  $Cu_1$ .  $M_2$  rather faint except at tip; branches of fork evenly divergent, stem strongly curved and about half as long as the fork. Anal lobe rather sharply right-angled. Halteres pale. Wing-length 1.8 mm.

Upolu: Malololelei, 1 ♀, 25.xi.1924.

Similar to the European *L. defecta* Winn., but probably distinct. As compared with British specimens so determined it is rather smaller, with a much more shining thorax and shorter costa. The species of *Lestremia* recorded from Australia and New Zealand belong to the typical subgenus, and are similar to if not the same as *L. leucophaea* Mg.

#### CECIDOMYIINAE.

20. *Lestodiplosis*, sp.
21. *Allobremia upolui* Barnes, sp. n.
22. *Liebeliola bifurcata* Barnes, sp. n.
23. *Phaenepidosia auriculata* Barnes, sp. n.

These four species are discussed or described by Mr. H. F. Barnes elsewhere in this fascicle (pp. 103-108).

#### ANISOPODIDAE.

24. *Mesochria buxtoniana*, sp. n.

♀. *Head* blackish, rather heavily dusted with grey. Antennae with the first three segments blackish (remainder missing in case of type). Palpi dark, very short, third (last) segment small and ending in a rather long point. Eyes touching for a considerable space as in the other species of the genus. *Thorax*

ochreous-brown, scutum shining dark brown except at the sides, with short pale hair and some longer yellowish bristles. Scutellum (as in the other species) with two strong bristles and some smaller hairs. *Abdomen* with the first segment yellowish, rest darker. *Legs* ochreous; posterior coxae brownish; middle femora somewhat darkened towards the base; middle tibiae with a broad brown ring before middle, and a narrower, darker brown ring at tip (hind legs missing in case of type). *Wings* hyaline; venation as in *M. scottiana* End., except that  $M_2$  is almost completely lost, only the tip being present, and there is no spur on  $Cu_2$ . Halteres ochreous. Wing-length 3.5 mm.

Upolu: Malololelei, 1 ♀, 30.xi.1924.

This is only the fourth species of this remarkable genus to be discovered, each of the four being known from a single specimen. The new species resembles *M. cinctipes* de Meij. (Java) in the ringed tibiae (although de Meijere only mentions the ring as present on the hind legs), but differs in the almost uniformly shining brown mesonotum. The other two species (*M. scottiana* End., Seychelles Is., and *M. medicorum* Edw., West Africa) have unicolorous legs.

#### BLEPHAROCERIDAE.

No species of this family were found, and it is not likely that any occur in Samoa. As has been pointed out by Tillyard, the habits of these insects are so specialised that they probably require continuous land connections for their dispersal, and there is no indication of any previous land connection between Samoa and the mainland of Australia or Papua.

#### SIMULIIDAE.

In spite of the fact that the numerous torrents would appear to provide ideal breeding-places, no species of this family have been found in Samoa. Search was made for adults and the beds of several streams were examined, but the only larvae obtained were those of Chironomidae. The absence of *Simulium* cannot be due to any insurmountable obstacle in distribution, because one endemic species (*S. laciniatum* Edw.) is known from Fiji and three (*S. cheesmanae* Edw., *S. tahitiense* Edw. and *S. buissoni* Roub.) from Tahiti, the last-named also occurring as a pest in the Marquesas Islands. Turning to other regions, we find that the Seychelles have an endemic species, and that an introduced species



occurs on Rodriguez. In several cases, however, these island species have a very local distribution, and it is not impossible that some will yet be found in unexplored parts of Samoa.

### CULICIDAE.

The mosquitoes are very much better known than other families of Nematocera, and we can therefore obtain from them more definite indications as to the origin of the Samoan fauna. The question of distribution of mosquitoes in the Pacific has been discussed in some detail by Buxton and Hopkins (*Researches in Polynesia and Melanesia*, Part III, 1927). From the data available it is quite clear the mosquito fauna is of Austro-Malayan origin, and that as one proceeds across the Pacific this fauna diminishes, but no new elements appear, except that in some islands or groups of islands local races or species may be developed. In the Solomon Islands almost as many species occur as on the mainland of Papua, and these have undergone no modification. Much the same fauna is found in the New Hebrides, though with some reduction in number of species as well as some modification of those which occur. In Fiji *Anopheles*, *Megarhinus* and *Aedes* (*Skusea*) have dropped out, although *Rachionotomyia*, *Uranotaenia* and *Taeniorhynchus* remain. East of Fiji the three latter genera are not found. *Aedes* (*Finlaya*) has reached Samoa and Tonga, but no farther east; the remaining species found in Samoa and in other islands to eastward are evidently recent introductions, except that in Samoa and again in Tahiti endemic species of *Culex* occur.

Only seven species of Culicidae have hitherto been found in the islands of the Samoa group, three of these having a cosmopolitan or tropicopolitan distribution, and three others being widely spread in the Australasian region. Two species (*Aedes argenteus* and *Culex fatigans*) have certainly, and two others (*Aedes variegatus* and *A. kochi*) quite possibly been introduced by human agency.\* Two widely distributed species (*Aedes vexans* and *Culex annulirostris*) are known to have more or less pronounced migratory habits, which would obviously conduce to dispersal by wind.

In addition to the seven Samoan species, the following have been recorded from Fiji or from other parts of Polynesia :

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\* It will be understood that neither of the last two species have been recently introduced by Europeans; either or both may well have been distributed in the Polynesians' voyages.—P. A. BUXTON.

*Aedes (Stegomyia) variegatus* var. *tongae* Edw. Tonga.

„ (*Finlaya*) *kochi* Dön., typical form. Fiji.

*Uranotaenia colocasiae* Edw. Fiji.

*Rachionotomyia purpurata* Edw. Fiji.

*Taeniorhynchus (Coquilleltidia) crassipes* v.d.W. Fiji.

*Culex sitiens* Wied. Fiji.

„ *atriceps* Edw. Tahiti.

One of these species, *Culex sitiens* Wied., will almost certainly be found to occur in Samoa. It is a migratory insect breeding in coastal salt marshes, and there is no apparent reason why it should not colonise any suitable breeding-places which may exist in Samoa.

The Samoan mosquitoes may be distinguished easily on naked-eye characters as follows :

1. Colour black and white, the tarsi conspicuously ringed with white	2.
Colour brownish . . . . .	3.
2. Mesonotum with a pair of curved white marks . . . . .	<i>Aedes argenteus</i> (Poir).
Mesonotum with a median white stripe . . . . .	<i>Aedes variegatus</i> (Döl.).
3. Wings and legs elaborately spotted . . . . .	<i>Aedes kochi</i> (Dön.).
Wings and legs not spotted . . . . .	4.
4. Proboscis with a well-defined whitish ring . . . . .	5.
Proboscis not or only indistinctly ringed . . . . .	6.
5. Abdomen banded, femora speckled . . . . .	<i>Culex annulirostris</i> Skuse.
Abdomen unbanded, femora not speckled . . . . .	<i>Culex samoaënsis</i> Theo.
6. Tarsi with narrow white rings . . . . .	<i>Aedes vexans</i> (Mg.).
Tarsi entirely dark . . . . .	<i>Culex fatigans</i> Wied.

## 25. *Aedes (Stegomyia) argenteus* (Poiret).

Buxton and Hopkins, *Researches in Polynesia and Melanesia*, p. 114, 1927. *Stegomyia fasciata* auct.

“ This species, like *Culex fatigans*, is a recent immigrant in Melanesia and Polynesia. It is still found principally on islands which are in frequent touch with the outside world, and more often in ports and round the settlements of Europeans than in other parts of the islands. So far as we know it has not succeeded in establishing itself as a wild species breeding in holes in trees, which is remarkable, for that is no doubt its natural haunt in its West African home. . . .

“ In Samoa it was abundant in Apia, which has a good harbour and a considerable European community. The first record from Apia is that J. F. Floyd \* took it in 1904 (Howard, Dyar and Knab). . . . In Samoa this species was never found far from the houses of Europeans ” (Buxton and Hopkins).

\* Mr. Buxton informs me that the correct name of this collector is J. T. Lloyd.—F. W. E.



Apparently the species has not been recorded from Pago Pago, nor from any Samoan port or town except Apia.

## 26. *Aedes* (*Stegomyia*) *variegatus* Dol.

var. *pseudoscutellaris* Theo.

*Stegomyia pseudoscutellaris* Theobald, *Entom.*, xliii, p. 156, 1910; Bahr, *Suppl. no. 1, Journ. London Sch. Trop. Med.*, 1912. *Aedes* (*Stegomyia*) *variegatus* Edwards, *Bull. Ent. Res.*, xiv, p. 370, 1924. *Aedes* (*Stegomyia*) *variegatus* var. *pseudoscutellaris* Edwards, *Bull. Ent. Res.* xvii, p. 103, 1926; Buxton and Hopkins, *Researches in Polynesia and Melanesia*, p. 101, 1927.

This mosquito is very common and nearly universally distributed in Samoa, breeding in coconut husks and shells, rot-holes in trees, small tins, cacao pods, concrete drains and various other situations. "It will be noticed that nearly all these places in which larvae were found resemble one another in being dark, in containing water with a high organic content, and in being small; the largest breeding-place in which larvae were ever found was a small barrel. Larvae were never found in puddles, or swamps, or the axils of plants (*e.g.* taro, banana, *Canna*), though all these places were often examined in our studies of other species of mosquito. . . . Both in Samoa and elsewhere the female *A. variegatus* never seemed to fly far from its breeding-place: it is generally spread over Samoa, but at the same time localised to an untold number of spots. It may easily be banished, or nearly banished from houses by clearing bush away, draining a few of the nearest tree holes, and collecting the nearest coco-nut shells, etc. It bites at all times of day, especially on dull days, and in deep shade; it seldom bites a person standing in sunshine, and it never bites at night" (Buxton and Hopkins).

## 27. *Aedes* (*Finlaya*) *kochi* (Dön.).

var. *samoana* Grünberg.

Text-fig. 4.

*Culex kochi* Dönitz, *Insekten Börse*, v, p. 38, 1901. *Finlaya samoana* Grünberg, *Ent. Rundschau*, xxx, p. 130, 1913. *Finlaya kochi* O'Connor, *Research Mem. 4, London Sch. Trop. Med.*, 1923. *A. (F.) kochi* var. *samoana* Edwards, *Bull. Ent. Res.*, xvii, p. 101, 1926; Buxton and Hopkins, *Researches in Polynesia and Melanesia*, p. 95, 1927.

The typical form of *Aedes kochi* occurs in New Guinea, New Britain, New Ireland, Solomon Is. and Fiji; it has been reared from coconut shells. The variety *samoana*, so far as present knowledge goes, is confined to Samoa and Tonga, where it is widely spread and abundant, breeding only in the leaf-axils

of cultivated and wild Araceae (*Colocasia*, *Alocasia* and *Cyrtosperma*). "It is scarcely possible to find a large specimen of any of these plants which does not harbour larvae of this mosquito. . . . The female is a persistent biter at night, and the bites are extremely irritating. . . . Bahr records that *A. (F.) kochi* . . . at Suva was very shy-feeding, the very reverse of our observations with var. *samoana*" (Buxton and Hopkins).



TEXT-FIG. 4.—*Aedes (Finlaya) kochi* Dön. var. *samoana* Grünb. ♀ in profile, showing projecting scales of sternites.

The accompanying figure illustrates the distinguishing feature of the variety *samoana*; the presence of outstanding scales on the apical part of the sixth and seventh abdominal sternites only. In the typical form such scales are present also on the fifth. This difference, small as it is, appears to be the only obvious distinction between the two forms, and we have therefore an interesting case of two races of a species differing little in external features but with markedly different habits.



28. *Aedes* (*Aëdimorphus*) *vexans* (Mg.).

*Culex vexans* Meigen, *Syst. Besch.*, vi, p. 241, 1830. *Ochlerotatus vexans* Edwards, *Bull. Ent. Res.* vii, p. 218, 1917. *Aedes* (*Aëdimorphus*) *vexans* Edwards, *Bull. Ent. Res.*, xvi, p. 372, 1924; Buxton and Hopkins, *Researches in Polynesia and Melanesia*, p. 91, 1927.

*A. vexans* has been recorded from several localities on or near the coast: Laulii, Mulifanua, and Aleipata, in Upolu, and Tuasivi, in Savaii. Apart from being widely spread in the Palaearctic, Nearctic and Oriental regions, it occurs on many other Pacific Islands, including the New Hebrides, New Caledonia, Fiji and Tonga, but there are no certain records from farther east than Samoa. The larvae occur always in shallow temporary pools and marshes.

29. *Culex samoaënsis* (Theobald).

*Pseudotaeniorrhynchus samoaënsis* Theobald, *Entom.* xlvii, p. 36, 1914. *Culex samoaensis* Edwards, *Bull. Ent. Res.*, xiv, p. 394, 1924; Buxton and Hopkins, *Researches in Polynesia and Melanesia*, p. 78, 1927.

This species was described from two females collected in a privy at Apia by Friederichs; a third female specimen taken in Samoa (no exact data) by O'Connor is in the British Museum. Buxton and Hopkins were unable to find the species. So far as can be judged from the known examples it is to be regarded as a distinct local development from *C. bitaeniorrhynchus* or some related species.

30. *Culex annulirostris* Skuse.

*Proc. Linn. Soc. N.S.W.* (2), iii, p. 1737, 1889; Edwards, *Bull. Ent. Res.*, xiv, p. 394, 1924; Buxton and Hopkins, *Researches in Polynesia and Melanesia*, p. 79, 1927. *Culex jepsoni* O'Connor (nec Theobald), *Research Mem.* 4, *London Sch. Trop. Med.*, 1923.

"In Samoa, larvae were found in every month of the year, in a considerable variety of breeding places, but generally in clean water which contained filamentous green algae. We have several records from water in hoof marks, with or without algae; we also found this species in stagnant pools, and in slowly running ditches among taro; it occurred also in an open concrete drain in the Apia hospital. . . . We obtained larvae on Upolu and Tutuila, but not on Savaii, where the species doubtless occurs. . . . Though the larvae were common in Samoa, we never found the adults wild. In the New Hebrides they bit savagely at night on the island of Mai; in Funafuti, in the Ellice group, they made life a burden by day and by night . . ." (Buxton and Hopkins).

31. *Culex fatigans* Wiedemann.

*Aussereur. zweifl. Ins.*, i, p. 10, 1828; Buxton and Hopkins, *Researches in Polynesia and Melanesia*, p. 83, 1927.

"This species is obviously a recent introduction in our area, and it is still found principally in harbour towns and foreign settlements, but not in the more remote islands. . . . From Samoa the earliest record is that J. T. Lloyd found *C. fatigans* common in Apia, Upolu Island, in January and February, 1905 (Howard, Dyar and Knab). In 1924 and 1925 we found it common round European dwellings, but not elsewhere; we obtained specimens from each of the three main islands, Upolu, Savaii, and Tutuila" (Buxton and Hopkins).

## CERATOPOGONIDAE.

No records concerning the occurrence of members of this family in Samoa have been published hitherto, except that Buxton and Hopkins in their report on researches in Polynesia mention having obtained one specimen of *Culicoides*; this is described below as *C. mollis*, sp. n. The collections of Buxton and Hopkins included eight species of this family, and in the Bishop Museum collection, which is especially rich in very small insects, are examples of eight more. Three or four of these species are extremely widely distributed; the same may perhaps be true of some of the others, though in the present incomplete state of our knowledge it has been necessary to treat them as undescribed.

It is now established that many members of this family are very widely spread, especially those which live in moist humus; the purely aquatic forms show a greater tendency to restriction in distribution and the development of local species or races.

The collection of Ceratopogonidae in Australasia generally has been much neglected, but a few (including two or three *Atrichopogon* and one *Lasiohelea*) have been obtained in Fiji by Veitch and Greenwood; the majority of these, apart from the introduced species, are different from those of Samoa. A species of *Forcipomyia* (different from those recorded here) was found by Miss Cheesman in Tahiti.

None of the Samoan species were observed to suck blood, but it will probably be found that the species of *Culicoides* and *Lasiohelea* are bloodsuckers, like the other members of these genera.



32. *Forcipomyia hirtipes* de Meij.

*Ceratopogon hirtipes* de Meijere, *Tijd. v. Ent.* i, p. 209, 1907.

Upolu : Vailima, 1 ♂, 1 ♀, 12.xii.1925 ; Apia, 2 ♀ sucking Noctuid larva (*Othreis fullonica* L.), 3.vii.1924. Savaii : Matavanu Crater, 2 ♂, 13.v.1924 (Bryan).

No distinctions from *F. hirtipes* are apparent, although no males from the Oriental region are available for comparison, and the identity of the Samoan specimens is therefore not absolutely certain. The species has been recorded from Java, Ceylon, Assam and Buru ; the females sucking the juices of various smooth-bodied caterpillars. Kieffer's *F. australiensis*, of New Guinea, is very similar to or perhaps identical with *F. hirtipes*.

33. *Forcipomyia globularis*, sp. n.

♀. *Head* dark grey above ; the small area immediately above antennae yellow. Rostrum not much shorter than height of head. Palpi blackish ; second segment much swollen on inner side almost to tip. Antennae with scape and last five segments of flagellum dark brown, rest lighter. First eight flagellar segments globular, some even slightly broader than long, without necks ; last five each 2.5–3 times as long as broad, and together quite 1.5 times as long as the first eight. *Thorax* blackish-brown, shoulders and pleural membrane lighter brown ; mesonotum dull, pleurae shining. Both long and short hairs of mesonotum golden. *Abdomen* dark brown ; cerci yellowish. Lateral membrane with scaly pubescence, some of which (towards tip of abdomen) is golden, the rest black. *Legs* yellowish ; posterior coxae dark brown ; middle and hind femora with a broad black ring just before tip ; hind tibiae with a narrow brownish ring at base. No obvious scales on legs ; bristles yellowish, except two or three below tip of first hind tarsal segment, which are black. First segment of middle tarsi slightly over one-third, of hind tarsi rather less than half as long as the second. *Wings* unmarked, except that the veins forming the radial cells are blackish. Hair all dark. Halteres yellow. Wing-length 1.7 mm.

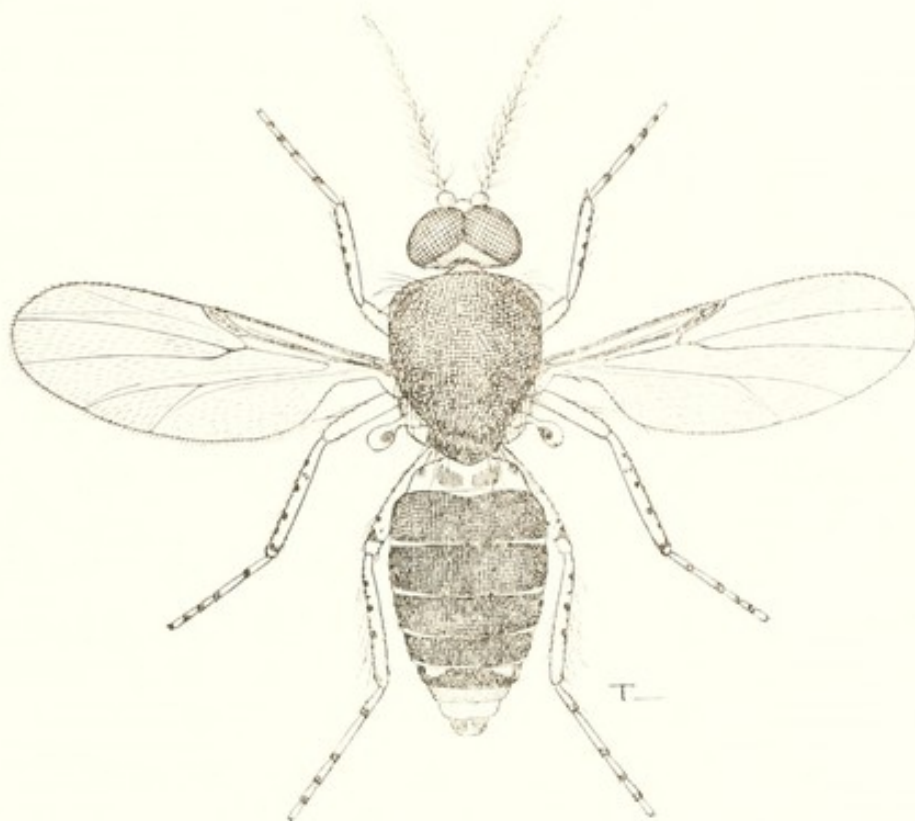
Upolu : Malololelei, 2,000 ft., 1 ♀, 21.vi.1924.

