

NEW GUINEA BITING MIDGES

(Diptera: Ceratopogonidae)¹

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Ceratopogonidae (Heleidae) are no doubt abundant in New Guinea, but they have been little studied hitherto. So far as I have been able to ascertain only 24 species have been reported up to the present time, by J. C. H. de Meijere (1915, *Tijdschr. Ent.* 58), J. J. Kieffer (1917, *Mus. Nat. Hung., Ann.* 15), J. W. S. Macfie (1932, *Tijdschr. Ent.* 75; 1936, *Roy. Ent. Soc. Lond., Proc.* (B) 5; 1939, Linn. Soc. N. S. Wales, *Proc.* 64) and D. J. Lee (1948, *ibid.*, 72, 73). It was therefore with great pleasure that I undertook at the request of Dr. J. Linsley Gressitt of Bishop Museum the examination of the collection of these insects made by him in New Guinea during his 1955 expedition², and I express my deepest thanks to him for this opportunity.

The collection consists of 255 specimens of 112 species, all of which were collected by light trap. *Forcipomyia* (sen. lat.) is predominant over other genera in New Guinea, making up 36.6% of total species and 46.3% of total specimens. *Culicoides* (26.8% of species and 20.4% of specimens) and *Atrichopogon* (21.4% and 23.9% respectively) follow successively. Of the 112 species 82, including 54 new ones, are thought to be endemic, which is 73.2% of all species. Oriental and Micronesian elements occupy 12.5% of the fauna and Australian are known in only five species. This seems to suggest that the ceratopogonid fauna of New Guinea has a rather strong independent characteristic.

Culicoides contains many important medical and veterinary pests as the species bite and suck blood from men and other animals. Some transmit microfilarial diseases. The New Guinean *Culicoides* fauna, however, is little known in spite of its importance, as is true with most other New Guinea insects. So far as I know, there have been reported only three species by Kieffer (1917) and Macfie (1939). The present paper deals with another 24, including 15 new species.

Additional to the species here described there are nine un-named species of which three are *Atrichopogon*, four are *Forcipomyia* (sen. str.), one is *Proforcipomyia* and one of an uncertain subgenus of *Forcipomyia* (sen. lat.). They are shown only in the couplets of

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2. For location of collecting localities, see Gressitt, J. L., 1956, *Hawaiian Ent. Soc., Proc.* 16 (1): 47-69, map, figs.

the keys to the species for comparison with the named species and are not described. They are either insufficient in number of specimens or too badly broken to positively identify them.

Almost all species were investigated under microscope, mounted in Gater's solution. Morphological terms used in this paper were adopted from my papers on Japanese *Culicoides* (1937, *Tenthredo* 1) and on Micronesian Ceratopogonidae [1959, *Ins. Micronesia* (Bishop Mus.) 12] and other modern taxonomic studies of the family by Wirth (1952, *Univ. Calif. Pub. Ent.* 9) and Arnaud (1956, *Microent.* 21).

Relative lengths shown in the text are lengths measured by an ocular micrometer under magnification of 150 (1 unit of which is 0.013 mm) in the case of wings and probosces, and under magnification of 600 (1 unit is 0.003 mm) in the case of legs, antennae, maxillary palpi, spermathecae and male hypopygia. In the case of a spermatheca, the relative length of the chitinized part of the duct precedes the relative size of the theca and is followed by a plus sign.

Abbreviations used in this paper are as follows. TR (tarsal ratio) is the relative length of the first tarsal segment to that of the second. AR (antennal ratio) is the relative length of the five distal segments taken together to that of the combined eight basal short segments from the second to the ninth in the normal case of 14-segmented female antenna. RL (relative lengths of leg-segments) is the relative lengths of seven leg segments, excluding coxae and trochanters.

Most of the material, including types, is in Bishop Museum. Duplicates are deposited in the U. S. National Museum, the School of Public Health of the University of Sydney, and in my collection.

I am very much indebted to Dr. J. L. Gressitt for making this study possible. My deepest thanks must be extended to Dr. W. W. Wirth of U. S. Department of Agriculture in Washington for his helpful suggestions for the identification of *Forcipomyia* and *Culicoides* and to Dr. L. W. Quate of Bishop Museum for his useful advice for this study as in the case of the Micronesian Ceratopogonidae. I also thank Mrs. T. I. Hirose and Miss E. Ohtani for their drawings of the text-figures and help with the manuscript of this report.

Genus *Leptoconops* Skuse

Subgenus *Styloconops* Kieffer

1. *Leptoconops* (*Styloconops*) *albiventris* de Meijere

Leptoconops albiventris de Meijere, 1915, *Tijdschr. Ent.* 58: 98.

Acanthoconops albiventris, Carter, 1921, *Bull. Ent. Res.* 12: 26.

Styloconops albiventris, Kieffer, 1921, *Arch. Inst. Pasteur Afr. Nord* 1: 107.—Macfie, 1933, *Bishop Mus., Bull.* 114: 98; 1939, *Linn. Soc. N. S. Wales, Proc.* 64: 367.—Lee, 1948, *ibid.* 72: 335.

Leptoconops spinosipes Kieffer, 1917, *Mus. Nat. Hung., Ann.* 15: 190.

DISTRIBUTION: New Guinea, New Britain and Marquesas Is.

Genus *Atrichopogon* Kieffer

One of the important characters of the genus is the short petiole vein of the median

fork (fM). It is rather peculiar that there are many species in New Guinea which do not show this petiolate median fork, but have a sessile or almost sessile fM. For these species, I propose a special *sessilis*-group, separating it from the typical group. For the species which have the compound eyes quite or partially pubescent, I place them in the *Kempia*-group rather than in an independent subgenus. Twenty-three New Guinea species may be distinguished by the following key:

KEY TO NEW GUINEA SPECIES OF ATRICHOPOGON

1. Eyes quite bare 2
Eyes entirely or partially pubescent (*Kempia*-group)..... 20
- 2 (1). Wing with fM sessile (*sessilis*-group) 3
Wing with fM petiolate..... 15
- 3 (2). Scutum and scutellum extensively yellowish or pale brownish 4
Scutum extensively brown or dark, or with brownish vittae at least on lateral sides 8
- 4 (3). Abdominal base dark and differing from paler main segments **2. nigribasalis**
Abdomen almost unicolored 5
- 5 (4). Legs with both ends of tibiae narrowly dark **3. longicalcaris**
Legs almost unicolored, pale brownish or yellowish 6
- 6 (5). Scutellum with 6 strong bristles **4. tridentistylus**
Scutellum with 4 or 5 strong bristles 7
- 7 (6). Segment 4 of maxillary palpus equal to or longer than 5. In ♂, antennal segment 11 very long, being longer than ultimate, and sternite 9 of hypopygium with many setae arranged transversally and styles gradually tapered..... **5. flaveolum**
Segment 4 of maxillary palpus shorter than 5. In ♂, antennal segment 11 only slightly longer than 10 and far shorter than 12, and sternite 9 of hypopygium with setae only on caudal part of middle area and styles suddenly narrowed at pre-apical part..... **6. flavitergum**
- 8 (3). Scutum almost entirely brownish or dark and without distinct adornment..... 9
Scutum bicolored and with colored markings..... 13
- 9 (8). Thoracic tergites including scutellum dark brown **7. nigrithoracius**
Scutellum far paler than scutum 10
- 10 (9). Male..... 11
Female..... 12
- 11(10). Scutellum with 6 strong bristles..... **8. annulifemoratus**
Scutellum with 4 or 5 strong bristles **9. fulviscutellaris**
- 12(10). FMCu of wing with inner angle acute..... **9. fulviscutellaris**
FMCu of wing with inner angle about 90 degrees..... **10. sessilis**
- 13(8). Scutum uniformly yellowish between foveae or 2 brownish lateral vittae.....
..... **11. pallidipedis**
Scutum with brownish cloud on middle part between foveae or 2 brownish lateral vittae 14
- 14(13). Scutellum with 6 strong bristles; wing with vein M swollen at end of r-m.....
..... NG No. 1

- Scutellum with 4 strong bristles; wing with vein M normal being not swollen at distal end NG No. 3
- 15(2). Scutum without adornment, being uniformly dark, brownish or yellowish..... 16
 Scutum with rather or very distinct brownish vittae on pale ground color 19
- 16(15). Scutum uniformly pale brownish yellow or yellow..... 17
 Scutum uniformly dark, brown or reddish brown..... 18
- 17(16). Scutellum with 6 strong bristles. In ♀, wing with rather long petiole vein of fM and inner angle of fMCu about 90 degrees..... **12. jacobsoni**
 Scutellum with 5 or 4 strong bristles. In ♂, wing with very short petiole vein of fM and inner angle of fMCu acuteNG No. 2.
- 18(16). Wing with petiole vein of fM shorter than r-m and Cu₁ distinctly oblique to its stem vein; legs uniformly brown..... **13. vestitipennis**
 Wing with petiole vein of fM as long as r-m and Cu₁ at nearly right angle to its stem vein; legs almost entirely yellow..... **14. biroi**
- 19(15). Scutum with 3 dark or brown vittae..... **15. vittatus**
 Scutum with 2 lateral brownish vittae and middle pale part as wide as vitta...
 **16. bifasciatus**
- 20 (1). Scutum almost entirely yellow; wings broadly fuscus on middle part
 **17. quateriharponum**
 Scutum almost entirely brownish, darkish or with colored markings; wings unadorned 21
- 21(20). Scutellum with 6 strong bristles **18. tenuiatis**
 Scutellum with 2 strong bristles..... 22
- 22(21). Abdomen dark brown and with caudal end yellow..... **19. simplicifurcatus**
 Abdomen uniformly brownish and without yellow caudal end..... 23
- 23(22). General color dark. In male, sternite 9 with caudal V shaped excavation.....
 **20. novaguinensis**
 General color brown. In male, sternite 9 without caudal excavation
 **21. armaticaudalis**

2. *Atrichopogon nigribasalis* Tokunaga, n. sp. Fig. 1.

Large yellow species with dark abdominal base, 2 distal segments of all tarsi dark. Eyes quite bare; female AR 1.73-1.98; apical segment 3 of male antenna longest and 4× as long as preceding one; wing of male without macrotrichia and that of female with macrotrichia on apical 1/4, second radial cell very long, about 6.5× in female and 4.7× in male as long as first radial cell, median fork sessile, inner angle of fMCu narrow in female; scutellum with 4 strong bristles.

Male: Body length about 3.25 mm. Wing about 2.26 mm by 0.6 mm. Thorax and legs mainly yellow, 3 basal segments of abdomen dark and posterior segments pale brown, scutum with many dark dots at bases of setae. Head mainly brown, with mouthparts yellow, eyes bare and contiguous above, proboscis about 2/3 height of head capsule; clypeus with 5 setae. Maxillary palpus slender, segment 3 somewhat swollen on apical 1/2 and with bottle-like sensory pore on pre-apical part and 5 segments in proportion of 15:19:25:12:16. Antenna (fig. 1a) with scape yellow, other segments, including plumose hairs, brown; segment 11 very short, somewhat longer than 10, 12 very long, being 4× as long as 11 and much longer than either following 2; combined relative length of segments 2 to 10 and

11 to 14 combined about 205:294, those of segments 2 to 11 and 12 to 14 about 230:268, dista 18 segments in proportion of 22:21:20:20:25:100:76:92 Thorax almost entirely yellow, scutum with large setae brown, small setae yellow, dark small dot like rings at bases of setae and slightly fuscus on shoulder parts; scutellum with 4 strong bristles and several minute setae; postscutellum somewhat brownish on lateral parts. Legs almost entirely yellow or pale yellow, but last 2 tarsal segments of all legs somewhat dark, hind tibia brownish on basal 1/2, except for pale yellow base; hind TR about 2.95; RL of fore leg 229:225:137:50:35:21:25, that of middle 275:262:164:61:41:22:27 and that of hind 307:285:227:77:52:26:31.

Wing (fig. 1d) without macrotrichia; relative lengths of R, M and stem of fMCu about 59:59.69, Rs about 4× as long as R₁ (58:15), second radial cell about 5× as long as first (47:10), fM sessile, fMCu under first radial cell and inner angle about 45 degrees, M₃₊₄

ending at level of costal end, Cu₁ ending slightly beyond tip of R₁. Halter white. Abdomen with basal 2 segments and basal 2/3 of segment 3 black, other posterior parts pale brown. Hypopygium (fig. 1c) pale brownish yellow, but style more brownish; tergite 9 round on caudal margin; sternite 9 transverse, with many setae, caudal membrane slightly spinulose only on basal area; coxite not distinctly tapered, arcuate and about 2.4× as long as wide (50:21); style stout, distinctly arcuate and tapered, with pre-apical minute tooth and about 4/5 as long as coxite; aedeagus broader than long, with basal arch about 1/4

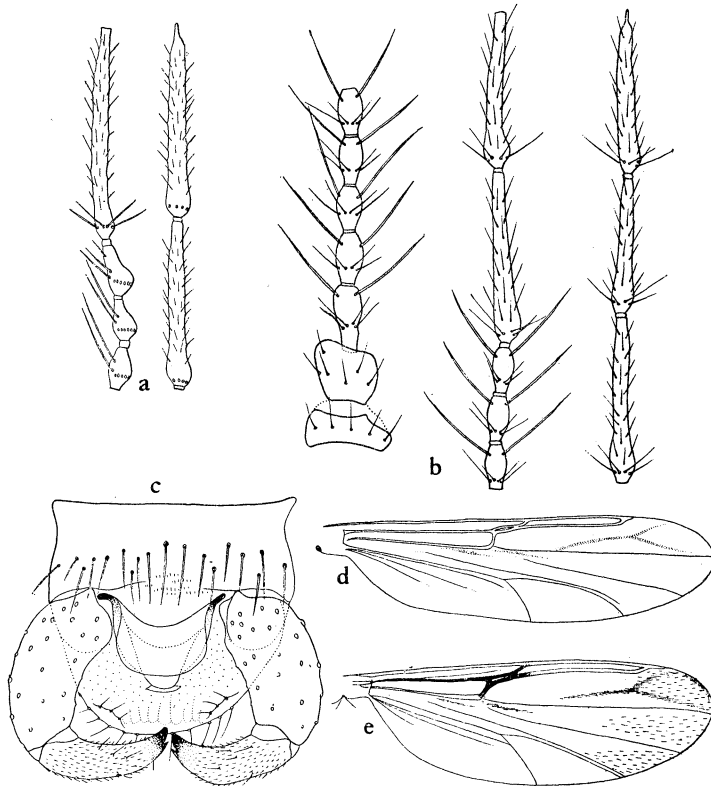


Fig. 1. *Atrichopogon nigribasalis*. a, distal 6 flagellar antennal segments, male; b, antenna with basal antennaria, female; c, hypopygium, male; d, wing, male; e, wing, female.

total length, round on caudal margin and with rather broad median lobe slightly produced beyond caudal margin of ventral swelling.

Female: Body about 3.1—3.3 mm long. Wing about 2.43—2.59 mm by 0.81—0.83 mm. Coloration mainly as in male, but scutum without dark dot-like spots, caudoscuteal area

white, scutellum and postscutellum slightly fuscus, abdominal segment 1 dark on caudal 1/2 and segment 3 dark only on anterior margin, all legs with coxae and trochanters white and hind tibia entirely yellow, differing from male. General structures as in ♂ with usual sexual differences. Head with proboscis about 1/2 or little more than 1/2 height of head capsule; clypeus with about 7 setae. Maxillary palpus with 5 segments in proportion of 21:25:32:16:15. Antenna (fig. 1b) mainly dark brown, with scape orange, basal short flagellar segments oval, about twice as long as wide and each with 2 long sensillae being about twice as long as verticils; penultimate 4 segments subequal in length and each subequal to 3 short segments 7 to 9 combined; AR about 1.73—1.98; relative lengths of distal eight segments about 22.3:22:23.5:72.8:68.3:69.5:66.5:80.5. Thorax with RL about 250:261:158.5:58:43:25.5:31 in fore, 300:292.5:188.5:64:46:24.5:32 in middle and 344:316:230.5:84:61:30:35 in hind leg; hind TR about 2.57—2.89.

Wing (fig. 1e) brownish on membrane and dark brown on anterior veins in allotype, but largely paler in paratype (teneral?) as in male, with macrotrichia on apical parts of cell R_5 , M_1 and M_2 and very few along margin of cell M_4 or none; costa produced beyond tip of R_s as long as r-m and ending slightly before tip of M_2 , fMCu under first radial cell, relative length of R, M and stem of fMCu 60:59:73, R_s a little more than $4 \times R_1$ (85.5:20.5), second radial cell about $5.6 \times$ first (61.5:11), inner angle of fMCu about 45 degrees. Halter white. Abdomen extensively pale brown, but caudal 1/2 segment 1, entire 2 and anterior margin of 3 dark, forming basal dark band, segment 3 with pair of small dark clouds on anterior part of tergite; sternal and pleural sides very pale brown; cercus pale brown; single spermatheca, pale brown, oval (43 units by 27.5 units), with minute dots on entrance part and without chitinized part of duct.

DISTRIBUTION: New Guinea.

Holotype, ♂ (BISHOP 2851), Karap 1550 m, upper Jimmi Valley, Sepik drainage, NE New Guinea, 20 July 1955, Gressitt. Allotype, ♀, and paratype, ♀, with holotype.

This species is highly specific in wing venation and thoracic and abdominal coloration. The wing vein fM is sessile without a petiole vein. Similar venation is known in the wing of *A. sessilis* Kieffer (New Guinea) and *A. discors* Macfie (Malaya), but these two allied species are highly different in their dark or brown color of thorax and uniform coloration of abdomen. Except for the sessile fM, *A. edwardsi* Macfie (Ceylon and Sumatra) may be another allied species in the coloration, but in this Oriental species the female hind TR is about 2.2 instead of about 2.57—2.89 of the present new species and the abdomen is uniformly brownish differing from the distinctly bicolored abdomen.

3. *Atrichopogon longicalcaris* Tokunaga n. sp. Fig. 2.

Rather large yellow and brown species. Basal short flagellar segments of female mainly yellow and in holotype, their distal margin narrowly brown, apical 5 long segments entirely brown; female AR about 1.68—1.77. Thorax mainly yellow, scutum with many dark dots at bases of setae, caudoscuteal area of scutum and postscutellum fuscus yellow; legs extensively yellow, tibial bases fuscus; hind tibia with large apical spur; hind TR 2.36—2.49. Female wing with macrotrichia very sparse, being distributed on apical parts of cell R_5 and M_1 and several on apical part of cell M_2 ; radial cell 2 very long and about $4.8 \times$ first, fM sessile, inner angle of fMCu far less than 45 degrees. Scutellum with 8 strong bristles arranged in line along caudal margin. Male unknown.

Female: Body length about 3.47 mm. Wing about 2.83 mm by 0.95 mm. Head yellow or yellowish brown including mouthparts, with eyes broadly contiguous above, proboscis slightly longer than 1/2 length of head capsule; clypeus with several setae. Maxillary palpus slender, yellowish brown or brown, segment 3 swollen ventrad before apical part and with oval pitcher-like sensory pore on pre-apical part, 5 segments in proportion of 21.5: 32: 44: 21: 24.5. Antenna with scape yellow, short flagellar segments yellow and apical margins brown or, in paratype, first entirely yellow and other short flagellar segments entirely yellowish brown, 5 longer apical segments brown; basal short segments oval and twice as long as wide, apical segment with distinct terminal stylet; AR 1.68—1.77, relative lengths of distal 8 segments about 27.8: 27.8: 33: 88: 76: 78: 76: 91. Thorax almost entirely yellow, but scutellum more or less fuscus on caudoscutal area and with many dark dots at bases of setae, postscutellum dark yellow; scutellum with 8 strong bristles arranged in line along caudal margin and many small setae, central seta somewhat longer in paratype. Legs extensively yellow, knee-joints and distal ends of all tibiae dark, tarsi pale brownish yellow, but apical 2 segments dark brown; hind tibia with spur (fig. 2c) yellowish brown, larger and longer than or as long as width of tibial end; hind TR 2.36—2.49; RL of legs about 293.5: 300: 185.5: 56: 45: 32: 37 in fore, 349.5: 355: 230: 64: 48: 31.5: 31 in middle, and 414.5: 391: 230.5: 95: 68.5: 34: 38 in hind leg.

Wing (fig. 2a) with membrane pale brown, anterior veins yellowish brown or yellow, macrotrichia very sparse, spread on apical part beyond tip level of R_s , cell M_2 with only several trichia and cell M_4 without or with very few trichia; costa distinctly produced beyond end of R_s and ending just before tip of M_2 , R , M and stem of $fMCu$ about 61: 61.5: 80.5, R_s very long, about $3.3 \times R_1$ (102.5: 31), second radial cell about $4.1 \times$ first (83.5: 17.5), fM sessile, $fMCu$ under first radial cell, inner angle about 45 degrees, M_{3+4} arcuate only on basal part and somewhat shorter than twice Cu_1 (71.5: 40), Cu_1 almost straight and obliquely meeting anal margin. Halter white. Abdomen uniformly brown; 1 spermatheca (fig. 2b), dark brown, oval (51 units by 30

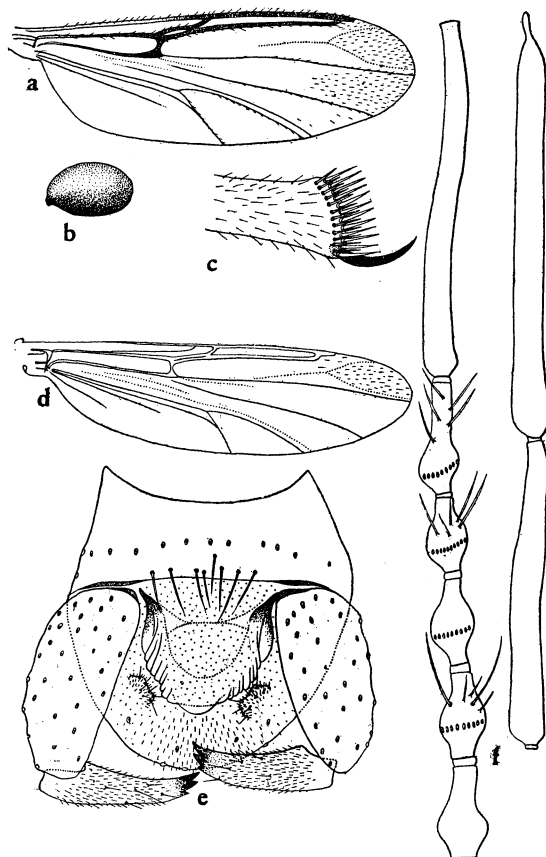


Fig. 2. *Atrichopogon* spp. a-c, *longicalcaris*, female: a, wing; b, spermatheca; c, tibial spur and comb of hind leg. d-f, *tridentistylus*, male: d, wing; e, hypopygium; f, distal 8 flagellar antennal segments.

units) and with or without vestigial chitinized neck part.

DISTRIBUTION: New Guinea.

Holotype, ♀ (BISHOP 2852), Karap, 1550 m, upper Jimmi Valley, Sepik drainage, NE New Guinea, 20 July 1955, Gressitt. Paratype, ♀, Wagate, 1800 m, Neth. New Guinea, 16 Aug. 1955, Gressitt.

The present new species is highly specific in the possession of the sessile fM, dark knee-parts of the yellow legs and the strongly developed tibial spur of the hind leg. Except for these characters, *A. edwardsi* Macfie may be the most closely related species.

4. *Atrichopogon tridentistylus* Tokunaga n. sp. Fig. 2.

Rather large yellow species, with abdomen brown; antennal segment 12 of male longer than 13, shorter than last and about 3× as long as preceding one; male hind TR about 2.39; male wing with macrotrichia only on apical part of cell R₅ beyond level of costal end, without trichia on other wing membrane; styles of hypopygium tapered and with apical 3 teeth. Female unknown.

Male: Body about 3.06 mm. Wing about 2.2 mm by 0.59 mm. General coloration yellow. Head brown, with mouthparts yellowish pale brown, eyes bare and broadly contiguous above, proboscis about 1/2 length of head capsule; clypeus with 8 setae. Maxillary palpus slender, segment 3 swollen ventrad on pre-apical part and with pitcher-like sensory pore there, 5 segments in proportion of 17:17:20:15:18 in length. Antenna (fig. 2f) entirely brown, segment 11 with neck part as long as basal node and total length about 1/3 following one, last 3 segments very long; relative lengths of segments 2 to 10 and 11 to 14 combined about 237:327; distal 8 segments in proportional length of 25:25:23:22:31:97:81.5:114. Thorax with tergal side almost entirely yellow, but scutum slightly fuscus on shoulder parts, paratergites brownish, pleuron pale brown, sternum yellowish pale brown; scutellum with 6 strong bristles arranged in line along caudal margin and about 15 small setae. Legs extensively yellow, coxae, trochanters and tarsi very slightly brownish, last tarsal segments brown, hind TR about 2.39; RL about 238:262:176:61:40:24:25 in fore, 278:279:179:59:41:24:28 in middle and 289:292:210:88:60:30:27 in hind leg.

Wing (fig. 2d) very pale, with macrotrichia only on distal part of cell R₅ beyond costal end; costa distinctly produced beyond tip of R_s, extending about 0.73 of length of wing (123:169) and ending at level midway of apical wing margin of cell M₂, relative lengths of R, M and stem of fMCu about 55:54:73, R_s about 3.5× R₁ (62.5:18), first radial cell very narrow and slit-like, second radial cell long about 3.7× as long as first (48.5:13), M swollen at distal end, forming triangular shape, fM sessile, fMCu under end of first radial cell, M₃₊₄ arcuate only at base and twice as long as Cu₁, Cu₁ almost straight and obliquely meeting anal margin. Halter with stem brown and knob white. Abdomen entirely brown, but hypopygium and segment 8 yellowish pale brown, tips of styles dark. Hypopygium (fig. 2e) with tergite 9 round on caudal margin, sternite transverse, with strong bristles arranged in transverse line at middle, several smaller bristles at middle of caudal margin, caudal membrane bare and caudal incision absent. Coxite slender, cylindrical and little more than twice width; style rather long, about 2/3 length of coxite, slightly arcuate, tapered and with 3 rather sharp teeth on apical part. Aedeagus broad, with ventral swelling almost hyaline, basal arch rather low and caudal median process indistinct.

DISTRIBUTION: New Guinea.

Holotype, ♂ (BISHOP 2853), Wum, 850 m, Jimmi Valley, Sepik drainage, NE New Guinea, 16 July 1955, Gressitt.

This species is closely allied to *A. jacobsoni* de Meijere and *edwardsi* Macfie in coloration, but in both allied species the wing vein M_{1+2} is present which distinctly differs from the present new species and moreover the styles of the first allied species are not so distinctly tridentate as in the present species and the wings are quite devoid of macrotrichia even on the apical part of cell R_5 .

5. *Atrichopogon flaveolum* Tokunaga, n. sp. Fig. 3.

Medium-sized yellow species, scutellum with 4 strong bristles. Male antenna with 4 distal segments very long; female AR about 1.5. Wing with M strongly thickened at distal end, fM sessile, male wing without macrotrichia, female with rather dense macrotrichia on marginal area, fMCu with inner angle about 45 degrees, Cu_1 obliquely meeting anal margin. Legs almost entirely yellowish, male hind TR 2.44—2.68, female about 2.67. Male hypopygium with styles rather short, distinctly tapered and with 2 apical teeth; 1 spermatheca, oval and chitinized neck part very short.

Male: Body about 2.39 (2.16—2.51) mm long. Wing about 1.78 (1.64—1.9) mm by 0.51 (0.49—0.52) mm. Head brown, with eyes quite bare and broadly contiguous above, mouthparts yellowish pale brown, proboscis about 1/2 length of head capsule; clypeus with 8 setae. Maxillary palpus slender, far paler, with 5 segments in proportion of 14.8: 18.3: 27: 13.3: 12.8 and segment 3 swollen ventrad on middle part and with large oval sensory pore at middle. Antenna (fig. 3a) with scape and apical 4 segments brown, basal short flagellar segments and plumose hairs paler; combined relative lengths of segments 2 to 10 and 11 to 14 combined about 160.5: 254; 11 very long and subequal to ultimate, relative lengths of distal 8 segments about 16.9: 14.5: 14.5: 14.5: 74: 56.3: 50.3: 73.8. Thorax extensively yellow, but paratergite yellowish brown to brown, scutum sometimes slightly fuscus along anterior margin or white on caudoscuteal area, postscutellum sometimes more or less brownish, pleuron slightly brownish or entirely yellow; scutellum with 4 strong bristles, and 9 to 11 small accessory setae, but sometimes with additional small bristle at center. Legs entirely yellow, but last tarsal segments rarely brownish; hind TR 2.59 (2.44—2.68); RL about 187: 192.7: 131.2: 45: 33: 23: 23.7 in fore, 205.7: 219.7: 148: 49.7: 36.3: 23: 22.7 in middle and 232: 222: 160: 62: 43.7: 26: 25.5 in hind leg.

Wing (fig. 3c) pale brownish yellow, without macrotrichia, with veins yellowish brown; costa extending about basal 0.7 of wing length (97.5: 139), ending above tip of M_{3+4} and produced as long as r-m beyond tip of R_s , relative lengths of R, M and stem of fMCu 44: 43.8: 59.8, R_s 3× as long as R_1 (49.3: 16.1), second radial cell also 3× as long as first (36.5: 11.8), M ending in triangular swelling, fM sessile, fMCu under septum of 2 radial cells, inner angle about 45 degrees, M_{3+4} slightly arcuate and about twice as long as Cu_1 (37.8: 18.2), Cu_1 almost straight and obliquely extended. Halter with stem more or less brownish and knob white. Abdomen brown and dark brown on pleural membranes. Hypopygium (fig. 3b) yellowish pale brown, but styles more brownish and with tips dark; tergite 9 semi-circular, sternite 9 transverse, setigerous and with about 5 or 6 setae on caudal margin of middle part which is membranous and spinulose, caudal membrane before aedeagus quite bare and without definite caudal incision. Coxite little more than twice basal width (44.3: 20.1), conical and not distinctly arcuate; style distinctly tapered, about 0.7 as long as coxite (30.8: 44.3), curved, with sharply pointed apical tooth accompanied by minute pre-apical tooth. Aedeagus broad, almost round on caudal margin, with basal arch about 1/2

total length and median caudal lobe obscure.

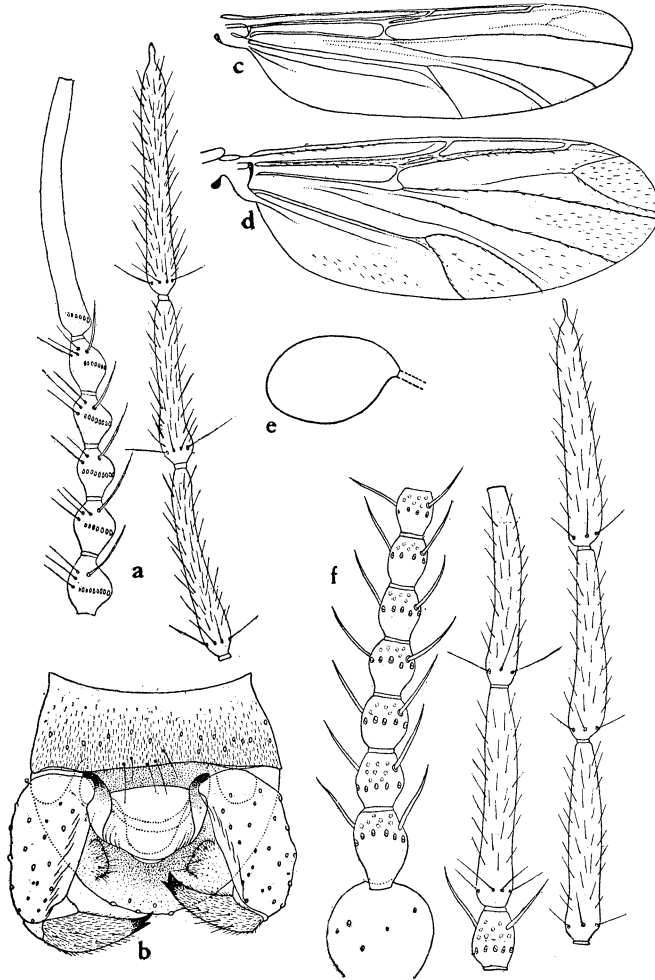


Fig. 3. *Atrichopogon flaveolum*. a, distal 9 flagellar antennal segments, male; b, hypopygium, male; c, wing, male; d, wing, female; e, spermatheca; f, antenna, female.

