NEW AND LITTLE KNOWN SAMOAN PSYCHODIDAE AND A NEW SPECIES FROM RAROTONGA.

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In this paper three new species of Samoan Psychodidae, collected during the summer of 1950–51, are described. I am also including a new species from Rarotonga, Cook Islands, collected the previous year, because it is rather closely related to *Psychoda quadrifilis* Edwards, a Samoan species. I am redescribing *Brunettia biformis* Edwards as the discovery of a closely related species, *B. similis* sp. n., makes it desirable to characterise Edwards's species more precisely.

All Samoan specimens were taken either on the main Island of Upolu, or the small island of Manono. Unless otherwise stated they were collected by myself. The types and paratypes will be deposited in the British Museum.

Psychoda adumbrata sp. n.

A small silvery-white species with three black bars across the wing.

♂. Scanty decumbent white tuft on clypeus, dense erect white tuft between antennae. Antennae 15 segmented, 1·6 times wing width, verticils closed, flagellum snowy-white; scape no longer than wide, basal flagellar segment with neck scarcely longer than bulb, very slightly longer in medial segments; thirteenth (fig. 1A) of normal diameter, fused to diminutive fourteenth, which has only a small amount of vestiture, both bearing a small sensory cone; fifteenth separated by a distinct neck; ascoids three branched, of normal Y shape. Palpi (fig. 1B) short; formula: 1 : 0·9 : 0·9 : 1·6.

Thorax with a white tufted vestiture; no allurement organ present. Wing ovate (fig. 1C), 1·4 mm. long by 0·35 mm. wide; radial fork almost above, very slightly after medial, both before level of tip of Cu; origin of R_{2+3} distinctly after tip of first basal cell which is longer than second; wing vestiture white, apart from black erect tufts arranged to form three transverse fasciae, one at wing base, one just behind medial fork and one at level of tip of M_3; in addition two erect tufts occur subterminally on R_4 and M_1; no erect hairs on R_5, and at base only of M_4. Legs covered with whitish fuscous hairs with a white reflection.

Abdomen with scanty whitish hair. Hypopygium (fig. 1D) with coxites longer than wide, bearing an encircling band, rather than a lateral tuft of hairs; style very characteristically shaped in profile, with a recurved terminal hook; scattered sensory setae present, but no lateral tuft at base. Aedeagus consisting of one straight and one curved pointed piece; cercopod (fig. 1E) swollen at base, 1·5 times as long as ninth tergite, with a single retinaculum.

♀. Similar to ♂. Subgenital plate (fig. 1F) exceedingly small, Y-shaped, with a long cylindrical genital digit bearing two setulae at tip; spermathecae consisting of two small striated capsules of characteristic appearance lying posterior to the remaining portions of the spermathecae. Ovipositor short, three times as long as the Y-shaped portion of the subgenital plate.

Type, allotype, 3 ♂ paratypes. Vailema, Upolu, 9.xi.1950.

This species was swept from thick vegetation bordering a stream on the way up to Vailema.

Psychoda malleopenis sp. n.

♀. Erect tuft of long squamuliferous hairs on face, shorter tuft on vertex; eye bridges separated by width of five facets. Antenna 16 segmented, 1·3 times as long as wing width; scape and pedicil with scaly covering, scape an elongate oval, 1·4 times as long as broad, basal flagellar segments (fig. 2B) with neck equal to bulb, longer than bulb in succeeding segments, until it is 1·5 times as long in medial segments; last three segments diminutive, separated, subspherical; ascoids of usual Y type, but arms rather long; verticils subdivided on segments 4–13 so that each bulb appears to have a short proximal verticil separated by a space from the longer distal verticil (fig. 2A). Palpi with segment 3 rather broad apically; formula: 1 : 1·1 : 1·3 : 1·3.