*Forcipomyia globularis* resembles *F. hirtipes* in most respects, differing chiefly in the antennae, the short basal segments of the flagellum approximating to the condition found in *Atrichopogon*.

34. *Forcipomyia punctipes*, sp. n.

Text-fig. 5.

♀. *Head* black, palpi and antennae dark brown. Second segment of palpi much enlarged on inner side on basal three-quarters, with distinct sensory pit. Last five segments of antennal flagellum together barely two-thirds as long as the first eight; these latter flask-shaped, with necks almost as long as the swollen basal part; sensory bristles rather stout. *Thorax* dull black above,

TEXT-FIG. 5.—*Forcipomyia punctipes*, sp. n. ♀.

all hair short and blackish; pleurae somewhat shining, dark brown, lighter on sutures. *Abdomen* mainly blackish above, and clothed with blackish pubescence. First tergite mainly yellow, black in the middle and with a small black dot on each side; tergites 2-5 with the apical lateral corners yellowish; 6 with a yellowish spot on each side at base; 7 and 8, also cerci, yellowish. *Venter* mainly yellowish with pale pubescence. *Legs* with yellow ground-colour. Coxae with a transverse brown mark. Hind femora with a narrow dark brown ring at base and another close to tip, also two or three small blackish



dots beneath. Each tibia on the outer side with four to six black dots, larger ones alternating with small ones. Each tarsal segment except the last narrowly black at the tip. No scales on legs; bristles and shorter hairs yellowish. First segment of hind tarsi about half as long as second. *Wings* without markings; hair dense and very dark; base yellowish; costa not quite reaching the middle. Halteres yellow, with a small black dot on upper surface of knob. Wing-length 1.7 mm.

Upolu: Malololelei, 2,000 ft., 1 ♀, 25.xi.1924.

I have neither seen nor read of any other species which at all resembles this in leg-markings.

### 35. *Forcipomyia swezeyi*, sp. n.

♂. *Head* dark, including antennae and palpi; tip of antennal plume creamy (terminal segments of flagellum missing in case of type). *Thorax* dark brown, mesonotum with a mixture of yellowish and black scaly hairs. *Abdomen* blackish, unmarked, with dark bristles and narrow scales. *Legs* covered with small close-lying scales. Ground colour yellow; front and middle femora more or less darkened towards base; hind femora blackish on the basal two-thirds; front and middle tibiae with a dark brown ring near base and a much broader one beyond middle, space between the rings lighter brown; hind tibiae black on about basal three-quarters, tip yellow; front tarsi yellow, with third segment dark; middle and hind tarsi with blackish rings at bases of first three segments, fourth segment entirely dark. First hind tarsal segment about 1.4 times as long as second. *Wings* rather rubbed in case of type; the hair apparently mostly pale, except for a black patch over the radial cells, and traces of a second on the front margin before the tip; no indication of other markings. Costa reaching just beyond middle. Venation normal. Halteres with yellowish stem and black knob. Wing-length 1.5 mm.

Tutuila: Pago Pago, 1 ♂, 10.ix.1923 (Swezey).

According to Kieffer's key to the group *Lepidohalea* (scaly-legged *Forcipomyia*), this species would appear to be *L. lepidopus* Kieff. (New Guinea), the description of which is inadequate for comparison; Kieffer does not mention a dark spot over the radial cells nor a light area in the middle of the anterior tibiae, nor does he indicate the hind tarsal proportions in his type.



36. *Forcipomyia ingrami* Carter.

*Ann. Trop. Med. and Parasit.*, xii, p. 290, 1919; Ingram and Macfie, *Ann. Trop. Med. and Parasit.*, xviii, p. 584, 1924.

Savaii: Safune, 45 ♂, 4-12.v.1924 (Bryan). Upolu: Apia, 2 ♂, 31.v.1924. Fiji: Lautoka, 10 ♂, 17.ii.1919 and 18.iii.1920 (Veitch and Greenwood).

Comparison with the excellent descriptions and figures of Carter, Ingram and Macfie, and with named specimens in the British Museum, leaves no doubt of the identity of these specimens. Although the species has been recorded hitherto only from West Africa, Ingram and Macfie have already suggested that it may be much more widely spread, and that species described by Kieffer from specimens from Tunis and the Seychelles may be the same. In West Africa the larvae were found by Ingram to be semi-aquatic and to prey on mosquito larvae.

37. *Lasiohelea samoensis*, sp. n.

♀. *Head* dark. Eyes very finely pubescent, the hairs scarcely half as long as diameter of facets, and not very dense. Rostrum very short, scarcely half as long as vertical diameter of head. Antennae dark brown, rather short; first eight flagellar segments disc-like, considerably broader than long; next two not more than twice as long as broad, last three rather longer, the terminal one the longest but still less than three times as long as broad. *Thorax* dull blackish, mesonotum with rather coarse but not very dense dark brown pubescence. *Abdomen* with integument and pubescence dull blackish. Legs entirely dark brown. First segment of hind tarsi fully three times as long as second. All tarsi with rather numerous hair-like scales. *Wings* almost as in *L. lefanui*; macrotrichia not very dense, leaving distinct bare lines along each side of the veins; above base of cubital fork there are about three rows of macrotrichia between cubitus and lower branch of media, and three between branches of media. Halteres with yellowish knob. Wing-length 0.8-0.9 mm.

Savaii: Safune, rain forest above 2,000 ft., 1 ♀, 8.v.1924. (Bryan).

The species of *Lasiohelea* are so similar in all parts of the tropics that it is difficult to suggest the exact affinities of this new species. It seems, however, to have more resemblance to *L. stimulans* (de Meij.), of the Malayan region, than to *L. townsvillensis* (Taylor), of Queensland. From *L. stimulans* it differs in its smaller size, shorter antennae and dark mesonotal pubescence. I have also



seen examples of undescribed species of *Lasiohelea* from New Ireland and New Britain, which seem allied to but distinct from this Samoan form. A female from Fiji, Nausori, v.1921 (R. Veitch) is very similar to *L. samoensis*, but has the antennae still shorter and the wings less hairy.

### 38. *Atrichopogon jacobsoni* (de Meij.).

*Ceratopogon jacobsoni* de Meijere, *Tijd. v. Ent.*, 1, p. 212, 1907. ? *Atrichopogon flavellus* Kieffer, *Rec. Ind. Mus.*, ix, p. 177, 1913. *Atrichopogon immaculatus* Kieffer, *Ann. Mus. Hung.*, xv, p. 181, 1917. *Atrichopogon cavernarum* Edwards, *Rec. Ind. Mus.*, xxvi, p. 107, 1924.

Upolu : Malololelei, 2,000 ft., 1 ♀, 26.vi.1924 ; Apia, 1 ♀, 29.iv.1924. Tutuila : Pago Pago, 4 ♂, 16 ♀, 2.xii.1924. Tonga : Vavau, Neiafu, 4 ♂, 1 ♀, 5.iii.1925. Fiji : Lautoka, numerous specimens, 9.iii.1919, 22.xi.1921 (Greenwood) ; Labasa, vii.1921 (Veitch).

The specimens agree sufficiently well with those of *A. cavernarum* in the British Museum, from the Malay Peninsula and Assam, and specimens of the same species were collected by Miss Cheesman in Tahiti. Although material is not available for comparison, it would seem practically certain, in view of the known distribution, that *A. jacobsoni* de Meij. (Java) and *A. immaculatus* Kieff. (New Guinea) are the same. The slight discrepancies in the descriptions may be overlooked and the species known as *A. jacobsoni*. *A. flavellus* Kieffer (India and Philippine Islands) apparently differs in having the flagellum and abdomen pale instead of dark brown to blackish, but this is probably only because the specimens upon which the description of *A. flavellus* was based were preserved in spirit. On the other hand the specimens from Ceylon, which I have recorded elsewhere under the name *A. jacobsoni*, belong to a different though allied species, in which the last segment of all the tarsi is conspicuously black, and *Cu*<sub>1</sub> is more oblique.

### 39. *Atrichopogon abrasus*, sp. n.

♂ ♀. *Head*, including antennae and palpi, also face in ♂, blackish ; face of ♀ ochreous. Proboscis shorter than height of head. Eyes touching, clothed all over with very short pubescence. Antennae of ♂ with last four segments subequal in length ; of ♀ with first eight flagellar segments globular, last five each about three times as long as broad. *Thorax* brownish ochreous, scarcely shining ; scutum with three confluent brown stripes, which are sometimes very little darker than ground colour. Scutellum with four black bristles. *Abdomen*



blackish, hypopygium lighter, ninth tergite somewhat triangular, with rounded tip. *Legs* uniformly light brownish. *Wings* hyaline, anterior veins not very dark; no macrotrichia in either sex. Second radial cell in ♀ very narrow, but as usual longer than in ♂. Costa in both sexes ending above a point a little beyond half-way between branches of cubital fork. Stem of median fork about as long as *r-m*. *Cu*<sub>1</sub> scarcely curved down at tip. *Cu*<sub>2</sub> very oblique. Anal angle very obtuse. Halteres yellow. Wing-length 1.3 mm.

Savaii: Safune, rain forest above 2,000 ft., 2 ♂, 1 ♀, 8.v.1924 (Bryan).

In venation this species approaches *Lasiohelea*, but is better placed in *Atrichopogon* on account of the entire absence macrotrichia from the wing-membrane, several other species of *Atrichopogon* being similar in this respect.

#### 40. *Atrichopogon atroscutellatus*, sp. n.

♀. *Head* blackish, including appendages. Eyes touching and very finely pubescent all over. First eight flagellar segments each a little broader than long, last five each about three times as long as broad. Proboscis only about half as long as height of head. Palpi with the second segment moderately swollen. *Thorax* black; scutum rather brightly shining; scutellum, post-notum, and a small area of scutum in front of scutellum velvety black; pleurae dull. Four scutellar bristles. *Abdomen* brown; sixth segment apparently without ventral appendage. *Legs* entirely brownish-yellow. *Wings* hyaline, anterior veins dark brown. Costa ending a little beyond level of tip of *Cu*<sub>1</sub>, which is rather sharply curved down. *Cu*<sub>2</sub> oblique. About a dozen macrotrichia in tip of cell *R*<sub>5</sub>, and about half a dozen in tip of cell *M*<sub>1</sub>. Stem of median fork short. Halteres orange. Wing-length 0.85 mm.

Savaii: Safune, rain forest about 2,000 ft., 1 ♀ (Bryan).

#### 41. *Dasyhelea radialis*, sp. n.

♂ ♀. *Head* blackish, face not obviously paler. Antennae of ♂ with segments 11-13 binodose as usual; 11, 12 and 14 subequal in length, 13 rather shorter; 14 without well-marked stylet, although its tip is somewhat narrowed; surface reticulated and provided with numerous minute scales, as figured by Carter, Ingram and Macfie (*Ann. Trop. Med.*, xv, p. 180, 1921) for *D. inconspicua*. Antennae of ♀ with segments 2-9 globular to shortly oval, not obviously



constricted apically; 10-14 almost cylindrical, gradually lengthened, 14 with more definite terminal stylet than in ♂. *Thorax* dark greyish-brown, with slight and irregular grey reflections, scutellum in ♂ hardly lighter, in ♀ reddish-brown. Mesonotal hairs short and dark; about eight marginal scutellar bristles. *Abdomen* blackish, without definite markings. Hypopygium rather small. Ninth tergite with short, rounded terminal processes. Ninth sternite slightly produced in middle. Claspers simple, short, only about half as long as side-piece; basal half stout and hairy, apical half more slender and bare, bluntly pointed. Basal structures quite symmetrical, the free distal parts of both parameres being absent (unless represented by short appendages which seem to be attached to the mesosome). *Legs* dark brownish, unmarked; tarsi somewhat lighter. Claws simple. *Wings* with moderately dense and uniformly distributed decumbent macrotrichia, greyish in colour. Costa reaching a little beyond middle of wing. Radial cells equal in length, the first so narrow as to be indistinguishable except in a mounted wing, the second fully three times as long as broad (including the bordering veins in the width of the cell); veins not very dark. Halteres yellowish. Wing-length 1.2 mm.

Savaii: Matavanu Crater, 2 ♂, 4 ♀, 13.v.1924 (Bryan).

Differs from most species of the genus in the unusually long second radial cell.

#### 42. *Dasyhelea*, sp.

Cf. *D. inconspicua*, Carter, Ingram and Macfie, *Ann. Trop. Med. and Parasit.*, xv, p. 191, 1921.

Tutuila: Pago Pago, 1 ♂, 1.x.1923 (Swezey and Wilder). Savaii: Matavanu Crater, 1 ♀, 13.v.1924 (Bryan). Fiji: Labasa, 12 ♂, 2.xii.1922.

These examples agree rather well with the description of the West African *D. inconspicua*, and with specimens in the British Museum so determined by Ingram. There are some small differences in the hypopygium which may indicate a specific or varietal distinction, the chief of which are as follows: Processes of ninth tergite with broad bases, bearing several bristles; processes of aedoeagus much shorter. According to the description the wings are "densely clothed with decumbent hairs," but this is hardly accurate; the hairs are rather scanty, leaving bare lines along each side of the veins (as in *D. flaviventris* Goet.).

43. *Dasyhelea*, sp.

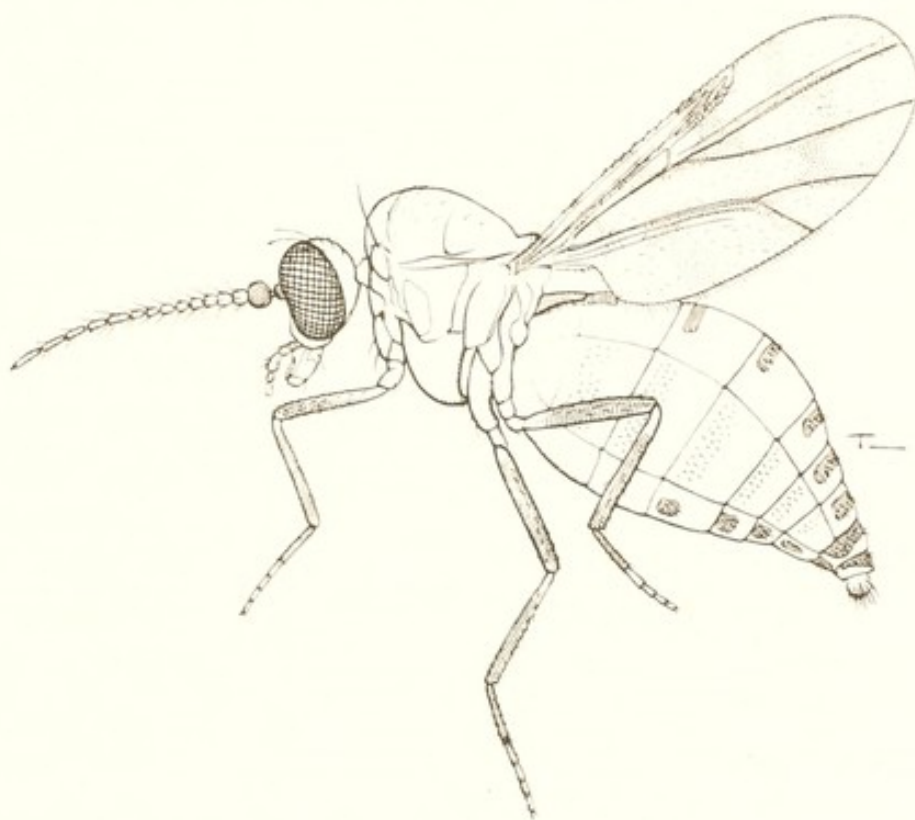
Upolu : Apia, 2 ♀, 1.i.1925.

A species with no striking features, belonging to the group which includes *D. obscura* Winn., *D. fusca* C. I. and M., *D. fusciformis* C. I. and M., *D. retorta* I. and M., *D. myrmedon* Kieff., etc. I am unacquainted with most of these species, to one of which the Samoan specimens may possibly belong.

44. *Culicoides mollis*, sp. n.

Text-fig. 6.

♀. *Head* dark. Eyes practically touching. Antennae with segments 2-6 nearly globular, 7-9 rather longer than broad, slightly contracted apically,



TEXT-FIG. 6.—*Culicoides mollis*, sp. n. ♀.

10-14 as usual about 2.5 times as long as broad. Palpi with the second segment stout, not twice as long as its greatest breadth. *Thorax* brown, sides of scutum broadly darker, but otherwise no definite markings (specimens are in spirit and markings may be obscured). Scutellum in the specimen mounted with one median marginal bristle and a number of small hairs. *Abdomen* whitish (in both specimens examined very much distended with eggs); tergites brownish,



1st well developed, 2-7 reduced to narrow strips of chitin about four times as wide as long, and occupying only a small part of the total length of the segments; tergite 2 placed at base of segment in contact with tergite 1; 3-5 each well removed from bases of respective segments. Two spermathecae, both rather shortly oval, necks chitinised for a short distance only. *Legs* dark brown; femora without a pale pre-apical ring, but tibiae each with a distinct yellowish ring at base; tarsi lighter. *Wings* covered with macrotrichia (not very densely) on apical half, but with very few on basal half between media and cubitus. Markings somewhat as in the European *C. pictipennis* Staeg. (*C. guttularis* Kieff.); ground colour greyish, but greater part of surface occupied by pale spots, of which a transverse band of three spots is placed at tip of wing, in cells  $R_5$ ,  $M_1$  and  $M_2$ ; a second transverse band of four almost confluent spots a little beyond middle of wing, uppermost spot of these four just includes tip of second radial cell, and lowermost almost fills cubital fork; other pale markings towards base of wing. Venation normal; second radial cell narrow. Halteres pale. Wing-length 1.5 mm.

Upolu: Apia, 2 ♀ taken at night while the collectors were bathing in the coral lagoon near the Pilot Station, 11.xii.1925. The fact that both specimens were gravid females suggests that breeding may take place in the sea, as has been recorded in the case of a few other *Culicoides*. Fiji: Natova, 2 ♀, ix.1916 (Veitch).

Quite the most peculiar feature of this species is the reduction of the abdominal tergites, which has not hitherto been noticed in any species of the genus. Apart from this, the wing markings are different from those of any other Australasian or Oriental species known to me. As stated above, *C. pictipennis* Staeg. has similar wing-markings, but in this case the wings are much more densely hairy and the abdomen is normal.

The Fijian specimens mentioned above probably belong to this species, but are too much damaged for full comparison.

#### 45. *Ceratopogon* (*Isohelea*) *peregrinator*, sp. n.

♀. Body all blackish, including antennae, palpi, legs and halteres; only the tarsi more or less pale. Eyes finely pubescent. First eight flagellar segments each scarcely as long, last five from 1.5 to 2.5 times as long as broad, terminal one the longest. Mesonotum very slightly shining, pits small.