61: 40: 26: 26 in hind leg.

Wing (fig. 3d) with macrotrichia rather broadly spread along apical and anal margins of wing. Costa extending to basal 3/4 (105: 142) wing length, produced beyond tip of Rs as long as r-m and ending slightly before tip level of M_2 , relative lengths of R, M and stem of fMCu about 43: 42: 51, Rs little more than $3 \times R_1$ (56: 17.5) second radial cell $4.7 \times$ first in length (54: 11.5), M with distinct swelling at end of r-m, fM sessile, fMCu under radial cell, inner angle about 45 degrees, Cu_1 very slightly sinuous and obliquely extending, M_{3+4} slightly arcuate and about 1.8 of Cu_1 (40.5: 23). Halter with stem brown and knob white. Abdomen with cercus pale brown; 1 spermatheca (fig. 3e), oval (33 units

Female: Body length about 2.24 mm. Wing about 1.85 mm by 0.65 mm. Coloration and structure as in male with usual sexual differences. Head with maxillary palpus rather slender and with 5 segments in proportion of 15: 22: 28, 15: 14, segment 3 thicker than in male and sensory pore larger. Antenna (fig. 3f) with scape yellowish brown, other segments brown, but only basal part of segment 2 paler; basal short flagellar segments short-oval being somewhat longer than wide; AR about 1.5; relative lengths of distal 8 segments about 14: 14: 16: 56: 55: 53: 51: 65. Thorax mainly yellow, scutum with small ill-defined fuscous clouds on humeral parts and caudoscuteal area, postscutellum and pleuron brownish. Legs yellow and partially yellowish white, all tarsi pale brown and apical 2 segments more brownish; hind TR about 2.67; RL about 178: 198: 128: 43: 34: 25: 23 in fore, 217: 238: 149: 48: ?: ? in middle and 240: 229: 163:

by 23 units), brown and with neck part very short.

DISTRIBUTION: New Guinea.

Holotype, ♂ (BISHOP 2854), Wum, 850 m, Jimmi Valley, Sepik drainage, NE New Guinea, 16 July 1955, Gressitt. Allotype, ♀, Karap, 1550 m, upper Jimmi Valley, NE New Guinea, 20 July 1955, Gressitt. Paratype, 3♂ same data as holotype.

This species is also very closely related to Malayan *A. fulvus* Macfie, as in the case of NG No. 2. But in the Malayan related species, the body is far larger, the female wings being about 3 mm by 0.97 mm, the basal short flagellar segments of female antenna are subspherical (as long as wide) and AR is much larger, being 2.54, the scutellum bears six strong bristles, the tibiae of the hind legs are broadly dark brown in the middle, the female hind TR is smaller, being about 2.4, the female wing has a petiole of fM which is about half of r-m, differing from the new species. Another allied species may be New Guinea *A. biroï* Kieffer, in this allied species, the male wings are provided with sparse macrotrichia on the apical quarter, fM is petiolate as long as r-m, and Rs is $2.5 \times R_1$, differing from the present species.

6. *Atrichopogon flavitergum* Tokunaga, n. sp. Fig. 4.

Rather large yellow species, scutum with brown dots at bases of setae, distal 2 tarsal segments brown. Male antenna with apical 3 segments distinctly elongate, segment 11 only somewhat longer than basal short segments; male hind TR about 2.35; male wing without macrotrichia, vein M distinctly swollen at end, fM sessile; style of male hypopygium suddenly narrowed on apical 1/4 and with sharp apical and small pre-apical dark tooth. Female unknown.

Male: Body about 2.99 mm long. Wings about 2.04 (1.98-2.11) mm by 0.59 mm. Head pale brown, including mouthparts, with eyes bare and broadly contiguous above, proboscis about 1/2 as long as height of head capsule; clypeus with 8 setae. Maxillary palpus (fig. 4d) slender, segment 3 with oval sensory pore just beyond middle, 5 segments in proportion of 15:20:30:14:17.5. Antenna (fig. 4a) with scape yellowish brown, short basal flagellar segments and plumose hairs brown, 3 long distal segments more brownish; segment 11 only slightly longer than preceding one, about 1/3 following segment and with neck part as long as basal node; combined relative lengths of segments 2 to 11 and 12 to 14 about 60:63; distal 8 segments in proportion of 5.9:6:6:5.8:7:20.5:20:24. Thorax extensively yellow on dorsal side, scutum with brown dots at bases of setae, pleuron and sternum pale brownish yellow; scutellum with 4 strong bristles and 16-18 minute accessory setae. Legs mainly yellow or pale brownish yellow, tarsi pale brown, but last 2 segments more brownish; hind TR about 2.35; RL about 237.5:240:140:50.5:36.5:21:26 in fore, 267:270:157.5:59.8:42:24.5:25.5 in middle and 295:284:187:79.5:55.5:30:27 in hind leg.

Wing (fig. 4b) with anterior veins yellow, membrane very slightly brownish, without macrotrichia. Costa extending to about basal 0.76 of wing length (115:152), ending slightly before tip of M_2 and produced beyond tip of Rs as long as r-m, relative lengths of R, M and stem of fMCu about 52.5:51:69, Rs about $3.3 \times$ as long as R_1 (59.3:17.8), second radial cell about $3.4 \times$ as long as first (45:5:13.3), M thickened at end into triangular shape, fM sessile, fMCu under septum between radial cells, inner angle about 45 degrees, M_{3+4} little more than twice Cu_1 (46.5:22) and slightly arcuate, Cu_1 almost straight and oblique. Halter with stem brown and knob white. Abdomen with tergum brown, pleural membranes and sternum paler, hypopygium (fig. 4c) yellowish pale brown, but tips of styles

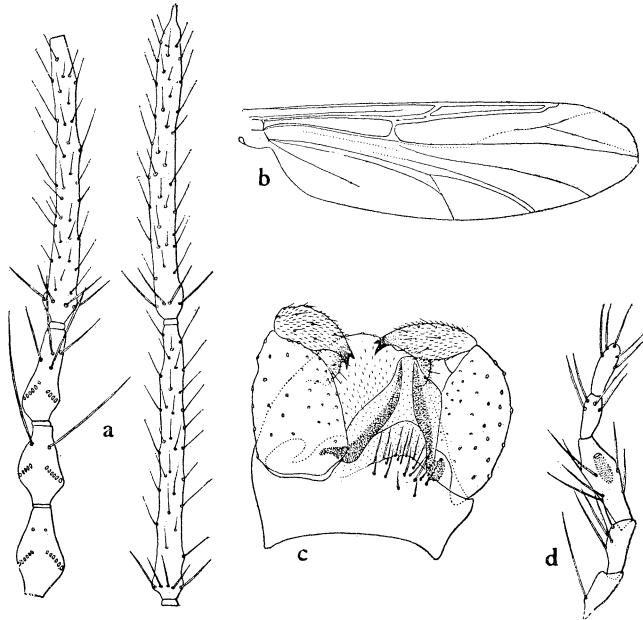


Fig. 4. *Atrichopogon flavitergum*, male. a, distal 6 flagellar antennal segments; b, wing; c, hypopygium; d, maxillary palpus.

dark. Tergite 9 round on caudal margin; sternite 9 transverse, with setigerous blunt caudal projection at middle and without bristles arranged transversally. Coxites rather stout, not distinctly arcuate and little shorter than twice basal width (50:27.5); styles stout, about 3/5 as long as coxites (30.5:50), suddenly narrowed at apical 1/4, terminating in sharp tooth and with an additional minute pre-apical tooth. Aedeagus broad, round on caudal margin, ending slightly before tergite 9, with caudal median projection very short, basal arch rather large and about 1/2 total length (18:38),

membrane between aedeagus and sternite quite bare.

DISTRIBUTION: New Guinea.

Holotype, ♂ (BISHOP 2855), Wum 850 m, Jimmi Valley, Sepik drainage, NE New Guinea, 16 July 1955, Gressitt. Paratype, ♂, same data as holotype.

This is closely related to the preceding *A. flaveolum* and *A. biroi* Kieffer, but distinctly differs from the latter in the absence of the petiole vein of fM and macrotrichia of the apical part of the male wing. *A. flaveolum* and *flavitergum* are distinguished from each other in the following three points: proportional length of flagellar segment 11 of the male antenna, development of setae of sternite 9 and shape of styles of male hypopygium.

7. *Atrichopogon nigrithoracius* Tokunaga, n. sp. Fig. 5.

Medium-sized dark brown species with legs yellow. Male antenna with segment 11 short; female AR about 1.48. Scutum dark brown and with black dots at bases of setae; scutellum with 4 strong bristles. Legs extensively yellow and with tarsal segments more or less fuscus brown; male hind TR about 2.44 and female 2.53. Wing without thickening of vein M, fM without petiole, fMCu with inner angle about 45 degrees, membrane without macrotrichia in male and rather dense macrotrichia spread broadly along apical and anal margin in female. Male hypopygium with sternite 9 rather densely setigerous and styles slender; 1 spermatheca, oval and with short neck part.

Male: Body about 2.85 mm long. Wing about 1.99 mm by 0.56 m. Head generally dark brown, with mouthparts yellow, eyes bare and broadly contiguous above, proboscis

about 2/3 as long as height of head capsule; clypeus with 8 setae. Maxillary palpus (fig. 5a) very slender, segment 3 with round sensory pore just beyond middle, 5 segments in proportion of 15:16:28:13:13. Antenna (fig. 5e) entirely dark brown, including plumose hairs; segment 11 short, only somewhat longer than 10, following 3 very long; combined proportional lengths of segments 2 to 10 and 11 to 14 about 234:234, those of segments 2 to 11 and 12 to 14 about 263:207; relative lengths of distal 8 segments about 24:23:21:20:27:75:56:75. Thorax entirely dark brown, scutum with black dots at bases of setae, scutellum with 4 strong bristles and several (6-7) small setae. Legs mainly yellow, but coxae and trochanters white and slightly brownish on bases of lateral sides of coxae, tarsal segments uniformly brownish or slightly fuscus; hind TR about 2.44; RL about 201:210:126:44:32:22:23 in fore, 238:229:128:45:32:22:25 in middle and 262:256:154:63:45:25:25 in hind leg.

Wing (fig. 5b) with membrane pale brown, veins fuscus, no macrotrichia. Costa extending basal 0.7 of wing length (105.5:153), slightly produced beyond tip of R_s and ending above tip of M_{3+4} , relative lengths of R, M and stem of fMCu about 52.5:52:67.5, R_s little more than $3 \times R_1$ (49:15), second radial cell fully $4 \times$ as long as first, fM sessile, M without distal thickening, fMCu under septum between radial cells, inner angle about 45 degrees, M_{3+4} very slightly arcuate and about 2.3 as long as Cu_1 (44:19), Cu_1 very slightly arcuate and obliquely extended. Halter with stem pale brown and knob white. Abdomen entirely dark brown. Hypopygium (fig. 5c) with tergite 9 round on caudal margin; sternite 9 transverse, subsquare, with band of bristles and many setae on middle part of caudal margin. Coxite oval and

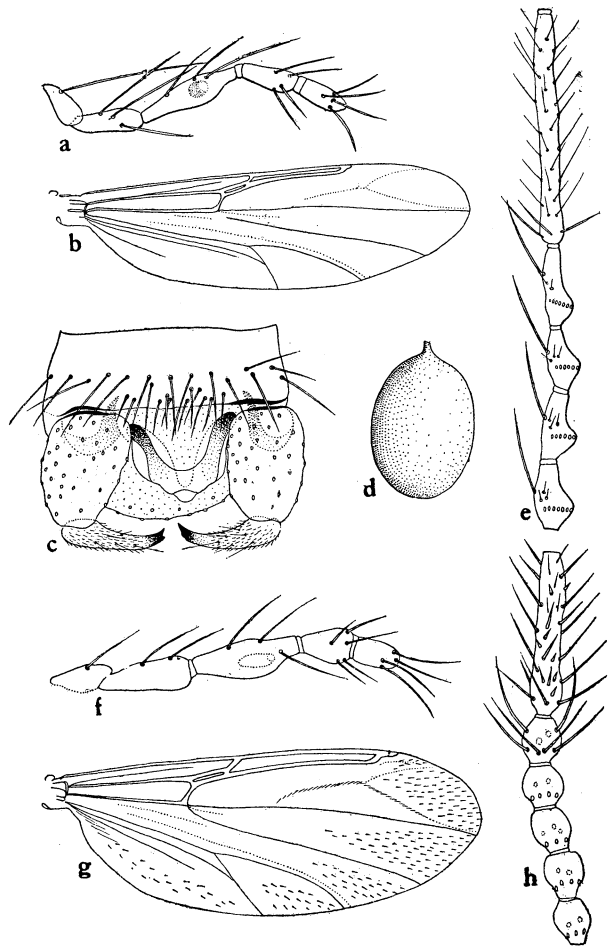


Fig. 5. *Atrichopogon nigrithoracius*. a, maxillary palpus, male; b, wing, male; c, hypopygium, male; d, spermatheca; e, flagellar segments 8-11 of antenna, male; f, maxillary palpus, female; g, wing, female; h, flagellar segments 5-10 of antenna, female.

about 1.5 times as long as wide (40:27); styles slender, tapered, arcuate, about 0.8 as long as coxites (32:40), sharply pointed in apical tooth and with 2 accessory minute teeth being blunt or pointed. Aedeagus broad, almost round on caudal margin, with basal arch about 1/2 total length, median caudal lobe blunt and very short; membrane between aedeagus and sternite quite bare.

Female: Body length about 2.22 mm. Wings about 2.11 mm by 0.75 mm. General structure and coloration very similar to male. Head with maxillary palpus (fig. 5f) slender, but not distinctly differing from that of male, segment 3 with sensory pore oval, 5 segments in proportion of 12:20:28:14:11.5. Antenna (fig. 5h) with basal short flagellar segments round and as long as wide; AR about 1.48; relative lengths of distal eight segments about 13.5:14:16:50:48:50:51:61. Thorax dark brown on tergum and brown on sternum and pleuron; scutellum with about 8 minute accessory setae besides 4 strong bristles. Legs with apical 3 or 4 tarsal segments more or less fuscus brown; hind TR about 2.53; RL about 180:189:111.5:38:29:22:27 in fore, 225:218:130:44:30:24:27 in middle and 253:239:148:58.5:38:25.5:29 in hind leg.

Wing (fig. 5g) with macrotrichia spread rather broadly along apical and anal wing margins. Costa distinctly produced beyond tip of Rs, but projection much shorter than r-m, ending slightly before level of tip of M₂, extending to about basal 3/4 wing length (122:162.5), relative lengths of R, M and stem of fMCu about 47:45:62, Rs about 3.7× as long as R₁ (69:18.5), second radial cell about 4.2 as long as first (55:13), M without apical thickening, fM at end of M, fMCu under first radial cell, inner angle about 45 degrees, M₃₊₄ very slightly arcuate and 1.7 as long as Cu₁ (52:30), Cu₁ almost straight and extending very obliquely. Abdomen entirely dark brown; 1 spermatheca (fig. 5d), oval (3+34 units by 26 units), brown and with short chitinized neck part of duct.

DISTRIBUTION: New Guinea.

Holotype, ♂ (BISHOP 2856), Daulo Pass, 2500 m, Asaro-Chimbu divide, NE New Guinea, 12 June 1955, Gressitt. Allotype, ♀, same data as holotype.

This species is allied to Malayan *A. discorus* Macfie in the female specific characters. The allied species, however, is different from the present species in the following points: the basal flagellar segments of female antenna are longer than broad ranging from 19:10 to 21:9 units, AR is somewhat larger, being 1.7, the female wings are very sparsely clothed with macrotrichia (at most a few in cell M₂ and only one or two in cell M₄ and anal cell) and hind legs with tibiae, and less distinctly femora, darkish brown in middle.

8. *Atrichopogon annulifemoratus* Tokunaga, n. sp. Fig. 6.

Rather large brown and yellow species; segment 11 of male antenna not distinctly elongate; thorax mainly brown or dark brown, but scutellum very pale brown and with 6 strong bristles; legs mainly yellowish, in middle and hind legs, femora with sub-basal and tibiae with basal brownish clouds, last 2 tarsal segments of all legs distinctly brownish; hind TR of male about 2.36; male wing without macrotrichia and apical thickening of vein M; sternite 9 highly setigerous on apical 1/2 and styles slender, slightly sinuous and ending in double apical teeth, mesal one flattened and semicircular and lateral one sharply pointed. Female unknown.

Male: Body about 3.22 mm long. Wing about 2.12 mm by 0.62 mm. Head mainly

yellowish brown, with eyes bare and broadly contiguous above, mouthparts yellow, proboscis about $3/5$ as long as height of head capsule; clypeus with 7 setae. Maxillary palpus (fig. 6d) slender and sensory pore of segment 3 small, 5 segments in proportion of 13:18:30:15:17. Antenna (fig. 6a) almost entirely brown, but scape yellowish, combined lengths of segments 2 to 10, 11 to 14, 2 to 11 and 12 to 14 about 256:324 and 291:288; segment 11 somewhat longer than preceding one, having neck part as long as node and about $1/3$ as long as following one; distal 8 segments in proportion of 27:28:27.5:27:34.5:98:21:110. Thorax almost entirely dark brown or brown, but scutellum alone far paler and with 6 strong bristles and 8 minute accessory setae. Legs distinctly paler, coxae, trochanters and bases of femora white, tarsi very pale brown and ultimate 2 segments more brownish, fore femora pale brownish yellow, tibia pale yellow, and without fuscus or brownish clouds or bands, middle and hind femora each with ill-defined brownish band on preapical part and distal $2/3$ pale brownish yellow, middle and hind tibiae brownish or fuscus on basal $1/4$ or $1/3$ and pale yellow on other distal parts; hind TR about 2.36; RL about 244:258:175:61:44:24: ? in fore, 281:278:190:?:?:? in middle and 316:310:208:88:58:30:29 in hind leg.

Wing (fig. 6b) entirely yellowish pale brown, no macrotrichia. Costa produced beyond tip of Rs far longer than r-m, ending to level of middle between ends of M_2 and M_{3+4} and extending about basal 0.8 of total wing length, proportional lengths of R, M and stem of fMCu about 55.5:56:64.5, Rs about 3.8 times as long as R_1 (64.5:17), second radial cell almost $5\times$ as long as cell R_1 (53:11), M without apical swelling, fM sessile, fMCu under septum between radial cells, inner angle about 45 degrees, M_{3+4} slightly arcuate, Cu_1 almost straight and obliquely extending to anal margin. Halter with stem brown and knob white. Abdomen brown and with yellow hypopygium (fig. 6c). Sternite 9 transverse, subsquare, highly setigerous on posterior $1/2$ and without caudal incision; tergite 9 semicircular. Coxite rather stout and about $1.7\times$ as long as basal width (47:28); style slender, and little more than $1/2$ coxite (26:47), slightly undulate and ending in double teeth, mesal one being flat and blunt and lateral one, minute and sharp. Aedeagus generally round on caudal margin, with caudal median lobe slightly produced beyond caudal margin of sternal swelling, basal arch very large and about $1/2$ total length; membrane between aedeagus and sternite broad and quite bare.

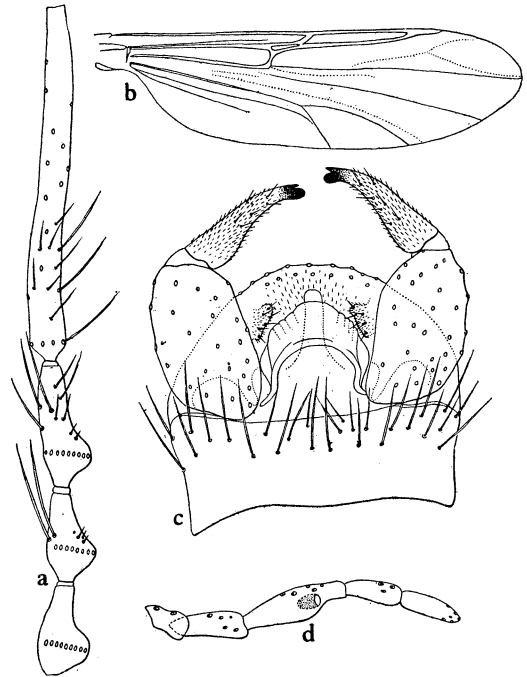


Fig. 6. *Atrichopogon annulifemoratus*, male. a, flagellar segments 9-12 of antenna; b, wing; c, hypopygium; d, maxillary palpus.

DISTRIBUTION: New Guinea.

Holotype, ♂ (BISHOP 2857), Karap, 1500 m, upper Jimmi Valley, Sepik drainage, NE New Guinea, 20 July 1955, Gressitt.

This insect clearly resembles Australian *A. atratus* Kieffer, but apparently may be distinguished by the following points: male wings with macrotrichia only between two branches of intercalary fork in cell R_5 and apical 4 segments of male antennae showing different proportional lengths. The specific characters of the male hypopygium of the allied species are quite missing from Kieffer's description.

9. *Atrichopogon fulviscutellaris* Tokunaga, n. sp. Fig. 7.

Medium-sized dark brown species with scutellum yellow or yellowish brown, legs mainly yellow and male hypopygium and female cercus also yellow. Antennal segment 11 of male not distinctly elongate; female AR about 1.86. Scutellum with 4 strong bristles. Wing with inner angle of fMCu about 45 degrees, Cu_1 obliquely extending to anal margin, vein M without apical swelling, fM sessile, male without macrotrichia and female with rather dense macrotrichia on apical part of wing and very few in cell M_4 . Hind TR about 2.23 in male and 2.64 in female. Styles of male hypopygium with 2 apical teeth; 1 spermatheca, oval and with slender chitinized part of duct.

Male: Body about 2.51 mm long. Wing about 1.98 mm by 0.56 mm. Head mainly brown, with eyes bare and widely contiguous above, mouthparts yellow, proboscis about 1/2 length of head capsule; clypeus with 8 setae. Maxillary palpus (fig. 7b) slender, with sensory pore of segment 3 oval and at middle of segment, 5 segments in relation of 12.5:16:28:13:14 in length. Antenna (fig. 7d) almost entirely dark brown, except for pale petiole part of segment 2, segment 11 only slightly longer than preceding one, last 3 segments very long: combined lengths of segments 2 to 10, 11 to 14, 2 to 11 and 12 to 14 in proportion about 205:216.5 and 233:188.5; distal 8 segments in proportion of 23:21:20:20:27:74:41.5:69. Thorax almost entirely dark brown, scutellum yellow, scutum with many black dots at bases of setae, 5 strong bristles on each fovea and 2 similar bristles on anterior part of mid-dorsal line, scutellum with 4 strong bristles and 10 minute accessory setae. Legs with coxae, trochanters and basal 1/2 femora white, apical 1/2 femora and total length of tibiae yellow, tarsi pale brown, but apical segments more brownish; hind TR about 2.23; RL about 194:183:113:41.5:29.5:22:24 in fore, 208:210:127:45:33:21:21 in middle and 242:231:145:65:44.5:25:25 in hind leg.

Wing (fig. 7a) entirely very pale brownish, no macrotrichia. Costa produced beyond tip of R_s as long as r-m, extending about basal 0.7 of wing length (101:152) and ending beyond level of tip of M_{3+4} , relative lengths of R, M and stem of fMCu about 51.5:50:66, R_s about 3.5× as long as R_1 (46:13), second radial cell about 4.5 as long as first (45.5:10), M without distal swelling, fM sessile, fMCu under septum between 2 radial cells and with inner angle about 45 degrees, M_{3+4} slightly arcuate and about 2.3× of Cu_1 (44:19), Cu_1 almost straight and obliquely ending on anal margin. Halter white. Abdomen brown. Hypopygium (fig. 7c) mainly brown, but coxite and style yellow. Tergite 9 round on caudal margin; sternite 9 with 2 transverse lines of bristles: one band-like on preapical part and one consisting of several setae on middle part of caudal margin, and without caudal incision. Coxite stout, slightly tapered, somewhat shorter than twice basal width (40:23); styles rather slender, distinctly tapered, about 0.7 as long as coxites (29:40), ending in

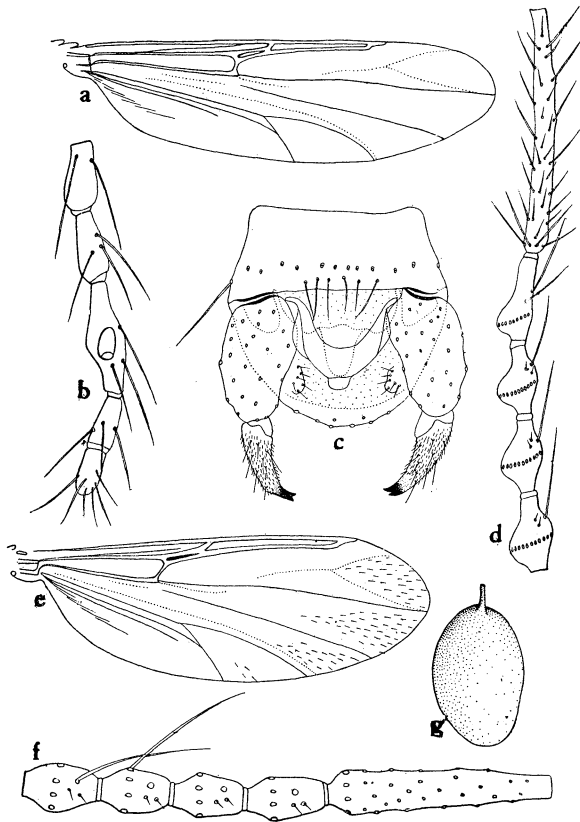


Fig. 7. *Atrichopogon fulviscutellaris*. a, wing, male; b, maxillary palpus, male; c, hypopygium, male; d, flagellar segments 8-12 of antenna, male; e, wing, female; f, flagellar segments 6-10 of antenna, female; g, spermatheca.

2 dark sharply pointed teeth. Aedeagus broad, round on caudal margin, with middle caudal lobe slightly produced, basal arch large and about 1/2 total length (16: 30).

Female: Body length about 2.68 mm. Wing about 2.02 mm by 0.68 mm. General coloration and structure as in male with usual sexual differences. Head with mouthparts yellowish pale brown; clypeus with 9 setae. Maxillary palpus with 5 segments in proportion of 15: 18: 29: 13: 13. Antenna (fig. 7f) with short basal flagellar segments short-oval, being slightly longer than wide; AR about 1.86; distal 8 segments in proportion of 17: 17.5: 20: 57: 51.5: 54: 52: 64. Thorax with scutellum yellowish brown, scutum with 6 bristles on either fovea and 4 or 5 bristles on anterior 1/2 of dorsal midline. Hind TR about 2.64, RL 189: 203: 123.5: 42: 28.5: 20.5: 26 in fore, 237.5: 236: 132: 46: 30: 22: 21.5 in middle and 264: 266: 153: 58: 38.5: 24: 25.5: in hind leg.

Wing (fig. 7e) with macrotrichia rather dense on apical 1/3 cell R_5 , on apical 1/2 cell M_1 and on apical 1/4 cell M_2 and few trichia on cell M_4 . Costa extending about basal 0.7 of wing length (117: 155), produced as long as r-m beyond tip of R_s and ending slightly before level of tip of M_2 , relative lengths of R, M and stem of fMCu about 49: 46: 61, R_s about 3.5 of R_1 (64: 18), second radial cell about 4.3 of first (51.5: 12), M not swollen at end, fM sessile, fMCu under first radial cell, M_{3+4} about twice Cu_1 (50: 25.5). Abdomen with tergum brown, other parts paler, cercus yellowish white, 1 spermatheca, (fig. 7g) oval (35 units by 23 units), brown and with slender chitinized part of duct.

DISTRIBUTION: New Guinea.

Holotype, ♂ (BISHOP 2858), Karap, 1550 m, upper Jimmi Valley, Sepik drainage, NE New Guinea, 20 July 1955, Gressitt. Allotype, ♀, same data as holotype.

This is very similar to the preceding new species, having only the following distinct differences: only 4 strong bristles of scutellum, instead of 6 in the allied species, sternite

9 less setigerous and styles of male hypopygium not flattened but sharply pointed. Malayan *A. nigripes* Macfie and Javanese *A. diluta* Johannsen may be another allied species. However, the Malayan allied species is obviously different in possession of petiolate fM of wings (both sexes) and highly specific male hypopygium and the Javanese species is also distinctly different in the following points: scutellum far paler than scutum, hind TR larger, being about 2.64, style of male hypopygium with three apical teeth, penultimate segment of female antenna rather shorter, being 44:64 to last segment and Rs not long, ending distinctly before tip of M_{3+4} in male and slightly beyond in female.

10. *Atrichopogon sessilis* Kieffer, 1917, Mus. Nat. Hung., Ann. 15: 183.

DISTRIBUTION: New Guinea.

11. *Atrichopogon pallidipedis* Tokunaga, n. sp. Fig. 8.

Medium sized yellow and brown species; paratergites and pleuron of thorax pale brown, scutellum and sternum yellow, postscutellum brown, scutum pale brown, but middle part between foveae yellow; legs mainly yellow or yellowish white, but knee-parts of all legs broadly pale brownish and distal 2 tarsal segments pale brown. Scutellum with 4 strong bristles; male leg with hind TR about 2.54. Wing of male without macrotrichia, vein M somewhat swollen at end and fM sessile. Sternite 9 of male with several setae on middle part of caudal margin, besides strong bristles arranged in a transverse line; styles rather slender and with 2 sharp terminal teeth. Female unknown.

Male: Body about 2.07 mm long. Wing about 1.65 mm by 0.47 mm. Head pale brown, with eyes quite bare and broadly contiguous above, proboscis about 1/2 as long as height of head capsule; clypeus with 8 setae. Maxillary palpus slender, with sensory pore of segment 3 oval and 5 segments in proportion of 10:16:24:10.5:10 in length. Antenna with scape yellowish brown, segment 2 yellow on basal part and brown on apical part, other segments missing. Thorax with tergum yellow and brown, sternum yellow, pleuron pale brown. Scutum yellow on median part between foveae and rather pale brown on lateral sides (laterad of foveae); paratergites pale brown; postscutellum brown; scutellum yellow and with 4 strong bristles and several minute setae. Legs generally yellowish, coxae, trochanters and basal 1/2 femora yellowish white, apical 1/2 femora, basal 1/3 tibiae and 2 apical tarsal segments pale brown, apical 2/3 of tibiae and basal 3 tarsal segments yellow; RL about 154:164:111.3:35:26:19.8:20.5 in fore, 178:184.5:124.5:41:29.3:19:19 in middle and 202:196:137.5:54.3:35.5:20:?? in hind leg; hind TR about 2.54 (2.4-2.65).