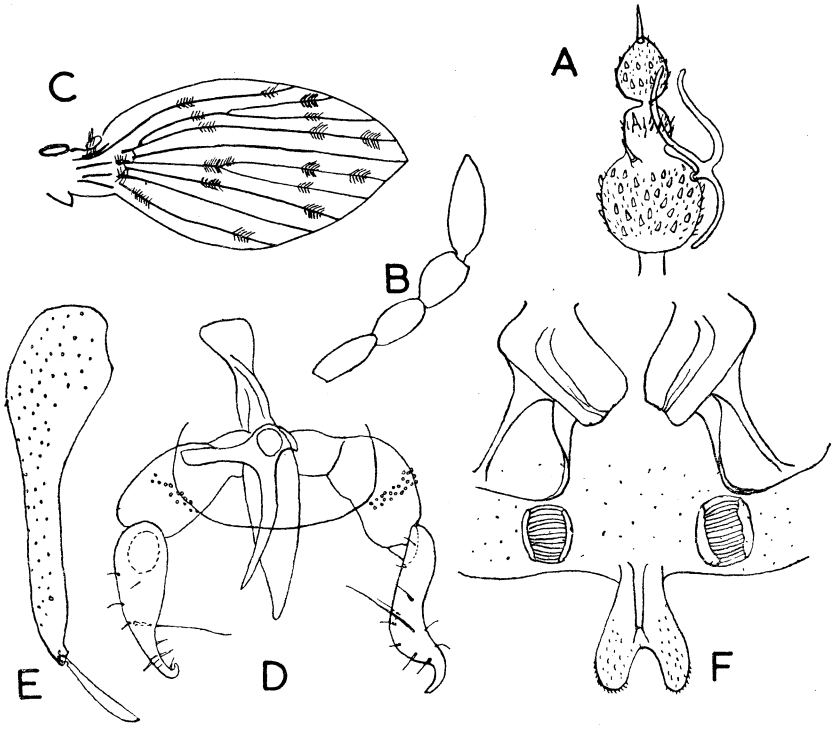

FIG. 1.—*Psychoda adumbrata* sp. n. A. Tip of antenna. B. Palp. C. Venation, showing position of dark tufts. D. Hypopygium. E. Cercopod. F. Subgenital plate and spermathecae.

Thorax covered with vestiture of squamuliferous hairs anteriorly giving way to normal hairs between and behind wings; no allurement organ. Wing (fig. 2C) with a recurved costal flap at base of costa bearing a long almost straight pencil of squamuliferous hairs, similar to, but more extensive than, that in *P. penicillata* Satchell; radial fork before medial, both before tip of Cu; origin of R_{2+3} on R_4 well after apex of first basal cell, which is equal to second; wing membrane infuscated around base of R_5; base of M_{1+2} bent away from base of R_5; approaching close to base of M_3. Wing vestiture with hairs replaced by scales in basal two-fifths of undersurface of wing, elsewhere hairy. Legs unicolorous.

Abdomen with hairy vestiture. Hypopygium with coxite (fig. 2D) subequal to style, style simply curved with a single long seta near the base, a few short setae further round, and some scattered short setae more distally on the inner surface; aedeagus consisting of one straight and one curved piece, the latter with a large sclerotised hemispherical knob at its tip; cercopod (fig. 2E) 1·4 times as long as ninth tergite, not swollen at the base, narrowing evenly in proximal part and then more rapidly two-thirds of the way along; retinaculum single, curved, one-third length of cercopod.

Type and paratype ♂, Malololelei, 2000 ft. Upolu, 18.xi.1950.