Scutellum with three bristles, one median and two lateral. Claws equal and simple, rather large. Wings hyaline, without distinct milky tinge, but lacking both microtrichia and macrotrichia as in related species. Veins forming radial cells rather thick and dark brown; first cell oval, rather distinct; second a little longer than first, but almost entirely obliterated by the thickening of the costa. Costa extending well beyond middle of wing; anterior margin beyond costa slightly darkened. Lower branch of media rather widely interrupted at base. Wing-length 0.75 mm.

Savaii: Matavanu Crater, 1 ♀, 13.v.1924 (Bryan).

So far as I am aware, this is the first species of the genus to be discovered outside Europe and North America.

#### 46. *Stilobezzia samoana*, sp. n.

♀. *Head* blackish, including antennae and palpi. Eyes very narrowly separated. First eight flagellar segments each rather over twice, last five nearly four times as long as broad. *Thorax* rather dark ochreous-brown, somewhat shining. Scutal bristles inconspicuous; scutellum with four marginal bristles. Abdomen rather dark brown. First tergite with about 6–8 hairs on each side. *Legs* uniformly ochreous. Hind tibiae with dorsal hair not much longer than tibial diameter; similar hair on first tarsal segment. Larger claw almost as long as last tarsal segment, smaller only one-third as long. Wings hyaline; venation as in *S. ochracea* (Winn.). Macrotrichia fairly numerous at tips of cells  $R_5$  and  $M_1$ , very few or none in cell  $M_2$ . Halteres brownish. Wing-length 1.5 mm.

Upolu: Apia, type ♀, ii.1924. Savaii: Safune, lower forest, 1 ♀, ii.1924 (Bryan).

Resembles the European *S. ochracea* (Winn.), and differs from most or all of the described Oriental and Australasian species, in its clear wings and unicolorous legs. Another plain-winged species was collected by Buxton in the New Hebrides.

#### 47. *Bezzia sexspinosa*, sp. n.

♂ ♀. *Head* blackish. Eyes just touching. Flagellum of antennae light brownish; in ♂ rather long, with slight beard, last four segments subequal in length, 4–5 times as long as broad; in ♀ first eight segments oval, last five long and cylindrical. *Thorax* blackish-brown; seen from above it appears slightly



shining, with some whitish pollinose patches about the shoulders; seen from in front it is greyish, with a dark median stripe. No spine on front margin. Scutellum with four rather strong bristles. *Abdomen* blackish. *Legs*: Front femur ochreous with a darker ring at base and another before tip, extreme tip also dark; tibia with base and tip dark, and a dark ring before the middle. Middle femur in type ochreous, with extreme tip and a preapical ring brown, in other specimens mainly dark brown. Hind femur blackish, more or less ochreous on basal half, especially in ♀. Middle and hind tibiae yellowish, with dark brown tips. All tarsi pale ochreous, segments with dark tips. Front femur armed with about six strong spines beneath, first close to base and others rather widely spaced. Female claws each with a small tooth on inner side. *Wings* hyaline, anterior veins not very dark.  $R_5$  more than twice as long as  $R_1$ , and ending above or scarcely beyond level of tip of  $Cu_1$ . Base of median fork just sessile. Halteres yellowish. Wing-length 1.7 mm.

Manua: Tau, type ♂ and ♀, 20.xi.1926 (Judd). Savaii: Safune, rain forest above 2,000 ft., 2 ♂, 8.v.1924 (Bryan). Also damaged specimens from Tutuila (Pago Pago), 16.iv.1924 (Bryan), and Tutuila, 760–900 ft., 18.iv. (Kellers).

By the armature of the front femora, this species seems related to *B. australiensis* Kieff. (New South Wales). The leg-markings vary in distinctness.

## CHIRONOMIDAE.

No species of this family had been recorded from Samoa until 1926, when I described four marine species obtained by Buxton and Hopkins, including the remarkable new genus *Pontomyia*. In addition to these, examples of ten other species—seven from the Buxton and Hopkins collection and three from the Bishop Museum—are before me. Probably more species could have been discovered in the taro swamps near Apia, but it is not likely that Samoa has a large Chironomid fauna because of the paucity of suitable breeding grounds.

Of the fourteen species obtained, ten appear to be endemic, and only one of the remaining four has so far been found in Fiji, this being a widely-distributed species. The most interesting of the new species described here belongs to *Thalassomyia*, the fourth marine genus of Chironomidae to be found in this area. Two groups of sea-midges remain unrepresented in the Samoan fauna as known at present: *Camptocladius*, and the *Telmatogeton-Halirytus* group. It is probable that future collecting will reveal the presence of these also.



More species of the *Orthocladius* group certainly ought to be found in Samoa; three are represented among some undescribed material from Fiji in the British Museum.

Two other Chironomidae have been described from material from the South Pacific: *Chironomus candidibasis* Edw. (Fiji) and *Orthocladius brachydiceranus* Edw. (Tahiti); these are represented by closely allied species in Samoa.

#### TANYPODINAE.

##### 48. *Ablabesmyia atromaculata*, sp. n.

♂ ♀. *Head* light brownish, palpi and antennae pale ochreous. Antennae of ♀ 15-segmented, first few flagellar segments nearly globular, rest spindle-shaped; verticils very long, quite four times as long as segments. (Antennae of ♂ type missing.) *Thorax* moderately dark brown; mesonotum shining, with four darker brown stripes (hardly indicated in ♂ type, which is immature); four conspicuous velvet-black spots, one on each side immediately in front of root of wing, the other pair situate in front of the lateral brown stripes. Pronotum hairy at sides only, not reaching up to front angle of mesonotum. Pleurae heavily dusted with silvery-grey. *Abdomen* shining brown, with rather sparse dark hair. Male hypopygium with anal segment scarcely developed; side-piece rather long, with a dense patch of short hair inside at base; clasper stout, almost straight and almost as long as side-piece; tip more slender and curved inwards, with strong terminal spine. *Legs* yellowish, vestiture of very short scaly hairs and longer normal hairs, which are rather dense; tips of femora very narrowly, of tibiae rather broadly, and of tarsal segments very broadly clothed with black hair. Front tarsi of ♂ without distinct beard. No pulvilli. No apical spurs on tarsal segments. *Wings* rather narrow, clothed with greyish hair, no markings.  $R_{4+5}$  running very close to  $R_1$ ;  $R_{2+3}$  apparently absent; costa not produced beyond tip of  $R_{4+5}$ . Anal area rather large, almost right-angled. Halteres brownish. Wing-length 3-3.5 mm.

Upolu: Apia, 1♂, 1♀, vi.1925.

In spite of the 15-segmented antennae, I refer this species to *Ablabesmyia* rather than to any other genus of the *Tanypus* group because of the unproduced costa, form of pronotum, absence of tarsal spurs and other points of agreement. It is readily distinguishable owing to the marking of the thorax.



49. *Ablabesmyia notabilis* Skuse.

*Proc. Linn. Soc. N.S. Wales* (2), iv, p. 280, 1889. (?) *Tanypus monilis* L., Kieffer. *Ann. Mus. Nat. Hung.*, xv, p. 203, 1917.

Upolu: Apia, 2 ♀, xii.1924. Also 5 ♀ in British Museum from Queensland, Townsville (Hill).

*A. notabilis* appears to be the Australasian representative of the widely spread *A. monilis* (Linn.), from which it differs slightly in wing-markings, as also in its much smaller average size.

50. *Ablabesmyia*, sp.

Upolu: Apia, 1 ♀ (too damaged to describe), 31.v.1924.

A very small species, with the basal half of the wing dark; perhaps identical with one of which I have examined specimens from Fiji and Hong Kong.

## CLUNIONINAE.

51. *Clunio pacificus* Edwards.

*Proc. Zool. Soc. London*, 1926, p. 790.

Text-fig. 7.

Upolu: Apia, "abundant in air over seashore, 8 p.m., 11.xii.1925, Pilot Station." Tutuila: Pago Pago, 1 ♂ at sea-level, 18.iv. (Kellers).

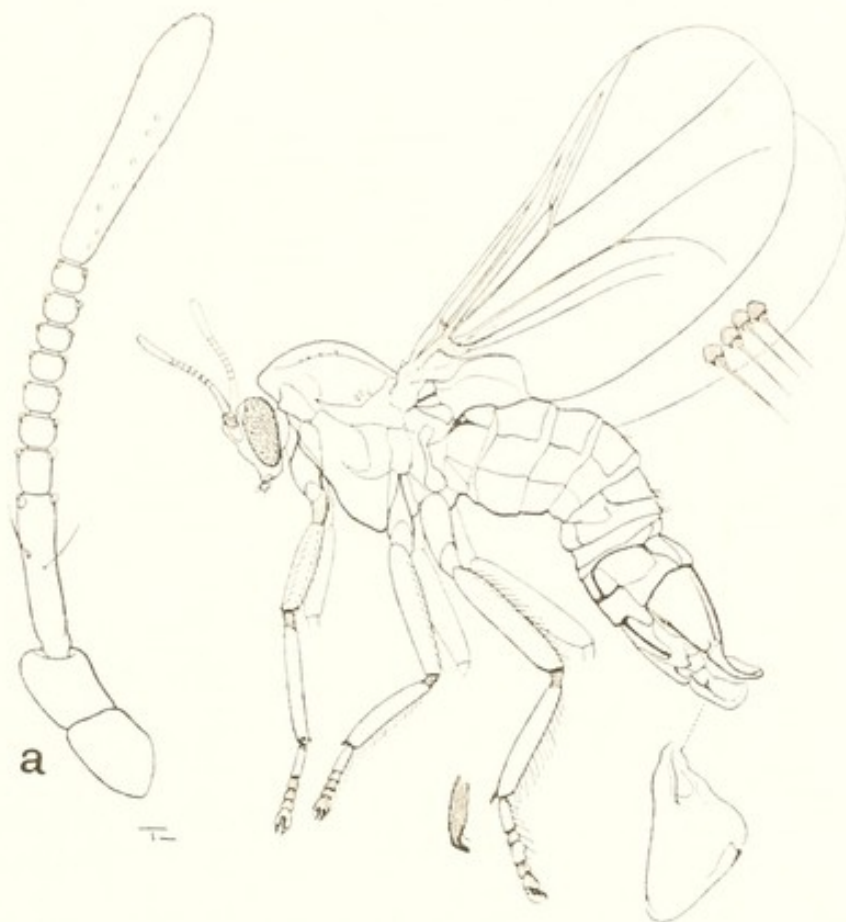
A marine species, much resembling the well-known European *C. marinus* Hal., but differing in various details, such as the shorter antennae, hind tarsi and coxae. The female has not been obtained, but will doubtless be found to resemble *C. marinus* in having functional legs but no wings.

52. *Thalassomyia pilipes*, sp. n.

♂ ♀. Closely resembles the European *T. frauenfeldi* Schin., differing as follows: General colour darker, body almost black. Hypopygium of ♂ with bristles on (morphologically) ventral side of side-piece shorter, but flattened and rather scale-like; a number of similar bristles are present on inner face of side-piece at base, which is not the case in *T. frauenfeldi*; claspers strongly bilobed at tip, additional lobe being developed on inner (flexor) surface. Cerci of ♀ slightly and evenly widened towards base, instead of suddenly and greatly enlarged on basal half. Last abdominal sternite of ♀ with fewer hairs, which are dark in colour instead of yellow. Legs of ♂ (but not of ♀) with rather long

erect hair, which is specially noticeable on the hind femora and tibiae, the hairs about three times as long as diameter of legs. (The legs of *T. frauenfeldi* are short-haired in both sexes, the only longer hairs occurring on the dorsal surface of hind tibiae). Cubital fork considerably shorter than in *T. frauenfeldi*, its base much beyond level of base of  $R_{4+5}$ . Wing-length about 3.5 mm.

Tutuila : Leone Road, 3 ♂, 1 ♀, 24.iii.1926 (Judd).



TEXT-FIG. 7.—*Clunio pacificus* Edw. ♂. (a) Antenna further enlarged. [Reproduced by permission of the Zoological Society of London.]

The discovery of this marine genus in Samoa is of much interest. The species is readily distinguishable from the other two (*T. frauenfeldi* Schin., of Europe, and *T. africana* Edw., of East Africa) by the hairy legs of the male and the shape of the claspers. A comparison with *Galapagomyia longipes* Johnson (Galapagos Is.), which may just possibly be the same species, is desirable.

It may here be noted that in this genus, as in *Clunio* and *Pontomyia*, the male hypopygium is inverted.



## ORTHOCLADIINAE.

53. *Orthocladius macrobrachius*, sp. n.

♂. *Head* blackish, palpi and antennae brown. Last antennal segment about 0.7 times as long as segments 2-13 together, with long hairs on its basal two-thirds or more, tip with fine pubescence. *Thorax* dull black; shoulders, lateral margin of scutum, and pleural membrane yellowish; scutellum dark brownish. *Abdomen* blackish, lighter beneath, each tergite with about 10 short hairs. Hypopygium with lobe of side-piece situate about middle, but rather more produced than in *O. brevifurcatus*; clasper slightly expanded on inner face in middle, terminal claw very stout; anal point present but very short. *Legs* brownish; no tarsal beard; empodia small; no pulvilli. On middle and hind legs the tibiae have simple spurs, one long and one short, and the first three segments of the tarsi each have small apical spurs. *Wings* with a very slight milky tinge by reflected light, very slightly brownish by transmitted light; no microtrichia.  $R_{4+5}$  nearly straight and ending well before level of tip of  $Cu_1$ . Costa extending nearly half-way from tip of  $R_{4+5}$  to wing-tip, but gradually thinning out and its exact termination difficult to distinguish.  $R_{2+3}$  ending beyond half-way between tips of  $R_1$  and  $R_{4+5}$ . Cubital fork very short, its base distant from  $r-m$  by nearly twice the length of the short, straight  $Cu_2$ . Slight indications of a fold near end of  $An$  parallel with  $Cu_2$ . Squama bare. Halteres light brownish. Wing-length 0.8-1.0 mm.

Savaii: Safune, 150 ♂, 12.v.1924 (Bryan).

This species is closely related to *O. brevifurcatus* Edw. (Britain) and *O. brachydicranus* Edw. (Society Is.), differing from both in the more distinctly produced costa and in details of the hypopygium.

## CHIRONOMINAE.

54. *Tanytarsus hopkinsi*, sp. n.

♀. Colour uniformly pale yellowish (probably green in life), vestiture pale. Eyes approximated, bare; distance between them only about as great as diameter of first segment of antennae. Antennae 6-segmented; segment 2 with a slight constriction near base and a short neck; 3 and 4 with longer necks, which are not much shorter than the swollen basal part; 5 without neck; 6 shorter than 4 and 5 together, with several rather long curved sense-hairs, and

four long bristly hairs at extreme tip. Last segment of palpi much longer than the others. Mesonotum very prominent, the pronotum hardly distinguishable. Cerci short and inconspicuous. First segment of front tarsi about 1.6 times as long as the tibia. Combs of posterior tibiae widely separated above, narrowly so beneath, outer comb with a long spur, inner comb apparently without spur. Fifth tarsal segment short, not half as long as fourth; claws very small, pulvilli present. *Wings* rather densely hairy on the whole surface.  $R_{4+5}$  rather curved, reaching almost to tip of wing; costa not produced;  $r-m$  rather oblique, though less so than in *Chironomus*, a little longer than the basal section of  $Rs$ ; base of cubital fork not much beyond  $r-m$ . Anal area moderately well developed; squama with three or four short marginal hairs, not a complete fringe. Wing-length 1.5 mm.

Upolu: Malololelei, 2,000 ft., 1 ♀, 25.xi.1924.

### 55. *Tanytarsus maritimus* Edwards.

*Proc. Zool. Soc. London*, 1926, p. 794.

Upolu: Apia, adults numerous in company with *Clunio pacificus*, 8 p.m., 11.xii.1925; larvae and pupae among *Halophila* plants in lagoon.

A small, pale yellow species (perhaps green in life); superficially resembles *T. hopkinsi*, but differs in many structural details, notably in the widely separated eyes; presence of only five segments in ♀ antennae, terminal segment having no long bristles at tip; and the long pointed cerci.

This species and the next are of special interest as being the first truly marine species of the tribe *Chironomariae* to be discovered. *T. maritimus* differs from *T. halophilae* in having the wings less hairy, especially in the male.

### 56. *Tanytarsus halophilae* Edwards.

*Proc. Zool. Soc. London*, 1926, p. 791.

Savaii: Fagamalo, larva and pupae among *Halophila* plants in lagoon, xi.1925.

A small species, described from specimens dissected from pupae; colour not ascertained, but presumably uniformly yellowish or green like the other two species. The wings are hairy on most of the surface in both sexes; female cerci long and pointed as in *T. maritimus*.





is believed to be the only insect which is submarinae in the adult stage.\* The male is an active swimmer, with peculiarly modified wings and legs, and long bare antennae; the female is worm-like and completely devoid of appendages except the posterior legs, which are vestigial. The female pupa was discovered, and its structure proves that *Pontomyia* is closely related to *Tanytarsus*; it is believed that in spite of its profound modifications it may be a recent development from the *T. maritimus* group.

The sexes being so extremely unlike, their association as male and female of one species is a matter of supposition only, until specimens are obtained *in copulâ*, or until both sexes can be reared or dissected from pupae. Meanwhile the supposition appears justified, because the two sexes were obtained at the same time and place, and because the degenerate female would appear to require some such modifications of structure in the male as are found in the insect described. It must be pointed out, however, that the pupa of the male *Pontomyia* has not yet been obtained, and there is therefore a possibility that the female of *P. natans* is other than the one described, and that the male which belongs to this female is a more or less normal *Tanytarsus*.

#### 58. *Chironomus melanocnemis*, sp. n.

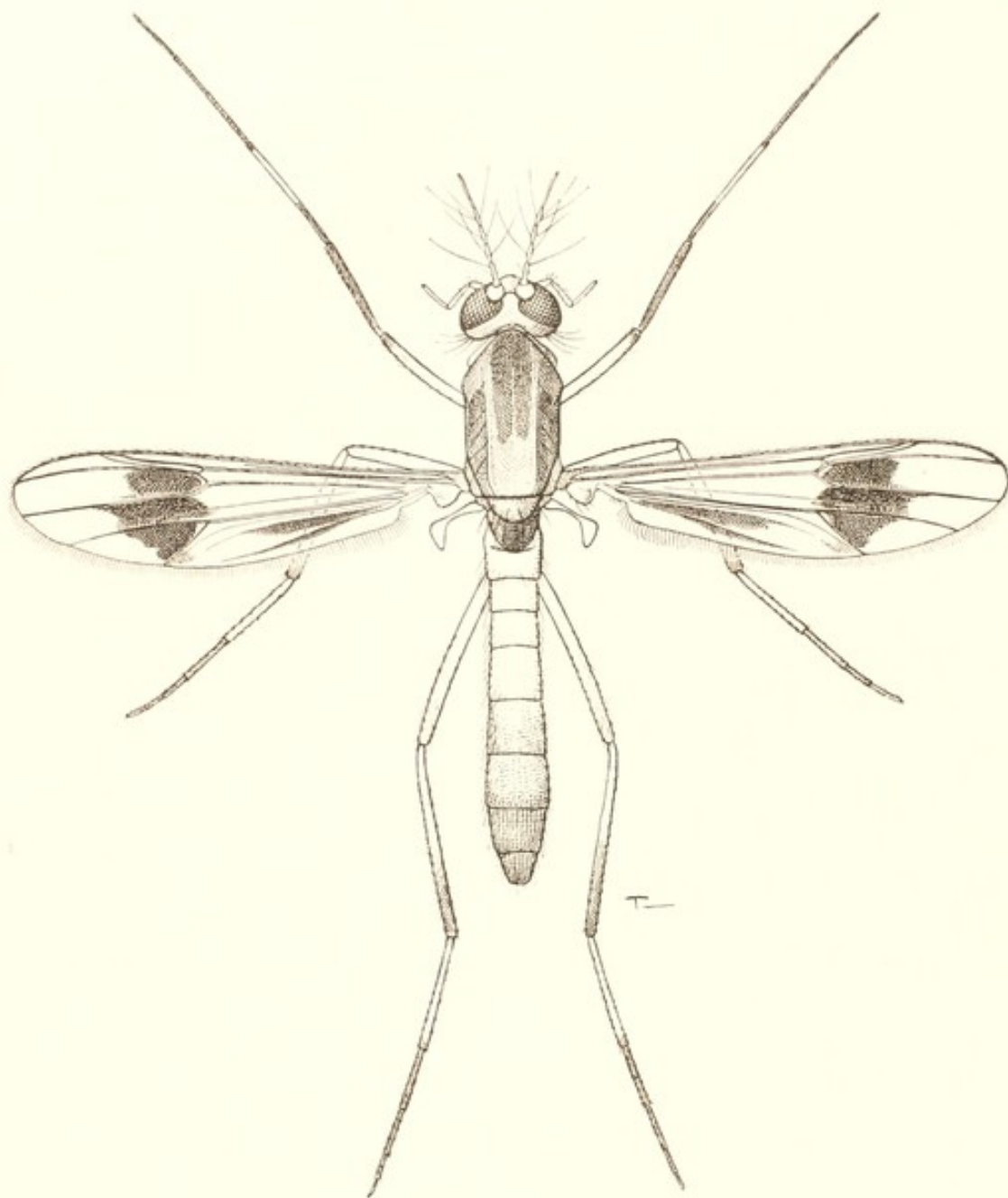
Text-fig. 9.