Wing (fig. 8b) entirely pale brown, no macrotrichia; costa produced as long as r-m beyond end of Rs and extending about basal 0.7 of wing length (89:127), relative lengths of R, M and stem of fMCu about 41:41.3:55.8, M slightly thickened at end, Rs ending above tip of M_{3+4} and somewhat longer than $3 \times R_1$ (45:13.8), first radial cell about 3.5 as long as first (34.5:10), fM sessile, fMCu under septum between radial cells, inner angle about 45 degrees, M_{3+4} slightly longer than twice Cu_1 (36.3:16) and slightly arcuate, Cu_1 straight and obliquely meeting anal margin. Halter with stem slightly brownish and knob white. Abdomen brown, but hypopygium (fig. 8a) yellowish pale brown; sternite 9 transverse, with several setae arranged along caudal margin before basal arch of aedeagus, besides longer bristles arranged in transverse line at middle part, caudal membrane quite bare; tergite 9 round on caudal margin. Coxite rather short (33:18), not distinctly

tapered or arcuate; styles slender, slightly arcuate, tapered and ending in 2 apical black teeth. Aedeagus broad, with caudal lobe flattened at tip and not beyond caudal margin of tergite, basal arch very large, semicircular and larger than 1/2 total length.

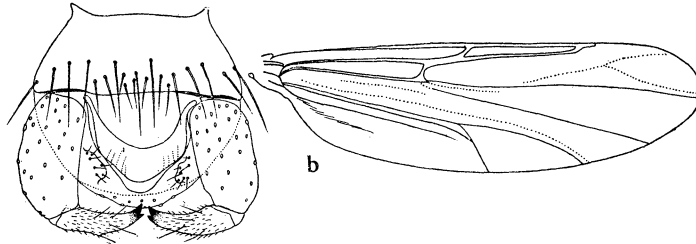


Fig. 8. *Atrichopogon pallidipedis*, male. a, hypopygium; b, wing.

DISTRIBUTION: New Guinea.

Holotype, ♂ (BISHOP 2859), Hollandia, Neth. New Guinea, 27 July 1955, Gressitt.

This is very closely allied to *A. bifasciatus* Kieffer, with only the following three distinct differences: wing vein M is thickened at the apical end, fM is sessile and the legs are not entirely yellow, but pale brownish on knee-parts and on distal 2 tarsal segments.

12. *Atrichopogon jacobsoni* de Meijere.

For synonymy see Tokunaga and Murachi, 1959, *Ins. Micronesia* (Bishop Mus.) 12 (3): 120

DISTRIBUTION: Malaya, Assam, Tahiti, Java, New Guinea, New Britain, Marquesas, Philippines, Samoa, Fiji, and Micronesia.

NE NEW GUINEA: Lae, ♂, 25 July 1955, Gressitt. NEW BRITAIN: Baining Mts, Gazelle Pen., St. Paul's, 8 ♂, 2 ♀, 9 Sept. 1955, Gressitt.

Relating to this species, the specific characters, literature and synonymy have been given by Tokunaga and Murachi (1959). New Guinea *A. immaculatus* Kieffer is a synonym of this species.

13. *Atrichopogon vestitipennis* Kieffer, 1917, *Mus. Nat. Hung.*, Ann. 15:183.—Macfie, 1931, *Ann. Trop. Med. Paras.* 25: 200-201; 1932, *ibid.* 26: 31-32.

DISTRIBUTION: New Guinea and New Zealand.

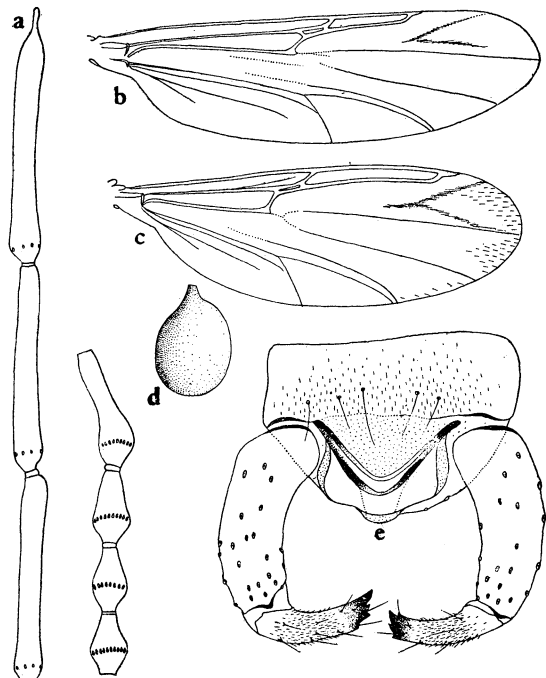


Fig. 9. *Atrichopogon vittatus*. a, distal 7 flagellar antennal segments, male; b, wing, male; c, wing, female; d, spermatheca; e, hypopygium, male.

14. *Atrichopogon biroi* Kieffer, 1917, Mus. Nat. Hung., Ann. 15: 182.

DISTRIBUTION: New Guinea.

15. *Atrichopogon vittatus* Tokunaga, n. sp. Fig. 9.

Medium-sized yellow species with very distinct brown scutal vittae. Antennal segment 11 of male much longer than preceding, but only somewhat longer than 1/2 following one; female AR about 1.82. Scutum with 3 brown vittae on yellow ground color; scutellum with 3 or 4 strong bristles on middle part besides 2 lateral ones. Legs mainly yellow, hind TR about 2.11-2.12. Wing of male without macrotrichia, that of female with macrotrichia only on extreme distal margins of cell R_5 , M_1 and M_2 , in both sexes fM with short petiole, fMCu with inner angle about 45 degrees, Cu_1 obliquely extending to anal margin and M without distal swelling. Styles of male hypopygium not distinctly tapered and with 3 or 4 apical teeth, coxite slender and arcuate, sternite 9 very weakly setigerous; 1 spermatheca, dark brown and with hyaline punctures before neck part.

Male: Body about 2.46 mm long. Wing about 1.73 mm by 0.53 mm. Head almost entirely brown, with eyes bare and widely contiguous above, proboscis slightly longer than 1/3 height of head capsule; clypeus with 8 setae. Maxillary palpus brown, rather stout, with segment 3 thickened apically and sensory pore before apex, 5 segments in proportion of 10:13.5:19:10.5:13.5. Antenna (fig. 9a) entirely brown, segment 11 with neck part much longer than basal node, about $1.6\times$ as long as preceding one and about 0.54 as long as following segment; combined lengths of segments 2 to 10, 11 to 14, 2 to 11 and 12 to 14 about 192:177 and 225:177 in proportion; relative lengths of distal 8 segments about 19:18:18:20:32:59:49:67. Thorax mainly yellow on dorsum, entirely yellowish pale brown on pleuron and sternum, paratergites brown, scutum with 3 brown vittae, median one ending at anterior margin of caudoscuteal area and 2 lateral ones arising at middle and reaching caudal margin of scutum, scutellum with 6 strong, black bristles and several small accessory setae, postscutellum yellowish brown. Legs mainly yellow, bases of all tibiae, and of hind tibia and last segments of all tarsi brown; hind TR about 2.12; RL about 201:183:81:31:28:21:24.5 in fore, 253:201:98:41:31:23:24 in middle and 255:222:127:60:39:25:24 in hind leg.

Wing (fig. 9b) with membrane very pale brown, veins more brownish, no macrotrichia. Costa slightly produced beyond end of R_s , shorter than r-m, extending about basal 0.7 of wing length and ending at level of end of M_{3+4} ; relative lengths of R, M and stem of fMCu about 56:52.5:58.5, R_s about $3.4\times$ as long as R_1 (37:11), second radial cell about $4\times$ as long as first (30:7), M entirely slender, fM petiolate, but stem and base of M_2 subatrophied, fMCu under base of first radial cell, inner angle about 45 degrees, Cu_1 obliquely meeting anal margin and about 0.4 as long as M_{3+4} (18.5:44.5). Halter with stem pale yellow and knob white. Abdomen brown, including hypopygium (fig. 9e). Sternite 9 with only 5 setae on middle part along caudal margin, without caudal incision and caudal membrane before aedeagus quite bare; tergite 9 semicircular. Coxite slender, very slightly tapered, arcuate, about $2.5\times$ as long as basal width (52:21) and extending far beyond caudal margin of tergite: style of almost uniform width, arcuate, somewhat longer than 1/2 coxite (30:52), ending in 3 or 4 dark teeth. Aedeagus broad, with basal arch subtriangular and about 1/2 total length (17:32), caudal median lobe extending slightly beyond ventral round swelling and reaching caudal margin of tergite.

Female: Body about 2.59 mm long. Wing about 20.7 mm by 0.69 mm. General coloration and structure very similar to male with usual sexual differences. Head with 12 setae on clypeus. Maxillary palpus with sensory pore round and situated just before tip of segment 3, 5 segments in proportion of 11.5: 17: 20: 10: 12. Antenna with scape yellowish brown, following 5 segments yellowish pale brown on basal 1/2 and brown on apical 1/2, remaining segments entirely brown, basal short flagellar segments elongate oval or subfusiform, slightly longer than twice width (16.5–18.5: 8); AR about 1.82; relative lengths of distal 8 segments about 16.5: 17.5: 18.5: 57: 54.5: 52: 50: 56. Thorax as in male, but scutellum with 3 median black bristles besides 2 lateral ones and with about 10 small accessory setae. Legs with RL about 224: 210: 80: 35.5: 29: 17.5: 26 in fore, 267: 229: 96: 40.5: 30: 21: 31 in middle and 288: 266: 131: 63: 40: 26: 34 in hind leg; hind TR about 2.11.

Wing (fig. 9c) pale brown, with macrotrichia on apical marginal areas of cells R_5 and M_1 and very few along apical margin of cell M_2 . Costal projection beyond end of R_s shorter than r-m, costa ending slightly before end of M_2 and extending to about basal 0.77 of wing length (122.5: 159), lengths of R, M and stem of fMCu about 54: 40.5: 57 in proportion, R_s about 4.5× as long as R_1 (65: 15), second radial cell about 4.8× as long as first, (52.5: 11), fM petiolate, but stem shorter than r-m, fMCu under middle of first radial cell, inner angle about 45 degrees, Cu_1 almost straight and obliquely meeting anal margin, M_{3+4} very slightly arcuate and somewhat longer than twice Cu_1 (50: 22). Abdomen rather pale brown, with sternites of segments 2 to 5 subdivided into paired hemisternites. One spermatheca (fig. 9d) oval, brown, with short neck part, many hyaline punctures before neck part and about 30 units by 21 units.

DISTRIBUTION: New Guinea.

Holotype, ♂ (BISHOP 2860), Karap 1550 m, upper Jimmi Valley, Sepik drainage, NE New Guinea, 20 July 1955, Gressitt. Allotype, ♀, same data as holotype.

This insect somewhat resembles New Guinea *A. bifasciatus* Kieffer, but in that species the scutum is provided with only two widely separated dark lateral vittae and devoid of median ones, notably differing from the present species. Another related species may be *A. nigripes* Macfie, in which the female is provided with dark brown bands at the sides of the scutum and in front of the scutellum, but without median anterior vitta, thus differing from the present species. It is notable that the two sexes of *A. nigripes* are different in the adornment of the scutum and may belong to different species.

16. *Atrichopogon bifasciatus* Kieffer, 1917, Mus. Nat Hung., Ann. 15: 181. Fig 10.

Medium-sized yellow and brown species; thorax mainly yellow, but scutum generally brown and with median part between 2 foveae yellow; legs entirely yellow. Female AR about 2.66; basal short flagellar segments almost spherical. Scutellum with 6 strong bristles; female TR about 2.61. Female wing with macrotrichia widely spread on apical 1/2 and on cell M_4 and anal cell; fMCu with inner angle larger than 90 degrees and Cu_1 strongly sinuous and meeting anal margin with right angle. Spermatheca single and oval.

Female: Body length about 2.35 (2.2–2.51) mm. Wing about 1.65 (1.59–1.75) mm by 0.64 (0.61–0.67) mm. Head yellowish brown or brown, with mouthparts yellow or very pale brownish yellow, eyes quite bare and broadly contiguous above, proboscis 1/2 or 1/3 length of head capsule; clypeus with 8 setae. Maxillary palpus (fig. 10a) slender, normal, with sensory pore of segment 3 rather large, oval and found just beyond middle; 5 seg-

ments in proportion of 11.8:17:27.8:15.3:15.3. Antenna (fig. 10b) with scape yellow, other segments brown, short basal flagellar segments subspherical, being as wide as long; AR about 2.66 (2.58-2.76). Thorax mainly yellow, but scutum brown on both sides laterad of

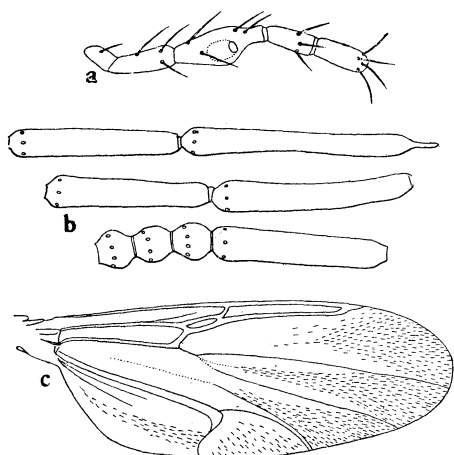


Fig. 10. *Atrichopogon bifasciatus*, female. a, maxillary palpus; b, distal 8 flagellar antennal segments; c, wing.

foveae. Scutellum with 6 strong bristles and about 10 (9-13) small setae. Legs entirely yellow; hind TR about 2.61 (2.53-2.72); RL about 173.7:179.7:110.7:37:28.3:20.8:22 in fore, 201.7:222.3:134.7:46:33:?:? in middle and 221.3:212:140.7:54:33.5:22:21.5 in hind leg.

Wing (fig. 10c) broad, pale brown, with rather dense macrotrichia widely spread on apical 1/2 wing and on middle part of anal cell along anal margin; costal projection beyond end of Rs shorter than r-m, ending distinctly before end of M₂ and extending about to basal 0.74 of wing length (91.7:127), proportional lengths of R, M and stem of fMCu about 39.2:37:56.7, Rs about 3.4 of R₁ (47.8:14.2), second radial cell also about 3.4× as long as first, M entirely slender, fM with petiole shorter than r-m, fMCu under

septum between radial cells, inner angle somewhat larger than right angle, M₃₊₄ strongly arcuate and somewhat shorter than twice Cu₁ (28.2:14.8), Cu₁ strongly undulate and meeting anal margin with right angle. Halter white or pale yellow. Abdomen almost entirely pale brown or pale brownish yellow; 1 spermatheca, brown, oval (0.7 + 31.3 units by 22.3 units), with punctures before very short neck part.

Male (after Kieffer): Antennal segment 11 rather short, being only twice as long as broad, 12 is 3× as long as 11 and subequal to ultimate, and 13 slightly shorter than ultimate and wing with macrotrichia only on apical part.

DISTRIBUTION: New Guinea.

NETH. NEW GUINEA: Hollandia, 100 m, 3 ♀, 23 Aug. 1955, Gressitt.

17. *Atrichopogon quateriharpagonum* Tokunaga, n. sp. Fig. 11.

Rather small yellow and dark brown species; scutum yellow, scutellum, postscutellum and paratergites fuscus yellow, pleuron with dark clouds on yellow ground color; legs mainly dark, but knee-parts, apices of tibiae and all tarsi yellow; wings broadly fuscus on middle parts; antennae with basal 9 segments yellow and apical 5 pale brown. Female AR about 1.75; eyes finely pubescent; scutellum with 4 strong bristles and few small setae; hind TR of female about 2.77; female wing with first radial cell slit-like, costa ending before tip of M₃₊₄; abdomen of female with many spine-like structures on ventral side of caudal part and pair of large spoon-like lobes; 1 spermatheca, oval and with many punctures before neck part. Male Unknown.

Female: Body length about 1.46 mm. Wing about 1.29 mm by 0.55 mm. Head entirely rather pale brown, with eyes entirely finely pubescent and contiguous above, proboscis

somewhat shorter than 1/2 height of head capsule; clypeus with about 10 setae. Maxillary palpus (fig. 11d) stout, segment 3 with round sensory pore just beyond middle, 5 segments in proportion of 11:12:11:9:11. Antenna (fig. 11a) with last 5 segments pale brown, other segments yellow; short basal flagellar segments round; AR about 1.75; relative lengths of apical 8 segments about 9.5:9:9.5:24:25:28:27:39. Thorax mainly yellow; scutum with small ill-defined fuscus clouds at shoulder, lateral parts just behind scutal suture and on posterior ends of foveae; paratergites and scutellum fuscus yellow; post-scutellum fuscus but with yellow median spot; sternum yellow, pleuron with dark spots and membranes yellow; scutellum with 4 equally strong bristles and 4 small setae along caudal margin. Legs with coxae, trochanters, femora and tibiae mainly dark, but knee-parts and apical 1/4 tibiae yellow, tarsal segments entirely yellow. Hind TR about 2.77; RL about 107:105:58:18:15:13.5:16 in fore, 124:126:59:18:16:14:19 in middle and 144:122:65:23.5:18:14.5:19 in hind leg.

Wing (fig. 11b) broadly faintly fuscus at middle, with veins dark, without macrotrichia; costa not produced distinctly beyond tip of Rs, ending distinctly before level of tip of M_{3+4} and extending about basal 0.55 of wing length (54:99), proportional lengths of R, M and stem of fMCu about 24:20:35, veins forming radial cells strong, Rs slightly shorter than $3 \times R_1$ (34:13), second radial cell about $2.5 \times$ as long as slit-like first radial cell (8:20), fM with petiole as long as r-m, fMCu under first radial cell, M_{3+4} somewhat longer than twice Cu_1 (34:16). Halter white. Abdomen dark, but last 2 segments, including cercus, yellow. Ventral abdominal processes well developed on sternites 8 and 9 (fig. 11e). Sternite 7 with median small caudal process bearing finely pectinate or serrulate margin and strong chitinized process just before genital opening, being 3 branched: middle branch bifid at extreme end, each lateral branch subdivided into 4 to 6 spines; sternite 9 with pair of simple or bifid and curved strong spines on sides of genital opening and pair of groups of 17-18 simple spines behind genital opening; pair of large spoon-like lobes on side of segment 9 each bearing 3 setae and finely pubescent. Spermatheca (fig. 11e) single, oval (2+28 units by 18 units), brown, with short chitinized neck part and many punctures before neck part.

DISTRIBUTION: New Guinea.

Holotype, ♀ (BISHOP 2861), Okaitadi, 1800 m, Paniai Lake, Wisselmeren, Neth. New Guinea, 16 Aug. 1955, Gressitt.

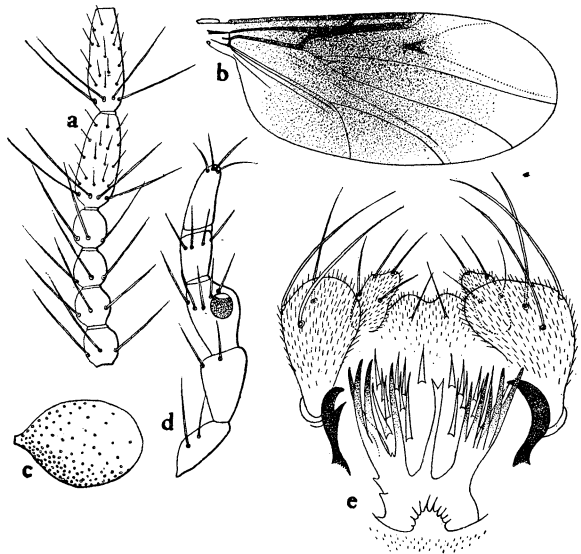


Fig. 11. *Atrichopogon quateriharpagonum*, female. a, flagellar segments 6-11 of antenna; b, wing; c, spermatheca; d, maxillary palpus; e, sternal aspect of abdominal apex.

The chitinized process of the seventh abdominal sternite somewhat resembles that of Brazilian *A. insigniventris* Macfie, but the coloration of various parts of body is quite different in the two. The smoky wings of *quateriharpagonum* are closely similar to that of Sumatran unnamed *A. sp. B* Macfie (female unknown), but that is an almost black species with uniformly yellowish brown legs differing obviously from the present species.

18. *Atrichopogon tenuiatus* Tokunaga, n. sp. Fig. 12.

Rather small black and yellow species; antenna mainly brown or dark brown, but scape with venter yellow; thorax dark brown, scutum with black dots at bases of setae; legs mainly dark brown, but apex of fore tibia and all tarsal segments yellow; knob of halter white; wing uniformly very pale brown; abdomen black, but ultimate 2 segments and male hypopygium yellow. Eyes entirely pubescent. Segment 11 of male antenna very long and as long as ultimate. Scutellum with 2 strong median and 4 somewhat shorter lateral bristles. Male hind TR about 2.86. Wing of male with Rs rather short, being only twice R_1 . Male hypopygium with sternite 9 with small median caudal incision and setigerous only on middle part of caudal margin, coxite and style slender, aedeagus longer than wide and somewhat shield-like. Female unknown.

Male: Body length about 2.08 mm. Wing about 1.63 mm by 0.52 mm. Head mainly brown, with eyes finely pubescent on entire surface and broadly contiguous above, proboscis slightly longer than $1/2$ height of head capsule. Maxillary palpus (fig. 12c) slender, with sensory pore of segment 3 small, last segment longer than preceding one and 5 segments in proportion of 14: 12: 20: 12: 14.5. Antenna (fig. 12a) with scape brown dorsally and yellow ventrally, short basal flagellar segments and plumose hairs brown, last 4 segments dark brown; segment 11 very long, much longer than following and as long as ultimate; combined lengths of segments 2 to 10 and 11 to 14 about 110: 216 in proportion and distal 8 segments in proportion of 15.3: 15: 15.5: 16: 45.5: 33.5: 28.5: 44: 8. Thorax entirely dark brown; scutum without special strong bristles, but with many black dots at bases of setae; scutellum with 6 strong bristles, median 2 much stronger than others, and about 13 minute setae. Legs mainly dark brown, but all tarsi yellow, end of middle tibia paler and distal part of fore tibia yellow; hind TR about 2.86; RL about 144: 138: 81: 23: 18.5: 15: 23 in fore, 178: 168: 81.5: 24: 21: 15: 24 in middle and 193: 163: 91.5: 32: 28: 18: 20 in hind leg.

Wing (fig. 12b) with membrane very pale, veins fuscus; costa ending far before level of end of M_{3+4} , not distinctly produced beyond end of Rs and extending about basal 0.54 of wing length (68: 125.5), proportional lengths of R, M and stem of fMCu about 37: 32: 52.5, M entirely slender, Rs twice as long as R_1 (31: 15.5), first radial cell slit-like, second radial cell about $1.4\times$ as long as first (17: 12), fM subatrophied and petiole probably absent, fMCu under end of first radial cell, M_{3+4} slightly longer than twice Cu_1 (32: 15). Halter with stem brown and knob white.

Abdomen mainly black, but caudal 2 segments and hypopygium (fig. 12d) yellow. Tergite 9 long, tapered, with two semicircular and membranous caudal lobes and cercus well developed; sternite 9 very short, transverse, band-like, with about 11 setae on middle part of caudal margin and caudal incision small. Coxite very slender, about $3\times$ as long as basal width (71: 23) almost cylindrical and straight; styles also slender, somewhat shorter than $2/3$ coxites (45: 71), claw-like, sharply pointed and arcuate on apical $1/3$. Aedeagus rather long, shield-like, with basal arch about $1/3$ total length and caudal median

lobe small.

DISTRIBUTION: New Guinea.

Holotype, ♂ (BISHOP 2862), Karap, 1550 m, upper Jimmi Valley, Sepik drainage, NE New Guinea, 20 July 1955, Gressitt.

This species is somewhat related to the Samoan *A. abrasus* Edwards in wing venation and yellow abdominal tip, but in the related species distal four antennal segments are subequal in length to each other, the scutum is adorned with three sub-confluent brown vittae, scutellum bears four strong bristles and legs are uniformly light brown, differing from this New Guinea species.

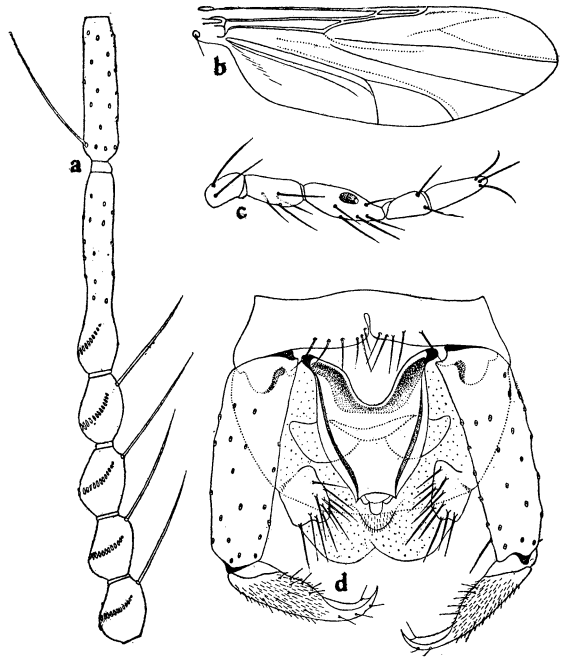


Fig. 12. *Atrichopogon tenuiatus*, male. a, flagellar segments 7-12 of antenna; b, wing; c, maxillary palpus; d, hypopygium.

19. *Atrichopogon simplicifurcatus* Tokunaga, n. sp. Fig. 13.

Small dark brown and yellow species; antenna of female with basal short flagellar segments yellow and apical 5 long segments brown; thorax mainly dark brown, but scutum with shoulder parts and caudoscuteal area paler; legs mainly dark, but knee-parts, distal parts of tibiae and entire tarsal segments yellow; wing with veins mainly dark; halter white; abdomen black, but with 3 posterior segments yellow. Eyes hairy. Female antenna with basal short flagellar segments round and AR about 1.43. Scutellum with only 2 strong median bristles and 2 minute setae. Legs of female with hind TR about 2.96. Wing without macrotrichia and with radial branches and costa strong. Abdomen of female with ventral spine-like processes. Male unknown.

Female: Body about 1.59 mm. Wing about 1.29 mm by 0.56 mm. Head brown, with eyes entirely pubescent and contiguous above, proboscis about 1/3 head capsule; clypeus probably with 6 to 8 setae. Maxillary palpus small, stout and 5 segments in proportion of 10.5: 11: 13.5: 9: 10. Antenna (fig. 13a) with scape yellowish brown, short basal flagellar segments mainly yellow, but apical margins brownish, and as long as wide, 5 apical segments brown and as long as or somewhat longer than twice 9; AR about 1.43; distal 8 segments in proportion of 10: 11: 11: 22: 24: 25: 26: 37. Thorax mainly dark brown, sternum brown, scutum with 3 broad dark brown vittae and paler foveae, shoulder parts and caudoscuteal area pale; scutellum with only 2 strong median bristles and 2 minute setae. Legs mainly dark, but knee-parts, apical 1/4 of tibiae and entire tarsal segments yellow; hind

TR about 2.96; RL about 114: 111: 65: 18: 15.5: 11: 22 in fore, 128: 130: 63: 18: 15: 11.5: ? in middle and 148: 126: 74: 25: 19.5: 14.5: 20 in hind leg.

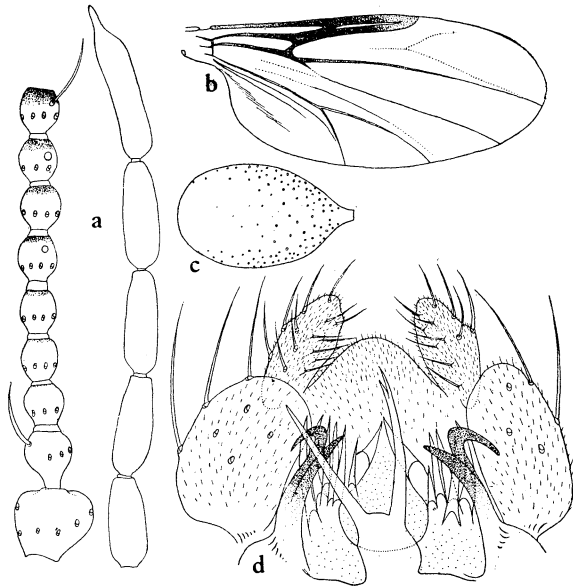


Fig. 13. *Atrichopogon simplicifurcatus*, female. *a*, antenna; *b*, wing; *c*, spermatheca; *d*, sternal aspect of abdominal apex.

Wing (fig. 13b) with veins fuscus, forming 2 radial cells conspicuously dark, no macrotrichia. Costa ending far before end of M_{3+4} , not produced beyond tip of Rs and extending to about basal 0.56 of wing length (56:99), R, M and stem of fMCu about 22: 19: 32, 2 radial cells very narrow, second about $3\times$ as long as first (23: 7), Rs about $3\times R_1$ (33: 11), fM with petiole as long as r-m, fMCu under septum between radial cells, M_{3+4} about twice Cu_1 (33: 17). Halter with knob white. Abdomen dark, but apical segments yellow. Venter of abdominal end (fig. 13d) with various processes: sternite 7 with large simple bifid process bearing short but broad base, pair of bifid lateral processes each

branching into slightly curved and longer recurved spine-like branch, pair of group of 5 or 6 simple spines and pair of stouter single spines, and segment 8 with very large setigerous lobe arising from each lateral side. Spermatheca (fig. 13c) single, brown, oval (2+27 units by 15 units), with minute hyaline dots and short neck part.

DISTRIBUTION: New Guinea.

Holotype, ♀ (BISHOP 2863), Okaitadi, 1800 m, Paniai Lake, Wisselmeren, Neth. New Guinea, 6 Aug. 1955, Gressitt.

This female is provided with a distinctly specific chitinized process of abdominal sternite 7. This sternal process is similar to that of Brazilian *A. insigniventris* Macfie, but more reduced and forked into 2 or 3 branches. *A. harpagonum* Macfie of Sumatra may be another allied species, but its ventral process of sternite 7 is comb-like and paired lateral processes are exceedingly strong, obviously differing from the New Guinea new species.

20. *Atrichopogon novaguinensis* Tokunaga, n. sp.

Fig. 14.

Rather small dark brown species; legs mainly brown, trochanters and basal 3 tarsal segments yellow or yellowish and both end-parts of tibiae more or less yellow. Eyes pubescent; male antenna with segment 11 much longer than preceding, but much shorter than following. Scutellum with only 2 strong median bristles. Male hind TR about 2.89. Wing of male without macrotrichia and with petiole of fM shorter than r-m. Male hypopygium

with style large and almost as long as coxite; sternite 9 with V-shaped caudal incision and only 4 small setae on caudal margin; aedeagus very broad, with ventral lobe subdivided and basal arch subtriangular. Female unknown.

Male: Body length about 1.61 mm. Wing about 1.28 mm by 0.4 mm. Head entirely brown, with eyes finely pubescent on dorsal 1/2 and broadly contiguous above, proboscis about 1/2 height of head capsule: clypeus with 8 setae. Maxillary palpus (fig. 14b) with 5 segments in proportion of 9:14:16:9.5:10 and sensory pore round. Antenna (fig. 14a) with scape dark brown, segment 2 yellow on basal 1/2 and dark brown on apical 1/2, segments 3 to 10 entirely pale brown, apical 4 segments dark brown; combined proportional lengths of segments 2 to 10, 11 to 14, 2 to 11 and 12 to 14 about 134:137 and 154:116; distal 8 segments about 13:12:14:12:21:35:33:44.5 in proportion.

Thorax almost entirely dark brown, but scutum with trace of paler foveae, humeral and caudoscuteal area paler, and entirely covered with dense pubescence and scattered minute setae. Legs mainly dark brown or brown, trochanters, basal 3 tarsal segments yellow or yellowish pale brown, apical 2 tarsal segments pale brown, in fore leg apex of femur yellow, in middle basal 1/3 and apical end of femur and apical 1/4 tibia yellow or yellowish pale brown, in hind leg femur as in middle and tibia with both ends pale brown; hind TR about 2.89; RL about 119.5:119:64:21:17:14.5:17 in fore, 143:135:64:21:17:14: ? in middle and 144:134:71:24.5:20:16:18 in hind leg.