The two specimens on which the description is based were swept from low vegetation bordering the farmstead in the clearing at Malololelei. The species is of interest in being the first member of the " penicillata complex " to be found

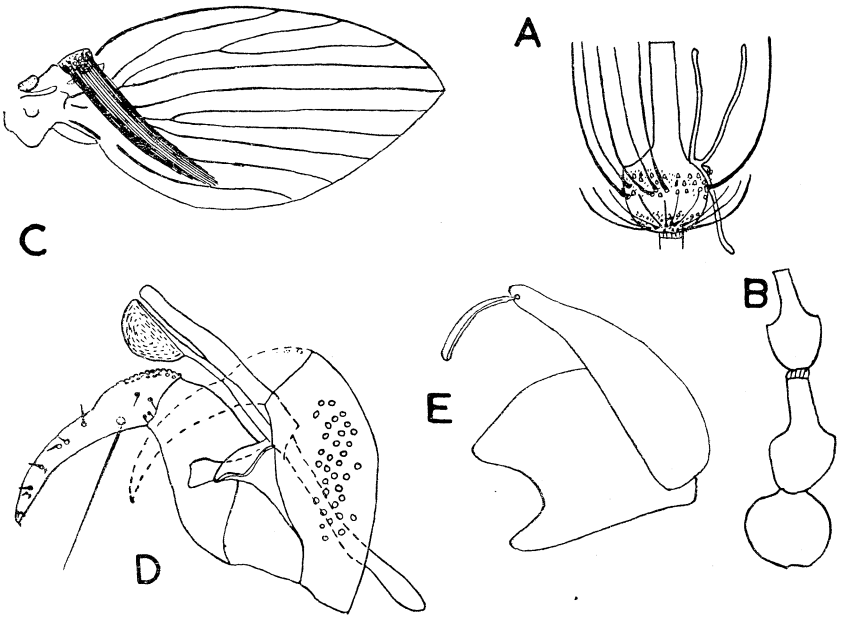

FIG. 2.—*Psychoda malleopenis* sp. n. A. Medial antennal segment. B. Base of antenna. C. Venation and costal tuft (ventral view). D. Hypopygium. E. Cercopod.

in Samoa. *Psychoda penicillata* Sat. (Satchell, 1950*a*) is an Australasian form with a pencil of squamuliferous hairs reflected under the wing. In Australia and New Zealand are a number of species closely related to it, the whole constituting the *penicillata* complex. *P. malleopenis*, in its costal tuft, its scaly underwing, and the shape of its style and cercopods, is a typical member of this complex of species.

Psychoda rarotongensis sp. n.

A uniformly greyish species, related to *P. quadrifilis* Edwards, but having different genitalia in both sexes.

♂. Eye bridges separated by width of half a facet. Antenna 15 segmented, 1·6 times as long as wing width; scape (fig. 3A) 1·1 times as long as wide; basal flagellar segments

with neck equal to bulb, 1·8 times as long as bulb in distal segments; segment 13 (fig. 3B) with practically no neck, 14 diminutive, almost devoid of hairy covering, 15 oval separated from 14; 13 and 14 each with a sensory cone; ascoids four branched, with one posterior and 3 anterior prongs, paired on segments 3–13. Palpi (fig. 3C) with greyish scaly covering; palpal formula: 1 : 1·1 : 1·1 : 1·9.

Wing (fig. 3D) 1·25 mm. long; length (from distal edge of basal-most semichitinous pad to tip) 2·3 times greatest width; radial fork after medial, both before tip of Cu; origin of R_{2+3} at apex of first basal cell which is a little longer than second; and additional semichitinous pad at base of costa bearing a loose cluster of hairs projecting partially under wing