♀. *Head* dark brown, including antennae and palpi. No frontal tubercles. Eyes separated by the width of 5 or 6 facets. Antennae with 6 segments of the usual form, second segment constricted in the middle. *Thorax* shining dark brown; mesonotum with three separate shining black stripes; pleural membrane heavily dusted with silvery-grey. Pronotum distinct, collar-like, reaching front margin of scutum, but just divided in middle. *Abdomen* dark brown. *Legs*: Front femora yellow with black tips; tibiae entirely black and rather thick; tarsi black, with outer two-thirds of first segment white. Middle femora and tibiae yellow; tarsi black, first segment with basal third yellowish and apical third white. Hind femora and tibiae yellow with tips darkened; tarsi black, first segment white except narrowly at base and tip. All coxae and trochanters yellow. First front tarsal segment about 1.4 times as long as tibia. Combs of posterior tibiae normal, each with a short spur; pulvilli distinct. *Wings* hyaline, veins all dark; a large black patch occupies nearly the basal

\* Except the bug *Aëpophilus bonnairei* Sign. (vide China, *Ent. Mo. Mag.*, lxiii, pp. 238-241, 1927).



half of cell  $R_5$  and extends across into cell  $Cu_1$ , narrowed to hind margin, which it just touches; a second black patch occupies middle of anal cell.  $Rs$  arising well beyond middle of wing; consequently cubital fork is short, although its



TEXT-FIG. 9.—*Chironomus melanocnemis*, sp. n. ♀.

base is below base of  $Rs$ ;  $Cu_2$  not half as long as  $Cu_1$ . Squamal fringe reduced to four or five hairs. Halteres yellowish. Wing-length 2.8 mm.

Upolu : Apia, 1 ♀, ii.1924.

Closely related to *C. candidibasis* Edw. (Fiji), differing chiefly in the leg-

markings, especially in the absence of a white ring at base of front tibiae and the broader black ring at base of first front tarsal segment.

59. *Chironomus* (s. str.) *samoensis*, sp. n.

♂ ♀. *Head* ochreous, palpi and antennal flagellum rather darker; plumes of ♂ antennae pale. Frontal tubercles present, of moderate size. Last segment of ♂ antennae quite three times as long as 2-11 together. *Thorax* greenish; scutum with three reddish-orange stripes, the areas between the stripes dusted with silvery-grey. Postnotum not darker than the scutal stripes. Pronotum slightly emarginate in middle. *Abdomen* of ♂ (when not discoloured) green, tergites 2-4 each with a more or less diamond-shaped brown spot near base, 5 brownish, 6-8 darker brown, hypopygium pale. Seen very obliquely from in front the segments are rather distinctly silvery-grey at the base; seen obliquely from behind the silvery dusting is on the posterior margins of 2-5 and nearly the whole of 6-7. Hypopygium with anal point moderately long and slender; claspers slender, not much enlarged at base; upper basal appendage rather small, with a downward-curved point; the structure almost as figured by Kieffer for *Ch. imberbis*. *Abdomen* of ♀ without distinct markings. *Legs* greenish-yellow; tarsi a little darker, first two segments narrowly and rather indistinctly brown at tip. No darkening on femora, nor on front tibiae. First segment of front tarsi about 1.8 times as long as tibiae. No tarsal beard. *Wings* hyaline; *r-m* slightly darkened; venation as in other members of the *dorsalis* group. Halteres pale.

Length of body (♂) 4.5-5 mm.; wing 3-3.5 mm.

Upolu: Apia, 7 ♂, 6 ♀, 23.ii., 4.iii., 20.vi.1924; Malololelei, 1 ♀, 21.iv.1925; Vailima, 1 ♂, 12.xii.1925. Tutuila: Pago Pago, 1 ♂, 2.xii.1924. Tonga: Nukualofa, 1 ♂, 23.ii.1925.

*Chironomus samoensis* is very closely related to a number of described Australasian species, such as *C. subdolus* Skuse and *C. imberbis* Kieff., of the cosmopolitan *dorsalis* group. It does not quite agree with specimens of *C. subdolus* in the British Museum, and is not represented in the collections from the Society Is. and Fiji. From *C. hawaiiensis* Grim. it differs chiefly in the absence of dark preapical rings on the femora.

60. *Chironomus* (s. str.), sp.

Upolu: Apia, one damaged ♀, 29.iv.1924.

Similar to the last, but scutal stripes black, front tibia black at base, etc.



61. *Chironomus* (*Polypedilum*), sp.

Upolu : Apia, one damaged ♀, 14.ix.1923 (Swezey and Wilder).

## PSYCHODIDAE.

No species of this family have hitherto been recorded from Samoa, but Buxton and Hopkins found several members of the genera *Psychoda* and *Brunettia*. Among the material available I have recognised six species, two of which are European and no doubt artificially introduced. The remaining four are described as new, but it is not improbable that some or all of them are wide-ranging species which have not yet been recognised elsewhere. For one of these species a new genus is proposed ; its breeding habits are not known, but the larvae are probably humus-feeders as is the case in *Brunettia* and *Psychoda*. No strictly aquatic species (*Pericoma*, *Sycorax*, etc.) have been found in Samoa, nor has any species of *Phlebotomus*.

In Fiji the Psychodid fauna is richer than in Samoa, and among the material in the British Museum are examples of some very peculiar species as yet undescribed, but the only species so far recorded, in addition to those mentioned below, is *Brunettia sexpunctata* Tonn.

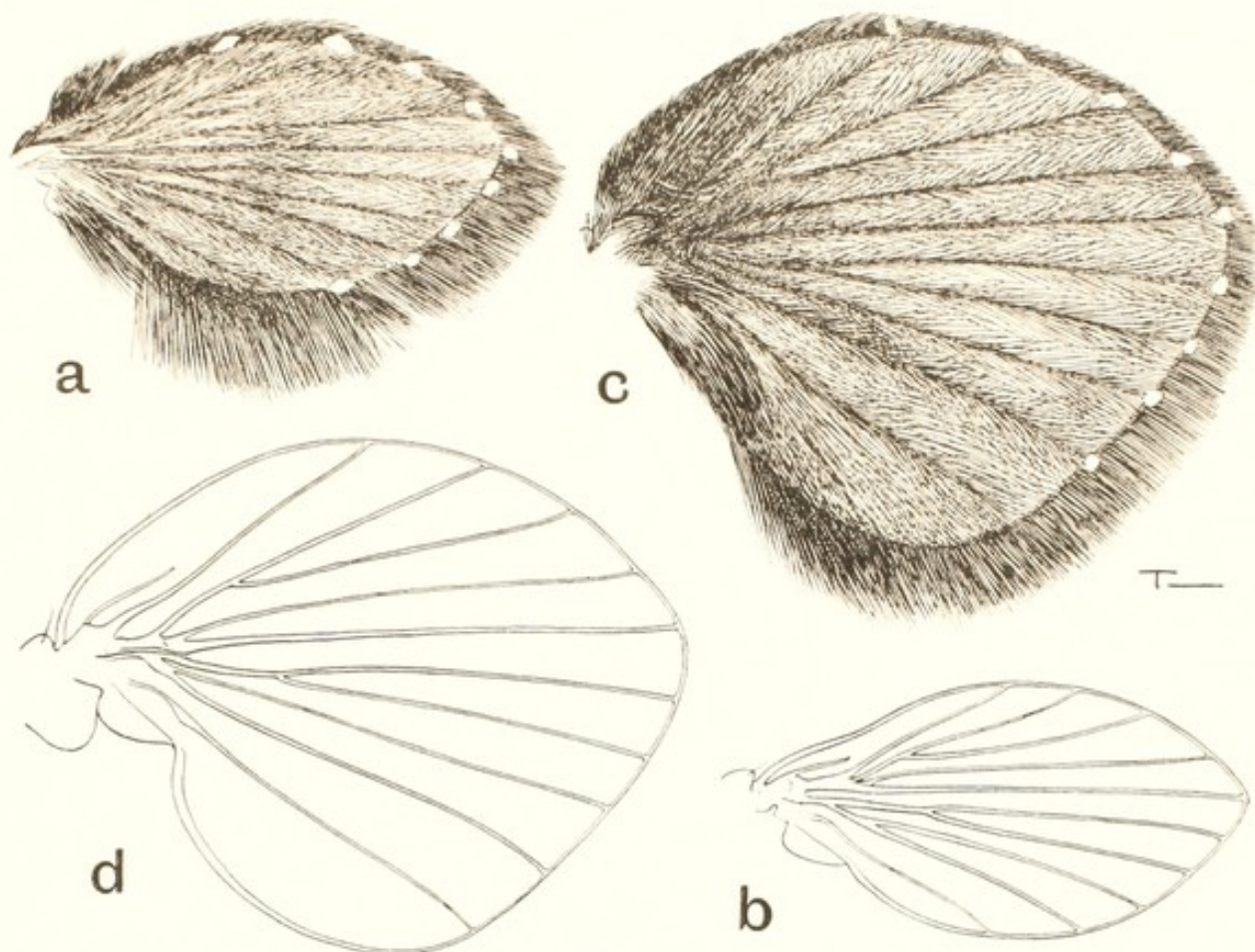
62. *Brunettia biformis*, sp. n.

Text-fig. 10.

♂. *Head* clothed above and on face with long erect blackish scales. Eye-bridges three facets wide, and separated by about the width of four facets. Palpi with small dark grey scales. Antennae 15-segmented ; segments 3-13 with long necks, fully as long as the swollen basal portion ; verticils long, dense, and forwardly directed ; sense-organs very long, S-shaped, not very stout ; segment 14 with a shorter neck, but provided with verticil and sensory organs ; 15 smaller than 14, ending in a rather long point the tip of which is slightly enlarged and pubescent. *Thorax* clothed with long blackish scales towards the front ; scales on back part of scutum and on scutellum lighter. Front part of pleurae, round prothoracic spiracle, considerably swollen and provided with a dense tuft of long black scales. *Abdomen* with dense blackish hair-like scales. Hypopygium very much as figured by Annandale for *B. superstes*, the ventral appendages having 25-30 spatulate spines ; subanal plate (B of Annandale's



figure) rounded-triangular; parameres slender and divergent; terminal segment of forceps with two or three bristles at tip, but instead of being stout and truncate as in *B. superstes* it is long, slender and pointed. *Legs*: Front legs clothed with dull black scales which have a grey-blue lustre seen from above. Middle and hind legs with the femoral scales dark, those on tibiae and tarsi rather light grey. All the scales are rather close-lying, but the hind tibiae



TEXT-FIG. 10.—*Brunettia biformis*, sp. n. Wings of ♂ (c, d) and ♀ (a, b), clothed and denuded.

have in addition some long erect hairs or hair-like scales. The front tibiae appear rather swollen apically. *Wings* very broad, almost circular in outline, the areas before  $R_1$  and behind  $Cu$  being much enlarged. Upper surface of wing clothed on basal half or more with dark brown scales which have slight bronzy reflections; rest of membrane and all veins with black hair; fringe black, not very long. On costa before tip of  $R_1$  is an indistinct group of narrow whitish scales, and small inconspicuous spots of similar scales occur at tips of  $R_2$  and the seven following veins, these spots hardly distinguishable in some specimens.



Long erect pale greyish hairs occur towards the base of  $R_1$  and  $R_2$ , hair otherwise dark. A large tuft of very long blackish scales on alula. Under surface of wing entirely clothed with bronzy-black scales, which are rather narrower in radial cells towards tip of wing.  $R_5$  ending immediately above wing-tip. Halteres dark. Wing  $2.5 \times 2.2$  mm.

♀. Verticils of antennae less dense than in the ♂, hairs more spreading and more irregular in length. Necks of flagellar segments shorter. A rather distinct white spot at tip of first hind tarsal segment. Wings much narrower, the costal and anal areas not being enlarged. Fringe on posterior margin much longer. White spots round margin of wing more distinct, especially the one on costa before tip of  $R_1$ , which is larger than the others. No scales on upper surface of wing, membrane and veins alike being clothed with black hairs. On most of the veins towards base of wing the hairs are long and erect; no pale hairs on  $R_1$  and  $R_2$ , but a few towards the base of  $Cu$ . Under surface of wing entirely covered with scales as in the ♂. Wing  $2.0 \times 1.2$  mm.

Upolu: Apia, 2 ♂, 4 ♀, ii.1925, reared from rotten grass; 1 ♂, 23.i.1924; 1 ♂, 1 ♀, 6.v.1924; 3 ♀, 9.vi.1924; 1 ♂ (type), xii.1924. Also 1 ♂, no locality noted (O'Connor), and some damaged females (identity not certain) from Manua, Tau, 27.ix.1923 (Swezey and Wilder). Tutuila: Pago Pago (Swezey and Wilder) and Savaii, Safune (Bryan). Fiji: no exact data, 2 ♀, 1906 (Knowles); Nausori, 1 ♂, i.1921 (Evans); Suva, 5 ♂, 2 ♀, 17.iv.1921, 28.30.1922 (Simmonds).

This interesting species superficially resembles the common and widely-distributed *B. albonotata* (Brun.) (*B. indica* Eaton), but in the female sex differs in having the whole of the under side of the wing scaly, whereas in *B. albonotata* the scales are present at the base only. *B. atrisquamis* (Brun.) and *B. argenteopunctata* (Brun.) are still closer to the new species, but have been insufficiently characterised for exact comparison. I have examined a male from Peradeniya, Ceylon, which may belong to *B. atrisquamis*, and this differs conspicuously in the shape of the forceps. The Fijian examples were doubtfully determined by Tonnoir as *B. argenteopunctata* Brun., the description of which agrees with our specimens, but pending confirmation of their identity with the Indian form the Samoan and Fijian specimens are best treated as distinct.

There is a remarkable difference in the shape and vestiture of the wings in the two sexes, and it is just possible that two species may be involved. All are referred to one species because all the males are of one type and all the females of



the other, and because in one case both forms were reared together. Moreover, among four or five other related species which I have examined, all the specimens with round wings are males, and most of those with narrower wings are females. This sexual dimorphism has not hitherto been noted. Annandale does not mention it in describing *B. superstes*, although he had both sexes before him. Another unusual feature is that the males are larger than the females, the reverse usually being the case in this subfamily. In *B. albonotata* Brun. and *B. sexpunctata* Tonn. the sexes are similar, the wings of the ♂ not being enlarged.

The form of the antennae and the numerous spines on the anal claspers indicate that *Brunettia* is more closely related to *Pericoma* than to *Psychoda*, although  $R_5$  ends almost in the tip of the wing. This last feature, as pointed out by Tonnoir, does not provide a universal distinction between *Psychoda* and *Pericoma*.

### *Lepidopsychoda*, gen. n.

Antennae with 13 well-developed segments, as in *Psychoda*, the small terminal segments embedded in the verticil of the 13th. Ventral appendages of male hypopygium long, slender, somewhat swollen at the base and with one or two more or less spatulate terminal spines, as in *Psychoda*. Female without horny ovipositor. Wings pointed, as in *Psychoda*,  $R_5$  ending exactly in the point. The new genus differs from *Psychoda* in having the whole of the wing membrane, both above and below, as well as all the veins, clothed with broad flat scales; the only hairs on the wing, apart from the fringe, are a few at the extreme base.

Genotype, *L. tineiformis*, sp. n.

The almost complete replacement of the hairs of the wing-veins by scales, and the occurrence of similar scales all over the membrane, seem sufficient grounds for separating the species described below from *Psychoda*, although the agreement is close in regard to antennal and genitalic characters, which Tonnoir regards as fundamental. Some species of *Brunettia* have more or less completely scaly wings, but in these the antennae have 15 well-developed segments and the hypopygium is of the *Pericoma* type. There remains the genus *Parabrunettia*, which was founded by Brunetti for scaly-winged species having the venation of *Psychoda*, i.e. with  $R_5$  ending in the wing-tip. As pointed out by Tonnoir, this is an uncertain character, and *Parabrunettia* should probably be treated as synonymous with *Brunettia*; the genotype is stated by Brunetti



to have a 13-segmented *flagellum*, and most of the other species included by this author in his genus also agree with *Brunettia* in this respect.

The Javanese species that I have recently described as *Brunettia* (*Parabrunettia*) *trimicra* belongs to this genus.

### 63. *Lepidopsychoda tineiformis*, sp. n.

♂. *Head* clothed mainly with small, flat, close-lying whitish scales, those on face rather longer and more erect. Sensory organs of antennae apparently simple, forwardly directed and not quite reaching base of succeeding segment. Three small terminal segments subequal in size, 14 and 15 well separated from 13 and 16 but not far from one another. *Thorax* with rather short erect whitish scales in front; shorter, close-lying, creamy ones on disc; and long dark brown scales behind. A tuft of long dark brown scales on pleurae. *Abdomen* clothed densely with rather dark bronzy-brown scales which lie almost flat, those at sides of last few segments longer. Hypopygium concealed, except the long ventral appendages, which have two terminal spines. *Legs* mainly dark brown; outer sides of front tibiae and tips of all the tarsal segments white. Middle and hind tibiae with long dense outstanding scales on outer side, dark brown in colour except a tuft of yellow ones close to tip of hind tibia; first hind tarsal segment similarly clothed with long dark brown scales. *Wings* clothed with purplish-brown and dark bronzy-brown scales irregularly mixed. Fringe rather short, dark brown except round the tip, where it is almost white. Halteres with dark knobs. Wing-length 2.7 mm.

♀. Similar to ♂, but posterior tibiae and tarsi without dense scale-tufts; scales on front of thorax not distinctly white, and (in perfect specimens) the area of close-lying scales on mesonotum less obvious.