Wing (fig. 14c) fuscus, but very pale, no macrotrichia; costa not produced apically, extending basal 0.63 of wing length (62.5:98) and ending at level of end of M_{3+4} , relative lengths of R, M and stem of fMCu 34:31:41, Rs about $3 \times R_1$ (28:9), second radial cell about $3 \times$ first (20:7), fM with petiole shorter than r-m, fMCu under first radial cell, M_{3+4} about twice Cu_1 (26:12). Halter with stem brown and knob white.

Abdomen entirely dark brown; hypopygium (fig. 14d) with tergite 9 semicircular; sternite with V-shaped caudal incision and only 4 small setae on lateral margin of incision. Coxite tapered, almost straight and about $1.2 \times$ as long as basal width (32:27); styles rather large, almost as long as coxites (30:32), claw-like, pointed and with 1 or 2 minute pre-apical teeth. Aedeagus broad, with ventral lobe subdivided into paired parts and dorsal lobe subtriangular but not pointed, basal arch thickened and subtriangular.

DISTRIBUTION: New Guinea.

Holotype, ♂ (BISHOP 2834), Wagete, 1750 m, Tigi Lake, Wisselmeren, Neth. New

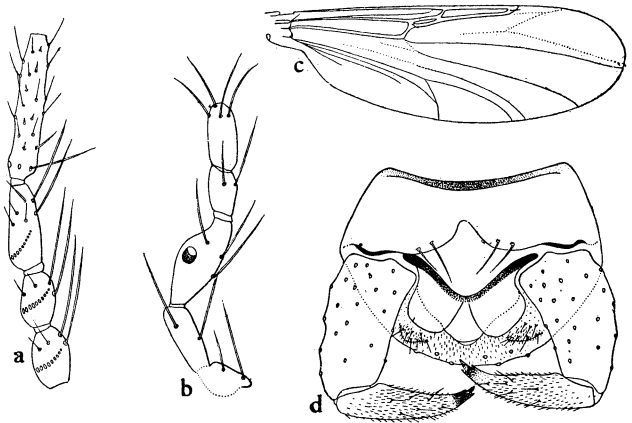


Fig. 14. *Atrichopogon novaguinensis*, male, a, flagellar segments 9-12 of antenna; b, maxillary palpus; c, wing; d, hypopygium.

Guinea, 16 Aug. 1955, Gressitt.

This is closely allied to the preceding species in general coloration, but the legs are notably different in adornment. Another allied species may be *A. rubidus* Macfie of Marquesas Is. in general coloration and structure of the wings, but it is quite different in the following points: plumose hairs of antennae rather poorly developed, scutellum with 4 strong bristles instead of 2, legs almost uniformly mahogany brown, being devoid of paler or yellowish adornment, hind TR about 2.5-2.6, being smaller than 2.89, sternite 9 of male hypopygium bearing about 18 setae, more than 4, and aedeagus with basal arch much shallower than the present new species.

21. *Atrichopogon armaticaudalis* Tokunaga and Murachi, 1959, Ins. Micronesia (Bishop Mus.) 12 (3): 131.

DISTRIBUTION: Micronesia and New Guinea.

NE NEW GUINEA: Lae, ♀, ♂ 25 Aug. 1955, Gressitt. Wum, Jimmi Valley, 17 ♀, 16 July 1955, Gressitt.

Genus *Culicoides* Latreille

KEY TO NEW GUINEA SPECIES OF CULICOIDES

1. Wing without dark or other color marking..... 22. *immaculatus*
Wing with dark and pale marking (sometimes faint and ill-defined) 2
- 2 (1). Wing with only 1 dark costal spot covering 2 radial cells (costal dark spot 2)
..... 23. *lineatus*
Wing with more costal dark spots (usually 3 or 4)..... 3
- 3 (2). Wing with costal dark spot 2 completely enveloping whole second radial cell
and its marginal veins 4
Wing with costal dark spot 2 not enveloping whole second radial cell and its
marginal veins (at least apical extreme of second radial cell or apical ends
of its peripheral veins covered in costal pale spot 2) 11
- 4 (3). Wing without costal pale spot 3 and pale spots of cells M_1 , M_2 and M_4
..... 24. *melanesiae*
Wing with costal pale spot 3 and pale spots of cells M_1 , M_2 and M_4 5
- 5 (4). Wing with costal pale spot 3 semicircular, being lunulate..... 25. *semicircum*
Wing with costal pale spot 3 not as above, but round, oval, subsquare, gourd-
shaped or diffusely paler in various size..... 6
- 6 (5). Wing with costal pale spots 2 and 3 obliquely transverse and convergent be-
neath before vein M_1 forming a V shape 26. *sultzei*
Wing with costal pale spots 2 and 3 not arranged in a V-shape (sometimes
one of them obliquely transverse but not convergent below)..... 7
- 7 (6). Wing with costal pale spot 3 distinctly separated from apical margin or corner
of cell R_5 8
Wing with costal pale spot 3 located at apical corner of cell R_5 and contiguous
to apical margin of that cell 10
- 8 (7). Wing with pale spots very small, costal pale spot 1 distinctly separated from

- costal margin **27. parviscriptus**
 Wing with pale spots normal in size, costal pale spot 1 not separated from costal margin 9
- 9 (8). Wing cell M_4 with pale spot very large, somewhat reniform and strongly curved **28. rabauli**
 Wing cell M_4 with pale spot normal..... **29. xanthoceras**
- 10 (7). Wing with costal pale spot 3 small, additional pale spot in basal area of cell R_5 beneath dark second radial cell **30. guttifer**
 Wing with costal pale spot 3 large, no additional pale spot in basal area of cell R_5 beneath second radial cell **31. pallidimaculosus**
- 11 (3). Wing without peripheral pale spots of cells R_5 , M_1 , M_2 and M_4 **32. tripallidus**
 Wing with peripheral pale spots all distinct 12
- 12(11). Wing with first and second radial cells quite confluent forming a large common radial cell (septum between 2 radial cells completely atrophied).....
 **33. gentilis**
 Wing with first and second radial cell not confluent (usually septum between 2 cells present, rarely first cell absent forming 1 stem vein of second radial cell and very rarely distal section of R_1 absent) 13
- 13(12). Wing cell M_4 with an additional pale spot at its basal angle 14
 Wing cell M_4 without an additional pale spot at its basal angle 15
- 14(13). Wing base extensively pale, not containing dark spot or cloud; costal pale spot 2 enveloping at least 2/3 of second radial cell..... **34. novaguineanus**
 Wing base with dark clouds; costal pale spot 2 enveloping only extreme apical ends of peripheral veins of second radial cell **35. hollandiensis**
- 15(13). Wing with costal pale spot 3 located distinctly far before apical corner of cell R_5 16
 Wing with costal pale spot 3 located at apical corner of cell R_5 21
- 16(15). Wing with an additional pale spot above fMCu small and distinct..... 17
 Wing without an additional pale spot above fMCu or with it very indistinct..... 18
- 17(16). Maxillary palpus without sensory pore, but with scattered sensillae on segment 3; wing with costal pale spot 3 as large as or larger than costal pale spot 2 and far larger than costal dark spot 3 **36. jimmiensis**
 Maxillary palpus with sensory pore, but without scattered sensillae on segment 3; wing with costal pale spot 3 smaller than costal pale spot 2 and as large as or smaller than costal dark spot 3 **37. amamiensis**
- 18(16). Wing with an independent additional round pale spot in costal dark spot 1 enveloping part of vein M..... **38. circumbasalis**
 Wing without independent additional pale spot in costal dark spot 1 enveloping part of vein M..... 19
- 19(18). Wing with dark marking faint, costal dark spot 1 smaller than costal pale spot 1, costal dark spot 2 forming a small but very distinct dark stigma-like costal spot..... **39. pseudostigmatus**
 Wing with dark marking normal, costal dark spot 1 larger than costal pale

- spot 1, costal dark spot 2 not forming a special stigma-like costal spot..... 20
- 20(19). Wing with costal pale spot 3 abutting upon anterior margin of cell R_5 ; scutellum with only 1 bristle..... 40. **unisetiferus**
 Wing with costal pale spot 3 separated from anterior margin of cell R_5 ; scutellum with 3 bristles..... 41. **buckleyi**
- 21(15). Wing with 3 costal dark spots very narrowly extending behind, forming 3 transverse bands quite separated from each other 22
 Wing with 3 costal dark spots not very narrow and not forming independent transverse bands 24
- 22(21). Wing with costal dark spot 1 forming a single transverse band 23
 Wing with costal dark spot 1 extending beneath forming 2 transverse bands ...
 42. **quaterifasciatus**
- 23(22). Wing with 3 transverse dark bands elongate and almost reaching anal margin
 43. **tritenuifasciatus**
 Wing with 3 transverse dark bands short and not extending far below beyond veins M and M_1 44. **australiensis**
- 24(21). Wing with second radial cell almost entirely and rarely at least apical 1/2 of the cell enveloped in costal pale spot 2..... 25
 Wing with second radial cell almost entirely enveloped in costal dark spot 2, but always its extreme apical end enveloped in costal pale spot 2..... 29
- 25(24). Thorax with caudal 1/2 of scutum extensively yellowish..... 26
 Thorax with scutum extensively brownish..... 28
- 26(25). Maxillary palpus with sensory pore, but without scattered sensillae on segment 3 45. **flavidorsalis**
 Maxillary palpus without sensory pore, but with scattered sensillae on segment 3 27
- 27(26). Maxillary palpus with segment 3 subequal in length to 2..... 46. **palpifer**
 Maxillary palpus with segment 3 far longer than 2..... 47. **flavescens**
- 28(25). Scutellum yellow and with a brown median spot; wing with second radial cell pointed apically, costal pale spot 2 extending behind and abutting upon vein M_1 48. **maculiscutellaris**
 Scutellum uniformly pale brownish yellow and without brownish marking; second radial cell round at tip, costal pale spot 2 ending beneath distinctly before an additional pale spot which covers sub-basal part of vein M_1
 49. **magnimaculatus**
- 29(24). Scutellum yellow; scutum extensively yellowish and with dark brown marking on anterior marginal area..... 50. **flaviscryptus**
 Scutellum and scutum almost uniformly brownish..... 51. **orientalis**

22. **Culicoides immaculatus** Lee and Reye, 1953, Linn. Soc. N. S. Wales, Proc. 77 (5-6): 375. Fig. 15.

Medium-sized, brown and yellowish species. Maxillary palpus rather slender; segment 3 with large but shallow sensory pore bearing very short sensillae. Antenna rather long, AR about 1.04. Scutellum with 3 large bristles. Wing without colored markings, with

many macrotrichia on membrane, but without trichia on basal radial cell. Legs with femora and tibiae mainly brown, but with knee-joints yellow; hind TR about 2.24. Male unknown.

Female: Body about 1.46 mm. Wing about 1.0 mm by 0.46 mm. Head largely brown including mouthparts, with proboscis about $\frac{3}{5}$ as long as head-capsule; eyes bare and narrowly separated above, as wide as or slightly less than a facet; clypeus with 3 pairs of setae on apical marginal parts. Maxillary palpus (fig. 15d) slender, with sensory pore large and bearing very short sensillae on its bottom; 5 segments in proportion about 7:17:20:10:9. Antenna (fig. 15a) with scape brown, following 6 basal segments yellowish pale brown, but apical margins brown, other apical segments brown; AR about 1.04; relative lengths of distal 8 segments about 11:11:11:16:15.5:18.5:19:25.5. Thorax brown and yellowish; scutum with obscure marking: lateral part (laterad of foveae) brown but somewhat yellowish on central area, caudoscuteal area pale yellow but slightly fuscus, middle part of cephalic margin with triangular brown cloud, middle part (between foveae) and shoulder parts continuously and uniformly pale yellow; scutellum and post-scutellum brown; pleuron extensively yellow on membrane, brown on sclerite; sternum pale brown; scutellum with 3 strong bristles and about 6 minute accessory setae. Leg with coxa and trochanter yellowish pale brown, but ventral side of trochanter brownish, femur mainly brown but yellow or pale brownish yellow on both end-parts, tibia yellowish on basal $\frac{1}{4}$ and brown on rest, tarsal segment 1 brownish on basal $\frac{1}{2}$ and yellowish on apical $\frac{1}{2}$, other distal segments all yellowish; middle tibia with distal end-part yellowish pale brown and hind tibia also slightly yellowish. Hind TR about 2.24. Leg segments, except for basal 2, in relative length of about 95:93.5:47:20.5:14 12:14 in fore, 121:112:62:22:16:12:14 in middle and 112:110:56:25:16.5:13.5: ? in hind leg.

Wing (fig. 15b) entirely slightly fuscus, but with veins distinctly fuscus, first radial cell and its marginal area more fuscus, but tip of Rs distinctly paler; macrotrichia almost all over surface, but basal radial cell bare

and bare areas along veins rather distinct. Costa extending slightly beyond basal $\frac{2}{3}$ of wing length (48:77), 2 radial cells subequal in length (11:10) second radial cell long and pointed apically, relative lengths of R_1 and R_s and R , M and stem of $fMCu$ about 13:21 and 26:22:32, base of M_2 atrophied, r_m as long as M_{1+2} , $fMCu$ slightly beyond base first of radial cell M_{3+4} about twice as long as Cu_1 and ending slightly beyond tip of costa. Halter yellow on base and brown on apical knob. Abdomen brown on dorsal side, pale brown on pleural membrane and far paler brown on ventral side; tergites with setae

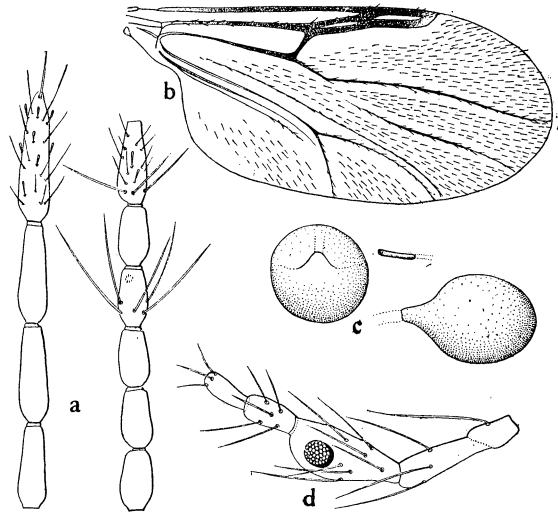


Fig. 15. *Culicoides immaculatus*, female. a, apical 10 antennal segments; b, wing; c, spermathecae; d, maxillary palpus.

arising from basal pale punctures; sternites subdivided into paired hemisternites; caudal tip and cercus yellowish. Spermathecae (fig. 15c) brown; 2 oval, subequal and each with short neck part (4+17 units by 15 units and 4+18 units by 15 units); 1 vestigial, tubular and almost straight (6 units by 1 unit).

DISTRIBUTION: Australia (Queensland) and New Guinea.

NETH. NEW GUINEA: Hollandia, ♀, 29 Aug. 1955, Gressitt.

This New Guinea specimen is slightly different from the description of the type specimen: in Australian specimens AR is 1.09 instead of 1.04, hind TR is 1.8 instead of 2.24 and femora and tibiae show no trace of pale bands. Other main specific characters of the present specimen quite coincide with the original description and figures and this specimen seems to represent a local variation.

23. *Culicoides lineatus* Kieffer, 1917, Mus. Nat. Hung., Ann. 15: 186.

According to Kieffer's description, specific characters are as follow: *Male*: Body about 1 mm long, mainly yellow and brown and wing with only 1 simple costal dark spot. Head with antenna mainly yellow including plumose hairs, but distal 5 segments dark brown, distal 4 segments elongate and cylindrical. Thorax with scutum mainly yellow, 3 scutal vittae, gray and subconfluent. Legs pale yellow, with dark knee-joints; femora and tibiae of fore and middle legs with median yellowish bands. Wing white, with R_1 and R_s united and dark, and only 1 costal dark spot covering confluent vein. Halter yellowish. Abdomen white or yellow, with tergites 3 to 7 narrow, dark and band-like. Female unknown.

DISTRIBUTION: New Britain.

This species is highly peculiar for *Culicoides*, the male antenna bears four elongate apical segments and the wing exhibits an united R_1 and R_s . The wing marking somewhat resembles that of *C. pseudostigmatus* n. sp., but the female of the present species is quite unknown.

24. *Culicoides melanesiae* Macfie, 1939, Linn. Soc. N. S. Wales, Proc. 64: 368.

Main specific characters reported by Macfie are as follow: *Female*: Dark brown, with wing about 1.2 mm by 0.5 mm, densely clothed with macrotrichia and adorned with only 2 distinct costal pale spots. Head with maxillary palpus without sensory pores on segment 3; antenna with AR about 1.0, basal short flagellar segments oval to fusiform. Thorax very dark brown; scutellum with 4 bristles and several small setae. Legs dark brown, with dark knee-joints, but hind tibia with distinct narrow bands at both base and apex; hind TR about 2.2. Wing densely clothed with macrotrichia almost all over surface, with only 2 distinct pale spots: one enveloping r-m, round, small and separated from costal margin, 2 just beyond dark second radial cell, touching costal margin and separated from vein M_1 , and faintly pale brown spot within anal cell below fMCu. Halter with pale brown knob. Abdomen dark brown; 2 spermathecae well developed, obovate and subequal.

DISTRIBUTION: New Britain

25. *Culicoides semicircum* Tokunaga, n. sp. Fig. 16.

Medium-sized brown and yellow species. Maxillary palpus rather stout and with sensory pores large and bearing very short sensillae. AR about 1.38. Scutum with distinct

small yellow spots on brown ground-color; scutellum yellow, with a middle brownish spot and 3 strong bristles. Leg with yellowish bands before and beyond brown knee-joint; hind TR about 2.72. Wings fuscus, with many paler spots, of which apical 1 of cell R_5 is large and semicircular, second radial cell entirely dark and $1/2$ as long as wide; macrotrichia spread on apical $1/4$ of membrane. Spermathecae: 1 developed normally and 2 vestigial. Male unknown.

Female: Body about 1.43 mm long. Wing about 0.91 mm by 0.4 mm. Head with vertex brown, frontal area pale brown, eyes almost contiguous above; mouthparts pale brown, with proboscis short and about $1/3$ as long as head height; clypeus with 4 small setae along each lateral margin. Maxillary palpus (fig. 16d) small, stout, with sensory pore large and sensillae not extending out from the pore; 5 segments about 4.5:8.5:13:5:6 in proportion of lengths. Antenna (fig. 16a) with scape brown, other segments all pale brown and far paler on their bases before basal verticilles; basal short flagellar segments oval, distinctly longer than wide; AR about 1.38, distal 8 segments in proportion of 8.5:8.5:9.5:19:18:18.5:21:26.5. Thorax brown, with clear yellow spots on dorsal side; scutum with 3 pairs of lateral small spots and pair of large oblong median spots on anterior $1/2$ before paired transverse scutal sutures, pair of round lateral spots just behind scutal sutures; caudoscultural area pale brownish fuscous and with paired yellowish pale brown lateral stripes just mesad of brown foveae; lateral caudal parts of scutum paler being yellowish pale brown; postscutellum yellow and with median brown longitudinal cloud; postscutellum dark brown and somewhat brown along anterior margin; pleuron and sternum all brown; scutellum with a median and 2 lateral strong bristles and 2 minute accessory median setae. Legs with coxae brown, trochanters pale brown, femora and tibiae mainly brown, knee-joints dark brown, tarsal segment 1 brown and other segments pale brown; fore and middle femora pale brown on basal and preapical parts, but hind femur without preapical pale band; all tibiae very pale on sub-basal and apical parts, but middle tibia without apical band. Hind TR about 2.72; leg-segments, excepting basal 2, in proportion of 79.5:72:48:13:9:7:9 in fore, 108:101:60:13:10.5:8:10 in middle and 98:95.5:43.5:16:12:8.5: ? in hind leg.

Wing (fig. 16b) fuscus, with many pale spots, second radial cell entirely covered with dark costal spot 2, pale costal marking 2 consisting of 2 round subequal spots, apical pale spot of cell R_5 large and semicircular, basal spots of cell M_1 far smaller than apical spot which reaches to apical margin, apical pale spot of cell M_2 also reaching apical wing margin, oval pale spot present above fMCu, pale spot of cell M_4 suboval, on middle part of cell and reaching to anal margin; macrotrichia sparsely spread on apical $1/4$ of wing membrane, quite absent in cell M_4 and bare areas along M_1 , M_2 and M_{3+4} distinct. Costa

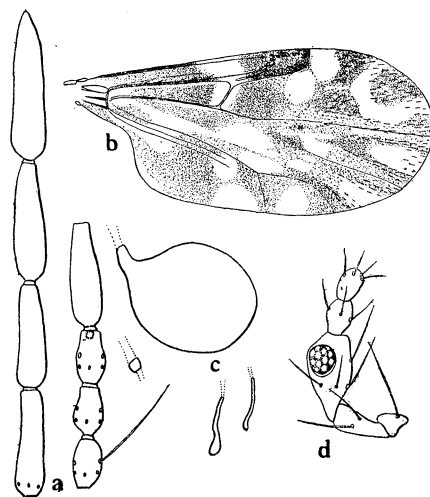


Fig. 16. *Culicoides semicircum*, female. a, apical 8 antennal segments; b, wing; c, spermathecae and basal ring; d, maxillary palpus.

ending at about basal $3/5$ wing length (45:70), R_s about twice as long as R_1 (8:15) and curved upwards at end, second radial cell twice as long as first (10:5), r-m as long as M_{1+2} , base of M_2 obscure, relative lengths of R, M and stem of fMCu about 24:22.5:33:5, fMCu under middle of first radial cell, M_{3+4} strongly curved, twice as long as Cu_1 (17:8) and ending beyond level of costal tip. Halter with stem yellow, knob brown but apical end of knob yellowish. Abdomen pale brown, with tergites reduced, pleuron with fine striation, sternites almost completely atrophied, pre-apical 2 segments more brownish, cercus and caudal tip white. Three spermathecae (fig. 16c); 1 brown, subspherical and with short chitinized neck-part (3.5+16 units by 16 units); 2 brown, tubular, and subequal (7 units by 1.5 units and 6 units by 1 unit).

DISTRIBUTION: New Guinea.

Holotype, ♀ (BISHOP 2865), Hollandia, 100 m, Neth. New Guinea, 23 Aug. 1955, Gressitt.

This species is quite peculiar in possession of a specific pale semicircular marking of wing cell R_5 and of a single subspherically developed spermatheca.

26. *Culicoides schultzei* Enderlein, 1908, Med. Nat. Gesellsch. Jena, Denkschr. 13: 459.—Okada, 1954, Jap. Jour. Appl. Zool. 19(1): 5. Figs. 17 and 18.

Culicoides oxystoma Kieffer, 1910, Ind. Mus. Mem. 2: 193.—Edwards, 1922, Bull. Ent. Res. 13(2): 164.—Tokunaga, 1937, Tenthredo 1(3): 295, 298, 307.—Arnaud, 1956, Microent. 21(3): 120.

Culicoides oxystoma var. no. 1 Tokunaga, 1950, Jap. Jour. Sanit. Zool. 1(3): 64, 66.

Culicoides kiefferi Patton, 1913, Ind. Jour Med. Res. 1: 336.

Culicoides punctigerus Tokunaga, 1951, Saikyo Univ., Agr. Sci. Rep. No. 1: 101.

Small or medium-sized brown and yellow species. Wing with costal pale spot 2 divided into 2 spots and 3 subconstricted, these pale spots arranged in V-shape, a pale spot present just above fMCu and often additional pale spot present below dark second radial cell macrotrichia of wing moderately spread on apical $1/3$. Antenna with basal short flagellar segments subspherical to short-oval, AR varying from 0.9 to 1.0. Thorax mainly dark brown, scutum with yellow and pale brown spots, scutellum yellow and with a brown median spot. Legs mainly pale brownish yellow and with dark knee-joints and brown bands on femora and tibiae; hind TR varying from 2.0 to 2.15. Spermathecae: 2 well developed and 1 minute or slightly developed. Male hypopygium with tergite 9 subtrapezoid and tapered, anal points rather large and slender, aedeagus with large basal arch, parameres slender and strongly turned on apical $1/4$.

Female: Body length about 1.23 mm. Wing about 1.13 mm by 0.49 mm. Head brown, with eyes separated above as wide as one facet, proboscis about $1/2$ as long as head capsule, clypeus with 4 to 6 setae. Maxillary palpus (fig. 17a) with sensory pore rather large, segments 3 thickened, and 5 segments in proportion of 9:15.5:15:6:8. Antenna (fig. 17b) with scape dark brown, short flagellar segments round to short-oval, very pale brown but apical margins more brownish, distal 5 segments entirely brownish; AR about 0.95, relative lengths of distal 8 segments about 9.5:9:12:13.5:13.5:14:14.5:21. Thorax mainly dark brown or brown; scutum with pair of oblong yellow spots on caudoscuteal area, pair of pale brown vittae between foveae on anterior $1/2$, small pale brown spot covering each humeral pit, rather large pale round spots before and behind each lateral scutal suture;

scutellum yellow, with median dark brown or brown spot and with 4 strong bristles and without small accessory setae; postscutellum dark brown and with small brown spot on anterior part. Legs mainly yellowish pale brown, with dark knee-joints, femora with preapical yellowish bands and broad brown bands beyond middle, tibia with subbasal yellowish bands, fore tibia with middle part very broadly dark brown or brown and apical part yellowish, middle and hind tibiae with broad dark brown or brown bands before middle and apical ends brown or dark brown; hind TR about 2.12; leg segments, except for basal 2, in proportion of 97: 90: 46.5: 19: 13.5: 10: 13.5 in fore, 120: 115: 62: 21: 21: 21: 13 in middle and 111: 110: 55: 26: 17: 10: 14 in hind leg.

Wing (fig. 17c) with macrotrichia moderately spread on apical 2/3 of cell R_5 , apical 1/2 of cell M_1 and on marginal areas of following cells, and bare areas along veins distinct; wing markings well defined, with many round and oval pale spots: wing base very narrowly pale before arculus and along base of M, costal pale spot 2 subsquare, covering r-m and basal first 1/2 radial cell and not extending beyond end of r-m, dark costal spot 2

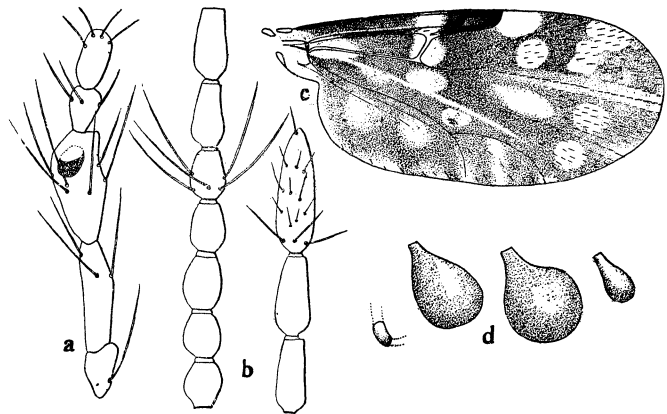


Fig. 17. *Culicoides schultzei*, female. a, maxillary palpus; b, apical 10 antennal segments; c, wing; d, spermathecae and basal ring.

rather large, enveloping apical 1/2 of first and entire second radial cell, costal pale spot 2 completely divided into semicircular costal spot and round posterior spot and the 2 obliquely arranged, costal pale spot 3 obliquely located at apical 1/3 cell R_5 , costal dark spot 3 narrowed behind by oblique costal pale spots 2 and 3 arranged in V-shape, no pale spot below dark second radial cell, basal pale spot of cell M_1 large and oblong, apical spot round and far separated from wing margin, apical pale spot of cell M_2 slightly separated from wing margin, pale spot of cell M_4 elongate or sub-constricted and just touching middle of M_{3+4} , pale spot just below end of r-m barely separated from costal pale spot 1, pale spot just above fMCu distinct, bare areas along M_1 paler, veins M_2 , M_{3+4} and Cu_1 ending in small paler marginal spots. Costa ending at basal 0.57 of wing length (50: 88) and at level of midway of cell M_4 , R_s about twice as long as R_1 (16: 8) and ending just at basal margin of costal pale spot 2, second radial cell subtriangular and entirely dark, relative lengths of R, M and stem of fMCu about 27: 23.5: 39, fMCu under middle of first radial cell, M_{3+4} deflected from its stem, strongly arcuate and twice as long as Cu_1 (24: 12). Halter pale brown. Abdomen pale brown, but segments 6 to 8 more brownish, last segment and cercus very pale. Spermathecae (fig. 17d) brown; 2 subspherical, slightly unequal (4+12 units by 12 units and 3+11 units by 11 units resoccell), 1 slightly developed (7 units by 4 units) and all with short neck parts.

Male: Body about 1.52 mm long. Wing about 1.03 mm by 0.42 mm. Coloration gene-

rally as in female but wing marking somewhat obscure and some of pale spots confluent. Head with eyes separated above as wide as $2\frac{1}{2}$ facets, proboscis about $\frac{2}{5}$ as long as head length; maxillary palpus with 5 segments in proportion of 9:11:15:7.5:8. Antenna (fig. 18b) with scape dark brown, short basal segments yellowish pale brown; plumose hairs pale brown, last 3 segments brown; combined lengths of segments 2 to 11 and 12 to 14 about

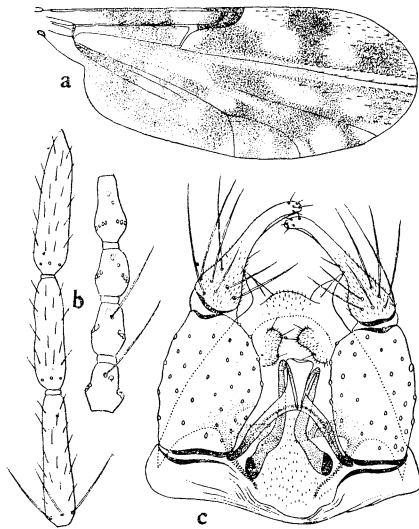


Fig. 18. *Culicoides schultzei*, male.
a, wing; b, apical 7 antennal segments;
c, hypopygium.

119:72; relative lengths of distal 8 segments about 8.9:8:8.5:10:24:20.5:26. Thorax as in female. Legs with color similar to that of female; hind TR about 1.93; 7 distal segments in proportion of 102:90:49:21:16:12: ? in fore, 131:121:70:23:18:11: ? in middle and 123:109:54:28:16.5:11:13 in hind leg.

Wing (fig. 18a) with macrotrichia rather sparsely spread only on apical $\frac{1}{2}$ cells R_5 and M_1 , costal pale spot 2 subconstricted, not completely divided, no pale spot below dark second radial cell. Costa ending at middle of wing length (basal 43: wing length 79) and slightly beyond tip of Cu_1 , R_s about $1.33\times$ as long as R_1 (12:9), first radial cell almost absent, second radial cell subtriangular and as long as its stem, $fMCu$ under tip of R_1 , M_{3+4} slightly deflected from stem, distinctly arcuate and twice as long as Cu_1 . Halter pale brownish white. Abdomen entirely pale brownish white. Hypopygium (fig. 18c) with large caudal emargination on sternite 9, caudal membrane finely spinulose; tergite 9 sub-trapezoid, extending beyond caudal end of coxite and with rather distinct anal points; coxite about twice as long as wide, style thickened on basal $\frac{1}{3}$, narrowed on apical $\frac{2}{3}$, slightly arcuate and almost as long as coxite (25:26.5); aedeagus Y-shaped, with basal arch slender and $\frac{3}{5}$ as high as total length and caudal lobe rather broad being about twice as long as wide; paramere rather slender, tapered, with basal $\frac{1}{3}$ extending mesad and convergent, then extending slightly laterad and divergent, apical $\frac{1}{4}$ suddenly recurved and ending in simple slender apex.