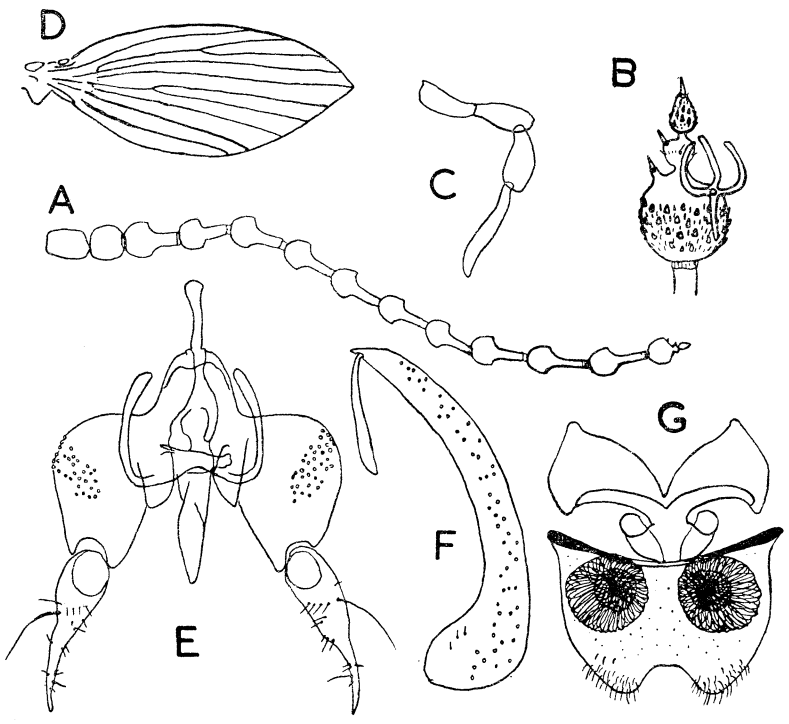

FIG. 3.—*Psychoda rarotongensis* sp. n. A. Antenna. B. Antenna tip. C. Palp. D. Venation. E. Hypopygium. F. Cercopod. G. Subgenital plate and spermathecae.

in the space between base of costa and R_1; erect hairs absent on usual veins (R_5, M_2 and M_4), present to tips of others; vestiture uniformly greyish-brown.

Abdomen with greyish vestiture. Hypopygium (fig. 3E); ninth sternite bent inwards medially; coxite swollen, longer than wide, style about as long as coxite; tapering to a curved blade-like point from half-way along, bearing scattered sensory setae but lacking all trace of usual lateral tuft of deciduous hairs at base; aedeagus simple, single, pointed, flanked by a small pointed rod lying closely up against main piece (not well displayed in type); cercopod (fig. 3F) just twice as long as ninth tergite, swollen basally, evenly curved, bearing a single retinaculum one third as long as cercopod.

♀. Similar to ♂, but eye bridges more separated, subgenital plate shaped as in fig. 3G; apparently lacking a genital digit; spermathecae unusual in having two basal capsules, normally underlying subgenital plate, in which the walls are thickened by radial ridges

so that the whole capsule looks like a ball of wool. Ovipositor twice as long as subgenital plate.

Type, allotype, 1 ♂, 2 ♀ paratypes, Wigmore's Waterfall, Rarotonga, Cook Islands, 26.i.1950.

The specimens were swept from dense bush a few yards below the waterfall. The species resembles the Samoan *P. quadrifilis* (Edwards, 1928) in the four branched ascoids and the conformation of the tip of the antenna. The ♂ genitalia are quite distinct, however, and the Samoan species does not possess the curious spermathecae.

Brunettia biformis Edwards.

Edwards, F. W., 1928, *Insects of Samoa*, **6** : (2) 68.

A large black scaly species with nine white spots on the wing margin, and the ♂ wing broadened.

♂. Bushy erect scaly tufts on clypeus, face and epicranium ; eye bridges 3 facets wide and touching. Antennae 15 segmented, 0·75 of wing width, blackish with campanuliform verticils ; scape (fig. 4A) 1·6 times as long as broad, flagellar segments excentric, basal one with neck much shorter than bulb, neck increasing until it is equal to the bulb in segment 12 ; terminal segment (fig. 4B) with an apiculus swollen at the tip ; ascoids paired rods arising close together on the swollen side of the bulb on segments 3–15, and curving through almost a complete circle. Palpi scaly, formula : 1 : 1·3 : 0·7 : 0·7.