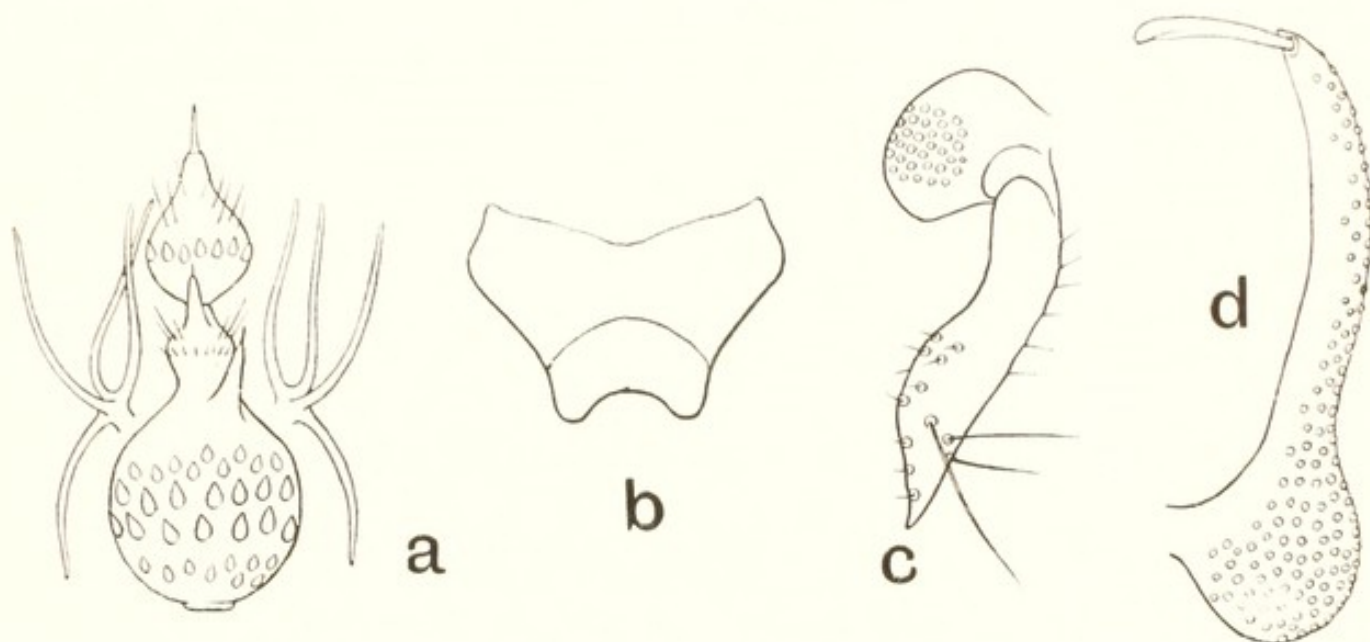
Upolu: Apia, 1 ♂ (type), 29.iii.1924; Malololelei, 2,000 ft., 1 ♂, 20.vi.1924. Fiji: Loloti, 1 ♂, 2 ♀, 14.iv.1922 (Greenwood).

This species rather closely resembles *L. trimicra* (Edw.), described from a single female from Java. The chief difference is in the antennae, *L. trimicra* having segments 14 and 15 well separated and almost globular, like segment 16; further, the scales on the front of the mesonotum and on the tips of the tarsi are whiter, and the wing-fringe seems shorter. It is possible that these differences are individual only, and that the Samoan species is the same as the Javan one.

64. *Psychoda quadrifilis*, sp. n.

Text-fig. 11.

♂ ♀. Belongs to the *phalaenoides* group, the members of which it closely resembles in all respects except as regards details of structure of antennae and genitalia. Sensory hairs of antennae (except perhaps on the last two or three segments) with four branches, as in *P. pusilla* Tonn., three being directed forwards and one backwards. Antennae with two small apical segments, the first of which is very small and not well separated from segment 13; terminal



TEXT-FIG. 11.—*Psychoda quadrifilis*, sp. n. (a) Tip of antenna; (b) genital plate of ♀; (c) forceps and (d) ventral appendage of ♂.

segment larger and somewhat flask-shaped. Segment 13 without a distinct neck, but with a bristle-like apical process on one side. Male hypopygium very much as in *P. severini* Tonn. and *P. surcoufi* Tonn. Ventral appendages with greatly enlarged base, the terminal spine about one-third as long as the stem. Forceps with the basal segment very short, swollen beneath; terminal segment with three rather long hairs (as in *P. severini*) and some shorter ones; seen from the side its lower margin is very strongly convex, much more so than in *P. severini*. Subgenital plate of female narrowed and emarginate apically, the lobes not divergent.

Upolu: Apia, 5 ♂, 1 ♀, 25.ii.1925, reared from rotten pumpkin.

*P. quadrifilis* differs from all the European species except *P. pusilla* in the

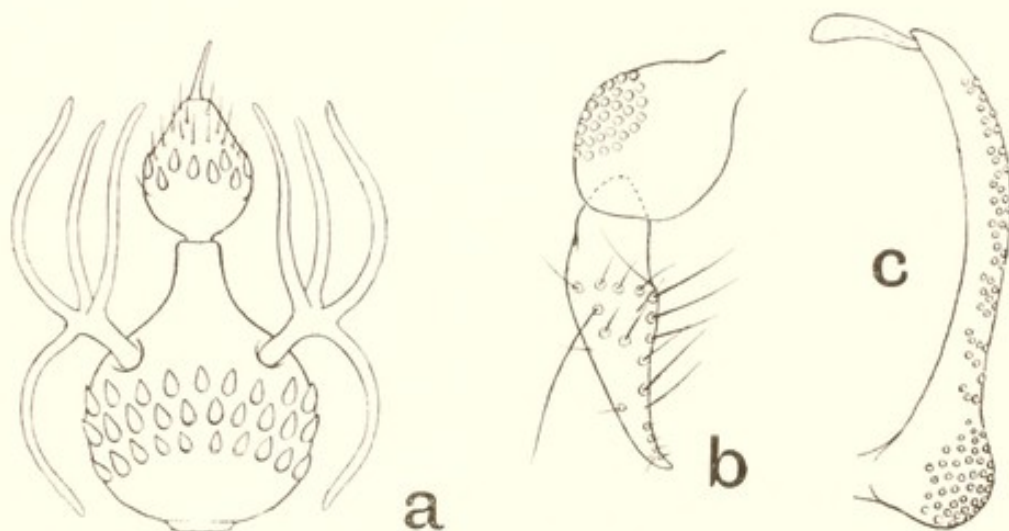


four-branched sensory organs of the antennae, and from *P. pusilla* in the other antennal and genital characters. It may be identical with some Oriental or Australasian species, but none of these have been properly described as yet.

### 65. *Psychoda savaiiensis*, sp. n.

Text-fig. 12.

♂. Antennae with 4-branched sensory organs as in *P. quadrifilis*, but the branches stouter and more wavy. Segment 13 of antennae with a short but distinct neck; only one small terminal segment, which is much less pointed than



TEXT-FIG. 12.—*Psychoda savaiiensis*, sp. n. (a) Tip of antenna; (b) forceps and (c) ventral appendage of ♂.

in *P. quadrifilis*. Hypopygium similar to that of *P. quadrifilis*, but ventral appendages more slender, less bulbous at base, with shorter and more spatulate terminal spine; terminal segment of forceps more bristly and not enlarged beneath.

Savaii: Salailua, 2 ♂, 21.v.1924 (Bryan).

### 66. *Psychoda nigripennis* Brunetti?

*Rec. Ind. Mus.*, ii, p. 376, 1908; *Fauna Brit. Ind. Dipt. Nemat.*, p. 232, 1913. ? *Psychoda obscura* Tonnoir, *Ann. Soc. Ent. Belg.*, lix, p. 14, 1919, and lxii, p. 70, 1922.

Savaii: Safune, rain forest 2,000–4,000 ft., 10 ♀, 8.v.1924 (Bryan).

I am unable to discover any obvious distinction from the Indian *P. nigripennis*, as described by Brunetti, or the Belgian *P. obscura*, as described and figured by Tonnoir. It is possible that these two names are synonymous, and

that the species will be found to have a cosmopolitan distribution, like several others of the family. In the absence of males, however, the determination of the Samoan specimens can only be regarded as provisional.

66A. *Psychoda albipennis* (Zett.) Tonnoir ?

*Ann. Soc. Ent. Belg.*, lxii, p. 81, 1922.

Fiji, 2 ♀ without exact data, 1906 (Knowles).

A specimen after being mounted agrees rather closely with Tonnoir's figures. The species is probably cosmopolitan, and may be expected to occur in Samoa. It is very similar to *P. quadrifilis*, but the last antennal segment is not pointed, and the sensory organs have only three branches.

67. *Psychoda alternata* (Say) Tonnoir ?

Samoa : no exact data, 1 ♂ (O'Connor).

The presence of dark spots on the wing-margin was not noticed in the dry specimen, nor do these show in the mount, but the antennae and hypopygium are almost exactly as figured by Tonnoir for this cosmopolitan species.

## TIPULIDAE.

Hitherto only five species of craneflies, four of which were described by Alexander in 1921 (*Bull. Brooklyn Ent. Soc.*, xvi, pp. 9-13), have been recorded from Samoa. In the present collections 33 species are represented, which must be considered as affording a very fair picture of the existing fauna, since the number is greater than has been found either in the Hawaiian Islands or in the Seychelles, where rather careful collecting has been done.

So far as can be ascertained at present, 23 of these 33 species are endemic, 21 of them being regarded as new. Of the remaining 10 species, 6 have also been found in Fiji, and 6 have a wider distribution in the Pacific. Of the 6 species common to Samoa and Fiji, 4 are not known to occur elsewhere, and 2 of these show slight racial differences in the two groups of islands. Three species are known as existing in Samoa and the New Hebrides or Northern Australia, but not in Fiji; at least one of these has developed into a distinct island race.

Although the cranefly fauna of New Guinea is still very little known, and



that of Fiji only imperfectly, the available evidence indicates that the Samoan and Fijian faunas have both been derived (probably independently) from the Papuan (Austro-Malayan) region. This conclusion is entirely in accord with that arrived at by Meyrick from a study of the Microlepidoptera.

The most noteworthy features of the Samoan crane-fly fauna as a whole are: (1) the absence of the whole subfamily Tipulinae, a feature common to most oceanic islands, although three species are found in Fiji. (2) The absence of the Cylindrotominae, Limnophilini and Hexatomini. (3) The considerable development of the genus *Trentepohlia*, and of *Lipophleps*, a subgenus of *Gonomyia*.

In addition to the Samoan species discussed below, the following Tipulidae have been met with in other Polynesian islands, or in Fiji:

- Thrypticomysia dichromogaster* Edw. Tahiti.
- Dicranomyia sordida* Brun. (*D. illingworthi* Alex.). Fiji, Tahiti.
- „ *rapae* Alex. Rapa.
- „ *sancti-georgii* Edw. Rapa.
- Doaneomyia fijiensis* Alex. Fiji.
- „ *tahitiensis* Alex. Tahiti.
- Libnotes veitchiana* Edw. Fiji.
- „ *greenwoodi* Alex. Fiji.
- Limonia dactylolabis* Alex. Fiji.
- „ *stoneri* Alex. Fiji.
- „ *teucholabina* Alex. Fiji.
- „ *veitchi* Alex. Fiji.
- Gonomyia* (s. str.) *varipes* Alex. Fiji.
- „ (*Lipophleps*) *digitifera* Alex. Fiji.
- „ „ *fijiensis* Alex. Fiji.
- „ „ *metallescens* Edw. Marquesas Is.
- „ „ *flavidapex* Edw. Tahiti.
- Erioptera oceanica* Alex. Fiji.
- Styringomyia fumosa* Edw. Fiji.
- Trentepohlia* (s. str.) *fijiensis* Alex. Fiji.
- Conosia irrorata* Wied. Fiji.
- Ctenacroscelis fijiensis* Alex. Fiji.
- „ *lepidus* Alex. Fiji.
- „ *walkerianus* Alex. Fiji.

In addition to the above, it may be noted that ten or eleven species of *Dicranomyia* and one of *Gonomyia* (subgen. *Lipophleps*) are endemic in the Hawaiian Islands. The widely distributed *Trimicra pilipes* Fab. has also been recorded from Hawaii, but apparently from no other part of the Pacific.

#### 68. *Thrypticomys subsaltens* Alex.

*Dicranomyia (Thrypticomys) subsaltens* Alexander, *Ann. Mag. Nat. Hist.*, (9), xiii, p. 34, 1924.

Upolu: Apia, Vailima, Mt. Vaea and Malololelei, numerous specimens, ii., vi., xi., xii. 1924-5. Recorded by Alexander from Fiji (Lautoka, Ndai, Suva).

Alexander does not describe the hypopygium, which provides the readiest means of distinction from the closely related *T. auripennis* Skuse, of Queensland and the New Hebrides. In *T. subsaltens* the two rostral spines are slender and bristle-like, strongly curved, and pointing in different directions. The tarsi have the last four segments and generally more than the apical half of the first segment white, the white being rather more extensive on the hind legs.

#### 69. *Thrypticomys auripennis* Skuse, var.

*Proc. Linn. Soc. N.S.W.*, (2), iv, p. 775, 1890; Edwards, *Ann. Mag. Nat. Hist.*, (9), xx, p. 233, 1927.

Upolu: Malololelei, 2,000 ft., 5 ♂, 17-20.vi.1924, 2.ii.1925, and 5.xii.1925. Savaii: Safune, rain forest above 2,000 ft., 1 ♂, 2.v.1924 (Bryan). Previously recorded from New South Wales (Skuse) and the New Hebrides (Edwards).

Compared with *T. subsaltens*, smaller and of a more slender build; the white on the tarsi is less extensive, well over half the first tarsal segment being dark on at least the hind legs; the hypopygium has the fleshy claspers longer (over twice as long as the side pieces), the rostral spines shorter, straight, and rather widely separated at the base, though rather variable in length and thickness.

In typical *T. auripennis* (as represented in the British Museum by a ♂ from S. Queensland) and also in *T. subsaltens*, the wings are practically clear, with a conspicuous stigma. The Samoan specimens of *T. auripennis* differ in having the whole wing slightly smoky, and the stigma less dark; the ventral process of the side-piece of the hypopygium is shorter and broader than in the Queensland specimen, and more like males from the New Hebrides. The formation of several local races of this species seems to be indicated, but the characters are rather indefinite.

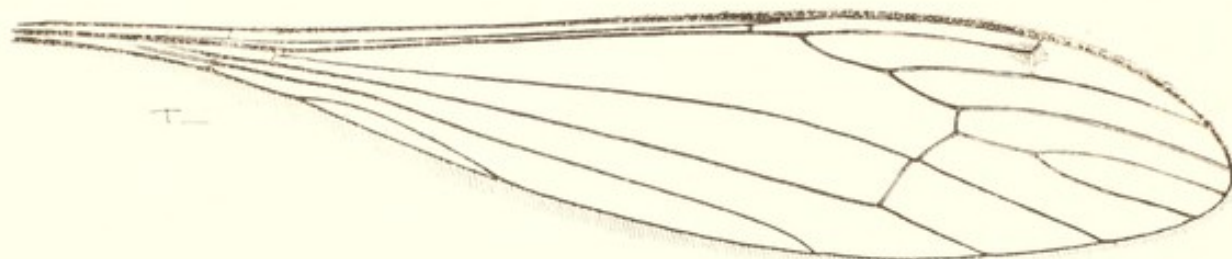


One specimen has the discal cell open on one wing; it is interesting to note that it is confluent with cell  $2nd.M_2$ , as is always the case in the allied genera *Doaneomyia* and *Pseudoglochina*.

70. *Pseudoglochina laticincta*, sp. n.

Text-fig. 13.

♂ ♀. *Head* brownish-ochreous. Front moderately broad. Rostrum very short, ochreous. Palpi black. Antennae with the first segment ochreous, the rest black; flagellar segments oval with short necks, verticils rather short, dorsal hair not very long. *Thorax* somewhat shining, brownish-ochreous, rather darker above, especially on pronotum. Abdomen dark brown, segments broadly ochreous apically. *Legs* with the femora brown, rather darker towards tips,



TEXT-FIG. 13.—*Pseudoglochina laticincta*, sp. n. Wing.

which are somewhat thickened. Tibiae white, with a black ring just before middle, this ring very broad and occupying about half the total length of the tibia. Tarsi wholly white. *Wings* greyish, strongly iridescent. Stigma small, dark brown; no trace of a dark cloud over base of *Rs*. *Sc* ending above base of *Rs*, which is gently curved and a little longer than basal section of  $R_{4+5}$ . Cell  $M_1$  about twice as long as its stem.  $Cu_1a$  at or just before base of cell  $M_3$ . *Ax* fused with hind margin for quite one-third of distance from basal cross-vein to its tip, free part of vein curved, approaching *An* at first, then divergent. Halteres blackish. Wing-length 7–8 mm.

Upolu: Vaea, 1,200 ft., type ♂ and ♀, 20.ii.1925; Vailima, 3 ♂, 2.ii.1925; Apia, 1 ♀, 14.v.1925.

This species differs from the other members of the genus in the broad tibial ring, the shorter subcosta, and in having the axillary vein partly fused with the hind margin. In all these respects it shows an approach to *Doaneomyia*, and it is worth noting that *D. albitarsis* Edw. (New Hebrides) has a very similar

colouring. *P. laticincta* is of special interest as indicating the origin of the endemic Pacific genus *Doancomyia* from the Austro-Malayan *Pseudoglochina*. It is to be expected that a true *Doancomyia* will be found in Samoa, since species occur in the New Hebrides, Fiji and Tahiti.

#### 71. *Libnotes hopkinsi*, sp. n.

♂. *Head* black, with slight pruinescence. Eyes nearly touching. Rostrum, palpi, and scape of antennae black; flagellum light brownish, segments shortly oval, with short verticils, dorsal hair not much longer than the rest. *Thorax* shining, devoid of pruinescence. Pronotum black. Praescutum blackish-brown except at sides posteriorly. Scutum ochreous in middle and above wing-base. Scutellum and postnotal meditergite dark brown, former ochreous at base in middle. Pleurae uniformly ochreous. *Abdomen* blackish above, light ochreous beneath. Hypopygium with the fleshy claspers very large, rostrum rather short, with one stout spine; ventral processes of side-piece rather long. *Legs* dark brownish, femora lighter except at tips, no sign of a pale preapical ring. *Wings* with a slight brown tinge, veins dark. Stigma conspicuous, dark brown; a large dark brown patch over base of *Rs*, reaching almost to *M*, and another similar but rather smaller patch over the arculus. Wing-tip scarcely darkened. Cross-veins clouded. *Sc* long, reaching well beyond end of *Rs*. Tip of *R*<sub>1</sub> about equal to *r*. *R*<sub>5</sub> rather long, strongly curved at base. Cells *M*<sub>1</sub> and *M*<sub>2</sub> equal at base; *Cu*<sub>1a</sub> near middle of discal cell. *Ax* diverging slightly from *An* at base. Long macrotrichia on the root of *An*. Halteres with pale stem and dark knob. Wing-length 9 mm.

Tutuila: Pago Pago, 1 ♂, 14.xii.1925.

The nearest known allies of this species seem to be *L. veitchi* (Alex.) (Fiji), *L. picta* Alex. (Guam I.) and *L. trimaculata* Brun. (India), in all of which the wing is very similar to that of the new species. *L. picta* has a very differently coloured thorax, and *L. trimaculata* has the wing-tip conspicuously dark. *L. veitchi* has the hypopygium and venation the same as in *L. hopkinsi*, but has only a small spot over base of *Rs*; praescutum with comparatively narrow median stripe, scutellum dark at sides only, abdomen banded, and femora with indications of a pale pre-apical ring.



72. *Libnotes samoensis* Alexander.*Bull. Brooklyn Ent. Soc.*, xvi, p. 9, 1921.