DISTRIBUTION: India, SW Africa, Malaya, Formosa, Java, Japan, Korea, Manchuria and New Guinea,

NETH. NEW GUINEA: Itouda, 1500 m, Wisselmeren, ♀, ♂, 12 Aug. 1955, Gressitt.

New Guinea specimens are very similar to South Indian specimens (recorded as *C. kiefferi* by Patton) in the absence of paler spot beneath dark second radial cell. The development of this additional pale spot is most obvious in Javanese specimens reported by myself as *C. punctigerus*. Malayan (Buckley, 1938) and Formosan specimens show an intermediate form of variation. Relating to the wing marking, the development of this additional pale spot and the degree of inclination of oblique costal pale spots 2 and 3, which affect the shape of costal dark spot 3, are main object of variation. Distribution of macrotrichia is also variable to a certain extent. The value of hind TR is variable from 2.0

to 2.15, while Arnaud showed far larger value, which is 2.89 (175: 61) or 2.23 calculated from his drawing. I have not examined the specimens which bear such a large value of hind TR.

27. *Culicoides parviscriptus* Tokunaga, n. sp. Fig. 19 and 20.

Medium-sized brown or dark brown species. Maxillary palpus short, stout and with very deep sensory pore on round or oval segment 3. Female AR about 0.88. Thorax almost entirely dark brown or brown. Leg brown and with pale brown and yellowish white bands on knee-part. Hind TR about 1.96 in female and 1.98 in male. Wing of female dark, thickly spread with macrotrichia and with many very small pale spots, pale costal spot 1 distinctly separated from costal margin, pale costal spot 2 not covering tip of R_s and subconstricted, costal pale spot 3 located on apical part of cell R_5 but distinctly separated from wing margin, middle pale spot of cell M_1 touching to vein M_2 , a pale spot present just above fMCu. Male hypopygium with style distinctly narrowed on apical 2/3 and strongly curved; aedeagus with pair of horn like processes on basal arch and parameres with tubercular processes on middle parts and finely serrated on apical parts.

Female: Body length about 1.29 mm. Wing about 1.03 mm by 0.47 mm. General coloration far darker and pale wing spots far smaller than in male. Head dark brown, with eyes barely separated above from each other less than a facet, mouthparts brown, proboscis about 1/2 as long as head height, clypeus with 2 pairs of small setae. Maxillary palpus (fig. 19d) short, stout; segment 3 oval, with very large sensory pore deeply and widely expanded within segment; 5 segments in length proportion of 5:9:23:6:7. Antenna (fig. 19a) with scape dark brown, other segments brown, basal short flagellar segments oval, longer than wide; AR about 0.88 and distal 8 segments in proportion of 11:11:11:14.5:13:14:14.5:23. Thorax almost entirely dark brown; scutum indistinctly brown along lateral margin of caudal 1/2 and along lateral part of caudoscuteal area; scutellum with 2 median and 2 lateral strong bristles and about 10 minute accessory setae. Legs with coxae brown, trochanters pale brown, following segments mainly brown, but last tarsal segments very pale; femora pale brown on basal ends and fore and middle femora also pale brown apically; tibiae with basal parts yellowish white and apices pale brown, but fore tibia with extreme base dark brown; hind TR about 1.96; leg segments, except for basal 2, in proportion of 98.5:97:46:20:11.5:10:10 in fore leg, 124:115:61:22:14.5:10.5:11.5 in middle and 117:109:53:27:16:10:11 in hind.

Wing (fig. 19b) fuscus, with many very small pale spots and numerous macrotrichia spread almost all over surface, bare areas along veins M_1 and M_2 rather distinct. Specific pale markings of wing as follows: pale costal spot 1 small, round, enveloping r m and

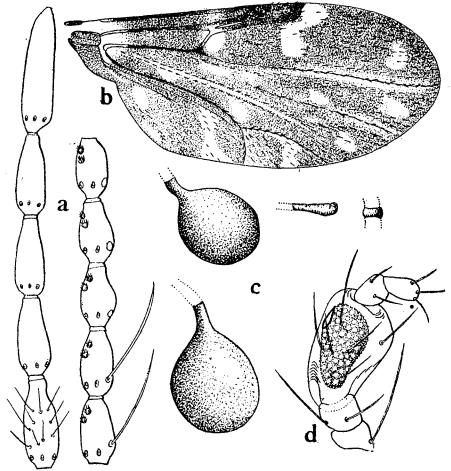


Fig. 19. *Culicoides parviscriptus*, female. a, apical 10 antennal segments; b, wing; c, spermathecae and basal ring; d, maxillary palpus.

basal veins of first radial cell and distinctly separated from costa, pale costal spot 2 just beyond tip of costa and R_s , narrow, somewhat transverse, but not reaching M_1 and sub-constricted at middle, pale costal spot 3 very small, reniform, located on apical part of cell R_5 but distinctly separated from apical margin of cell and vein M_1 , middle pale spot of cell M_1 small and just touching vein M_1 , apical pale spot of cells M_1 and M_2 also small and distinctly separated from wing margin, pale spot of cell M_4 somewhat transverse, arising from M_{3+4} and located just beyond middle of cell, pale spot just above fMCu also small. Costa ending at basal $2/3$ wing length (50 : 80), R_s about twice as long as R_1 (10 : 19), second radial cell slightly longer than R_1 (10 : 8), fMCu under middle of first radial cell, M_{3+4} fully twice as long as Cu_1 (21 : 9) and ending slightly beyond level of costal tip, relative lengths of R, M and stem of fMCu about 24 : 21 : 35. Halter with stem yellow and knob dark brown. Abdomen mainly brown, but pleural membranes dark and cercus pale brown. Spermathecae (fig. 19c) : 2 subspherical, brown, each with a short duct (4+13 units by 11 units and 4+15 units by 12 units respectively) and 1 vestigial, brown and tubular (7.5 units by 1.5 units).

Male : Body length about 1.11 mm. Wing about 0.77 mm by 0.28 mm. General coloration somewhat paler than in female being almost entirely brown. Head brown, with eyes very finely pubescent only on mesal parts and narrowly separated above as in female, clypeus also with 2 pairs of setae, proboscis about $1/3$ as long as height of head-capsule. Maxillary palpus (fig. 20c) with segment 3 subspherical and sensory pore deep but not so large as in female, 5 segments in proportion of 4 : 7 : 11 : 5 : 7. Antenna with scape dark brown; following segments missing. Thorax entirely brown, but slightly paler only on humeral pits; scutellum with 4 strong bristles and single minute median accessory seta. Legs with coloration similar to those of female, but hind tibia with extreme base brownish, tarsi slightly paler than in female. Hind TR about 1.95-2.0; leg segments, except for coxae and trochanter, in proportion of 78 : 79 : 39 : 15.5 : 11 : 8.5 : 8 in fore, 104 : 95 : 51 : 17.5 : 13 : 9 : 10 in middle and 89 : 82 : 39.5 : 20 : 13 : 9 : ? in hind leg.

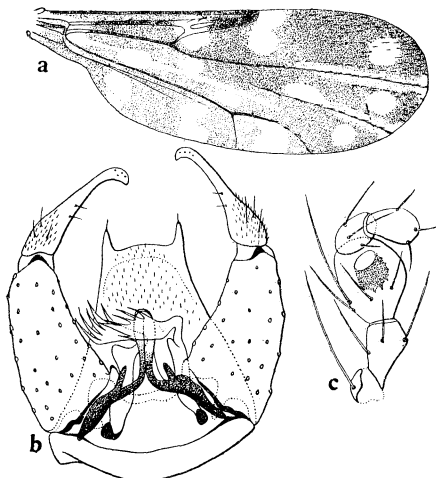


Fig. 20. *Culicoides parviscriptus*, male. a, wing; b, hypopygium; c, maxillary palpus.

Wing (fig. 20a) with macrotrichia sparse, spread on apical $1/6$ wing surface, pale spots slightly larger than in female; costa ending distinctly before middle of wing (34 : 85), second radial cell incomplete, R_1 of this cell absent, R_s ending above basal $1/3$ anal margin of cell M_4 , fMCu just beyond level of tip of first radial cell, relative lengths of R, M and stem of fMCu about 17 : 15 : 28. Pale spots rather larger than in female but costal 1 and 3 apical round spots not touching wing margin. Halter with stem yellow and knob brown.

Abdomen rather pale brown, but pleural membrane with fine brown striation. Hypopygium (fig. 20b) brown, but paramere yellow and style pale brown; tergite 9 as long as basal width, distinctly tapered, with slender

anal points and caudal margin not emarginate but very slightly convex; sternite 9 transversely arcuate, with caudal emargination very shallow and membrane without spinules; coxite conical, tapered and about twice as long as basal width; style slightly swollen and pubescent on basal 1/3 and distinctly narrowed on apical part and ending in curved tip; aedeagus somewhat Y shaped, basal arch rather low, 2 arms as long as median lobe and each arm with small horn-like process just beyond middle, median lobe rather slender and slightly clavate; paramere large, with triangular blunt process at middle, strongly curved at narrow part just beyond middle, apical 1/2 broadened and serrated into 5 or 6 spinules on apical margin.

DISTRIBUTION: New Guinea and New Britain.

Holotype, ♂ (BISHOP 2866), Wum, 850 m, Jimmi Valley, NE New Guinea, 16 July 1955, Gressitt. Allotype, ♀, St. Paul's, 300 m, Baining Mts., Gazelle Pen., New Britain.

This species is somewhat allied to *C. odibilis* Austen and *C. flumineus* Macfie in the wing marking. These allied species, however, are distinctly different in the following points: in the first allied European species, all marginal pale spots of wings broadly touch the costa and wing margin and cell M_1 is not provided with a middle pale spot but with a basal distinct one which is very small and obscure in the new species; and in the second allied Malayan species, the basal short flagellar segments of female antenna are at most slightly longer than wide and subspherical to oval, the female AR is larger, 1.3, and the pale spots except for costal 1 and 2 are poorly developed, being scarcely perceptible by transmitted light, all highly differing from the present species.

28. *Culicoides rabauli* Macfie, 1939, Linn. Soc. N. S. Wales, Proc. 64: 367.—Lee and Reye, 1953, *ibid.* 77: 384.

This species has been fully studied by Macfie, Lee and Reye, but the male sex is not known. Chief specific characters are as follows: *Female*: Body dark brown, with wing about 1.4–1.49 mm by 0.6 mm. Head with AR about 1.41. Maxillary palpus with large sensory pore but relatively shallow. Thorax dark brown; scutellum with 4 bristles and several small setae. Legs dark brown, with faint traces of narrow paler bands before and beyond dark knee-joints; hind TR about 2.0–2.2. Wing with dense macrotrichia spread almost on whole surface; base very broadly pale, costal pale spot 1 large, broadly abutting upon costal margin and extending behind far beyond end of r-m, costal dark spot 2 broad and enveloping distal 1/2 of first and all of second radial cell, costal pale spot 2 touching costal margin and far separated from vein M_1 , 3 apical pale spots round and far separated from wing margin, pale spot of cell M_4 somewhat reniform, strongly curved, large and occupying basal 2/3 cell, 2 additional pale spots present on sub-basal part of vein M_1 and just above fMCu, middle pale spot of cell M_1 united with spot of cell M_2 enveloping middle part of vein M_2 . Halter with white or creamy knob. Abdomen dark brown; 2 spermathecae, well developed, oval, subequal. Male unknown.

DISTRIBUTION: New Britain and Australia (Queensland).

29. *Culicoides xanthoceras* Kieffer, 1917, Mus. Nat. Hung., Ann. 15: 186.

According to Kieffer, the main specific characters of this species are as follow: *Female*: Body about 0.8 mm long, with antenna entirely yellow, wing densely clothed with macrotrichia almost all over surface and pale spots on fuscus ground color. Head with

antenna entirely yellow and with AR about 1.5, short basal flagellar segments round to oval, segment 9 about 1.5× as long as wide. Thorax with dark brown scutum with yellowish marking. Legs with femora brown and bearing yellow apical bands. Wing entirely clothed with macrotrichia, fumous and with normal pale spots: costal pale spot 1 enveloping r-m and arising from costal margin, 2 radial cells forming dark costal spot, costal pale spot 2 just at end of second radial cell, arising from costal margin and ending at M₁, costal pale spot 3 located between intercalary fork of cell R₅ and touching costal margin, basal pale spot of cell M₁ at extreme base of cell, 2 pale spots just above and below fMCu, extreme base of the wing pale, other several pale spots normal. Halter white. Male unknown.

DISTRIBUTION: New Guinea.

30. *Culicoides guttifer* de Meijere, 1907, Tijdschr. Ent. **52**: 209.—Edwards, 1922, Bull. Ent. Res. **13** (2): 163. Figs. 21 and 22.

Culicoides guttifer var. *histris* Johannsen, 1946, Bishop Mus., Bull. **189**: 190.

Culicoides leucostictus Kieffer, 1911, Ind. Mus., Rec. **4**: 340.

Culicoides micropunctatus Tokunaga, 1951, Saikyo Univ., Agr. Sci. Rept. **1**: 105.

Culicoides mackayensis Lee and Reye, 1953, Linn. Soc. N. S. Wales, Proc. **77**: 383.

Rather large or medium-sized brown species with many small round pale spots on wing. Maxillary palpus with large sensory pore on segment 3. Antenna of female with basal flagellar segments oval and AR about 1.22 (varying from 1.21 to 1.55). Thorax mainly brown, with dark brown and yellowish brown markings on dorsum; scutellum with 4 bristles and several small accessory setae. Legs mainly brown and with very pale and yellow bands before and beyond dark knee-joints; hind TR about 2.25 (2.0-2.4) in female and 1.91 (1.73-2.25) in male. Wing with macrotrichia densely spread almost all over surface in female and rather sparsely on apical 1/2 cells R₅ and M₁; wing markings: in female, pale spots clearly defined, round and small and, in male, pale spots somewhat more indistinct than in female due to paler fuscus ground color and some of these spots subconfluent; dark costal spot 2 enveloping apical 1/2 of (in female) or almost entire length (in male) of first and whole second radial cell, costal pale spot 2 completely divided into 2 similar round spots (in female) or more or less constricted at middle (in male), costal pale spot 3 located at apical angle of cell R₅, no pale spots just above fMCu and at basal angle of cell M₄, 1 additional pale spot present in dark spot 2 between R_s and forking point of M₁₊₂. Single spermatheca very large, elongate and with hyaline punctures. Male hypopygium with shallow caudal emargination on sternite 9 and spinulous caudal membrane; tergite 9 elongate, subtrapezoid, with caudal median emargination V-shaped and anal points large; aedeagus sub-triangular, with basal arch about 2/5 total length; paramere small, not extending beyond tip of aedeagus and simple.

Female: Body length about 1.6 mm, varying from 1.26 mm to 1.94 mm. Wing about 1.12 mm by 0.48 mm varying from 1.06 mm by 0.46 mm to 1.18 mm by 0.51 mm. Color brown to dark brown. Head entirely brown, with eyes separated above as wide as 1 or 2 facets, proboscis about 1/2 as long as head height, clypeus with usually 4 and rarely 3 lateral setae on either side. Maxillary palpus (fig. 21d) rather stout, with segment 3 oval and sensory pore large, 5 segments in proportion of 8.5:21.5:21:8.3:8.8. Antenna (fig. 21a) with scape brown or dark brown, short basal segments long-oval, yellow or yellowish pale brown but apical margins brown, distal 5 segments entirely brown and cylindrical;

AR about 1.22 (varying from 1.21 to 1.23); distal 8 segments in proportion of 11:10.8:11.3:19.3:19.5:21.3:22.8:29.8. Thorax mainly brown; scutum with ill-defined dark brown, yellowish brown and brown markings: humeral pits yellow, shoulder part broadly dark brown, paired stripes along foveae dark brown, central part of anterior 1/4 dark brown forming short vitta, paired 2 oblong central vittae between foveae yellowish brown, large lateral cloud covering lateral scutal suture brown, caudoscuteal area broadly fuscus; scutellum brown and with median large spot and pleuron dark brown, and with 4 bristles and several small setae: postscutellum dark but area along scutellum brown. Legs mainly brown, trochanters and bases of femora much paler, tarsal segments, except for brown segment 1 of hind leg, also very pale; fore and middle legs with knee-joints dark and with very pale bands before and beyond knee-joints; hind leg without preapical femoral band, but with yellow sub-basal tibial band beyond dark base; hind TR about 2.25; relative lengths of leg segments, except for basal 2, about 99:98.5:49.5:21.5:13.5:9.5:12.8 in fore, 127:128.5:72.8:24.3:15:10.3:13 in middle and 123.5:121:59:26:16:12:13.3 in hind leg.

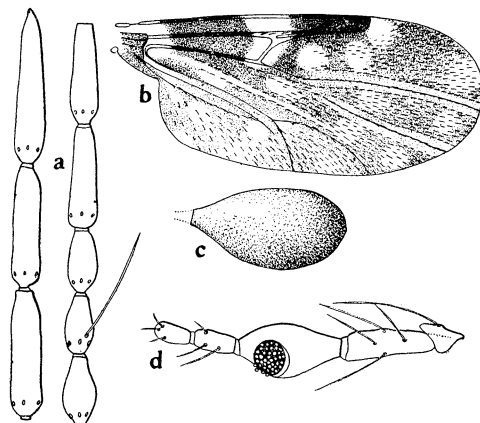


Fig. 21. *Culicoides guttifer*, female. a, apical 8 antennal segments; b, wing; c, spermatheca; d, maxillary palpus.

Wing (fig. 21b) with macrotrichia rather densely spread almost all over surface and bare areas along veins distinct, with ground-color fuscus and pale spots small, mainly round and well defined, feature of wing marking as follows: wing base with dark spot before arculus, costal pale spot 1 largest, turned V-shaped, covering r-m and basal 1/2 of first radial cell and very slightly beyond M and M_{1+2} , costal dark spot 2 large, covering apical 1/2 first and entire second radial cell, distinct pale spot present behind Rs and above forking point of M_{1+2} , characteristic for species, and usually round but rather variable in size and shape (sometimes oval), costal pale spot 2 consisting of 2 similar round spots usually somewhat obliquely arranged, costal pale spot 3 at apical corner of cell R_5 but vein M_1 ending in dark area, apical pale spots of cells M_1 , M_2 , M_4 and anal cell more or less touching wing margin, no pale spots just above fMCu and at inner angle of fMCu. Costa ending at basal 0.68 of wing length (58.5:86.3) and above tip of M_{3+4} , Rs about 1.7 \times as long as R_1 (22.8:13) and ending at apical end of costal dark spot 2, second radial cell rather large, about 1.4 \times as long as first (11:8) and not extending to costal pale spot 2, relative lengths of R, M and stem of fMCu about 27.5:25:36.5, fMCu under base of first radial cell, M_{3+4} slightly deflected from stem and about 1.7 \times of Cu_1 (21.5:13). Halter with knob dark brown and stem yellow. Abdomen yellowish brown or yellowish pale brown, with tergites reduced to narrow bands, sternites reduced to paired hemisternites, pleuron slightly fuscus, cercus yellow. Only 1 spermatheca (fig. 21c) brown, large, oblong (33 units by 18.5 units), rather variable in shape, with many hyaline punctures and without distinct neck part; end part weakly chitinized and hyaline at times.

Male: Body much smaller than female, being about 1.45 mm long and wing about 0.94 mm by 0.34 mm. Color generally much paler than female and markings of scutum, legs and wing rather ill-defined or more obscure in comparison to female, but basic features of these markings quite identical with female. Head mainly pale brown to brown, with eyes separated above as in female, proboscis much shorter than 1/2 head height, clypeus usual-

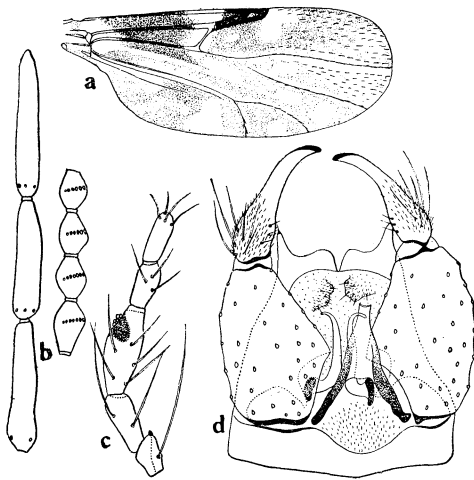


Fig. 22. *Culicoides guttifer*, male. a, wing; b, apical 7 antennal segments; c, maxillary palpus; d, hypopygium.

ly with 6 and rarely 8 setae. Maxillary palpus (fig. 22c) rather slender and with 5 segments in proportion of 6.5: 11.5: 13.8: 7.5: 9. Antenna (fig. 22b) with scape brown, short basal segments pale brownish white or yellowish white, plumose hairs very pale brown or yellowish pale brown, 3 apical segments little more brownish; relative combined lengths of segments 2 to 11 and 12 to 14 about 118.3: 84.3; distal 8 segments in proportion of 10.5: 10: 5: 9.8: 9.3: 10.3: 29.5: 26.3: 28.5. Thorax mainly brown, with ill-defined yellowish brown clouds; scutellum with 4 bristles and 1 to 3 minute accessory setae. Legs as in female, but much paler; hind TR about 1.91, varying from 1.73 to 2.09; leg segments, except for coxae and trochanters, in proportion of 97.5: 88: 48: 20.5: 13.5: 10.3: 11 in fore, 121.5: 114: 67.5: 23: 14.8: 10.3: 12 in middle and 105.5: 105:

50: 26.5: 15: 11.3: 12 in hind leg.

Wings (fig. 22a) with macrotrichia sparsely distributed on apical 1/2 of cells R_5 and M_1 , bare areas along M_1 distinct; wing markings faint, mainly differing from that of female in following points: additional pale spot behind R_5 often reduced, costal pale spot 2 usually not completely constricted into 2 spots, anal pale spots often confluent with each other. Halter with knob brown or pale brown and stem yellow. Abdomen very pale brown, with reduced tergites and hemisternites more brownish, pleural sides slightly fuscus. Hypopygium (fig. 22d): tergite 9 rather long, tapered, subtrapezoid, with deep V-shaped caudal emargination and anal points rather long and conical; sternite 9 with caudal emargination very broad and shallow and caudal membrane finely spinulose; coxite conical, tapered, not beyond tergite and with simple basal process; style slightly arcuate, tapered, slightly shorter than coxite (27: 31.5), basal thickened parts pubescent and setigerous; aedeagus subtriangular, longer than basal width (22: 20.8), shorter than style (22: 27), with basal arch about 2/5 total length and apical end truncate; paramere slightly shorter than aedeagus (20: 22), with basal 1/3 extending laterad, rest tapered, extending caudad and ending in slightly curved tip not sharply pointed and not ending distinctly beyond tip of aedeagus.

DISTRIBUTION: Malaya, Sumatra, Java, Seychelles Is., Mariana Is., Caroline Is., Australia (Queensland), New Guinea.

NETH. NEW GUINEA: Hollandia, 2 ♀, 2 ♂, 23 Aug. 1955, Gressitt.

This species shows a rather wide range of variation in the color markings of the tho-

rax, legs, wings and values of AR and hind TR. Edwards (1922) pointed out that *C. leucostictus* Kieffer from Seychelles Islands of Indian Ocean is quite identical with *C. guttifer*. Johannsen's variety *histrion* from Guam Island does not seem to be distinctly different from the type specimens. *C. micropunctatus* Tokunaga from Java has somewhat more densely spread macrotrichia on the female wing and a smaller additional pale spot in costal dark spot 2 of wing than the type specimens; these differences, however, are quite involved within rather wide range of variation of *C. guttifer*. Australian *C. mackayensis* Lee and Reye is also thought to have no important distinctive specific characters which differ from *C. guttifer*, the original description being quite coincident with observations on *C. guttifer*.

31. *Culicoides pallidimaculosus* Tokunaga, n. sp. Fig. 23.

Small pale brown and yellow species. Wing with many large ill-defined pale spots and with very faint dark markings; macrotrichia of wing membrane very sparse, spread over apical 1/4. Maxillary palpus stout and with sensory pore rather large and shallow. Antenna with AR about 1.64 and short flagellar segments spherical to short-oval. Thorax with many yellow spots on scutum. Hind TR 2.4–2.7. Spermathecae: 1 very large, 1 very small and 1 highly reduced. Male unknown.

Female: Body length 0.96–1.11 mm. Wing 0.89–0.9 mm by 0.38–0.39 mm. Head entirely brown, with eyes almost contiguous above, clypeal setae 5 and proboscis shorter than 1/2 head height (1/3 to 2/5). Maxillary palpus (fig. 23d) stout, with segment 3 oval, sensory pore rather large, shallow and sensillae very short, not extending out from pore, 5 segments in proportion of 5:8:13:4.5:5.5. Antenna (fig. 23b) with scape brown, following short segments pale brownish yellow, with each apical part more brownish, apical 5 segments pale brown; AR 1.62–1.66; relative lengths of apical 8 segments about 7:8.3:9.5:19.8:19:21.5:22.5:26.8. Thorax with scutum brown and with many yellow spots: 2 small spots on humeral pits, 2 large oval in middle between foveae, 2 small round ones before each lateral scutal suture, large round 1 behind each scutal suture, obscure brown cloud along lateral margin of anterior 1/2; caudoscuteal area extensively fuscus; in paratype, scutum more widely brownish, 2 pairs of pale spots before scutal sutures more obscure than in holotype and caudoscuteal area extensively paler; posts cutellum yellow, with median brown spot and 3 strong bristles and 3 minute accessory setae; postscutellum dark brown; pleuron and sternum pale or very pale brown. Legs pale brown, with knee-joints brown; fore and middle legs with white bands before and beyond knee-joints, hind leg with sub-basal white band on tibia and in paratype, all legs paler than in holotype and hind femur faintly paler on pre-apical part. TR 2.86–2.96 in fore, 3.93–4.0 in middle and 2.41–2.73 in hind leg; femora

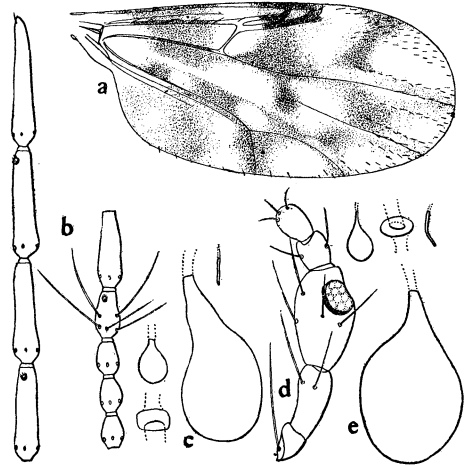


Fig. 23. *Culicoides pallidimaculosus*, female. a, wing; b, apical 9 antennal segments; c, spermathecae and basal ring of holotype; d, maxillary palpus; e, spermathecae and basal ring of paratype.

and following 6 segments in proportion of 78.8: 72: 40: 13.8: 10.5: 7.5: 9: 8 in fore, 98: 99: 56.5: 14.3: 11.5: 8: 9 in middle and 94.5: 93: 41.5: 16: 12: 8.3: 10 in hind leg.

Wing (fig. 23a) with very sparse macrotrichia on apical 1/4 and several trichia closely associated along anal margin, ill-defined large pale and slightly confluent fuscus markings (in paratype fuscus marking very faint); all marginal spots large and broadly touching wing margin, costal pale spot 1 enveloping r-m and basal 2/3 of first radial cell, costal spot 2 not covering second radial cell and marginal veins, costal spot 3 large and occupying apical 1/3 cell R_5 ; no paler spots at ends of M_1 and M_2 . Costa ending to basal 2/3 of wing length (44.3:67.8), R_s about 1.7 \times as long as R_1 (15:9), second radial cell somewhat longer than first (7.3:6.3), relative lengths of R, M and stem of fMCu about 23.3: 21.8: 30, fMCu under middle of first radial cell, M_{3+4} deflected from stem, strongly curved, ending far beyond level of costal end and about 2.4 \times as long as Cu_1 (18: 7.5). Halter entirely white. Abdomen pale brown, with pleural membranes more brownish, tergites and sternites obscure and probably highly reduced, last segment and cercus yellow. Spermathecae (figs. 23c, e) brown, all highly unequal: 1 well developed, in holotype, somewhat irregular and suboval, with large neck part (7+12 units by 9 units) and in paratype, oval and with short neck part (4+15 units by 12 units); 1 oval, small and with short neck part (1.5+4.3 units by 3.5 units); 1 vestigial, minute and tubular (4.5 units by 0.5 unit).

DISTRIBUTION: New Guinea.

Holotype, ♀ (BISHOP 2867), Botanical garden, Lae, NE New Guinea, 25 Aug. 1955, Gressitt. Paratype ♀ same locale as holotype, 21 Aug. 1955, Gressitt.

This species is somewhat allied in the wing marking to Australian *C. robertsi* Lee and Reye and Javanese *C. bifasciatus* Tokunaga. However, in the first allied species, AR is much smaller, being only 1.05, and hind TR is also smaller, being 2.2, and in the second allied species, the apical pale spot of wing cell R_5 is much smaller, the macrotrichia of wing membrane are more broadly spread on wing cell M_4 and anal cell, AR is smaller, being 1.1-1.2, and hind TR is also smaller, being less than 2.2; moreover, these 2 allied species are highly different from the present new species in the structure of spermathecae, which are highly specific in the new species.

32. *Culicoides tripallidus* Tokunaga, n. sp. Fig. 24.

Rather large dark brown species. Wing thickly covered with macrotrichia and with only 3 pale spots: 1 on base, 1 enveloping r-m and 1 covering second radial cell; other pale spots very obscure. Maxillary palpus with large but shallow sensory pores just beyond middle of segment 3; antenna with AR 1.2. Thorax almost entirely dark brown; scutellum with 3 median and 2 pairs of lateral bristles and about 12 minute accessory setae. Legs almost entirely brown, but all knee-parts pale brown or yellow and last tarsal segments very pale; hind TR about 2.17. Abdomen with 2 well developed spherical spermathecae. Male unknown.

Female: Body about 1.7 mm long. Wing about 1.52 mm by 0.9 mm. General color dark brown. Head with eyes narrowly separated above less than 1 facet from each other, clypeus with 3 pairs of lateral setae and proboscis about 3/5 as long as head-capsule. Maxillary palpus (fig. 24c) slender, with segment 3 fusiform and sensory pore large but shallow situated just beyond middle of segment, 5 segments in proportion of 10: 22: 28: 10: 9. Antenna (fig. 24a) with scape dark brown and other segments all brown, basal short flagellar segments oval, being much longer than wide; AR about 1.2 and distal 8 segments in proportion of 14: 14: 14.5: 23: 23: 26: 25: 31.5. Thorax almost entirely dark, but scutum

with 2 very obscure brownish oval spots in middle between foveae, 2 similar irregular clouds in middle of lateral parts or laterad of foveae and brownish humeral pits; scutellum dark, with 2 strong and 1 slightly shorter median bristles and pair of strong and pair of rather short lateral bristles and 10 or more minute accessory setae. Legs mainly brown, knee-parts of all legs yellow or pale brown, tarsi brown but last segments very pale. Hind TR about 2.17; segments from femora to tarsi in proportion of 120: 126: 70: 34: 18.5: 14.7 in fore, 153: 154: 81: 31: 20: 13.5: 15 in middle and 149: 154: 76: 35: 23: 15: 17 in hind leg.