Thorax with a dense covering of black squamuliferous hairs anteriorly and of long ordinary hairs posteriorly ; anepisternite protuberant and covered with minute pores, covered with a thick vestiture of short black scales. Wing (fig. 4C) very broad, wing tip just below R_5, all veins very straight and radiating to margin ; stem of R_{2+3} only one-quarter of R_2 ; radial fork before medial, both near base of wing ; wing membrane between base of R_1 and radial fork sclerotised and slightly intucked to form a shallow pocket lined with particularly dense scales, the whole constituting a scent organ. Wing vestiture black, apart from small white tufts at the tips of R_1–R_5 and M_1–M_4, making 9 in all, wing membrane and veins covered with densely imbricated scales on basal four-fifths of dorsal surface and almost all of ventral surface ; scales of dorsal surface replaced by hairs in distal fifth ; erect hairs present on basal four-fifths of Sc, R_1, R_2 and M_3, and confined to bases of stems of radial and medial forks and Cu ; alula tuft very long and lying close to hind margin of wing. Legs with black scaly covering ; tibia and first 3 tarsal segments of first leg incrassate ; remainder normal.

Abdomen with loose black hairy vestiture. Hypopygium (fig. 4D) with ninth sternite simply curved, coxite quite devoid of hair, style simple, slightly curved, with two setae inserted at the point where the outer edge turns through an angle to run to the tip ; two small setae near tip ; aedeagus simple, bifid, symmetrical, articulating with the lateral parameres ; cercopods equal in length to ninth tergite, bearing a proximal bunch of 12 or so normal spoon-shaped retinacula, and a distal bunch of 14 or so angulated retinacula with racket-like tips.

♀. Eye bridges separated by width of 5 facets. Antennae with necks shorter than in ♂.

Anepisternite not modified. Wing not broadened, 1·7 times as long as wide (fig. 4F) ; white tufts at vein tips more conspicuous than in ♂ ; scales replaced by hairs on dorsal surface of wing ; under-surface uniformly scaly ; erect hairs present on all wing veins in basal two fifths of wing ; tibiae and first tarsal segment narrowly whitish in certain lights.

Subgenital plate as in fig. 4G with paired lobes not meeting in the midline ; spermathecae of type characteristic of genus, with a small amount of reticulation on the capsules. Ovipositor 1·9 times as long as subgenital plate.

26 ♂, 25 ♀ from various localities in Upolu and Manono, Samoa, xi–xii, 1950 ; also from Suva, Fiji, 29.ii.1950 (*B. J. Marples*).

This is the most common species of Psychodidae in Samoa and the ♂s and ♀s may frequently be seen on the surface of leaves in the sunshine, in the luxuriant rain forest covering the lower slopes of the mountains. They are often seen performing their short circular runs around each other, a mating dance that may be, but is more often not, followed by copulation. Edwards (1928)