Upolu : Apia, 2 ♂, 1 ♀, 4.iii.1924, 14.v.1925 ; Malololelei, 2,000 ft., 3 ♂, 2 ♀, 11.iv.1924. Tutuila : Pago Pago, 2 ♂, 1 ♀, 14.xii.1925. Alexander's types (♂ ♀) were from Apia.

This is almost certainly to be regarded as a variety of the Indo-Malayan *L. nervosa* de Meij., from which it differs almost solely in having no trace of a median praescutal stripe. There is no difference in the hypopygia between the two forms, and both exhibit the same range of variation in the wings: the stigma is normally large in the male, small in the female, and there are associated differences in the venation; small males tend to resemble the females both in venation and size of stigma. According to the published descriptions, it would appear probable that *L. parvistigma* Alex. and *L. subaequalis* Alex. (Queensland) and *L. manni* Alex. (Solomon Is.) are also synonyms or varieties of *L. nervosa* de Meij., while according to the type *L. immaculipennis* White (Ceylon) is also the same.

73. *Libnotes punctipennis* de Meij.

*Libnotes punctipennis* de Meijere, *Tijd. v. Ent.*, liv, p. 35, 1911; *Libnotes distincta* Senior-White, *Mem. Dept. Agr. India, Entom.*, vii, p. 133, 1922.

Upolu : Apia, 1 ♀, 27.v.1925 ; Malololelei, 1 ♀, 25.vi.1924. Tutuila : Pago Pago, 1 ♂, 14.xii.1925. Savaii : Salailua, rain forest, 2,000–4,000 ft., 1 ♂, 17.v.1924 (Bryan).

This is a widely-spread species, occurring from Ceylon and India to the New Hebrides, and possibly to Japan, if I am correct in believing *L. puella* Alex. to be synonymous. The species varies somewhat in different parts of its range; the Samoan examples have rather fewer dark spots on the wings than the type, the tip of vein  $R_1$  is rather shorter, and the knob of the halteres is not darkened. The hypopygium of the male from Tutuila is quite the same as in one in the British Museum from Selangor.

74. *Libnotes fijiensis* Alex. var.

*Teucholabis fijiensis* Alexander, *Ann. Ent. Soc. Amer.*, vii, p. 240, 1914.

Upolu : Malololelei, 2,000 ft., 2 ♂, 4 ♀, iii.–iv.1924, xii.1925, iv.1926. Also Tutuila, 1 ♂ (Kellers).

The males agree with Alexander's description of the type from Nadi, Fiji Is., but there seems to be a slight difference in the hypopygium, which may



indicate that the Samoan form is varietally distinct; the ventral appendage of the side-piece is shorter than shown in Alexander's figure, and the clasper is rather broader, its outer margin less concave. The female (not hitherto described) differs from the male in the much smaller stigma, this sexual difference being found also in several other small species of *Libnotes*.

*L. fijiensis* is the most easterly representative of a small group, apparently of Austro-Malayan origin, which includes *L. veitchiana* Edw. (Fiji), *L. hebridensis* Edw. (New Hebrides) and *L. toxopei* Edw. (Buru); all these might perhaps be regarded as varieties of *L. fijiensis*, and might be referred with almost equal propriety to the genus *Limnobia*.

#### 75. *Libnotes perkinsi* (Grimshaw).

*Limnobia perkinsi* Grimshaw, *Fauna Hawaiiensis Dipt.*, iii, p. 6, 1901; Alexander, *Proc. Haw. Ent. Soc.*, v, p. 249, 1923. *Libnotes perkinsi* Alexander, *Bull. Brooklyn Ent. Soc.*, vi, p. 9, 1921; Edwards, *Ann. Mag. Nat. Hist.*, (9), xx, p. 239, 1927.

Upolu: Apia, 2 ♂, 8 ♀, xii.1924–ii.1925; Vailima, 1 ♀, 12.xii.1925; Malololelei, 2,000 ft., 2 ♂, 1 ♀, 13.ii.1924, vii.1924.

First described from a specimen from Hawaii, this rather distinct species has since been found in Tahiti and Fiji, and has also been recorded by Alexander from Apia. It is not yet known to occur in Papua or on the mainland of Australia.

#### 76. *Libnotes strigivena* (Walk.).

*Limnobia strigivena* Walker, *Journ. Linn. Soc. Lond.*, v, p. 229, 1861. *Libnotes strigivena* Skuse, *Proc. Linn. Soc. N.S. Wales*, (2), iv, p. 787, 1889.

Upolu: Apia, 1 ♂, 28.x.1925; Malololelei, 2,000 ft., 3 ♂ (one reared from larva found under dead bark), 25–27.iv., 2.vii.1924; Vaea, 1 ♀, 20.xii.1924. Tutuila: Pago Pago, 1 ♂, 14.xii.1925. Also 1 ♀ from Tonga, Nukualofa, 22.ii.1925.

The species is known to be found in New Guinea, Northern Australia and Fiji; it has also been recorded, but probably in error, from Java.

The series before me shows some variation. The larger and darker specimens have the margin of the praescutum broadly dark, and indications of four praescutal stripes; distinct scutal stripes, and a median dark line across the scutellum and postnotum. In the lighter specimens these thoracic markings are less distinct. There is usually a dark spot on the middle coxa, which is absent in the type from New Guinea. The single damaged specimen from Tonga has the dark ring of the front femora broader than usual, and including the whole tip.



77. *Dicranomyia* (*Alexandriaria*) *atromaculata*, sp. n.

♂ ♀. *Head* shining black above; frons ochreous, heavily dusted with silvery-grey. Antennae and palpi black, flagellar segments rounded to shortly oval, terminal one a little longer. Proboscis shorter than head, labella yellow. *Thorax* (in mature specimens) shining black, except the posterior pronotal angles, which are ochreous, and a large dull black patch on each side of the praescutum, extending from pseudosuture to suture. *Abdomen* dark brown, rather short. Hypopygium with the fleshy claspers large, the two rostral spines rather long and moderately stout. Valves of ovipositor ochreous; cerci rather long, curved, pointed. *Legs* dark brown, bases of femora ochreous. *Wings* rather dark grey, stigma very small, indistinctly darker; veins dark. *Sc* ending well before base of *Rs*, which is short and curved, slightly shorter than basal section of *R*<sub>4+5</sub>. Tip of *R*<sub>1</sub> turned upwards and shorter than *r*, which is straight. *Cu*<sub>1a</sub> a little before *fM*, slightly oblique. Halteres with basal half of stem yellowish, the rest blackish. Wing-length 4 mm.

Tutuila: Pago Pago, type ♂, paratypes 5 ♂, 8 ♀, 14.xii.1925. Upolu: Apia, 5 ♂, 3 ♀, ii., iii., vii.1924; Malololelei, 2 ♂, 5 ♀, xi.1924, xii.1925. Savaii: Fagamalo, 1 ♀, viii.1925.

This species belongs to a small group, of which several species are known to occur in the Malayan and Papuan regions; of these, *D. semirufa* Edw. (New Hebrides) is the nearest to the new species; it has the same colouring of the thorax, but differs conspicuously in its bright red abdomen. *D. simplissima* Alex. (Java) resembles *D. atromaculata* in its shining black thorax, but apparently lacks the dull spots on the praescutum. All species which, like the present, have only three posterior cells in the wing, have been referred by Alexander for convenience only to the subgenus *Alexandriaria* Garrett; there is probably no close relationship between the Oriental forms and the North American species for which *Alexandriaria* was introduced.

78. *Dicranomyia* *fijiana* Alex.

*Ann. Mag. Nat. Hist.*, (9), xiii, p. 36, 1924.

Upolu: Malololelei, 2,000 ft., 1 ♂ and one broken specimen, 25.ii.1924 and vii.1924.

In these specimens the wing-markings differ slightly from the type from Fiji, the small grey clouds in cells *R*<sub>3</sub> and *R*<sub>5</sub> being situate on the veins instead

of free in the cells: the hypopygium, however, agrees with the types in having large fleshy claspers, with a small rostrum bearing two very short spines. The very closely allied *D. punctulata* de Meij. (*D. fascipennis* Brun.), which is widely distributed in India, Ceylon, the Malay Peninsula and Java, differs in having small fleshy claspers, which have a large rostrum provided with a single longish spine. Other species belonging to the same group are *D. guttula* Alex. (East Africa) and *D. fullowayi* Alex. (Guam I.); the latter is possibly identical either with *D. fijiana* or *D. punctulata*.

79. *Dicranomyia subsordida*, sp. n.

Text-fig. 14.

♂ ♀. *Head* brownish, pruinose. Front about as wide as three facets. Proboscis only about half as long as head. Antennae dark, flagellar segments rounded, last few shortly oval, verticils short. *Thorax* brownish, pruinose; praescutum with a darker brown median stripe and two shorter brown stripes on each side of the median one posteriorly; scutellum and postnotum more greyish. Pleurae dull brownish-ochreous; a rather ill-defined dark brown stripe extending from the neck to base of abdomen. *Abdomen* dark brown above, unbanded, lighter below. Hypopygium as figured. Cerci short, curved and pointed as usual. *Legs* brownish-ochreous, tips of femora slightly darker. *Wings* hyaline, veins dark; slight brown clouds over arculus and at base of *Rs*; stigma small, roundish. *Sc* ending above base of *Rs*, *Sc*<sub>2</sub> near its tip; *Rs* rather strongly arched, barely twice as long as basal section of *R*<sub>4+5</sub>; *r* at tip of *R*<sub>1</sub>, which is rather sharply turned up; *Cu*<sub>1a</sub> at or a little before base of closed discal cell. Halteres brownish. Wing-length, 5 mm.



TEXT-FIG. 14.—*Dicranomyia subsordida*, sp. n. Hypopygium from above.

Upolu: Apia, type ♂, 31.i.1925; Malololelei, 2,000 ft., 2 ♀, 25.ii.1924, 21.iv.1925.

A rather obscure species, superficially resembling *D. sordida* Brun., but differing in the pleural stripe and hypopygium, notably in the absence of the



small accessory finger-like process of the side-piece which characterises *D. sordida*. It is probable that the last-named will also be found to occur in Samoa, as it has a wide distribution from India to Fiji, Tahiti and Queensland.

### 80. *Dicranomyia upoluensis*, sp. n.

♀. *Head* ochreous, darker at sides. Front as wide as three or four facets. Proboscis dark brown, as long as head. Antennae with first four or five segments ochreous, rest darker; all flagellar segments very shortly oval, verticils short. *Thorax* ochreous, rather strongly pruinose except on scutellum and postnotum; praescutum with three rather broad and distinct brown stripes, lateral pair continued across scutum on to sides of scutellum. An ill-defined dark brown pleural stripe extending from neck to base of abdomen. *Abdomen* dark brown (perhaps discoloured in case of type), tip ochreous. Cerci rather long, straight, tips rather blunt. *Legs* ochreous, tips of femora slightly darkened. Claws with usual small basal tooth. *Wings* hyaline, veins dark; no stigma. *Sc* ending above base of *Rs*; *Sc*<sub>2</sub> retracted to near middle of *R*. *Rs* gently curved, fully twice as long as basal section of *R*<sub>4+5</sub>. Tip of *R*<sub>1</sub> sharply turned up and much shorter than *r*, which is long and curved. Discal cell open, cell *M*<sub>3</sub> short. *Cu*<sub>1a</sub> rather more oblique than usual and placed a little before *fM*. Anal angle rather prominent. Halteres ochreous. Wing-length 4.5 mm.

Upolu: Aleipata, Lalomanu, type and one other ♀, xi.1924.

On account of the long straight cerci, prominent anal angle, and some details of venation, this species seems to be related to the subgenus *Idioglochina*, but in the absence of the male its true position is uncertain. No other known species of *Idioglochina* has a dark pleural stripe.

### 81. *Dicranomyia (Idioglochina) tusitala* (Alex.).

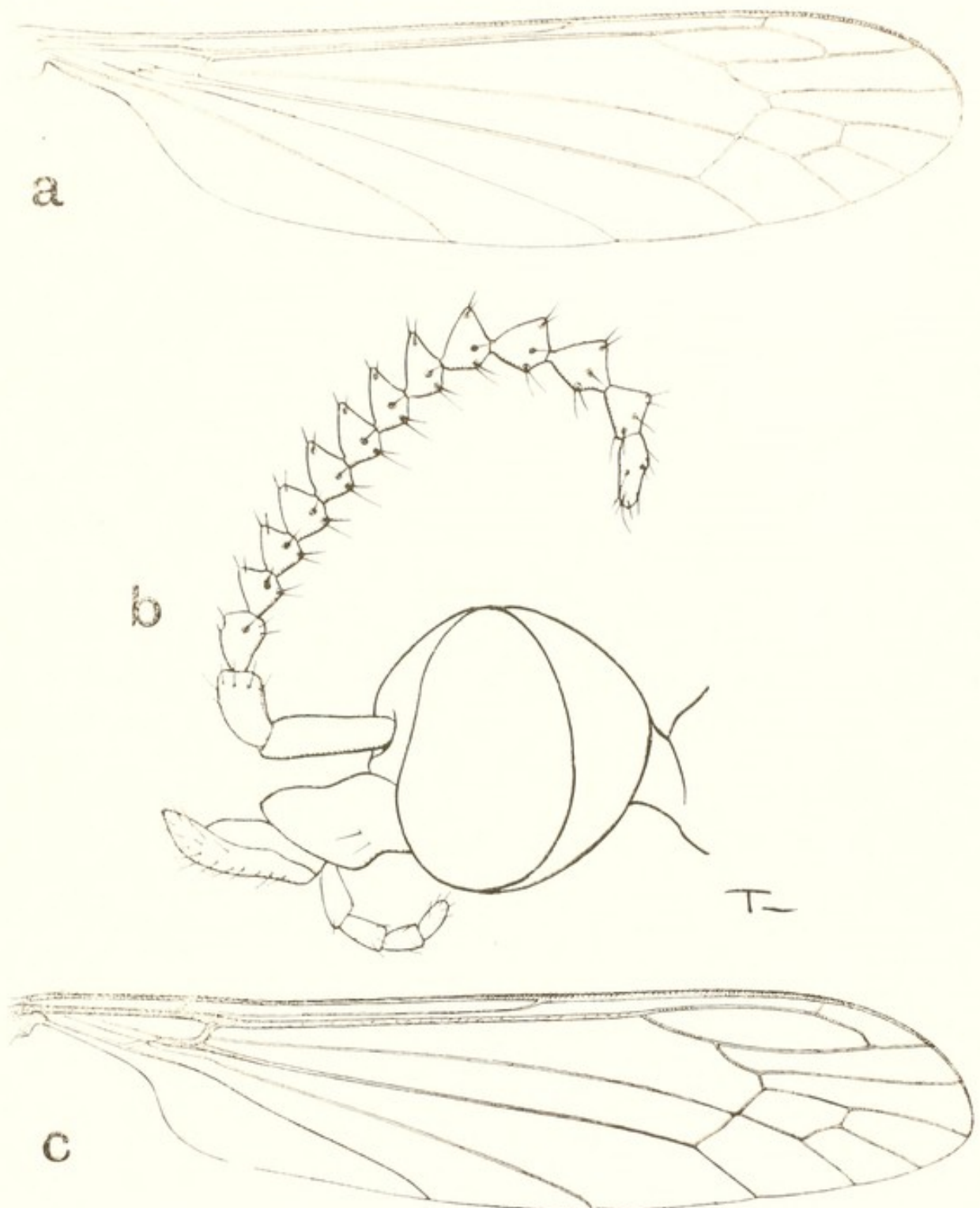
Text-fig. 15.

*Rhipidia tusitala* Alexander, *Bull. Brooklyn Ent. Soc.*, xvi, p. 10, 1921; *D. (Idioglochina) tusitala* Alexander, *Can. Ent.*, liii, p. 207, 1921.

Upolu: Apia, 6 ♂, 3 ♀, 3.ii.1924, 17.xii.1925. Tutuila: 1 ♀ on board ship, 22.iv.1903 (M. J. Nicoll; Earl of Crawford's expedition, voyage of the *Valhalla*). Also 1 ♀, probably of this species, from Tonga, Haapai, 26.ii.1925.

The peculiarity of venation (*R*<sub>2+3</sub> curved towards *R*<sub>4+5</sub> near base, so that the cell *R*<sub>1</sub> is unusually large) on which Alexander partly based his definition

of the subgenus *Idioglochina*, is found in the male only. In the series before me all the females have  $R_{2+3}$  straight. There is some variation in colour, some specimens having traces of three dark stripes on the praescutum.



TEXT FIG. 15.—*Dicranomyia* (*Idioglochina*) *tusitala* Alex. Wing of ♀ (a), and (c) ♂, and (b) head of ♂.



The subgenus *Idioglochina* is a small group probably originating from New Guinea, but including one species found in Formosa and one (*Rhipidia bioculata* de Meij.) in Sumatra. Three species, two of which are very similar to *D. tusitala* are known to occur in the New Hebrides. The British Museum possesses a specimen (too damaged for description) of another nearly allied species from Suva, Fiji (Evans).

## 82. *Geranomyia samoana*, sp. n.

♀. *Head* black, slightly pruinose; the narrow front light grey. Antennae and mouth-parts black. Flagellar segments nearly cylindrical, about twice as long as broad, last few rather shorter. Proboscis distinctly longer than head and thorax together; palpi with only one distinct segment. *Thorax*: pronotum, praescutum and scutal lobes dull light brownish; middle part of scutum, scutellum, postnotum and pleurae shining lighter ochreous; praescutum very little arched, much less than in *G. unicolor*. *Abdomen* brown above, light ochreous beneath; cerci moderately long. *Legs* light brownish, tarsi darker. Wings with a faint brown tinge, veins all dark; stigma oval, light brown; faint brown clouds at base of *Rs* and over cross-veins. *Sc* ending beyond mid-length of *Rs*; *Rs* more than twice as long as basal section of  $R_{4+5}$  and gently curved;  $Cu_1a$  at base of discal cell. Halteres brownish. Wing-length, 6 mm.; body, 6 mm.; proboscis, 3 mm.

Upolu: Malololelei, type and one other ♀, 20.v.1924; Vailima, 2 ♀, 2.ii.1925.

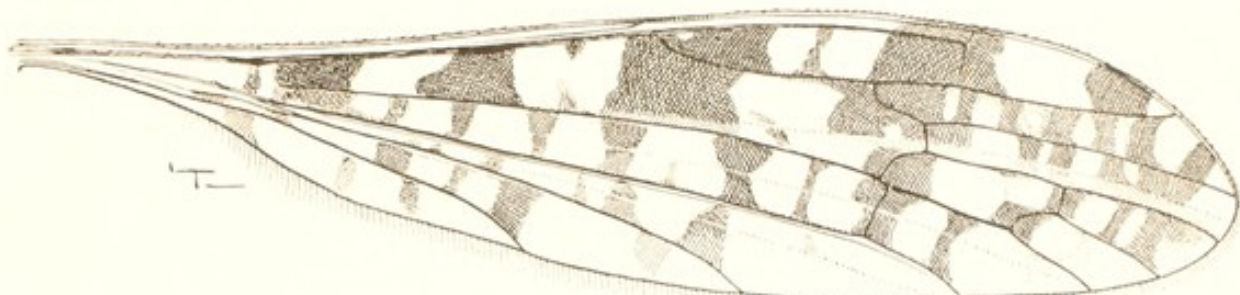
This species is very similar to *G. melanocephala* Edw. (Borneo), but differs in its somewhat longer proboscis, clouded base of *Rs*, etc.

## 83. *Rhipidia pulcherrima*, sp. n.

Text-fig. 16.