Wing (fig. 24b) fuscus, with only 3 rather large pale spots, thickly covered with numerous macrotrichia absent only on basal area, costal and basal radial and 2 radial cells and bare areas along M_1 and M_2 rather distinct; 3 distinct pale spots as follows: 1 on basal area, 1 enveloping r-m, related parts of other veins to cross-vein and widely touching costa but not extending behind beyond furrow above stem of fMCu, 1 covering distal 2/3 of second radial cell, very faint paler clouds transversely extending before free part of Cu_1 and from basal part of cell M_1 to anal margin of cell M_4 . Costa ending at basal 3/5 (72: 117) wing length and just before end of M_{3+4} , Rs about 1.5 \times as long as R_1 (33: 22), second radial cell rather large and longer than first (17: 14), r-m shorter than M_{1+2} , relative lengths of R, M and stem of fMCu about 40: 37: 50, fMCu just before midway of first radial cell, M_{3+4} twice Cu_1 and slightly curved. Halter entirely white. Abdomen almost entirely brown, with tergites complete, sternites subdivided into hemisternites, pleural membranes highly fuscus. Spermathecae (fig. 24d) brown, 2 spherical, distinctly unequal (5+16 units by 16 units and 7+19 units by 19 units respectively), provided with distinct neck parts, 1 vestigial, tubular, very slightly swollen (9 units by 2 units).

DISTRIBUTION: New Guinea.

Holotype, ♀ (BISHOP 2868), Daulo Pass, 2500 m, Asaro-Chimbu Divide, NE New Guinea, 12 July 1955, Gressitt.

This new species is very closely allied to Japanese *C. saninense* Tokunaga in the wing markings. But the allied Japanese species is different in the following points: segment 3 of maxillary palpus is not provided with sensory pore and sensillae are scattered on its distal part, AR is about 1.11, short basal flagellar segments are short-oval, 2 spermathecae are subequal in size and shape and their neck parts are very short, all differing from the present new species. Another allied species may be New Guinean *C. melanesiae* Macfie, but in this species the wing base is not covered with a pale spot, costal pale spot 2 is distinctly separated from costa and costal spot 2 does not envelope second radial cell, distinctly differing from the present new species.

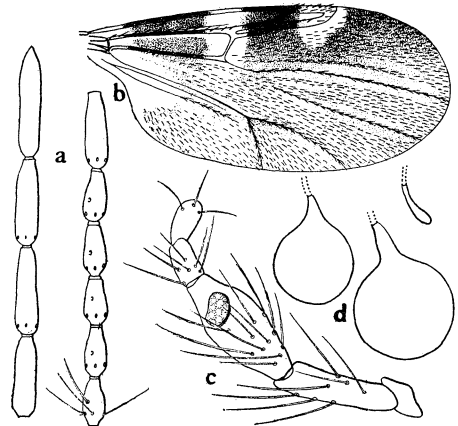


Fig. 24. *Culicoides tripallidus*, female. a, apical 10 antennal segments; b, wing; c, maxillary palpus; d, spermathecae.

33. *Culicoides gentilis* Macfie, 1934, Ann. Trop. Med. Parasit. 28 (2): 191. Fig. 25.

Rather large or medium-sized brown or dark brown species. Maxillary palpus without

sensory pore but with scattered sensillae. Antenna with rather large AR, about 1.31. Thorax with scutum almost uniformly brown or dark brown. Legs with yellow knee-parts in fore and middle leg; hind TR about 2.13. Wing with very sparse macrotrichia along apical margin, 2 radial cells united into combined radial cell, very slightly broader at distal end, costa and Rs ending just in costal dark spot 3 across costal pale spot 2. Spermathecae: 2 round or short-oval and subequal or unequal. Male unknown.

Female: Body length about 1.72 mm, rather variable from 1.47 mm to 2.07 mm. Wing about 1.46 mm by 0.56 mm, varying from 1.27 mm by 0.49 mm to 1.74 mm by 0.66 mm. Head dark brown including mouthparts, with eyes bare and contiguous above; clypeus with 2 pairs of setae; proboscis about 1/2 as long as head capsule or slightly longer. Maxillary palpus (fig. 25c) rather slender; segment 3 elongate and fusiform, with scattered sensillae on apical 1/2 and without sensory pore, 5 segments in proportion of 8.3:20.3:28:11.3:13.3. Antenna (fig. 25a) with scape dark brownish, following segments almost brown, but several short basal segments yellowish or pale brown on basal parts before verticils, short basal flagellar segments oval and distinctly longer than wide; distal 8 segments in proportion of 16.5:16:17:28:30:34:38:51; AR about 1.31.

Thorax uniformly brown and with paler humeral pits; scutellum with only 2 median and 2 lateral strong bristles and with additional minute accessory seta in 1 specimen. Legs mainly brown, with trochanters and bases of femora yellow, all tarsi yellowish brown but hind tarsal segment 1 brown; 4 anterior legs with knee-parts rather broadly yellow; hind tibiae broadly yellow on base and narrowly yellow at end; in paler specimens, middle and hind tibiae mainly yellow and each with brown band before apex; hind TR about 2.13 (1.94-2.26); leg segments, except for basal 2, in proportion of 130:143:84.3:32:20.8:14.2:16 in fore, 173:186.7:98.2:37.7:23.7:13.5:16.9 in middle and 168:169.7:89.7:42.7:26.2:14.8:19.2 in hind leg.

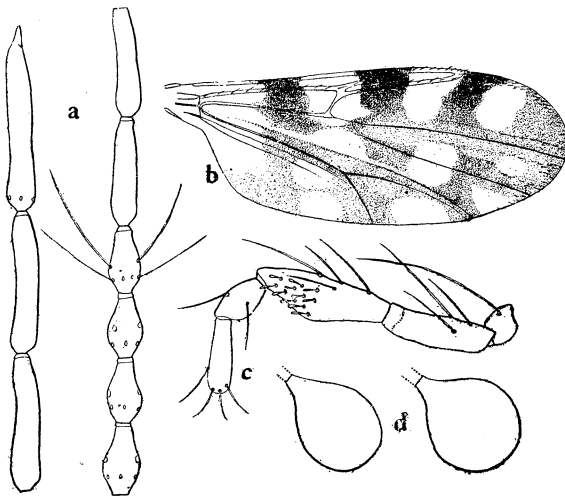


Fig. 25. *Culicoides gentilis*, female. a, apical 9 antennal segments; b, wing; c, maxillary palpus; d, spermathecae.

Wing (fig. 25b) with very sparse macrotrichia along apical margins of cells R_5 and M_1 and very few at apical corner of cell M_2 , several in line along either side of distal part of vein M_1 . Wing markings sharply defined, paler yellowish spots rather large, costal pale spot 3 touching wing margin, pale spot 2 covering almost apical 1/2 combined radial cell; in paler specimen fuscus areas paler and yellowish. Costa ending at basal 0.72 of wing length (80.7:112.3), R_s about twice as long as R_1 (17:34) and ending just on dark costal spot 3 across pale spot, relative lengths of R, M and stem of fMCu about 40:35.5:46.2, r-m as long as M_{1+2} ,

fMCu under origin of r-m, fM above or just beyond level of fMCu, M_{3+4} ending at or

just before costal end and about twice as long as M_{3+4} (35.7: 18), Cu_1 ending somewhat before tip of R_1 . Halter white. Abdomen brown, with pleural membranes strongly fuscus, tergites complete, sternites subdivided into hemisternites, caudal end and cercus yellow. Spermathecae (fig. 25d) brown; 2 with short neck parts, oval, subequal (16.3 units by 12.3 units and 16.5 units by 11.5 units respectively) or unequal (16 units by 12 units and 13 units by 10 units) and 1 vestigial and tubular (4.7 units by 1.3 units).

DISTRIBUTION: Malaya and New Guinea.

NE NEW GUINEA: Wum 850 m, Jimmi Valley, 2 ♀, 16-17 July 1955, Gressitt. NETH. NEW GUINEA: Hollandia 100 m, ♀, 23 Aug. 1955, Gressitt.

The wing venation, especially the shape of combined radial cell, and distribution of wing macrotrichia of these specimens are similar to those of another Malayan species, *C. gemellus* Macfie. The wing marking, however, is quite similar to that of *C. gentilis*, especially the third costal pale spot not being separated from the wing margin. Taking the wing markings as an important specific character, the present New Guinean specimens are thought to be *C. gentilis* or its variational form. AR of the present specimens is rather larger than in Malayan specimens (AR is 1.08), *C. gemellus* (AR is 1.15) and other related species.

34. *Culicoides novaguineanus* Tokunaga, n. sp. Figs. 26 and 27.

Rather small brown species. Wing with rather scant macrotrichia along apical margin, colored marking well defined, somewhat similar to that of *C. peregrinus* Kieffer: paler costal spot rather large and broadly touching costal margin, distinct triangular pale spot present at basal angle of cell M_4 and small pale spot present just above fMCu. Maxillary palpus slender, with normal sensory pore just beyond middle of segment 3 and sometimes in female with very few scattered sensillae in addition to those of pore. Female antenna with basal short flagellar segments far longer than wide and distinctly tapered and AR about 1.02. Thorax almost entirely brown; scutum with obscure paler or yellowish clouds; scutellum with 1 median and 2 lateral strong bristles and always without minute accessory setae. Legs mainly brown; tibiae of fore and hind legs somewhat broadly yellowish on bases and middle legs with knee-parts yellow; female hind TR about 2.06 and male TR about 1.93. Spermathecae with very short neck parts; larger 2 subequal and oval or sub-spherical. Male hypopygium with tergite 9 round on caudal margin, anal points highly reduced, sternite 9 without distinct caudal emargination; membrane bare, parameres finely spinulous at tip, aedeagus simple.

Female: Body length about 1.57 mm (1.3-1.96 mm). Wing about 1.15 mm (1.12-1.24 mm) by 0.47 mm (0.45-0.49 mm). Head almost entirely brown including mouthparts, with eyes contiguous above, proboscis about 1/2 as long as head capsule, clypeus bearing 4 setae and very rarely with 5. Maxillary palpus (fig. 26a) slender, with segment 3 somewhat fusiform, sensory pore normal and sometimes very few scattered sensillae present on distal part of segment; relative lengths of 5 segments about 7.7: 15: 19.1: 10.1: 8.9. Antenna (fig. 26b) with scape brown or dark brown, other segments mainly brown, but several basal short segments with bases yellowish before basal verticils, short flagellar segments about twice as long as wide and tapered; AR rather small, about 1.02 varying from 0.99 to 1.04; distal 8 segments in proportion of 14.6: 14.4: 15.2: 19.1: 19.6: 23.1: 25: 34.9. Thorax almost

entirely brown, but scutum with obscure pale or yellowish clouds: pair of small clouds covering humeral pits, pair of oblong larger clouds on middle of anterior 1/2 between

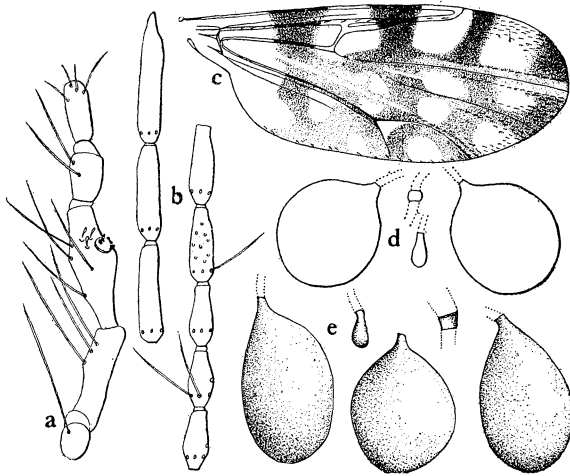


Fig. 26. *Culicoides novaguineanus*, female. a, maxillary palpus; b, apical 8 antennal segments; c, wing; d, spermathecae and basal ring of paratype; e, spermathecae and basal ring of holotype and round spermatheca of another paratype.

foveae and pair of round clouds covering free parts of transverse scutal sutures; scutellum always with only 3 large bristles. Legs mainly brown, but trochanters slightly paler, bases of femora very narrowly pale brown, distal 4 tarsal segments very pale brown, knee-parts more or less paler or yellow: in fore leg extreme end of femur slightly paler, basal 1/4 of tibia yellow, in middle leg apical 1/6 of femur, basal 1/4 and extreme end of tibia yellow, in hind leg extreme end of femur yellowish brown, distal and basal 1/5 of tibia yellow. Leg segments, except for basal 2, in proportion of 114.3: 110.8: 62.1: 23.2: 14.9: 11.6: 15.2 in fore, 141.2: 143.2: 75.7: 24.7: 16.3: 12.3: 15.2 in middle and 134.7: 129.7: 62.1: 29.8: 18.1: 13.6: 17.5 in hind leg. Hind

TR about 2.06 varying from 1.97 to 2.14.

Wing (fig. 26c) with rather sparse macrotrichia on distal area of cell R_5 along wing margin, distal parts of cells M_1 and M_2 , very few trichia along anal margin of cell M_4 and anal cell, macrotrichia arranged in single lines along both sides of distal 1/2 of M_1 and distal 1/3 of M_2 and above distal 2/3 of M_{3+4} . Costa ending at about basal 0.7 of wing length (63.1: 89.2), slightly before dark costal spot 3 and slightly or just beyond level of tip of M_{3+4} , relative lengths of R, M and stem of fMCu about 32.8: 27.2: 41.6, Rs about 1.7 \times as long as R_1 (25.4: 14.6), second radial cell far longer than first radial cell (15.5: 9.4), fMCu usually under midway of first radial cell, M_{3+4} longer than twice of Cu_1 (23.4: 10.3), slightly deflected from stem of fMCu and slightly curved, Cu_1 ending slightly before or just beyond tip of R_1 . Wing with well defined colored markings as shown: very large pale spot covering basal 1/5 wing, pale costal spot 1 large, enveloping r m and basal 2/3 of first radial cell, pale costal spot 2 large, enveloping apical 2/3 second radial cell, dark costal spot 3 rather narrow, pale costal spot 3 subsquare and situated distinctly before apical corner of cell R_5 , all marginal paler spots widely touching wing margin, but apical pale spot of cell M_1 distinctly separated from wing margin, basal corner of fMCu distinctly paler, small pale spot present just above fMCu; wing marking slightly variable: pale costal spot 1 rarely narrower, subconfluent with pale spot below or round spot of caudal margin, pale costal spot 2 rarely narrower, pale costal spot 3 sometimes subconstricted in middle and narrowed on costal side, basal pale spot of cell M_1 rarely confluent with spot behind and that under M_{1+2} , apical pale spot of cell M_2 sometimes oblong and rarely shorter than apical spot of cell M_1 , basal pale spot of cell M_4 often larger, small pale

spot above fMCu rarely confluent with above paler spot, 2 small pale spots of anal cell often larger, rarely round or subsquare and basal one rarely confluent with pale wing base. Halter entirely white. Abdomen brown or dark brown, with cercus pale brown, tergites square, sternites subdivided into hemisternites, pleural membranes with dark striation. Spermathecae (figs. 26d, e) brown, each with small neck part; 2 large, generally oval but rarely subspherical, subequal (1.5+16.3 units by 12.4 units and 1.3+15.5 units by 11.6 units respectively), 1 vestigial, slightly swollen apically (4.3 units by 1.8 units).

Male: Body about 1.53 mm long. Wing about 0.95 mm by 0.35 mm. Coloration and general structure similar to female with usual sexual differences. Head with eyes separated above as wide as $1.5\times$ facet, proboscis short and about $1/3$ head height, clypeal setae 4. Maxillary palpus (fig. 27b) without scattered sensillae on segment 3, with 5 segments in proportion of 8: 8.5: 12: 6: 4.5. Antennae broken off. Thorax as in female, but caudoscutal area of scutum rather paler; scutellum with strong median bristle and rather short lateral bristle on each side. Legs with color as in holotype, distal 7 segments in proportion of 102: 96: 54: 21: 14: 11.5: 14 in fore, 123: 124: 67: 24: 14: 11.5: ? in middle and 108: 109: 53: 27.5: 16: 12: 13 in hind leg; hind TR about 1.93.

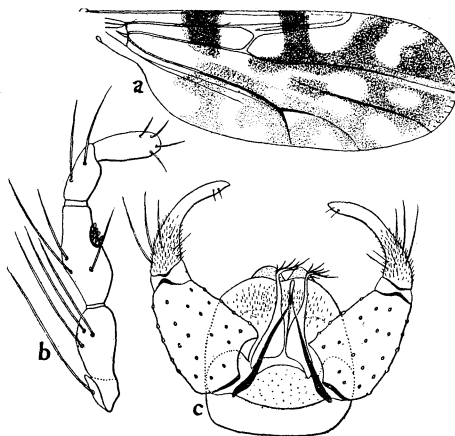


Fig. 27. *Culicoides novaguineanus*, male. a, wing; b, maxillary palpus; c, hypopygium.

Wing (fig. 27a) with very scant macrotrichia at tip, arranged closely in line along apical margin of cells R_5 and M_1 , several trichia arranged in line above distal $1/4$ of vein M_1 ; colored markings as in holotype, but pale costal spot 3 narrower than in female and very slightly constricted at middle, distal 2 pale spots of anal cell confluent forming U-shaped large spot; costa ending before tip of M_{3+4} and extending about 0.7 of wing length (51: 73), R_s shorter than twice R_1 (22: 13), second radial cell subequal in length to first (11: 10), relative lengths of R, M and stem of fMCu about 25: 23.5: 36.5, fMCu under midway of first radial cell, M_{3+4} longer than twice Cu_1 (18: 7.5). Abdomen brown, pleural membranes darker. Hypopygium (fig. 27c) generally brown, but with styles and parameres yellow; tergite 9 round on caudal margin and without anal points, sternite 9 transverse, slightly arched, without distinct caudal emargination, with caudal membrane bare; coxites conical and about $1.5\times$ as long as basal width (31: 20), styles tapered, arcuate and pubescent on basal $1/2$; aedeagus triangular, extending caudad almost as long as tergite 9 and with basal arch round and low; paramere thickened on basal part being somewhat triangular, distinctly tapered, extending slightly beyond caudal margin of tergite 9 and very finely plumose with several minute spinules at tip.

DISTRIBUTION: New Guinea and New Britain.

Holotype, ♀ (BISHOP 2869), Hollandia, 100 m, Neth. New Guinea, 23 Aug. 1955, Gressitt. Allotype, ♂ and 6♀ paratypes, same data as holotype; ♀ Keravat, 30 m, Gazelle

Pen., New Britain, 11 Sept. 1955, Gressitt.

This species is somewhat allied to *C. peregrinus* Kieffer in the wing markings, but in the allied species, maxillary palpus has scattered sensillae on segment 3 and is without sensory pores and the coxites of the male hypopygium have many spinules on mesal sides of basal parts, highly differing from the new species. Japanese *C. amamiensis* Tokunaga and Javanese *C. quadratus* Tokunaga are more closely allied to the present species. However, in the first species, the pale spots of the wing are smaller, pale costal spot 3 is separated from the wing margin by a slightly fuscus area and the cell M_4 is not provided with basal pale spot, hind TR is slightly larger, being usually 2.16, and the spermathecae are distinctly unequal. In the second allied species, the base of the wing is dark before the arculus, middle two dark spots of the costal area are far broader than costal pale spots, the second radial cell is squarely ended at the tip and vein M_{3+4} extends distinctly beyond tip of Rs, hind TR is far larger, being 2.25, and the legs are more widely yellow before the knee-joints, all of which differ from the present new species.

35. *Culicoides hollandiensis* Tokunaga, n. sp. Figs. 28 and 29.

Small yellowish brown and yellow species. Female antenna with AR less than 1, about 0.93, distal 5 segments rather short, elongate oval. Maxillary palpus slender and with sensory pore bearing very short sensillae. Thorax mainly yellowish brown and scutum with several yellow distinct spots; scutellum with 3 strong bristles and several minute accessory setae. Legs mainly pale brown, with knee-joints brown, fore and middle legs with yellow bands before and beyond knee-joints, hind tibia with yellow bands on sub-basal and apical part; hind TR 1.93-2.12. Wing with well defined colored markings, pale costal spot 2 constricted or subconstricted at middle and covering only apical end of Rs, costal pale spot 3 slightly separated from wing margin, basal angle of cell M_4 pale and small pale oval spot present just above fMCu; macrotrichia of wing membrane rather thickly spread almost all over surface in female and rather scantily spread on apical 1/3 in male. Spermathecae: 2 large, oval and subequal. Male hypopygium: tergite 9 round on caudal margin and with minute anal points, sternite 9 without distinct caudal emargination, caudal membrane entire spinulose; style rather stout; paramere short, simple and sharply pointed.

Female: Body about 1.53 mm (1.33-1.73 mm) long. Wing about 0.98 mm by 0.44 mm. Coloration mainly yellowish brown and yellow. Head mainly brown including mouthparts, with eyes separated above as wide as 1/2 facet, proboscis rather long, about 3/5 head height, clypeus with 3 pairs of lateral setae. Maxillary palpus (fig. 28c) slender, with rather large sensory pore on segment 3 apically, sensillae of pore not extending out from pore, relative lengths of 5 segments about 11.5:24.3:21.3:9.3:8.5. Antenna (fig. 28a) with scape brown, following short segments yellowish brown, apical 6 segments mainly yellow and somewhat brownish on apical parts, basal short flagellar segments oval, distal 5 segments not cylindrical, but elongate oval and rather short; AR about 0.93; apical 8 segments in proportion of 10.8:11:11:15.3:15.5:16:16.5:22.8. Thorax mainly yellowish brown; scutum with large yellow spots: pair of large oblong ones at middle of anterior 1/2 between foveae, pair of similar spots laterad of middle spots, pairs of short-oval spots on cephalic part of caudoscuteal area, obscure small spot just before each lateral scutal suture, similar small spot on each lateral caudal angle, humeral pits yellow; posterior 1/2 caudoscuteal area brown; scutellum yellow; postscutellum brown and with yellowish brown cloud on anterior part; scutellum with 1 strong median and pair of strong lateral bristles and several (6-7) minute ac-

cessory setae. Leg pale brown and yellow; in fore leg, coxa yellow, trochanter pale brown, femur mainly pale brown, with base yellowish brown, preapical part yellow, knee-joint brown, tibia with basal end brown, sub-basal part yellow and apical 2/3 pale brown, tarsal segment 1 pale brown, following 3 tarsal segments very pale brown, last tarsal segments yellowish; in middle leg, coxae pale brown, femoral preapical part obscurely paler, tarsal segment 1 very pale brown, other parts or segments as in fore leg; in hind leg, femoral preapical paler band absent, tibia with distinct apical yellow band and other parts and segments as in middle leg; leg segments, excepting coxae and trochanters, in proportion of 97.5:

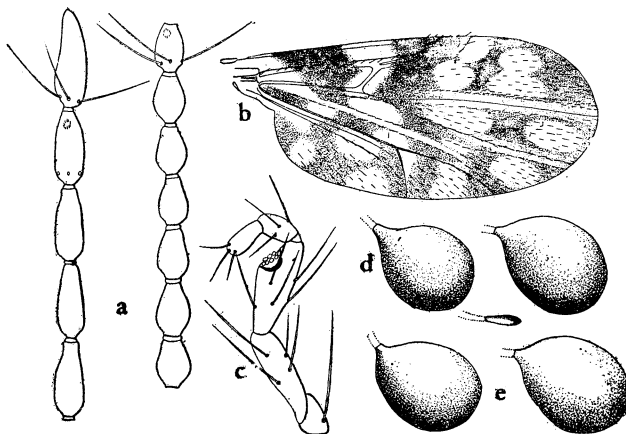


Fig. 28. *Culicoides hollandienseis*, female. a, apical 12 antennal segments; b, wing; c, maxillary palpus; d, spermathecae of holotype; e, 2 large spermathecae of paratype.

91.5: 48: 20.3: 13.8: 10.8: 12 in fore, 124.5: 118.5: 65.5: 21: 14.8: 11.3: 12 in middle and 115.8: 109.5: 52.5: 26: 15.5: 11.5: 12.5 in hind leg; hind TR varying from 1.93 to 2.12.

Wing (fig. 28b) with rather dense macrotrichia covering almost all of surface, but basal area, costal cell and basal radial cell bare, bare areas along M_1 , M_2 and stem of fMCu distinct. Colored markings well defined, costal pale spot 1 broadly touching wing margin, enveloping r-m and basal 1/2 of first radial cell, narrower than neighboring costal dark spots which cover almost entire second radial cell, pale costal spot 2 touching wing margin, covering apical end of R_s and constricted at middle into 2 round spots, pale costal spot 3 located far before tip of cell R_5 , separated from wing margin and subconstricted in middle, costal dark spot 3 very narrow and broadened at middle, cell M_4 with basal triangular pale spot and median large pale spot arising from middle of M_{3+4} and ending on anal margin, small pale spot present just above fMCu, small dark spot present on wing base covering base of stem of fMCu. Costa ending at basal 0.7 or 0.8 of wing length (57:75.5), R_s about 1.8 \times as long as R_1 (18.5: 10), first radial cell very narrow and slit-like, second cell rather broad and distinctly longer than first (9.8: 7.8), relative lengths of R, M and stem of fMCu about 26: 23: 33.5, fMCu under center of first radial cell, M_{3+4} about twice as long as Cu_1 (21.3: 10.3), not deflected from stem of fMCu, very slightly curved and ending distinctly before level of tip of R_s . Halter entirely white. Abdomen entirely pale brownish yellow, with tergites almost entirely reduced, but penultimate segment somewhat browner; cercus yellow. Spermathecae (figs. 28d, e): 2 oval, brown, subequal (2+16 units by 12 units and 1.5+16 units by 11.5 units respectively) and each with short neck part; 1 vestigial, brown and tubular (4.5 units by 1 unit).

Male: Body about 1.13 mm long. Wing about 0.96 mm by 0.34 mm. Coloration generally as in ♀. Head slightly yellowish brown including mouthparts, with eyes separated above as wide as 1 facet, clypeal setae 5. Maxillary palpus (fig. 29b) slender, similar to

those of female and with 5 segments in proportion of 5:13:14:9:9. Antenna (fig. 29a) entirely yellowish brown including plumose hairs, relative lengths of segments 2 to 11 combined and of segments 12 to 14 combined about 116:77, distal 8 segments in proportion

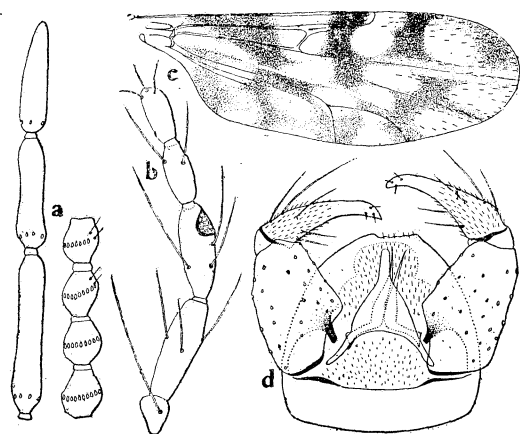


Fig. 29. *Culicoides hollandienseis*, male. a, apical 7 antennal segments; b, maxillary palpus; c, wing; d, hypopygium.

of 8:8:8:9:9:21:23:22.5. Thorax similar to female, but generally more yellowish. Legs with coloration similar to female but paler brownish, bands before and beyond brown knee-joints white; hind TR about 1.94; relative lengths of segments from femora to tarsi about 91:81:46:18.5:13:9:10.5 in fore, 122:109:62:20.5:14.5:10:12.5 in middle and 106:100:46.5:24:14:10:12 in hind leg.

Wing (fig. 29c) with macrotrichia sparse, distributed on apical 1/4 and bare areas along M_1 distinct; paler spots larger than in female, pale costal spot 1 enveloping r-m and basal 3/4 of first radial cell, costal dark spot 2 much narrower than pale spot 1 or 2 and similar to dark spot 3 in size and covering almost entire second radial

cell, pale spot 2 with middle constriction very slight, spot 3 large and oval differing from female wing markings. Costa ending at basal 0.6 of wing length (46:74) and above midway of anal margin of cell M_4 , Rs about $1.5\times$ of R_1 (12:8), second radial cell as long as first (5:5), but much wider, relative lengths of R, M and stem of fMCu about 27:24:35, fMCu under middle of first radial cell, M_{3+4} slightly deflected from stem, strongly curved on apical 1/2 and about twice as long as Cu_1 (16:7). Halter white. Abdomen very pale brown. Hypopygium (fig. 29d) pale brown, but aedeagus and paramere more brownish; tergite 9 round on caudal margin and with vestigial anal points, sternite 9 transverse, without caudal emargination and with caudal membrane spinulose; coxite conical (24×15); style shorter than coxite (20:24), rather stout, tapered, slightly arcuate and pubescent on basal 1/2; aedeagus with slender basal roots, basal arch semicircular and low, median part subtriangular and caudal part rod-like; paramere slightly shorter than aedeagus (17:19), rather small, each with basal root slender and extending laterad, apical 2/3 almost extended caudad straight as far as aedeagus, tapered and sharply pointed.

DISTRIBUTION: New Guinea.

Holotype, ♀ (BISHOP 2870), Hollandia, 100 m, Neth. New Guinea, 23 Aug. 1955, Gressitt. Allotopotype, ♂, and paratype, ♀, same data as holotype.

This species is somewhat allied to *C. rabauli* Macfie, but these two species may be easily distinguished by the following differences: In the allied species (male unknown), two pale spots of wing cell M_4 are confluent with each other along underside of vein M_{3+4} forming a semicircular large spot, a pale oblong spot covering sub-basal part of vein M_1 is present under second costal pale spot and a similar spot covering middle part of M_2 is present above middle of M_{3+4} ; AR is larger, being about 1.8; scutellum is provided with four strong

bristles and hind TR is 2.0–2.2. While in the present species, two spots of wing cell M_4 are quite separated from each other, two oblong pale spots covering M_1 and M_2 are absent; AR is less than 1.0; scutellum is provided with three strong bristles and hind TR is 1.93–2.12.

36. *Culicoides jimmiensis* Tokunaga, n. sp. Fig. 30.

Medium-sized brown species. Maxillary palpus with scattered sensillae on segment 3 and very few on segment 4. Thorax with pair of distinct median yellow spots on scutum. Legs with yellow knee-parts on anterior pairs; hind TR about 2.18. Wing without basal dark spot, 3 costal pale spots widely touching wing margin, second radial cell ending just before costal dark spot 3, costal pale spot 3 far before apical part of cell R_5 and subconstricted, apical pale spots of cells M_1 and M_2 somewhat separated from wing margin, basal pale spot of cell M_1 confluent with that below beyond sub-basal part of M_2 ; macrotrichia spread rather densely on apical 2/5 wing and sparsely along anal margin of anal cell and cell M_4 . Spermathecae: 2 well developed, oval and subequal. Male unknown.

Female: Body about 1.78 mm long. Wing about 1.22 mm by 0.53 mm. Coloration generally brown and with yellow spots on scutum and yellow bands on legs. Head dark brownish, with mouthparts brown, eyes contiguous above, proboscis slightly longer than 1/2 head height (15: 24), 6 clypeal setae. Maxillary palpus (fig. 30b) rather slender; segment 3 not strongly swollen and with many scattered sensillae on almost entire length of ventral side and segment 4 with very few scattered similar sensillae; 5 segments in proportion of 5: 16: 20: 9: 8.5. Antennae missing. Thorax mainly brown; scutum dark brown on anterior 1/4, pale brown on anterior 1/2 of caudoscuteal area, humeral pits yellow, with pair of large yellow spots at middle between foveae, pair of curved large pale clouds before scutal sutures elongate caudad between foveae, and free ends of scutal sutures; scutellum with 4 strong bristles and no accessory minute setae. Legs mainly brown, with bases of femora and distal 2 tarsal segments pale brown; anterior 4 legs with knee-parts rather broadly yellow; hind legs with apical ends of femora pale brown and both end-parts of tibiae distinctly yellow; hind TR about 2.18; relative lengths of leg segments, except for basal 2, in proportion of 106: 106: 60: 22: 14.5: 10: 13 in fore, 135: 135: 75: 25: 16: 12: 14 in middle and 130: 130: 61: 28: 17.5: 12: 14 in hind leg.