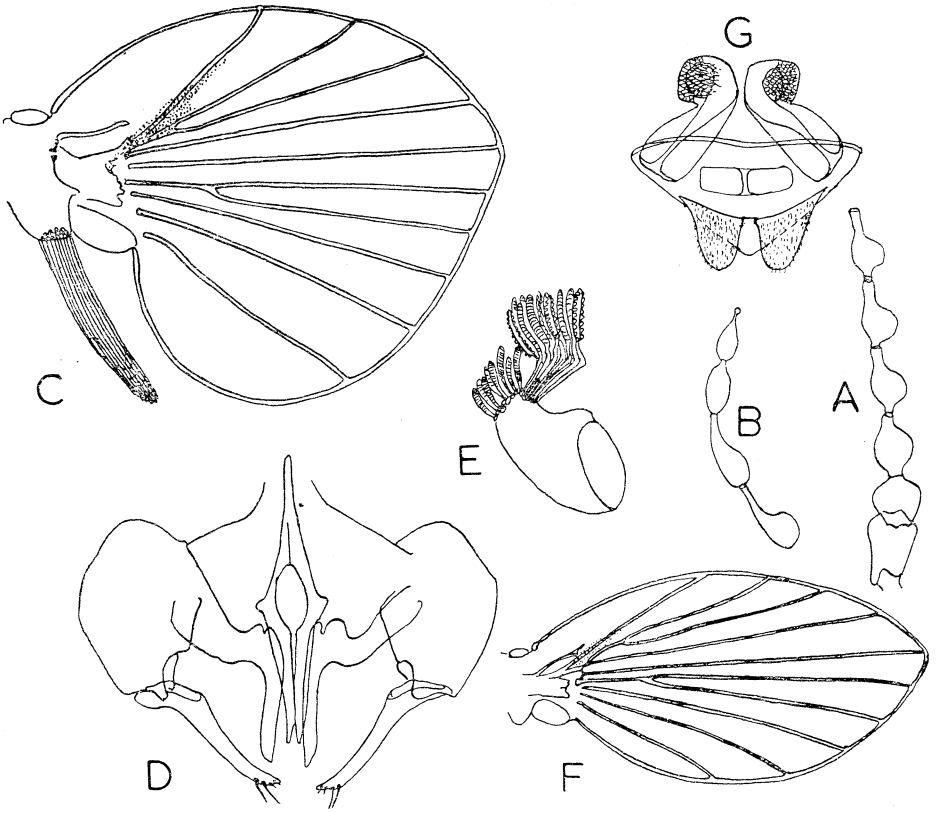

FIG. 4.—*Brunettia biformis* Edwards. A. Base of, B. tip of antenna. C. ♂ wing. D. Hypopygium. E. Cercopod. F. ♀ Wing. G. Subgenital plate and spermathecae.

tentatively associated the ♂ and ♀ of this species as he had bred them out together. I have collected a pair in copulation, verifying Edwards's assumption.

From the specimens I selected some ♂s to dissect and mount on slides. After they had been so mounted I noticed that one was of a distinctly different species, *B. similis* sp. n. I am unable to give any details of the coloration of this new species, for colours are not visible in dissected specimens, but I am fairly certain that the arrangement of white markings will be found to be similar to that of *B. biformis*. Were it markedly different I would have noticed it before the specimen was dissected.

Brunettia similis sp. n.

A black species with broad wings in the ♂, similar to *B. biformis* Edwards, but differing in the shape of the ♂ wing and style.

♀. Decumbent hairy tuft on clypeus, erect scaly tuft on face and vertex. Eye bridges three facets wide, touching in mid-line. Antennae with tips damaged in type; scape and pedicil with scaly covering, verticils campanuliform; scape (fig. 5A) 1·7 times as long as broad, basal flagellar segment with neck much shorter than bulb, medial flagellar segment excentric, with bulb forming two separate bulges (fig. 5B) corresponding each with the inser-