♀. *Head* with blackish integument, upper surface heavily dusted with whitish-grey. Rostrum black, a little shorter than head. Antennae mainly dark, first three or four segments ochreous, especially on under side; flagellar segments rounded to shortly oval, without distinct necks; verticils very short. *Thorax*: pronotum with heavy whitish dusting, which is continued as a rather narrow stripe below margin of mesonotum to wing base. A second pale stripe crosses pleurae below this, rest of pleurae being dull dark brown. Mesonotum rich chocolate-brown, scutellum and most of pronotum darker; praescutum

with a rather broad median ochreous stripe, which forks a little in front of suture; scutum with a narrow median pale line. *Abdomen* uniformly dull blackish. Cerci short. *Legs*, including coxae, brownish-yellow, only last two or three tarsal segments darkened; third and fourth tarsal segments slightly swollen. Claws with basal tooth. *Wings* with an elaborate dark brown pattern as in Text-fig. 16; hyaline ground-colour rather strongly iridescent, dark areas not



TEXT-FIG. 16.—*Rhipidia pulcherrima*, sp. n. Wing.

so; base of wing and basal part of costa yellow. Halteres with stem and base of knob pale yellow, rest of knob black. Wing-length 5.5 mm.

Upolu: Malololelei, 2,000 ft., type ♀, vii.1924. Savaii: Safune, 2,000–4,000 ft., 1 ♀, 3.v.1924 (Bryan).

This beautiful species will be recognised easily by its wing-markings. I believe it belongs to the *rostrifera* group of *Rhipidia*, but as the male is unknown, and females of this group are not readily separated from *Dicranomyia*, it is possible that it should be referred to the latter genus.

#### 84. *Helius connectus*, sp. n.

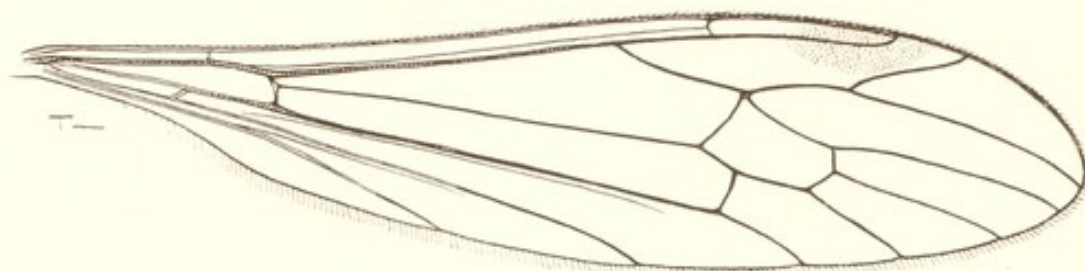
Text-fig. 17.

♂ ♀. *Head* ochreous, darker on the narrow front. Rostrum about as long as head, blackish. Palpi black. Antennae with scape blackish, flagellum brown; segments nearly cylindrical, about twice as long as broad, with long verticils. *Thorax* with the pronotum blackish, rest rather light ochreous, somewhat shining. *Abdomen* ochreous, segments 2–7 each with a broad dark brown band in middle, occupying more than half the length. *Legs* with coxae and trochanters ochreous; femora brown, tip pure white; tibiae rather narrowly white at base (this white ring equalling that at tip of femora) and more broadly white apically, middle part brown; tarsi wholly white. *Wings* hyaline, stigma oval, light brownish; pre-arcular cell and cell *Cu* below it slightly smoky.



Cross-vein  $r-m$  very short or absent, the large discal cell usually just in contact with  $Rs$ .  $R_{2+3}$  and the two sections of  $Rs$  subequal in length, or the second section of  $Rs$  a little shorter.  $Sc$  ending just before middle of  $Rs$ ;  $Cu_1a$  just before middle of discal cell. Halteres with slender ochreous stem and dark brown knob. Wing-length 4 mm.

Upolu: Vailima, type ♂, 24.v.1924; Malololelei, 2,000 ft., 2 ♂, 1 ♀, 21.iv.1925, xii.1925. One of the males from Malololelei differs from the type in having the abdomen entirely dark above; the other has the whole body



TEXT-FIG. 17.—*Helius connectus*, sp. n. Wing.

discoloured. The female from Malololelei agrees with the type male in colouring of abdomen.

In the colouring of the legs this species is similar to *H. niveitarsis* Skuse (Eastern Australia), but the latter is larger and has  $r-m$  nearly as long as  $m-cu$ .

A damaged and immature specimen from Malololelei, 25.ii.1924, perhaps represents a distinct species; the femora appear to be ochreous, with darker tips, and the tibiae as well as the tarsi wholly white; this appearance, however, may possibly be due to immaturity.

### 85. *Toxorhina infumata*, sp. n.

♀. *Head* ochreous-brown, darker in middle; front as broad as four or five facets. (Antennae and mouth-parts missing in case of type.) *Thorax* with ochreous ground-colour; lateral praescutal stripes, scutal lobes, scutellum and middle of postnotum dark brown; middle praescutal stripe lighter brown. A dark brown pleural stripe from base of front coxa to base of abdomen, broad in front but fading out behind; a dark brown mark on lower part of sternopleura. Praescutum moderately produced. *Abdomen* dark brown, sternites broadly banded with ochreous at base, this colour just appearing at sides of tergites. Ovipositor ochreous, valves long and slender. *Legs* with coxae and

trochanters ochreous, front coxae dark at base, rest dark brown. *Wings* with a strong and uniform smoky tinge, no stigma. Discal cell open. Cell  $M_3$  not much widened apically and slightly longer than its stem. Halteres ochreous. Wing-length 5.5 mm.; body 7 mm.

Upolu : Malololelei, 1 ♀, 25.ii.1924.

So far as I am aware, this is the first member of this genus to be recorded from the Australasian region. Of the five described Oriental species, the one which it most nearly resembles is *T. fasciata* Edw. (Borneo), which has fused praescutal stripes and ochreous bands on the posterior margins of the tergites. None of the Oriental species have smoky wings.

### 86. *Styringomyia didyma* Grimshaw.

*Fauna Hawaiensis, Dipt.*, p. 10, 1901. *Idiophlebia pallida* Grünberg, *Zool. Anz.*, xxvi, p. 524, 1903. *S. didyma* Edwards, *Trans. Ent. Soc. London*, 1914, p. 222; *Ann. Mag. Nat. Hist.* (9), xiii, p. 270, 1924, and xx, p. 239, 1927; Alexander, *Bull. Brooklyn Ent. Soc.*, xvi, p. 13, 1921.

Upolu : Apia, 2 ♂, 3 ♀, 31.v., xi.-xii.1924. Tutuila : Pago Pago, 1 ♂, 1 ♀, 2.xii.1924. Tonga : Nukualofa, 1 ♂, 14.ii.1925. Also Fiji, Suva, 19.vii.1923 (Edwards), and New Hebrides, Banks Group (Ridsdale).

First described from material from Hawaii, this widely distributed species has since been found in the Caroline Is., Society Is. and New Guinea. On the mainland of Australia it appears to be represented by *S. bancrofti* Edw.

### 87. *Empeda crassicus*, sp. n.

♂ ♀. *Head* grey. Front rather broad. Rostrum and scape of antennae orange, palpi and flagellum black. Flagellar segments shortly oval and with short verticils in both sexes. *Thorax* rather bright ochreous, dorsum, except sides of praescutum in front, darker brownish. *Abdomen* bright ochreous, tergites 1-8 darkened except on posterior margin. Hypopygium rather long, claspers small; upper pair black, Y shaped, the two prongs of the fork subequal in length, one of these slightly bifid at the tip, the other pointed; lower clasper pale, blunt-ended, blade-like. *Legs* without scales; coxae and trochanters ochreous, femora brownish, anterior pairs darker, with tips broadly blackish-brown; all femora thick, especially front pair, which is rather strongly clubbed, and hardly more than half as long as hind pair. Tibiae mainly pale yellow, bases brownish, tips black. Tarsi black. Wings slightly opaque and practically



bare, veins rather light brownish.  $R_2$  very short, less than half as long as  $R_3$ . Discal cell open. Halteres ochreous. Wing-length, ♂ 3 mm., ♀ 3.5 mm.

Upolu: Malololelei, 2,000 ft., type ♂, 30.xi.1924; allotype ♀, 21.iv.1925.

A rather distinct species owing to the colouring of the legs.

### Gonomyia, Mg.

The collection before me contains examples of four species of this genus from Samoa, and of a fifth from Tonga, all belonging to the subgenus *Lipophleps* Bergroth (*Liponeura* Skuse). Of this subgenus, which is found in most parts of the world, nearly all the species are small (wing-length 4 mm. or less) and obscurely coloured, with a general resemblance to *G. pacifica*. Three of the Samoan species, however, are larger and more ornate than usual, and seem to represent a special Polynesian development of the subgenus. Two other species of this group are known: *G. flavidapex* Edw., of Tahiti, and *G. metallescens* Edw., of the Marquesas Is., both of these being large and more highly ornamented than the Samoan species. None of these ornamental forms are known to occur in other parts of the world.

The genus *Gonomyia* has hitherto been supposed to have spurless tibiae, but in these large Polynesian species of the subgenus *Lipophleps* fine bristly spurs are distinctly visible on the hind tibiae. Having found them in *G. nigripennis*, I closely examined some of the small species of the subgenus, and could detect them in several specimens, although they are not easy to differentiate from the ordinary hairs.

Of the other divisions of this genus, *Gonomyia* s. str. is represented in the Pacific by one species in Fiji, but *Ptilostena* and *Progonomyia* have not yet been found in any Pacific islands. It is not improbable that *Ptilostena* occurs, as it has colonised various islands in the Indian Ocean.

### 88. *Gonomyia* (*Lipophleps*) *pacifica*, sp. n.

♂ ♀. *Head* rather variable in colour; yellowish round eyes and more or less extensively darkened in middle. Rostrum and palpi blackish. Antennae with first segment yellow, second and following segments dark brown in type ♂, but clear yellow in the second ♂ and in ♀, terminal segments dark in all; verticils only moderately long. *Thorax* dark greyish-brown above, very slightly pollinose, scutellum and postnotum somewhat shining. Postnotum and a narrow line

extending from it to base of wing bright yellow. Pleurae apparently yellowish, with two dark brown stripes, one broad and extending from neck to base of abdomen, the other less distinct and crossing lower part of sternopleura. *Abdomen* in type mainly dark, dorsum darker than venter, lateral margins of tergites more or less yellow, especially towards base; in the other specimens the yellow of the tergites is more extensive, and the venter is mainly blackish. Hypopygium dark in colour. Side-piece with long dorsal terminal finger. Only one pair of claspers, which are large and subglobular, somewhat produced on their inner dorsal face and in this position bearing a few small hairs and a couple of curved pale bristles, otherwise bare; a strong sharply-pointed black tooth arises from the apical margin and projects dorsally (this tooth more slender in the type than in the second male). Parameres fused, forming a simple pale sheath for the penis, tip of latter somewhat swollen, with two or three pairs of small pale teeth. Ninth sternite strongly notched at base of penis, eighth sternite prominent in middle. *Legs* dark brownish, lighter at base of femora; coxae ochreous. *Wings* quite clear, all veins dark. *Sc* ending well before base of *Rs*, which is short, curved, and a little over half as long as  $R_{2+3}$ . Basal section of  $R_{4+5}$  much shorter than *r-m*.  $Cu_1a$  well before base of closed discal cell. Halteres ochreous. Wing-length 3.5-4 mm.

Upolu: Malololelei, 2,000 ft., type ♂, 10.iii.1924; another ♂, 25.ii.1924; Apia, 1 ♀, 22.v.1924. A female from Society Is., Raiatea (Miss Cheesman), should perhaps be referred to this species.

The group to which this species belongs includes a number of species which are best distinguished by the male genitalia. *G. flavomarginata* Brun. (India) is very similar externally, but has a totally different hypopygium. *G. hawaiiensis* Alex. (Oahu) is equally close, and may in fact prove to be identical with the Samoan species when its male has been discovered.

#### 88A. *Gonomyia* (*Lipophleps*) *fijiensis* Alex.

*Ann. Ent. Soc. Amer.*, vii, p. 241, 1914.

Tonga: Nukualofa, 1 ♀, 18.ii.1925. Recorded by Alexander from Fiji, Nadi.

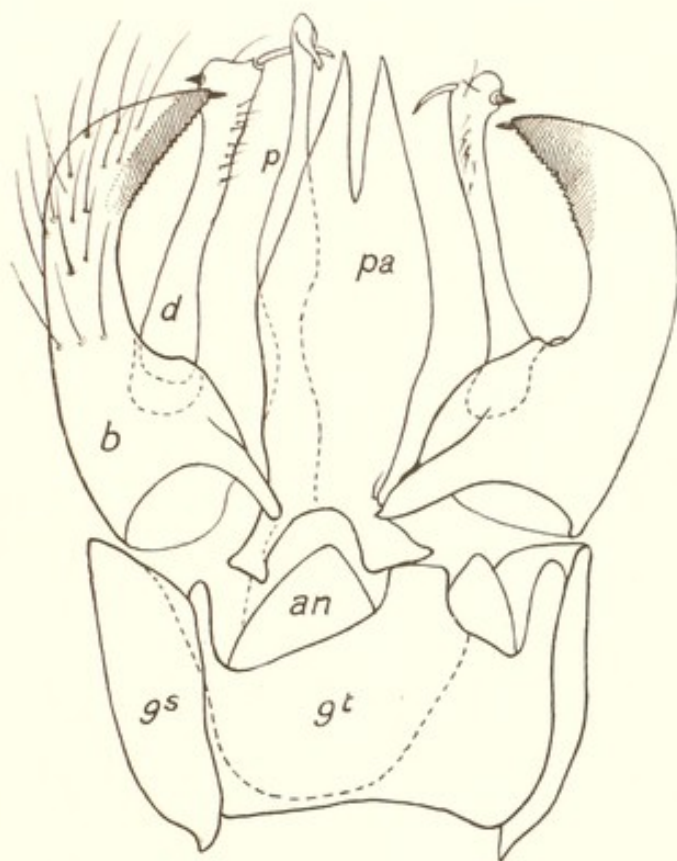
Somewhat resembles the last, but is well characterised by its bright yellow costa.



89. *Gonomyia (Lipophleps) dicranura*, sp. n.

Text-fig. 18.

♂. *Head* yellow, with black hair. Front moderately broad, about half as broad as one eye. Rostrum brownish, palpi black. Antennae with scape yellow, flagellum blackish; first four flagellar segments oval, rest slender and cylindrical, dorsal hairs of verticils 2-3 times as long as segments. *Thorax*



TEXT-FIG. 18.—*Gonomyia (Lipophleps) dicranura*, sp. n. ♂ Hypopygium from above.

with pronotum yellow. Praescutum shining dark brown (stripes more or less fused), with margin rather broadly shining yellowish; tuberculate pits distinct and black. Scutum yellowish in middle, lobes shining dark brown. Scutellum shining yellow. Postnotum dark brown, with slight grey dusting. Pleurae yellowish above, lower part mainly dark brown with a conspicuous silvery sheen when viewed from above; sternum yellow. *Abdomen* mainly ochreous, tergites with black apical bands, which widen in middle, forming a series of connected triangles. *Hypopygium* of rather unusual type for this genus. Ninth segment large, considerably longer than the unmodified eighth segment, so that ninth sternite (9s),

which is cleft to the base in the mid-ventral line, appears at first sight as the side-pieces. Ninth tergite (9t) with a truncate projection in middle. Anal segment chitinised at sides (an), and when exerted appearing trilobed, with dense patches of pubescence on each side. Side-piece (b) small, hardly more than half as long as ninth sternite, but with a stout apical projection, which is about twice as long as basal part; distal half of inner face of this projection blackened, and there is a small terminal black spine facing inwards. One clasper (d), which is in the form of a long straight rod, slightly swollen at tip; on its inner face a

few bristly hairs, the one at the tip longer and stouter; on the outer face at the tip is a short black spine. Parameres (*pa*) fused at base into a stout tubular structure, ending in a pair of flattened, pointed blades, which are about half as long as basal tubular part. Penis (*p*) long, rather slender, without teeth, rather wavy, tip suddenly narrowed and bent at right angles. Legs ochreous, tarsi darkened. Posterior tibiae at tip with a pair of thickened bristly hairs, which may represent spurs, these hairs not discernible in all specimens. Wings faintly tinged with brown, veins all light brown, no stigma. Macrotrichia of all veins rather distinct and extending to near base. *Sc* ending almost opposite base of *Rs*, which is moderately long and angled close to base.  $R_{2+3}$  continuing the direction of *Rs* and about half as long again; cell  $R_1$  narrow.  $R_{4+5}$  with short basal section, tip curved down as usual, so that cell  $R_5$  is very narrow at tip; *r-m* long, thick, and transverse;  $Cu_1a$  at base of closed discal cell. Halteres ochreous, stem brownish. Wing-length 5.5–6 mm.

Upolu : Malololelei, 2,000 ft., 1 ♂, vi.1924, and 2 ♂, 21.iv.1925.

#### 90. *Gonomyia* (*Lipophleps*) *labidura*, sp. n.

♂. Very similar to *G. dicranura*, differing as follows : Tips of femora dark brown. Dark abdominal bands less triangular, not nearly reaching bases of segments. Processes of side-pieces of hypopygium longer, over three times as long as basal part, the tip less extensively blackened, but the inward-facing point much more prominent. Two little blackened points on outer side of clasper at its tip. Parameres fused into a large tubular structure for almost their whole length, ending in two very short points. The bent tip of the penis longer and more slender.

Upolu : Malololelei, 2,000 ft., 2 ♂, 22.iv.1925, xii.1925.

In one specimen the discal cell is open on one wing.

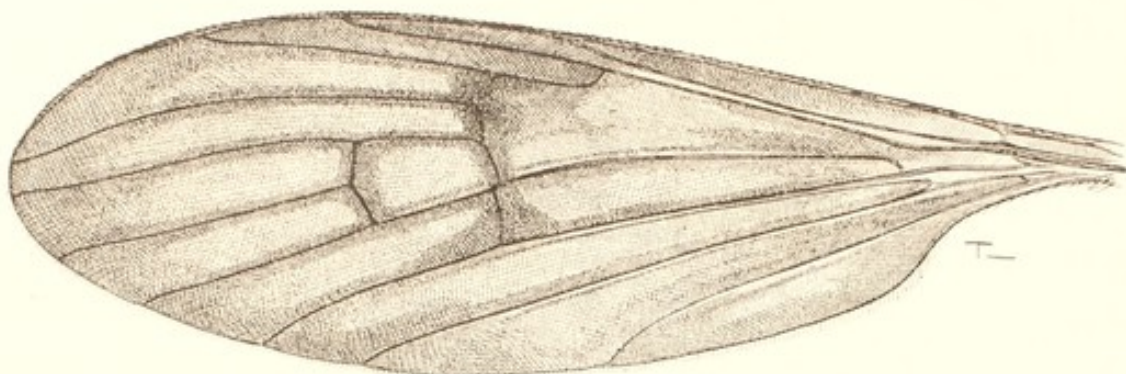
#### 91. *Gonomyia* (*Lipophleps*) *nigripennis*, sp. n.

Text-fig. 19.

♀. *Head*, including rostrum, rather light brown. Front moderately broad. Palpi and antennae blackish, flagellar segments with very long dorsal hairs. *Thorax* brown, somewhat shining; middle part of praescutum, scutal lobes, and lower part of pleurae darker. *Abdomen* velvety black, basal part of ovipositor shining dark brown, valves reddish. *Legs* dark brown; tibiae with



bristly spurs as in last two species. *Wings* with a deep smoky tinge over the whole membrane, the base, tip and posterior margin, as well as broad seams along nearly all veins, darker; a broad seam over stigmatic region and cord,



TEXT-FIG. 19.—*Gonomyia (Lipophleps) nigripennis*, sp. n. Wing.

and another over tip of discal cell still darker. Venation much as in *G. labidura*, but *Rs* shorter;  $R_{2+3}$  over twice as long as *Rs*; and *Sc* reaching a little beyond base of *Rs*. Halteres dark brown. Wing-length 7 mm.