Wing (fig. 30a) with rather dense macrotrichia on apical 2/5 and sparsely along anal margin, bare areas along veins distinct. Wing markings well defined as follows: broad pale spot on wing base, 3 costal pale spots touching wing margin and rather large, costal pale spot 2 enveloping r-m and basal 2/3 of first radial cell, dark costal spot 2 enveloping apical 1/3 first and basal 1/3 second radial cell, costal pale spot 2 enveloping apical 2/3 of second radial cell which extends just to costal dark spot 3, costal dark spot 3 rather narrow and slightly constricted at middle, costal pale spot 3 broad, subconstricted in middle and very widely separated from apical corner of cell R_5 , basal pale spot of cell M_1 confluent with spot beneath it beyond vein M_2 , apical 2 pale spots of cells M_1 and M_2 somewhat separated from apical wing margin, pale median spot of cell M_4 rather deeply constricted at middle, pale spot present above end part of stem of fMCu, anal cell with 2 round pale spots on apical part. Costa ending at basal $0.68\times$ wing length (64: 94) and just before tip of M_{3+4} , R_s about $1.5\times$ as long as R_1 (25: 17), second radial cell about

1.3× as long as first (12:9), relative lengths of R, M and stem of fMCu about 30:27:44,

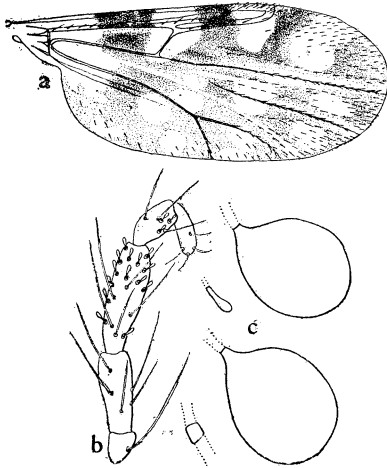


Fig. 30. *Culicoides jimmiensis*, female. a, wing; b, maxillary palpus; c, spermathecae and basal ring.

fMCu under middle of first radial cell, M_{3+4} slightly deflected from stem of fMCu, very slightly curved and longer than twice Cu_1 (23:10). Halter white. Abdomen brown, with tergites complete, sternites reduced into paired hemisternites, pleural membranes fuscous brown, cercus yellow; spermathecae (fig. 30c) all brown; 2 well developed, oval, subequal, (2+16 units by 14 units and 1+15 units by 13 units respectively) and with short neck parts; 1 vestigial, and tubular (4 units by 1 units).

DISTRIBUTION: New Guinea.

Holotype, ♀ (BISHOP 2871), Wum, 850 m, Jimmi Valley, Sepik drainage, NE New Guinea, 16 July 1955, Gressitt.

This species is allied to *C. cuniculus* Lee and Reye and *C. kagiensis* Tokunaga in wing markings. These two allied species, however, are distinguished from the present species in the following differences: in the first Australian allied species, the eyes are separated above rather widely,

the maxillary palpus is provided with a large and very irregularly shaped sensory pore on the third segment, hind TR is less than 2.0, being about 1.8, there is an additional small oval faint spot present just below the second costal pale spot enveloping the sub-basal part of vein M_1 and the third costal pale spot is distinctly subdivided into two spots; in the second Formosan allied species, the wing base is provided with a small costal and obscure sub-basal dark spots, the maxillary palpus is provided with a small ordinary sensory pore on segment 3 and the two larger spermathecae are almost spherical and more distinctly unequal.

37. *Culicoides amamiensis* Tokunaga, 1937, Tenthredo 1(3): 325; 1941, Ins. Mats. 15(3): 93 (variation of Manchurian specimens); 1950, Jap. Jour. Sanit. Zool. 1(3): 66.—Okada, 1954, Jour. Appl. Zool. 19(1): 7.—Komyo, 1955, Seto Mar. Biol. Lab., Publ. 4(2-3): 372.—Arnaud, 1956, Microent. 21(3): 90. Fig. 31.

Medium-sized brown species, with rather small well-defined pale spots on wing. Maxillary palpus with sensory pores on slender segment 3. Antenna of female with basal short flagellar segments elongate, oval; AR 1.03-1.12. Thorax mainly brown, scutum with ill-defined paler clouds; scutellum with 2 median (rarely 1) and 2 lateral bristles and 2 additional smaller setae on lateral margins. Legs with yellow and pale brown bands before and beyond knee-joints; hind TR 1.96-2.17. Wing with sparse macrotrichia distributed on apical marginal area, very few close-set trichia along anal margin; wing markings well defined and pale spots, in female, rather small, base of wing broadly pale, costal pale spot 1 widely touching costal margin and not extending beyond M and M_{1+2} ; costal pale spot 2 as large as 1, touching costal margin, enveloping apical 1/2 second radial cell, widely separated from vein M_1 , costal pale spot 3 longer than wide, situated at apical 1/3 cell R_s , narrowly

separated from costal margin and distinctly so from M_1 , basal pale spot of cell M_1 just or almost confluent with posterior spot of cell M_2 , pale spots present just above fMCu and at end of M_1 , no pale spot at inner angle of fMCu. Spermathecae: 2 well developed, subspherical or short-oval and subequal or slightly unequal. Male hypopygium with tergite 9 almost round on caudal margin and anal points highly reduced, sternite 9 with caudal emargination very shallow; styles stout, tapered and arcuate; aedeagus with basal arch about 1/3 total length, middle part subtriangular and caudal part tapered and slender; paramere as long as aedeagus, slightly extending beyond tip of aedeagus and tapering to finely hairy apex.

Female: Body about 1.57 mm (1.3–1.91 mm). Wing about 1.19 mm by 0.5 mm, varying from 1.11 mm by 0.46

mm to 1.24 mm by 0.52 mm. Coloration generally brown. Head brown, with eyes almost or quite contiguous above, proboscis about 1/2 as long as or slightly longer than 1/2 length of head capsule (14: 26), clypeus with 4 setae on lateral parts. Maxillary palpus (fig. 31c) brown, rather slender, with sensory pore on preapical part of fusiform segment 3, 5 segments in proportion of 6.1: 14.6: 19.4: 9.9: 9.5. Antenna (fig. 31a) with scape brown, short basal segments rather long, oval and several of them pale brown, but rest brown as in apical 5 long segments; AR about 1.09 (varying from 1.03 to 1.12); apical 10 segments with following relative lengths: 12.3: 13: 12.5: 12.7: 13: 16.8: 17.2: 20.8: 21.8: 32.3. Thorax almost entirely brown, but scutum with pair of small pale spots covering humeral pits, other paler clouds ill-defined and obscure; pair of oblong median vittae between foveae, small reniform cloud on either side above scutal lateral suture, small round cloud on either side behind lateral suture, caudoscuteal area uniformly brown or faintly paler laterally; scutellum usually with 2 median and 2 lateral bristles and 2 smaller lateral setae but rarely single median bristle. Legs mainly brown, with yellow or pale brown knee-parts, bases of femora pale brown, tarsi mainly very pale brown; fore leg with knee-joint dark and pale brown narrow band on preapical part of femur and wide yellow band on sub-basal part of tibia; middle leg with distinct, broad and yellow knee-part and rarely with dark knee-joint; hind leg without femoral preapical pale or yellow bands, but with yellow basal and apical tibial bands and rarely knee-joint dark, tarsal segment 1 brown. Hind TR about 2.06 (varying from 1.96 to 2.13). Leg segments, except for basal 2, in proportion of 103.3: 98.2: 59.3: 22.3: 14.4: 10.4: 12.5 in fore, 131.8: 131.7: 77.3: 24.3: 16.3: 11.7: 14.3 in middle and 128.8: 122.2: 60.1: 29.3: 16.7: 10.5: 12.8 in hind leg.

Wing (fig. 31b) with macrotrichia sparsely spread on apical parts of cells R_5 , M_1 and M_2 and very few closely arranged along anal margin; wing markings very clear, pale spots well defined and rather small, wing base broadly pale and without dark spot on area of arculus, costal pale spot 1 touching costal margin, covering r-m and basal 1/2 first radial

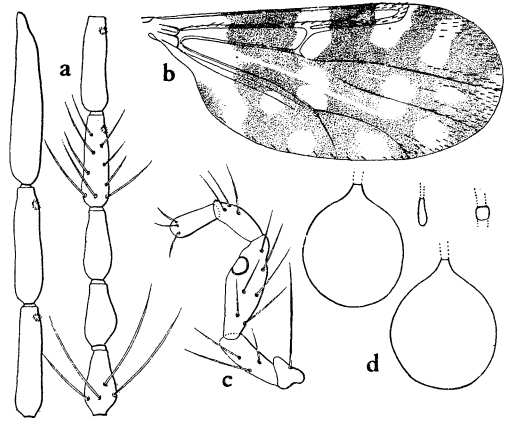


Fig. 31. *Culicoides amamiensis*, female. a, apical 8 antennal segments; b, wing; c, maxillary palpus; d, spermathecae and basal ring.

cell and just reaching M and M_{1+2} , costal dark spot 2 as wide as or slightly wider than costal pale spot 1 or 2 and enveloping apical 1/2 first and basal 1/2 second radial cell, costal pale spot 3 as wide as pale spot 1, enveloping apical 1/2 of second cell and widely separated from vein M_1 , costal pale spot 3 located at distal 1/3, as wide as costal dark spot 3 and narrower than costal pale spot 2, longer than wide but sometimes sub-square and not touching wing margin and vein M_1 , costal dark spot 3 sometimes wider than pale spot 3, basal pale spot of cell M_1 distinctly separated from vein M_1 but reaching to M_2 and more or less confluent with posterior pale spot of cell M_2 , apical pale spot of cell M_1 small and much separated from wing margin, apical pale spot of cell M_2 just touching or rarely just separated from wing margin, pale spot of cell M_4 widely touching wing margin but separated from M_{3+4} , anal cell with 2 round pale spots and basal dark spot, small pale spots present just above fMCu and at end of M_1 and rarely more faint spots at end of M_2 . Costa ending at basal 0.7 of wing length (63: 89.4) and above tip of M_{3+4} , Rs about $1.75\times$ as long as R_1 (24: 13.6) and extending slightly before costal dark spot 3, second radial cell large and about $1.4\times$ as long as first (12.6: 9.2), relative lengths of R, M and stem of fMCu about 32.4: 29.8: 41.1, fMCu before middle level of first radial cell, M_{3+4} slightly deflected from stem, slightly curved and about $2\times$ as long as Cu_1 (24: 11). Halter yellowish white or white. Abdomen with tergites and hemisternites brown, pleural sides dark and cercus yellow. Spermathecae (fig. 31d) brown; 2 well developed, subspherical, short-oval or slightly pyriform, equal or subequal ($1.6+15.7$ units by 13.5 units and $1.2+14$ units by 12.4 units respectively) and with small neck parts; one vestigial and tubular (3.7 units by 1 unit),

DISTRIBUTION: Manchuria, Japan, New Guinea and New Britain.

NE NEW GUINEA: Wum, Jimmi Valley; 5♀, 16-17 Aug. 1955, Gressitt. NEW BRITAIN: Keravat, ♀, 11 Sept. 1955, Gressitt.

This species, hitherto, has been known from NE Asia and its most southern locality was the Ryukyu Islands. The present report of this species from New Guinea is thus peculiar. The New Guinea specimens, however, are completely identical with Japanese type specimens as shown in the above detailed description. This peculiar discontinuous distribution may be filled in by additional new localities found in more careful critical surveys on the Oriental Region in the future.

38. *Culicoides circumbasalis* Tokunaga, n. sp. Fig. 32.

Rather small brown species. Thorax with many brown spots on scutum; scutellum with 4 strong bristles and many minute accessory setae. Legs with knee-joints dark brown and with yellow bands on sub basal parts of all tibiae. Wing with dense macrotrichia spread all over surface excepting costal and basal radial cell, pale spots well defined and mainly round, dark spot present on wing base before arculus, pale specific round spot present in costal dark spot 1 enveloping middle part of vein M, costal dark spot 2 covering distal 1/2 of first radial cell and almost entire second radial cell except for extreme tip of Rs, pale costal spot 2 enveloping distal end of Rs and constricted into semicircular and round spots, pale costal spot 3 round, slightly separated from wing margin and far separated from apical corner of cell R_5 , 2 pale spots of cell M_1 round, apical one much separated from wing margin. Spermathecae: 2 large, oval and unequal. Male unknown.

Female: Body about 1.31 mm long. Wing about 1.03 mm by 0.43 mm. Coloration

generally dark brown. Head dark brown including mouthparts, with eyes barely separated above as wide as $1/2$ facet, proboscis slightly longer than $1/2$ head height, clypeus with 3 or 4 setae on each side. Maxillary palpus (fig. 32b) with segment 3 large and oval, sensory pore large and just beyond middle of segment, 5 segments in proportion of 7:18:23:9:8 in length. Antenna (fig. 32c) with scape dark brown, following short basal segments yellow, but apical margins brown, distal segments broken off. Thorax mainly dark brown; scutum with many brown spots: pair of oblique large spots covering humeral pits and widely divergent cephalad, pair of small spots behind humeral pits, pair of similar small spots on middle part just before level of scutal sutures, pair of a little larger spots on sides just before scutal sutures, pair of similar spots on anterior part of caudoscuteal area, pair of rather large spots on sides just below lateral scutal sutures, pair of very small spots on posterior part of caudoscuteal area; scutellum brown, with 4 strong bristles and about 10 minute accessory setae; postscutellum dark brown and with brown semicircular spot on anterior part; pleuron and sternum uniformly brown. Legs mainly brown, with trochanters and bases of femora pale brown, all knee-joints dark and all tarsi very pale; fore leg with femoral preapical part narrowly pale brown, tibial sub-basal part rather widely yellow; middle and hind legs without preapical paler bands of femora, but tibiae with sub-basal part yellow and apical ends pale brown, tarsal segment 1 of hind leg brown; hind TR about 2.2; leg segments, except for basal 2, in proportion of about 98:92:46:19:12.5:10:15 in fore, 127:115:67:22:15:10.5:13.5 in middle and 115:105:55:25:17:11:15 in hind leg.

Wing (fig. 32a) dark and with dense macrotrichia covering almost all of surface except costal and basal radial cell, bare areas along veins distinct. Colored markings as follows: extreme base of wing with dark spot before arculus, costal dark spot 1 very broad and containing characteristic round distinct pale spot which covers middle part of vein M, costal pale spot 2 circular, rather widely touching costal wing margin and enveloping r-m and basal $1/2$ first radial cell, costal dark spot 2 covering distal $1/2$ of first radial cell and almost entire length of second radial cell except for apical end of R_5 , pale costal spot 2 widely touching wing margin, covering only apical end of R_5 and constricted into upper semicircular and lower round spot, dark costal spot 3 very narrow, pale costal spot 3 slightly separated from wing margin, round and much separated from apical corner of cell R_5 , 2 pale spots of cell M_1 round and apical one much separated from wing margin, apical marginal parts of cell R_5 and M_1 obscurely paler, pale spots along anal margin of wing large and very broadly touching wing margin, small oval pale spot present above middle part of stem of fMCu. Costa ending at about basal 0.65 of wing length (50:77) and beyond middle level between tips of M_{3+4} and Cu_1 ,

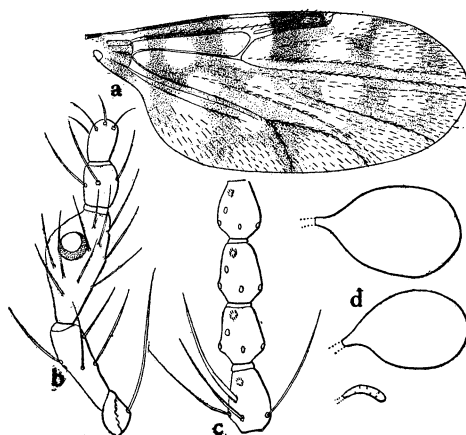


Fig. 32. *Culicoides circumbasalis*, female. a, wing; b, maxillary palpus; c, antennal segments 6-9; d, spermathecae.

R_s about $1.4\times$ as long as R_1 (20:14) and extending very slightly beyond dark costal spot 2, second radial cell subequal in length to first (10:9), relative lengths of R, M and stem of fMCu about 25:23:33, fMCu under middle of first radial cell, M_{3+4} slightly deflected from stem of fMCu and about twice as long as Cu_1 . Halter with knob brown and stem yellow. Abdomen mainly brown, with tergites not reduced, sternites reduced into hemisternites, pleural membranes fuscus brown. Spermathecae (fig. 32d) brown; 2 oval, unequal (3+22 units by 14.5 units and 3+19 units by 14 units respectively); one vestigial and tubular (6 units by 1 unit).

DISTRIBUTION: New Guinea.

Holotype, ♀ (BISHOP 2872), Hollandia, 100 m, Neth. New Guinea, 23 Aug. 1955, Gressitt.

This species is highly specific in possession of a distinct pale round spot in the broad first costal dark spot and is somewhat allied to *C. marmoratus* Lee and Reye and *C. shortii* Smith and Swaminath. These two species, however, are different in the following points, in addition to the characteristic differences of the pale round spot in the first costal dark band: in the Australian allied species, segment 3 of the maxillary palpus is provided with a few additional sensory pores on distal half besides the normal pore, hind TR is less than 2.0, being about 1.8, the apical marginal part of wing is not paler and the two larger spermathecae are almost spherical. In the second Oriental species the third costal pale spot is not circular but gourd-like and distinctly constricted and hind TR is about 2.0.

39. *Culicoides pseudostigmatus* Tokunaga, n. sp. Fig. 33.

Rather small brown and yellow species. Antenna with AR less than 1.0 being about 0.93. Thorax almost entirely brown; scutellum with 4 strong bristles and several minute accessory setae. Legs with knee-joints brown; other parts and segments mainly very pale or yellow, but femora and tibiae with rather broad pale brown bands; hind TR about 2.18. Wing with sparse macrotrichia on apical 1/3, stigma-like dark costal spot, other fuscus markings very faint, all marginal pale spots touching wing margin, costal dark spot 2 enveloping apical 1/2 first radial cell and basal 1/3 second cell, costal pale spot 3 located far before apical end of cell R_s , additional oval spot which covers sub-basal part of vein M_1 present just under pale costal spot 2, apical marginal part of cell R_s faintly paler. Three spermathecae, equal, sub-spherical and each with large hyaline neck part. Male unknown.

Female: Body about 1.34 mm long. Wing about 0.78 mm by 0.35 mm. Coloration generally brown but legs mainly yellow or very pale. Head brown, with eyes separated above as wide as two facets from each other; clypeus with 3 setae on each lateral side; mouthparts pale brown. Maxillary palpus (fig. 33c) about 1/2 length of head capsule, segment 3 elongate-oval, with sensory pore rather small and located just beyond middle of segment, 5 segments in proportion of 6:17:16:9:9. Mandible (fig. 33e) with 15-17 teeth. Antenna (fig. 33b) with scape brown, following short basal segments yellowish pale brown and subspherical to short-oval, distal 5 segments rather pale brown and twice to $4\times$ as long as wide; AR about 0.93; distal 10 segments in proportion of about 7.5:7.5:7.5:8:8.5:10:10.5:11:11.5:18.5. Thorax almost entirely brown, with humeral pits and setal bases of scutum pale; scutellum with 4 strong bristles and about 6 minute accessory setae. Legs with coxae brown, other segments mainly yellowish pale brown, with knee-joints distinctly

brown; anterior 4 legs with rather broad yellow bands before and beyond brown knees and very broad pale brown median bands on femora and tibiae about 1/2 as long as these segments; in hind leg, apical 1/2 of femur pale brown, tibia with rather narrow pale brown band before middle about 1/4 as long as segment; all tarsal segments much paler. Relative lengths of leg segments, except for basal 2, about 73: 72: 33: 13: 10.5: 8: 13 in fore, 93: 87: 46.5: 16: 12.5: 9.5: 12 in middle and 84: 79: 37: 17: ? : ? : ? in hind leg; hind TR about 2.18.

Wing (fig. 33a) with scant macrotrichia on apical 1/3 and cell M_4 almost without macrotrichia; fuscus markings very faint, excepting only distinct costal stigma-like dark spot which is costal part of costal dark spot 2 and envelops apical 1/2 first radial cell and basal 1/3 second, all marginal pale spots large and broadly touching wing margin, wing base broadly pale but with dark small cloud on sub-basal part of stem of fMCu, costal pale spot 1 confluent with paler spot below, costal pale spot 2 somewhat round, enveloping apical 2/3 second radial cell and subconfluent with following under small pale spots forming a broad and slightly zigzag pale band ending in

large pale spot of cell M_4 , costal pale spot 3 located far before apical end of cell, almost reaching M_1 and very slightly constricted before middle, apical corner of cell R_3 rather broadly but obscurely paler, oval small pale spot enveloping sub-basal part of vein M_1 between costal spot 2 and basal pale spot of cell M_1 , pale spot of cell M_4 very large, broadly touching M_{3+4} and slightly constricted, no pale spots just above fMCu and at basal corner of cell M_4 , costa ending slightly beyond middle of wing length (38: 60) and at level of apical 1/3 anal margin of cell M_4 , R_s about 1.5 \times as long as R_1 (15: 10) and ending slightly before costal dark spot 3, second radial cell slightly longer than first (8: 7), relative lengths of R, M and stem of fMCu about 18.5: 16.5: 25, fMCu under center of first radial cell, M_{3+4} not distinctly deflected from stem of fMCu, slightly curved and about twice as long as Cu_1 (19: 10). Halter white.

Abdomen mainly pale brown, with tergites subsquare and brown, sternites highly reduced, posterior 2 or 3 segments brown, cercus pale brown; 3 spermathecae (fig. 33d) very small, brown, somewhat subspherical, quite equal (all 5 units by 6 units) and each with hyaline broad neck part.

DISTRIBUTION: New Guinea.

Holotype ♀ (BISHOP 2873), Hollandia 100 m, Neth. New Guinea, 23 Aug. 1955, Gressitt.

This is one of four New Guinean species which bear three spermathecae; other distinct specific character is the stigma-like dark spot of wing; excepting these distinctions, the new species is somewhat allied to *C. sigaensis* Tokunaga, *javiae* Tokunaga and *marksii*

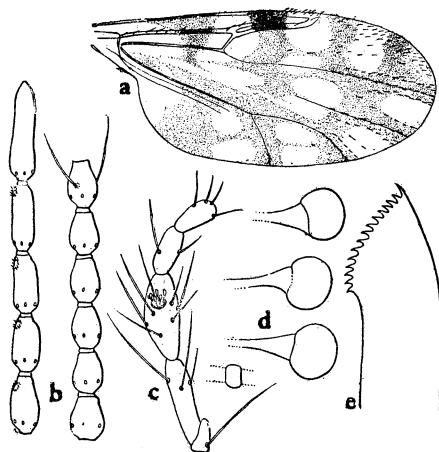


Fig. 33. *Culicoides pseudostigmatus*, female. a, wing; b, apical 11 antennal segments; c, maxillary palpus; d, spermathecae and basal ring; e, apical end of mandible.

Lee and Reye in the wing markings. However, in the Japanese *sigiensis*, the cosalt pale spot 3 of wing is much larger, occupying the apical 1/3 of cell R_5 and hind TR is smaller, being at most 2.0, distinctly differing from the New Guinea species. In the Javanese allied species, the clypeus bears two pairs of marginal setae, hind TR is only 1.9 and costal dark spot 2 covers the entire second radial cell. In the third Australian allied species, costal pale spot 3 is quite divided into two spots, the short basal flagellar segments of antenna are longer and subcylindrical and hind TR is less than 2.0.

40. *Culicoides unisetiferus* Tokunaga, n. sp. Figs. 34 and 35.

Small brownish species. Maxillary palpus slender and with normal sensory pore on segment 3. Female antenna with short basal flagellar segments oval and AR about 1.4. Thorax brownish, female paler than male, scutellum with only 1 median strong bristle. Legs with knee-joints brown and yellow or pale brown bands before and beyond knee-joints; female hind TR about 2.41. Wing with very few macrotrichia only on apical part; female wing far darker and more extensively dark than in male, small dark spot at base before arculus, costal pale spot 1 small, oval and very narrowly touching costal margin, costal dark spot 2 rather broad and enveloping apical 3/4 first and basal 1/2 of second radial cell, costal pale spot 2 subsquare, enveloping apical 1/2 second radial cell, ending at middle of costal margin of pale spot, and broadly touching wing margin, costal pale spot 3 somewhat reniform, touching wing margin and distinctly separated from corner of cell R_5 , 2 pale spots of cell M_1 small, apical pale spot being smaller but rather broadly touching wing margin, no distinct pale spot above M_{3+4} in cell M_2 , pale spot above fMCu absent, pale spot of cell M_4 semicircular, dark spots of wing all confluent with each other; male wing with pale spots far larger and costal pale spot 1 broadly touching wing margin, other features of wing markings similar to female. Two spermathecae, well developed, round, equal and with rather long neck parts. Male hypopygium with tergite 9 somewhat concave on caudal margin, anal points almost absent, sternite 9 with caudal membrane spinulose; style slightly thickened at tip; aedeagus elongate, triangular and with basal arch very low; parameres simple and with apical parts filamentous.

Female: Body about 1.16 mm long. Wing about 0.83 mm by 0.36 mm. Coloration generally pale brown and far paler than in male. Head with vertex pale brown, other parts including mouthparts pale brownish yellow or very pale brown, eyes just touching above, proboscis about 1/2 as long as head capsule and clypeus with 2 pairs of marginal setae. Maxillary palpus (fig. 34c) slender, with segment 3 as long as 2 and sensory pore small; 5 segments in proportion of 5:14:13.5:8:6. Antenna (fig. 34b) with scape brown, short basal segments oval, much longer than wide and yellowish, but apical margins more brownish, distal 5 segments much elongate and pale brown; AR about 1.14; distal 8 segments in proportion of 8.5:9.5:10.5:15.5:16.5:15.5:14.5:24. Thorax almost entirely pale brown, central part, sides of caudoscuteal area and scutal sides behind scutal sutures faintly paler; scutellum with single median strong bristle. Legs mainly pale brown, with bases of femora very pale, knee-joints brown, fore and mid-legs with yellow bands before and beyond knee-joints, hind leg with rather pale band before knee-joint and yellow bands beyond knee-joint and at end of tibia; hind TR about 2.41; leg segments, except for basal 2, in proportion of 77:73:40:12.5 9.5:7.5:10.5 in fore, 95:92:57:15:10:8:11 in middle and 92:91:41:17:11:8:11 in hind leg.

Wing (fig. 34a) extensively fuscus, with pale spots rather small and few in number,

macrotrichia rather sparse, distributed along apical wing margin between tips of R_s and M_{3+4} and arranged in single lines along both sides of apical 1/2 M_1 , bare areas between these lines of macrotrichia and those along apical part of M_1 distinct; markings as follows: small dark spot present at wing base before arculus, costal pale spot 1 subtriangular, enveloping r-m and extreme base of first radial cell and narrowly touching costal margin, costal dark spot 2 rather broad enveloping apical 3/4 of first radial and basal 1/2 second cell, costal pale spot 2 somewhat square, covering apical 1/2 second radial cell, ending at middle of costal margin of pale spot, broadly touching wing margin and not reaching vein M_1 , costal pale spot 3 subreniform, touching wing margin and broadly separated from corner part of cell R_5 , 2 pale spots of cell M_1 small, oval, apical one distinctly separated from apical margin, apical pale spot of cell M_2 small, semicircular, but broadly touching wing margin, pale spot of M_4 large, semicircular broadly touching M_{3+4} and wing margin, pre-apical 2 pale spots of anal cell widely contiguous with each other, no pale spots above fMCu and above M_{3+4} in cell M_2 . Costa ending at basal 0.66 of wing

length (42:64) and distinctly before level of tip of M_{3+4} , R_s about 1.5× as long as R_1 (15:10), second radial cell subequal in length to first (5:6), proportional lengths of R, M and stem of fMCu about 22:19:30, fMCu midway under first radial cell, M_{3+4} deflected from stem of fMCu, strongly curved and twice as long as Cu_1 (14:6.5). Halter white. Abdomen very pale brown, with tergites normal, sternites obscure, pleural membranes with fine brown striation; cercus yellow. Two well developed spermathecae (fig. 34d, e), round brown, equal (3+11 units by 10.5 units and 2+11 units by 9 units respectively) and with rather long neck parts; one vestigial and irregularly curved (?).

Male: Body about 1.5 mm long. Wing about 0.91 mm by 0.33 mm. Coloration more brownish than in female and structures generally similar to female with usual sexual differences. Head mainly brown, with mouthparts slightly paler, eyes just touching above, proboscis slightly longer than 1/2 length of head capsule (10:18). Maxillary palpus (fig. 35b) slender and 5 segments in proportion of 5:10:11:7:8. Antennae missing. Thorax entirely brown; scutellum with single bristle as in female. Legs mainly pale brown; relative lengths of leg segments, except for basal 2, about 87:79:46:16.5:12:?:? in fore, 103:102:78:?:?:? in middle and 100:98:46:?:?:? in hind leg (apical tarsal segments missing).

Wing (fig. 35a) with fuscus markings much paler and pale spots larger than in female, macrotrichia very sparsely arranged in line along apical wing margin of cell R_5 and very few at apical part of cell M_1 ; costal pale spot 1 very broadly touching costal margin and enveloping r-m and basal 3/4 of first radial cell, costal dark spot 2 covering distal 1/4 of first radial cell and basal 1/2 of second radial cell, costal pale spot 2 enveloping apical 1/2 of second cell, which extends a little into pale spot, broader than dark costal

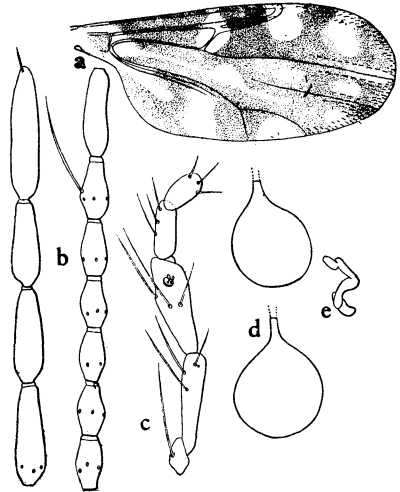


Fig. 34. *Culicoides unisetiferus*, female. a, wing; b, apical 11 antennal segments; c, maxillary palpus; d, spermathecae; e, vestigial spermatheca (?).

spots on both sides, subequal in width to costal pale spots 1 and 3 and not reaching vein M_1 , faint paler spot present above M_{3+4} in cell M_2 and small oval spot present above pre-apical part of stem of fMCu, apical pale spot of anal cell large and semicircular. Costa ending at basal 0.65 of wing length and at level of basal 1/3 of anal margin of cell M_4 , Rs about $1.7\times$ as long as R_1 , second radial cell subtriangular and slightly longer than first cell (7.5: 6), relative length of R, M and stem of fMCu about 25: 24: 34.5, fMCu under basal end of second radial cell, M_{3+4} somewhat deflected from stem of fMCu, strongly curved and twice as long as Cu_1 (14: 7).

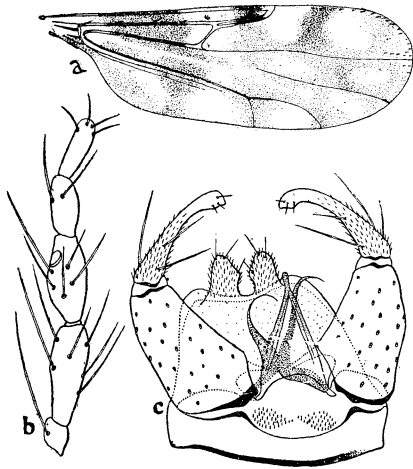


Fig. 35. *Culicoides unisetiferus*, male. a, wing; b, maxillary palpus; c, hypopygium.

Abdomen very pale brown, with pleural sides very finely striated and brown. Hypopygium (fig. 35c) pale brown, with tergite 9 subtrapezoid, slightly concave on caudal margin, anal points obscure; sternite 9 with caudal emargination very shallow and caudal membrane with spinulous patches; coxite conical and about twice as long as basal width; style slightly arcuate and slightly swollen at apex; aedeagus elongate, and subtriangular with basal arch very low; parameres angulate at basal 1/3, its apical 2/3 taper-

ed into filiform tips and extending slightly beyond tip of aedeagus and caudal margin of tergite 9.