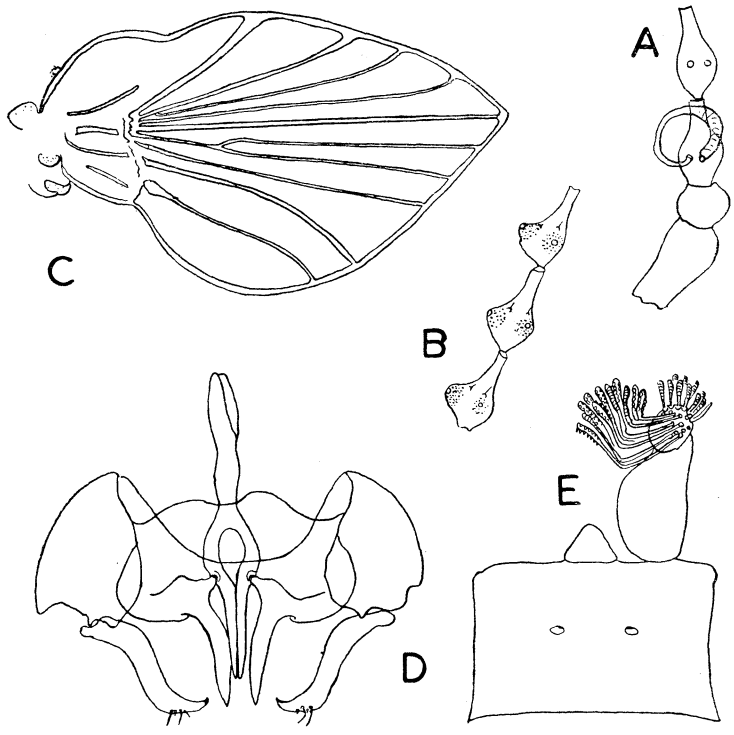

FIG. 5.—*Brunettia similis* sp. n. A. Base of, B. Middle of antenna. C. ♂ Venation. D. Hypopygium. E. Cercopod.

tion of the curved, broad ascoid; neck a little longer than bulb; a minute seta inserted in a pore above base of each ascoid. Palpi with first joint much reduced; formula 1 : 2·9 : 3·1 : 3.

Thorax with anepisternite much as in previous species. Wing (fig. 5C) with R_5 at tip, humeral area broadened giving a distinct hump to the otherwise regular curve of the costal margin; radial fork before medial, very near to base of wing; R_1, R_2, R_5, M_4 and Cu rather thick veins, R_1 and R_2 being particularly diffuse; scales replacing hairs on veins and membrane in basal four-fifths in wing on both surfaces; humeral enlargement heavily scaled; sclerotised area between bases of R_1 and R_2 forming a scent organ as in previous species. Wing markings no longer visible. Tibia and first three tarsal segments incrassate on fore legs, normal on remainder.

Abdomen with hairy vestiture. Hypopygium (fig. 5D) similar to that of *B. biformis*, but style more sharply angulated subterminally, giving it a square-ended appearance.

Type and only specimen, Vailima, Upolu, 16.xi.1950.

In addition to the four Samoan species described here, numerous specimens were taken of *P. makati* Del Rosario (Del Rosario, 1936) [= *P. infurcis* Sat. (Satchell, 1950*b*)] a tropicopolitan species already known from Fiji, Rarotonga, Philippines and Australia. Three specimens of *P. cochlearia* Sat. (Satchell, 1950*b*) hitherto known only from Fiji were taken, and Edwards' (1928) species *P. quadrifilis* was represented by 2 ♂, 6 ♀ specimens. The ubiquitous *P. alternata* Say was plentiful on both islands. Material of another two, possibly three, species was also present in the collection, but was too damaged to be described.

Check List of Samoan Psychodidae.

Brunettia Annandale.
B. biformis Edwards, 1928.
B. similis sp. n.
Lepidopsychoda Edwards, 1928.
L. tineiformis Edwards, 1928.
Psychoda Latreille.
P. alternata Say, 1824.
P. quadrifilis Edwards, 1928.
P. savaiiensis Edwards, 1928.
P. makati Del Rosario, 1936.
P. cochlearia Satchell, 1950.
P. nigripennis Brunetti ? 1908 (mentioned by Edwards, 1928).
P. malleopenis sp. n.
P. adumbrata sp. n.

Summary.

The new Samoan species *Brunettia similis* sp. n., *Psychoda adumbrata* sp. n., *P. malleopenis* sp. n. are described and a new description is given of *Brunettia biformis* Edwards, 1928. The new species *P. rarotongensis* sp. n. from Rarotonga, Cook Islands, is described. A check list of ten species of Samoan Psychodidae is included.

References.

Del Rosario, F., 1936, *Philipp. J. Sci.* **59** : 553–571.
Edwards, F. W., 1928, *Insects of Samoa.* **6.** *Diptera*, Fasc. 2 : 68–75. British Museum (Natural History).
Satchell, G. H., 1950*a*, *Trans. R. ent. Soc. Lond.* **101** : 147–178.
——, 1950*b*, *Proc. R. ent. Soc. Lond.* (B) **19** : 176–185.