Upolu: Malololelei, 2 ♀, 20, 25.vi.1924.

### Trentepohlia Big.

The development of this genus in Samoa is surprising, no fewer than nine species being represented in the collections made by Messrs. Buxton and Hopkins; judging from the number of specimens sent, these must form the dominant element in the crane-fly fauna. All these species belong to the subgenus *Mongoma*, as do most of the other known Australasian species of the genus, although one species of the subgenus *Trentepohlia* is known to occur in Fiji.

The following key will separate the described Australasian species of the subgenus *Mongoma*:

- |                                                                                                                      |                                                 |     |
|----------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|-----|
| 1. Entirely pale yellow . . . . .                                                                                    | <i>spectralis</i> , sp. n.                      |     |
| Dark, at least abdomen brown . . . . .                                                                               |                                                 | 2.  |
| 2. Tibiae white-tipped . . . . .                                                                                     |                                                 | 3.  |
| Legs dark, tarsi sometimes lighter . . . . .                                                                         |                                                 | 11. |
| 3. Femora not white-tipped; middle tibiae with fringe of white hair at tips . . . . .                                | <i>tarsalis</i> Alex. (?= <i>pennipes</i> O.S.) |     |
| Femora not white-tipped; middle tibiae not fringed . . . . .                                                         |                                                 | 4.  |
| 4. $Cu_2$ ending practically at tip of $An$ ; tarsi dark at base . . . . .                                           |                                                 | 5.  |
| $Cu_2$ ending about half its length before tip of $An$ ; base of cell $M_3$ proximal to that of cell $M_1$ . . . . . |                                                 | 6.  |

5. Base of cell $M_1$ proximal to that of cell $M_3$ (Waigiu)	<i>obscura</i> de Meij.
Base of cell $M_3$ proximal to that of cell $M_1$ (Queensland)	<i>australasiae</i> Skuse.
6. Tarsi white or creamy, not darkened at base	7.
Tarsi brownish, at least at base of first segment	8.
7. Thorax light reddish-brown	<i>pacifica</i> Alex.
Thorax dark brown (New Hebrides)	<i>galactopus</i> Edw.
8. Tibiae narrowly white at tips (under 1 mm.)	<i>albangusta</i> , sp. n.
Tibiae more broadly white at tips (1.5 mm. or more)	9.
9. Tarsi white except at base	<i>spinulifera</i> , sp. n.
Tarsi uniformly brownish	10.
10. Wings smoky, stigma not very dark	<i>samoensis</i> Alex.
Wings clear, stigma conspicuous	<i>fuscistigma</i> , sp. n.
11. $R_1$ more or less atrophied beyond $r$	<i>valida</i> , sp. n.
Tip of $R_1$ distinct	12.
12. Discal cell long, base of cell $M_3$ retracted	13.
Discal cell short	14.
13. $R_2$ barely half as long as $R_3$ (Guam.)	<i>guamensis</i> Alex.
$R_2$ quite two-thirds as long as $R_3$	<i>brunnea</i> , sp. n.
14. Base of cell $M_1$ proximal to that of cell $M_3$ (Buru)	<i>subquadrata</i> Edw.
Bases of cell $M_1$ and $M_3$ about level	<i>brevicellula</i> Alex.

The remarkable resemblance between some species of *Trentepohlia* and two spiders (*Pholcus ancoralis* and *Smeringopus elongatus*), also a Reduviid bug (*Gardena*, sp.) has been discussed by Buxton (*Proc. Ent. Soc., Lond.*, ii, p. 65, 1928).

"In Samoa, Tipulidae of the genus *Trentepohlia* are abundant; several species habitually sit in dark places in the forest, for instance between buttress roots; in these places large numbers are found together, covering an area of a square foot or more; these insects, standing close together, sway themselves rapidly and continually on their long legs. The commonest species in Samoa is *T. pacifica* Alex., and one frequently sees a large area of bark the whole surface of which seems to shimmer, owing to the numbers of these insects standing and swaying on it. Occasionally they hang from one another like bees in a swarm. . . .

"Spiders of the family Pholcidae have the same habit of swaying rapidly as they stand in their webs; frequently a dozen or more stand and do this in a single web, and as the webs are placed in situations similar to those occupied by the *Trentepohlia* some degree of superficial resemblance is achieved. It appears that Pholcidae stand and shimmer in their webs, in many parts of the tropics, and elsewhere. In Samoa the species which have been observed to do this are *Pholcus ancoralis* and *Smeringopus elongatus*; they are superficially similar, and were not distinguished in the field, but it seems that both species have the



habit. They are dull brown in colour, with long legs, the joints of which are whitish, and the resemblance between them and the *Trentepohlia* was noticed in the field.

"In range *Trentepohlia pacifica* is peculiar to Samoa. Of the spiders, *Pholcus ancoralis* is known only from Samoa and Tonga; *Smeringopus elongatus* has a wide tropical distribution. Within Samoa, the *Trentepohlia* and the Spiders (collectively), both range from the coast of Upolu to the top of the island, at about 2,000 feet. One may therefore say that they are co-extensive in range, and that they inhabit similar places; also they are similar in colour and in habit, and this makes it difficult to suppose that the resemblance is due to chance alone. It is possible that the relation is mimetic; if this view is adopted then presumably the spider is model, the Tipulid mimic, and the Tipulid has used the shimmering habit, common to many Tipulids, and has also copied the spider's pattern and colour. Such a view covers most of the facts, so far as they are known, but it is not easy to see what advantage could accrue to the insect from resembling the spider.\*

"On a single occasion a spider, *P. ancoralis*, was found eating a Tipulid in its web; the insect was *Trentepohlia brevicellula* Alex., a species without white bands on the legs."

## 92. *Trentepohlia* (Mongoma) *valida*, sp. n.

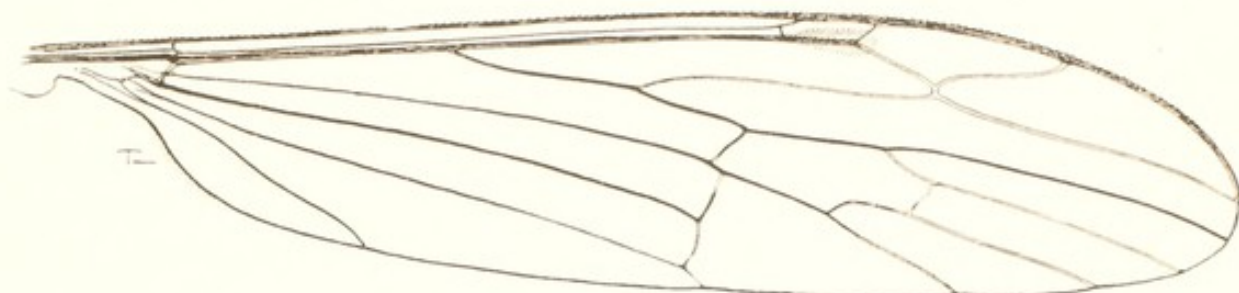
Text-fig. 20.

♂ ♀. *Head* as in *T. brunnea*, but the whole antennae blackish. *Thorax* very dark brown, dull, praescutum with rather conspicuous hair as in *T. brunnea*. *Abdomen* blackish-brown; valves of ovipositor reddish, cerci long, slender, nearly straight. Hypopygium short, claspers with tooth distinctly before middle, terminal portion broad and spatulate. *Legs* rather stout for a member

---

\* That the resemblance in colour and habit between *Trentepohlia* and the two spiders mentioned above is mimetic may well be the case, but the line of reasoning by which Mr. Buxton arrives at the conclusion that "presumably the spider is model, the Tipulid mimic," is not easy to follow, seeing that the facts ascertained would seem to point in exactly the opposite direction. The "mimicry" here—if mimicry there be—is surely "aggressive," since, under the conditions described above, the spider, by appearing to be "one of themselves," tacitly issues to the Tipulids the invitation immortalised in nursery-rhyme. Moreover, the spiders are doubtless far less numerous than the *Trentepohlia*, and such a numerical relation would be in accordance with existing knowledge with regard to "mimics" and "models."—E. E. AUSTEN.

of this genus, especially in ♀, colour uniformly dark brown, tarsi scarcely lighter. No spines nor bristles on any of the femora. *Wings* uniformly dark brown, stigma and veins not much darker than membrane. Tip of  $R_1$  short, very indistinct or absent. *Sc* scarcely reaching base of  $r$ , which is very oblique and joints  $R_2$  at or close to its base.  $R_2$  almost continuing direction of  $R_{2+3}$ , but scarcely half as long as  $R_3$ . Discal cell barely twice as long as wide; bases of



TEXT-FIG. 20.—*Trentepohlia (Mongoma) valida*, sp. n. Wing.

cells  $M_1$  and  $M_3$  both considerably retracted, that of cell  $M_3$  rather more so.  $Cu_1a$  immediately beyond base of discal cell, and almost in a straight line with  $Cu_2$ , which is very little curved and joins  $An$  at right angles a little before the margin. Halteres dark brown, with short stem and large knob as in *T. brunnea*. Wing-length 10–11 mm.

Upolu: Malololelei, 2,000 ft., type ♂ and ♀, 5.xii.1925; Vailima, 600 ft., 1 ♂, 26.iii.1925.

No very close ally of this species can be indicated. Its venational characters, notably the loss of the tip of  $R_1$ , are rather distinctive.

### 93. *Trentepohlia (Mongoma) brunnea*, sp. n.

♂ ♀. *Head* blackish-brown, black-haired. Antennae with first segment brownish, remaining segments blackish; flagellar segments about three times as long as broad, with short verticils. Palpi black. Rostrum ochreous. Neck rather shorter than in the *T. australasiae* group. *Thorax* rather dark brown, dull, and unmarked; praescutum with three stripes of dark hair, most conspicuous in front. *Abdomen* dark brown. Female cerci very short and strongly curved. Hypopygium short; claspers with tooth at about middle, apical half slender, only about half as broad as basal half. *Legs* moderately slender, almost uniformly brown, tarsi a little lighter. Posterior femora with longish bristles at base beneath. *Wings* with a strong brown tinge, stigma not much darker, veins dark. *Sc* reaching a little beyond base of  $r$ , which is very oblique and



joins  $R_{2+3}$  only a short distance before or even at the fork.  $R_2$  nearly horizontal, fully two-thirds as long as  $R_3$ . Discal cell rather long; first section of  $M_2$  about equal to  $m$ ; base of cell  $M_3$  at about two-thirds the length of discal cell.  $Cu_1a$  placed well beyond base of discal cell;  $Cu_2$  curved, ending in  $An$  only a short distance before margin. Halteres dark brown, with rather short stem and large knob. Wing-length 8–10 mm.

Upolu: Malololelei, 2,000 ft., 5 ♂, 3 ♀, 1.i., 12.i., 21.iv., 5.xii.1925.

In colour this species resembles *T. guamensis* Alex., which differs in venation,  $R_2$  being much shorter.

#### 94. *Trentepohlia* (Mongoma) *brevicellula* Alexander.

*Ann. Mag. Nat. Hist.*, (9), xiii, p. 44, 1924.

Upolu: Vaea, 1,200 ft., 2 ♂, 20.ii.1925; Vailima, 4 ♂, 1 ♀, 24.v.1924; Malololelei, 2,000 ft., 4 ♂, 2 ♀, 25.ii.1924, 17.vi.1924, 5.xii.1925. Tutuila: Pago Pago, 5 ♂, 14.xii.1925. Savaii: Salailua, 1 ♂, 21.v.1924 (Bryan). Recorded by Alexander from Fiji (Loloti).

Diagnostic features: Thoracic dorsum rather dark unicolorous brown. *Legs* uniformly brown. Discal cell shorter and broader than in the other species; cells  $M_1$  and  $M_3$  subequal at base;  $r$  meeting  $R_{2+3}$  only a short distance before the fork. Wing-length 5–6 mm.

This is the smallest *Trentepohlia* in the islands, and also the most widely distributed. In addition, it is the only one which has definitely been identified as occurring outside the Samoan group.

#### 95. *Trentepohlia* (Mongoma) *spectralis*, sp. n.

Entirely pale yellow, except the eyes, flagellum and male claspers, which are black. Frons whitish. Flagellar segments elongate-oval, without distinct verticils. Femora without distinct spines, but with scattered fine bristles. Venation as in *T. samoensis*. Wing-length 6–8.5 mm.

Upolu: Malololelei, 2,000 ft., 6 ♂, 3 ♀, 25.ii., 25.iv., 20.v., 17.vi., 30.xi.1924. Savaii: Safune, 2 ♀, 4.v.1924 (Bryan); Salailua, 1 ♀, 22.v.1924 (Bryan).

The only other completely yellow species of this subgenus at present known is *T. flava* Brun. (India), in which  $Cu_2$  ends in the wing-margin. *T. albipennis* de Meij. (Java) is also mainly yellow, but has long dorsal hairs on the flagellar segments.

96. *Trentepohlia* (Mongoma) *samoensis* Alexander.*Bull. Brooklyn Ent. Soc.*, xvi, p. 12, 1921.

Upolu : Apia and Malololelei, 34 specimens in all, ii., v., xi.-xii. Tutuila : Pago Pago, 1 ♂, 14.xii.1925. Recorded by Alexander only from Apia.

The chief diagnostic features of this species are the following : Praescutum wholly dark brown. Femora creamy white for about 1 mm. at the tips. Tibiae narrowly whitish at the base, and creamy for about 1.5 mm. at the tips. Tarsi uniformly pale brown. Front femora with a few longish bristles near the base beneath ; posterior femora without bristly spines. Wings rather strongly tinged with grey. Wing-length 6.5-9.5 mm.

Alexander described the stigma as dark brown, but in most of the specimens before me it is quite inconspicuous ; nor is the wing-tip distinctly darkened. In most of the examples of this species brought back by Messrs. Buxton and Hopkins, *Sc* reaches only slightly beyond the base of *r*, and *Sc*<sub>2</sub> is farther from the tip than stated by Alexander.

97. *Trentepohlia* (Mongoma) *fuscistigma*, sp. n.

♀. *Head* dark grey. *Neck* blackish. *Antennae* and *palpi* blackish, *labella* ochreous. *Flagellar* segments almost cylindrical, over three times as long as broad, without distinct verticils. *Thorax* nearly bare, shining, dark brown above, sides of praescutum and middle of scutum ochreous ; pronotum darker brown. *Pleurae* mainly light ochreous. *Abdomen* dark brown ; *cerci* ochreous, rather long and not very strongly curved. *Legs* (hind pair only remaining in case of type) somewhat stouter than in the allied species ; *coxae* and *trochanters* ochreous ; *femora* dark brown, with the tips (1.5 mm.) white, and numerous short spinules beneath on basal fifth ; *tibiae* (including base) dark brown, with the tips (1.5 mm.) white ; *tarsi* dark brownish. *Wings* nearly clear, veins conspicuously dark ; stigma dark brown ; wing-tip also rather distinctly darkened ; a faint seam over *Cu*<sub>1</sub>*a*, *Cu*<sub>2</sub> and base of discal cell. *Sc* extending well beyond base of *r*, which is bordered with brown and meets *R*<sub>2+3</sub> more than its own length before the fork. Discal cell nearly three times as long as its greatest breadth ; base of cell *M*<sub>3</sub> retracted almost to middle of discal cell ; basal section of *M*<sub>2</sub> much shorter than *m* ; *Cu*<sub>1</sub>*a* at base of discal cell ; *Cu*<sub>2</sub> meeting *An* about half its length distant from wing-margin. Halteres brownish. Wing-length 11 mm.



Upolu : Malololelei, 2,000 ft., 1 ♀, 25.ii.1924.

This is very much like *T. samoensis* Alex., but seems fairly well distinguished by the lighter sides of praescutum, presence of hind femoral spinules, practical absence of white at base of tibiae, and clearer wings with more conspicuous stigma.

98. *Trentepohlia* (Mongoma) *albangusta*, sp. n.

♀. *Head* as in *T. fuscistigma*. *Thorax* nearly bare, bright ochreous-brown, somewhat shining. Praescutum with a broad but not very sharply-defined dark brown median stripe; scutal lobes, scutellum and postnotum brown. *Abdomen* dark brown, lighter beneath; ovipositor ochreous, cerci shorter and rather strongly curved. *Legs* slender, coxae and trochanters ochreous. Femora dark brown, tip (1 mm.) creamy-white. Tibiae dark brown, extreme base (0.3 mm.) and tip (0.6 mm.) whitish. Tarsi rather dark brown. Front femora with a few longish bristles near base beneath; posterior femora with more numerous but shorter bristles. *Wings* clear; stigma hardly indicated; veins dark. Cross-vein *r* meeting  $R_{2+3}$  about its own length before the fork;  $R_2$  less oblique than usual and over half as long as  $R_3$ ; discal cell long; cell  $M_3$  retracted almost to middle of discal cell; basal section of  $M_2$  shorter than *m*;  $Cu_1a$  just before base of discal cell;  $Cu_2$  joining *An* more than half its length distant from wing-margin. Halteres brownish, base of stem ochreous. Wing-length 9 mm.

Upolu : Malololelei, 2,000 ft., 2 ♀, 17.vi.1924, vii.1924.

Readily distinguishable from the related species by the very narrow white tips to the tibiae.

99. *Trentepohlia* (Mongoma) *spinulifera*, sp. n.

♂ ♀. *Head* blackish, front narrow as usual. Antennae and mouth-parts entirely dark; flagellar segments elongate-oval, without distinct verticils. *Thorax* almost bare, somewhat shining, more so on pleurae; praescutum and scutum uniformly dark brown; scutellum and postnotum rather lighter; pleurae ochreous. *Abdomen* dark brown. *Legs*: Femora dark brown, the tips white for about 1.5 mm. Tibiae dark at base, tips pure white for about 3 mm., no distinct fringe present. Tarsi white, base of first segment somewhat darkened, sufficiently so to contrast with white tip of tibia. Front femora with about a dozen short bristles beneath near base; posterior femora each with about 30 or

more short bristles in a long close-set row extending along basal fourth beneath. *Wings* almost clear, stigma hardly indicated, veins moderately dark. Cross-vein  $r$  placed about its own length before fork of  $R_{2+3}$ . Discal cell fully twice as long as its greatest breadth; base of cell  $M_3$  retracted about one-third length of discal cell.  $Cu_1a$  at or just before base of discal cell.  $Cu_2$  meeting  $An$  at a distance equal to about half its length from wing-margin. Halteres brownish. Wing-length 5.5–7.5.

Upolu: Malololelei, 2,000 ft., 5 ♂, 2 ♀, 30.xi.1924, 21.iv.1925.

According to Skuse's description, *T. spinulifera* must be very near *T. australasiae* Skuse (Queensland), but the latter is said to have an ochreous thorax and tibiae narrowly white at the base. Skuse does not mention the femoral bristles.

#### 100. *Trentepohlia* (Mongoma) *pacifica* Alexander.

*Bull. Brooklyn Ent. Soc.*, xvi, p. 13, 1921.

Upolu: Apia, 16 specimens in all, i.–iv., vi., xi.; Aleipata, 1 ♂, 2 ♀, 10.iv.1924. Recorded by Alexander from 2 ♀ from Apia (Doane.)

Diagnostic features: *Thorax* reddish-brown, hardly darker above. Femora pure white at tips for over 1 mm.; tibiae narrowly white at base, and pure white for about 2 mm. at tips; tarsi white. Front femora with a few bristles beneath near base; posterior femora without any. *Wings* almost clear, stigma hardly indicated. Wing-length 5.5–7 mm.

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