DISTRIBUTION: New Guinea and New Britain.

Holotype, ♀ (BISHOP 2874), St. Paul's 300 m, Baining Mts., Gazelle Pen., New Britain, 7 Sept. 1955, Gressitt. Allotype, ♂, Hollandia, 100 m, Neth. New Guinea, 23 Aug. 1955, Gressitt.

This species is closely allied to Malayan *C. buckleyi* Macfie in the wing markings, however, the allied species is different in the following points from the present species: the third costal pale spot of the female wing is distinctly separated from the wing margin by a dark-costal bridge, macrotrichia are fairly numerous, covering a greater part of the margin distal to the level of the costal end, AR is about 1.28, scutellum is provided with three or four strong bristles and hind TR is about 2.

41. *Culicoides buckleyi* Macfie 1937, Roy. Ent. Soc. Lond., Proc. B, 6 (6): 117. Fig. 36.

Small brown or dark brown species. Maxillary palpus slender, with long segment 3 and small sensory pore. Antenna with AR about 0.95-0.96 (in Malayan specimens 1.28). Thorax almost entirely brown or dark brown; scutellum with 3 strong bristles. Legs mainly dark brown or brown, fore and middle legs with yellow sub-basal bands on tibiae and hind leg with apical yellow band besides similar sub-basal band; hind TR about 2.34 (in Malayan specimens 2.0). Wing dark, with paler spots fewer in number and small, macrotrichia rather scant, spread along apical margin and very few closely along anal margin; arrange-

ment of pale spots: costal pale spot 1 angulate and touching wing margin, pale spot 2 enveloping apical $1/2$ second radial cell, much larger than pale spots 1 and 3 and rather broadly touching costal margin, costal pale spot 3 somewhat reniform, oblique and not reaching costal margin, apical pale spot of cell M_1 well separated from wing margin, apical pale spot of M_2 just touching wing margin, pale spot of M_4 just touching vein M_{3+4} , no pale spots above $fMCu_1$, M_{3+4} in cell M_2 and at basal angle of cell M_4 . Two spermathecae, round (in Malayan specimens pyriform) and equal.

Female: Body 1.3 mm to 1.51 mm long. Wing about 0.96 mm to 1.24 mm by 0.57 mm to 0.46 mm. Coloration almost entirely brown or dark brown. Head with eyes contiguous above, proboscis about $2/3$ length of head capsule (12.5:19.5), clypeus with 2 lateral setae on either side. Maxillary palpus (fig. 36c) slender, with segment 3 elongate and sensory pore small and shallow, 5 segments in proportion of 6:18:20:9:8. Antenna (fig. 36a) with scape dark brown, other segments mainly brown; AR about 0.96; segments, except for scape, with following relative lengths: 12:8:10:11:9:8.5:9.5:10:13:14:14.5:15:24. Thorax almost entirely dark brown or brown, but humeral pits yellow, scutum indistinctly showing faint and slightly paler clouds on central part between foveae and lateral parts before and behind scutal suture; scutellum with 3 strong bristles and without minute accessory setae. Legs mainly dark brown or brown, but with trochanters and bases of femora yellowish, knee-joints black, preapical parts of femora slightly paler, in fore and middle legs sub-basal parts of tibiae broadly yellow and apical ends slightly paler, in hind leg both ends of tibia broadly yellow; hind TR about 2.33 (2.26-2.44); leg segments, except for basal 2, in proportion of 94:91.8:50.8:17.3:12:8.5:11.5 in fore, 115.3:113.5:67.9:18.5:12.5:11.8 in middle and 117:116.5:52.8:9:22.8:13.8:10.5:12.5 in hind leg.

Wing (fig 36b) with macrotrichia very scanty, spread on apical margin and very sparsely arranged in line closely along anal margin, broadly fuscus and with pale spots rather less in number and small; feature of wing markings as follows: wing base rather narrowly pale, costal pale spot 1 rather narrow, turning somewhat

V-shaped, enveloping r-m and basal $1/3$ first radial cell and touching costal margin, dark spot 2 broad and covering apical $2/3$ of first and basal $1/2$ of second radial cell, costal pale spot 2 rather broad subrectangular or suboval, enveloping apical $1/2$ of second radial cell, cell ending at middle of anterior margin of spot, costal pale spot 3 somewhat reniform or subrhombic, oblique, distinctly separated from costal margin and vein M_1 and located far before apical corner of cell R_5 , apical pale spot of cell M_1 small, round or oval and far before apical margin, both sides along distal $1/2$ vein M_1 somewhat paler, apical spot of cell M_2 round and just touching wing margin, pale spot of cell M_4 subtriangular

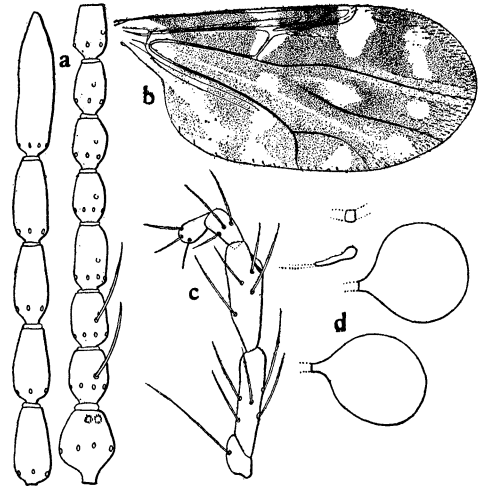


Fig. 36. *Culicoides buckleyi*, female. a, antenna (scape omitted); b, wing; c, maxillary palpus; d, spermathecae and basal ring.

and just touching vein M_{3+4} , no pale spots above fMCu, M_{3+4} in cell M_2 and at basal angle of M_4 . Costa ending at basal 0.67 of wing length (57:84.5) and before level of tip of M_{3+4} , Rs about 1.6× as long as R_1 (22:13.5), second radial cell subtriangular and slightly shorter than first cell (6.5:8.5), relative lengths of R, M and stem of fMCu about 29:26:41, fMCu under middle of first radial cell, M_{3+4} distinctly deflected from stem of fMCu, strongly curved and about twice as long as Cu_1 (21:9.5). Halter with knob brown and stem yellow. Abdomen with tergites and hemisternites brown, pleural membranes with very fine fuscus brown striation, cercus pale brown; spermathecae (fig. 36d) brown, 2 well developed, subequal, subspherical or short-oval (2+12.5 units by 10.5 units and 1.5+13 units by 11.5 units) and with very short neck parts, 1 vestigial (6.3 units by 1.3 units) and slightly swollen at tip.

DISTRIBUTION: Malaya and New Guinea.

NE NEW GUINEA. Jimmi Valley: Wum, 2♀, 16 Aug. 1955 Gressitt.

The New Guinea specimens quite coincide with Macfie's description of the Malayan specimens especially in the wing markings and coloration of various parts, but the values of AR and hind TR are distinctly different from the original description. These differences may represent some local variation. To settle this question a comparison of the male hypopygium from the 2 localities should be done.

41 *Culicoides quaterifasciatus* Tokunaga, n. sp. Fig. 37.

Rather small brown species. Maxillary palpus with segment 3 broad, oval and with rather large sensory pores. Antenna with basal short flagellar segments subspherical to short oval and AR about 1.26. Legs without femoral preapical pale bands, but with tibial sub-basal yellow bands; hind TR about 2.08. Wing mainly pale and with 4 fuscus bands besides 2 apical clouds; macrotrichia rather thickly spread all over surface. Thorax almost entirely brown and scutellum with 4 strong bristles and 4 small accessory setae. Two well developed spermathecae, short oval and subequal. Male unknown.

Female: Body length about 1.08 mm. Wing about 0.99 mm by 0.43 mm. Head mainly brown including mouthparts, with eyes very narrowly separated above as wide as 1/2 facet, proboscis short and about 1/3 as long as head height, clypeus with 3 pair of small marginal setae. Maxillary palpus (fig. 37c) short, stout, with segment 3 thickened, short-oval, and with rather large sensory pore on preapical part; relative lengths of 5 segments about 6:14:15.5:6:7.5. Antenna (fig. 37a) with scape brown, with short basal segments rather pale brown and subspherical to short-oval, distal 5 segments subcylindrical and brown; AR about 1.26; relative lengths of distal 10 segments about 8.5:8.5:8:8:16:17.5:19:19:23.5. Thorax entirely brown, but scutum with humeral pits pale and puncture-like bases of setae hyaline; scutellum with 4 strong bristles, pair of small and pair of minute accessory setae. Legs mainly brown, with bases of femora pale brown, tarsal segments pale brown except for brown hind segment 1; sub-basal parts of fore and hind tibiae yellow and basal part of middle tibia yellowish brown; hind TR about 2.08; leg segments, except for basal 2, in proportion of 93:87:43:17:12:9.5:13 in fore, 119:112:54:20:14:10:14 in middle and 107:98:50:24:14:10.5:14 in hind leg.

Wing (fig. 37b) with macrotrichia rather densely spread almost all over surface, bare areas along veins rather distinct; fuscus markings rather faint and consisting of 4 trans-

verse bands and 2 small apical clouds: basal dark band 1 arising from dark costal spot 1 covering sub-basal 2/5 costal cell and ending in dark spot covering sub basal part of stem of fMCu and not reaching anal margin; band 2 arising from common costal dark spot to band 1, extending obliquely beyond preapical part of M, then ending in preapical dark spot of anal cell, but rather broadly interrupted by furrow above stem of fMCu and not reaching anal wing margin; band 3 arising from tip of R_1 , covering extreme tip of first radial cell and basal 1/3 second cell, passing through forking part of M_{1+2} , interrupted broadly in cell M_2 and ending in dark spot covering entire distal section of Cu_1 ; band 4 arising from basal 1/3 costal margin between tips of costa and of M_1 , ending at apical tip of M_{3+4} , forming zigzag complete band; veins M_1 and M_2 each ending in small fuscus cloud at wing margin. Costa ending at basal 0.67 of wing length (51 : 76) and at middle of costal

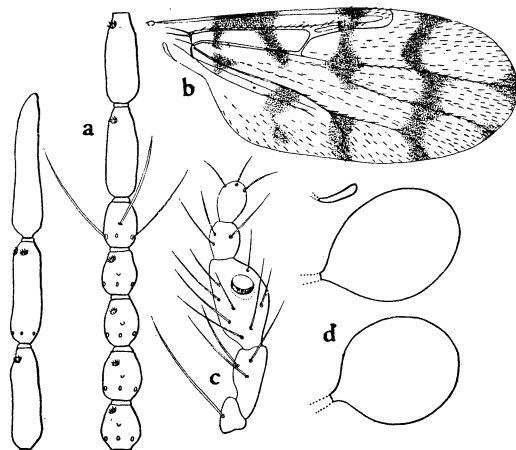


Fig. 37. *Culicoides quaterifasciatus*, female. a, apical 10 antennal segments; b, wing; c, maxillary palpus; d, spermathecae.

pale spot 2, R_s round at tip, ending before level of tip of M_{3+4} and about 1.5 \times as long as R_1 (18:12), second radial as long as first (7:7), relative lengths of R, M and stem of fMCu about 25:23.5:34, fMCu midway under first radial cell, M_{3+4} somewhat deflected from stem of fMCu, slightly curved and about twice as long as Cu_1 (21:10). Halter yellowish white. Abdomen entirely pale brown, but caudal 3 segments more brownish; tergites and hemisternites small; spermathecae (fig. 37d) brown; 2 well developed, short oval (26 units by 19 units and 24 units by 20 units respectively) and with very short neck parts, 1 vestigial (8 units by 2 units) and tubular.

DISTRIBUTION: New Britain.

Holotype, ♀ (BISHOP 2875), St. Paul's, 300 m, Baining Mts., Gazelle Pen., New Britain, 9 Sept. 1955, Gressitt,

This species is somewhat allied to Australian *C. magnimaculatus* Lee and Reye, Palearctic *C. impunctatus* Goetghebuer and Micronesian *C. peliliouensis* Tokunaga in the wing markings. These allied species, however, are different from the present New Britain species in the following points: in the first allied species, dark band 1 of wing just before the arculus is absent, band 2 is broadly expanded along the anal wing margin, bands 3 and 4 are connected by dark bridges above the sub basal part of M_1 along M_{3+4} , legs bear lighter bands just before the apical ends, hind TR is about 1.73, antennal basal short flagellar segments are long, about twice as long as broad, and AR is about 1.0. In the second allied species, the wing is not provided with basal short dark band, segment 3 of maxillary palpus is rather slender and bears scattered sensillae besides a small depression just beyond the middle, the basal short flagellar segments of the antenna are long-oval, AR is about 1, the hind leg bears an apical yellow band on the tibia and hind TR is about 1.82. In the third allied species, the wing is also without basal dark band 1, middle and pre-apical bands are

connected with each other by dark clouds along veins M_1 , M_2 and M_{3+4} the maxillary palpus bears 3 sensory pores on the apical part of a rather slender segment 3, AR is about 1.11 and hind TR is about 2.17.

43. *Culicoides tritenuifasciatus* Tokunaga, n. sp. Figs. 38 and 39.

Rather large brown and yellow species. Wing extensively yellowish white, with highly characteristic 3 narrow transverse dark bands, macrotrichia rather dense and broadly spread on anal and apical margins of wing in female and on apical 1/3 in male, second radial cell almost entirely pale. Maxillary palpus slender and with rather large sensory pore on preapical part of segment 3. Antenna with AR about 1.15. Thorax brown and yellowish, scutum extensively yellowish but brownish along anterior margin, scutellum entirely yellowish, other sclerites brownish, 4 scutellar bristles. Legs mainly brown, with knee-parts broadly yellow, hind TR about 1.95 in female and 2.3 in male. Wing extensively yellowish white and with characteristic 3 narrow transverse bands. Two spermathecae, well developed, oval and subequal. Male hypopygium with styles and parameres yellow, aedeagus with very large basal arch, parameres short and with minute serrulation at tips and tergite 9 with small anal points.

Female: Body length about 1.66 mm. Wings about 1.51 mm by 0.7 mm. Thoracic scutum paler than in male and yellowish part slightly brownish than in male and legs more broadly brown than in male. Head entirely brown including mouthparts, with eyes bare and separated above as wide as one facet, proboscis rather long and about 3/5 as long as head height, clypeus with 2 setae on each side. Maxillary palpus (fig. 38c) slender, with segment 3 long and fusiform, sensory pores rather large on preapical parts, 5 segments in proportion of 12:27:27:12:8.5. Antenna (fig. 38d) almost entirely brown, but scape more brownish and short basal segments elongate, oval and with basal parts before verticils paler; AR about 1.15; distal 8 segments in proportion of about 12:13:14:21:21:26:26:30. Thorax with scutum mainly pale brownish yellow, pale brownish along anterior margin, with pair of faint incomplete pale brown foveae on anterior part and yellow humeral pits, scutellum pale brownish yellow, postscutellum brownish but rather paler, pleuron and sternum all brown, scutellum with 4 strong bristles and several minute accessory setae. Legs mainly brown, bases of all femora pale brown, entire tarsal segments of middle leg and apical 4 tarsal segments of fore and hind legs very pale, anterior 4 legs with knee-parts broadly yellow and hind leg with femoral apical part pale brown, basal 1/3 of tibia yellow and no apical pale band of tibia; hind TR about 1.95; legs with distal 7 segments in proportion of 125:122:66:29:20:14:? in fore, 151:148:73:32:21:14:16 in middle and 159:158:74:38:24.5:16:17 in hind leg.

Wing (fig. 38a) extensively yellowish white, with 3 narrow dark transverse bands: dark costal spot 1 extending caudad beyond middle of stem of $fMCu$ but not reaching anal margin, costal dark spot 2 enveloping distal 1/3 first radial cell, extending caudad covering forking part between M_1 and M_2 and entire length of free part of Cu_1 and ending at anal wing margin, second radial cell including marginal veins entirely located in costal pale spot 2 and ending slightly before dark band 3, costal dark spot 3 extending caudad forming slightly zigzag band and ending at tip of M_{3+4} . Macrotrichia of membrane rather densely spread on apical 1/2 cell R_5 , apical 1/2 cell M_1 , apical marginal part of cell M_2 , posterior 1/2 cell M_4 and posterior 1/2 anal cell, macrotrichia arranged in single lines long both

sides of M_1 and M_2 and along a furrow above M_{3+4} and stem of $fMCu$, bare areas along veins broad. Costa ending at basal 0.7 of wing length (78:116) and before level of tip of M_{3+4} , R_s ending distinctly before dark band 3 and about twice as long as R_1 (35:17), second radial cell very large, entirely covered by costal pale spot 2 and about 1.4 \times as long as first (19:14), relative lengths of R , M and stem of $fMCu$ about 35:32:50, $fMCu$ under midway of first radial cell, M_{3+4} somewhat deflected from stem, slightly curved and twice as long as Cu_1 (35:17). Halter with knob white and stem yellow. Abdomen slightly yellowish brown mainly, with 2 pairs of fuscus lines on sides, cercus pale brownish yellow. Two spermathecae (fig. 38d) well developed, brown, with many hyaline punctures, oval, subequal (1.5+17 units by 16 units and 1.5+18.5 units by 14 units respectively) and with short neck parts; 1 vestigial, brown and tubular (7 units by 1.5 units).

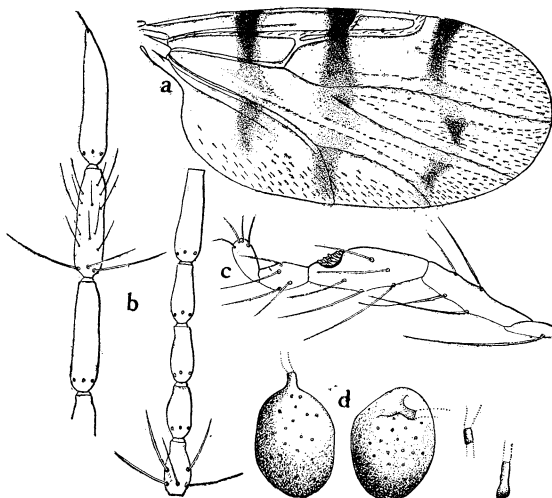


Fig. 38. *Culicoides tritenuifasciatus*, female. a, wing; b, apical 9 antennal segments; c, maxillary palpus; d, spermathecae and basal ring.

Male: Body about 1.69 mm long. Wing about 1.39 mm by 0.55 mm. Coloration more distinctly yellow and brown than in female, other structures mainly as in female with usual sexual differences. Head almost entirely brown, with eyes bare and just touching above, clypeus with 3 marginal setae on each side, proboscis about 1/3 as long as head length. Maxillary palpus (fig. 39c) more slender and with 5 segments in proportion of 6:13.5:18:9.5:10.5. Antenna (fig. 39b) with scape brown, following short basal segments and plumose hairs yellowish pale brown and short flagellar segments oval, 3 apical segments brown but basal parts before verticils yellowish pale brown; relative combined lengths of segments 2 to 11 and 12 to 14 about 139 units and 112.5 units respectively; distal 8 segments in proportion of 10:10:10:11:11:40:34:36. Thorax with scutum yellow but broadly brown along anterior margin, scutellum yellow, other parts almost entirely brown. Legs mainly brown and yellow and with knee-parts broadly yellow: coxae brown, trochanters yellowish brown, bases of all femora pale brown, tarsi mainly very pale brownish yellow and tarsal segment 1 of hind leg more brownish, femoral apical yellow parts about 1/4 in fore, about 1/3 in posterior 2 pairs and tibial basal yellow parts about 2/5 in all legs. Hind TR about 2.3; relative lengths of leg segments, except for basal 2, about 124:123:63:29.5:18.5:10:12 in fore, 157:150:84.5:30:18:9:13 in middle and 147:146:69:30:20:?:? in hind leg.

Wing (fig. 39a) with macrotrichia rather densely spread on apical 1/4, lines of macrotrichia along veins extending before middle dark band: wing markings as in female, but middle dark band enveloping distal 1/3 of first radial cell and basal end of second including distal section of R_1 ; costa ending at basal 0.57 of wing length (61:107), at

level midway to anal margin of cell M_4 and slightly beyond middle of costal pale spot 2, R_s about twice as long as R_1 (27: 13), second radial cell about 1.5 \times first (15:

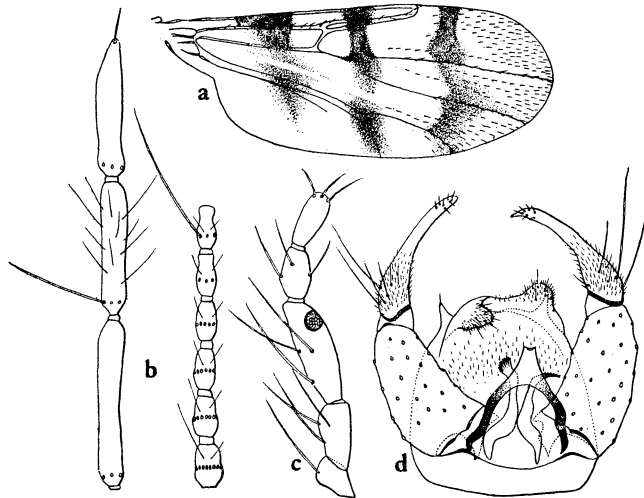


Fig. 39. *Culicoides tritenuifasciatus*, male. a, wing; b, apical 9 antennal segments; c, maxillary palpus; d, hypopygium.

10), relative lengths of R, M and stem of fMCu about 34: 33: 50, fMCu under apical tip of first radial cell, M_{3+4} somewhat deflected from stem and about twice as long as Cu_1 . Halter yellowish white. Abdomen very pale brown mainly, with fuscus pleural membranes. Hypopygium (fig. 39d) brown, but parameres and styles yellow; sternite 9 with caudal emargination very shallow and indistinct, tergite 9 almost round on caudal margin and with anal points small; coxites conical and about 2 \times as long as basal width, styles

slightly arcuate, tapered and pubescent on basal 1/2; aedeagus Y-shaped, basal arch very large and caudal lobe subtriangular and 1/2 as long as basal roots; parameres rather thickened on basal parts, slightly narrowed beyond middle, slightly expanded at extreme tips and very minutely serrulate on apical margins.

DISTRIBUTION: New Guinea.

Holotype, ♀ (BISHOP 2876), Daulo Pass, 2500 m, Asaro-Chimbu Divide, NE New Guinea, 12 June 1955, Gressitt. Allotype, ♂ same data as holotype.

The present species is characterized by the wing markings and somewhat allied to *C. impunctatus* Goetghebuer. But in the allied Palearctic species, the basal two wing bands are distinctly interrupted at the furrow above the stem of fMCu and the third band is confluent with apical dark spots along veins M_1 and M_2 , segment 3 of maxillary palpus bears scattered sensillae, AR is about 1.0 and thorax is much darker.

44. *Culicoides australiensis* Kieffer 1917, Mus. Nat. Hung., Ann. 15: 188.

Brown and yellowish species, with wing markings somewhat similar to that of *C. tritenuifasciatus*. According to the original description, the main specific characters and differences from the similar species are as follows:

Female: Body brown and yellowish, wing with 3 dark transverse bands rather short and not extending much below beyond M and M_1 . Head with AR of antenna about 1.07 being smaller than 1.15, antennal segment 10 (basal segment of elongate 5 apical segments) about 2.5 \times as long as preceding one, being much longer than 1.5 \times . Thorax with tarsal

segment 1 of hind leg relatively long and equal in length to following 4 segments taken together; while in allied species segment 1 shorter than following 3 segments taken together (74:78.5). Wing with macrotrichia spread only on apical 1/4, being spread on much narrower area than in allied species, 3 transverse dark bands rather short and not extending behind far beyond veins M and M_1 , instead of almost complete bands in allied species, and second radial cell equal in length to first, but not much longer than 19:14 of allied species.

DISTRIBUTION: New Guinea.

45. *Culicoides flavidorsalis* Tokunaga, n. sp. Fig. 40.

Small brown and yellow species. Maxillary palpus with large oval segment 3 and rather large sensory pores. Thorax with scutum extensively yellow, only anterior and lateral margins brown, scutellum entirely yellow and bearing 3 strong bristles and many minute accessory setae. Legs mainly brown, but with knee-parts broadly yellow or pale brown; hind TR about 2.04. Wing with rather thick macrotrichia spread almost all over surface; pale spots very large, except for small oval basal spot of cell M_2 , and marginal pale spots broadly touching wing margin, second radial cell almost entirely pale and ending slightly before costal dark spot 3. Two spermathecae, large, subspherical and with rather long necks. Male unknown.

Female: Body about 1.21 mm long. Wing about 1.04 mm by 0.49 mm. Coloration brown and yellow. Head almost entirely brown, with eyes barely separated above, clypeus bearing 3 small setae on lateral margin, proboscis about 1/2 as long as head capsule. Maxillary palpus (fig. 40c) with segment 3 large and oval, sensory pore rather large and sensillae short but extending out from pore. Antenna with scape brown, flagellum broken and missing. Thorax: scutum extensively yellow, anterior and lateral margins brown and caudoscuteal area very faintly brownish, scutellum entirely yellow, with 3 strong bristles and about 15 minute accessory setae, other parts all brown. Legs mainly brownish, coxae, trochanters and basal 4 tarsal segments pale brown, femora and tibiae mainly brown, but basal ends of femora very pale brown, knee-parts broadly pale brown or yellow; in fore and hind legs femoral preapical parts pale brown, in middle yellow and in all legs tibial sub-basal parts yellow, last tarsal segments of all legs yellow: hind TR about 2.04; relative lengths of leg segments, except for basal 2, about 91:92:45:18:12:11:13.5 in fore, 109:110.5:56:20:14:11:13 in middle and 111:107:49:24:15:12.5:15 in hind leg.

Wing (fig. 40a) with rather dense macrotrichia almost spread on entire surface, bare lines along veins rather distinct; pale spots very large, except for basal, small and oval, spot of cell M_1 , marginal spots broadly touching wing margin, basal spot very large, costal pale spot 1 enveloping r-m and basal 1/2 first radial cell and confluent with a pale spot below M_{1+2} , costal dark spot 2 enveloping apical 1/2 first radial cell and apical section of R_1 , costal pale spot 2 large, covering almost entire second radial cell and reaching vein M_1 , costal pale spot 3 very large occupying apical 1/3 cell R_5 , pale spot of cell M_4 occupying almost entire space of cell and broadly touching vein M_{3+4} , apical pale spot of anal cell single, large and touching apical part of stem of fMCu, no pale spots above M_{3+4} in cell M_2 and above fMCu. Costa ending at basal 0.7 of wing length (56:80) and just before costal dark spot 3, R_s about 1.5× as long as R_1 (23:15) and ending just before tip of M_{3+4} , second radial cell about 1.6× as long as first, fMCu midway under first radial cell, relative

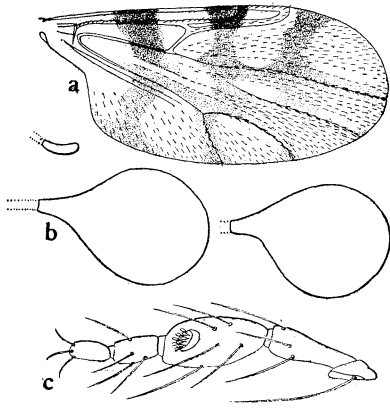


Fig. 40. *Culicoides flavidorsalis*, female. a, wing; b, spermathecae; c, maxillary palpus.

lengths of R, M and stem of fMCu about 24: 21: 34, M_{3+4} slightly deflected from stem of fMCu, slightly curved and twice as long as Cu_1 (24: 12). Halter white. Abdomen entirely brown, with tergites and sternites not reduced, cercus pale brown; spermathecae (fig. 40b) brown; 2 well developed, subspherical, subequal (3.5 + 14.5 units by 12.5 units and 5 + 15 units by 13.5 units respectively) and with rather long neck parts, 1 vestigial and tubular (4 units by 1 unit).

DISTRIBUTION: New Guinea.

Holotype, ♀ (BISHOP 2877), Wum, 850 m, Jimmi Valley, Sepik drainage, NE New, Guinea, 17 July 1955, Gressitt.

This New Guinea species is somewhat allied to *C. arcuatus* Winnertz and *C. fagineus* Edwards in the wing markings. These 2 allied species differ

from the present species in the following points: in the first Palearctic species, the pale basal wing spot of cell M_1 is larger and subconfluent with a similar pale spot below cell M_2 , the maxillary palpus bears scattered sensillae on the slender segment 3, short basal flagellar segments of antenna are elongate and oval, AR is only 0.9 to 1.0, the thoracic scutum is brown, the hind leg bears yellow or white band on apical end of tibia besides pale knee-part, and hind TR is 1.88 to 2.0. In the second European allied species, the middle dark band of the wing is broadly interrupted in cell M_2 between vein M_2 and fMCu, cell M_2 is broadly pale above M_{3+4} , and the thorax is brownish.

46. *Culicoides* (*Trithecoides*) *palpifer* DasGupta and Ghosh, 1956, Calcutta Sch. Trop. Med., Bull. 4: 122. Fig. 41.

Small yellow and brown species, closely related to *C. raripalpis* Smith. Clypeus with 4 setae. Maxillary palpus with scattered sensillae and short-oval segment 3. Antenna with basal short segments elongate-oval and AR about 1.08. Thorax with scutum and scutellum almost entirely yellow; scutellum with only 3 bristles. Legs mainly brown, with knee-parts broadly yellow and hind tibia entirely yellow; hind TR about 2.42. Wings similar to those of *C. raripalpis* and *C. anophelis* in distribution of macrotrichia, venation and wing marking; pale spots very ill-defined, costal pale spots 1 and 2 very large, second radial cell very large, almost entirely enveloped in costal pale spot 2 and ending before costal dark spot 3. Spermathecae round, one large and 2 smaller and equal, with large but hyaline neck parts.

Female: Body about 1.11 mm long. Wing about 0.98 mm by 0.43 mm. Coloration yellow and brown. Head brown, with eyes just touching above, mouthparts yellowish brown, proboscis about 1/2 as long as head capsule, clypeus with 4 setae. Maxillary palpus (fig. 41c), stout, small, very pale brownish yellow, with segment 3 as long as 2, short-oval, with scattered sensillae, 5 segments in proportion of 4: 10: 11: 8: 5. Antenna (fig. 41b) with scape brown, other segments also entirely brown, AR about 1.08, basal short flagellar segments rather long-oval; relative lengths of distal 8 segments about 13: 13: 13: 16.5: 16: 18: 19.5: 31.5. Thorax yellow and brown; scutum almost entirely yellow, but with faintly brownish small

cloud on caudal area; scutellum yellow and with only 3 bristles; postscutellum brown and with pale yellowish median spot; dorsal 1/2 of pleuron yellow, ventral half brown. Legs with coxae and trochanters brown, 2 basal tarsal segments brown and 3 distal yellow, basal ends of all femora yellow; in fore leg, femur and tibia brown and with broad yellow bands before and beyond brown knee-joint, about 1/3 as long as segments; in middle leg, apical 1/2 femur and basal 1/2 tibia including knee-joint yellow and rest brown; in hind leg, femur mainly brown, with broad preapical yellow band and tibia entirely yellow. Hind TR about 2.42; leg segments, except for basal 2, about 87:79:43:14:10:9: ? in fore, 109:110:58:14.5:11:9.5:10 in middle and 104:102:46:19:12:9.5:12 in hind leg in relative length.

Wing (fig. 41a) with macrotrichia sparsely spread only on apical part, bare areas along distal part of vein M_1 broad, costal median 2 pale spots large and rather well defined, other pale spots along apical and anal margin ill-defined; costal dark spot 2 enveloping apical 1/2 of first radial cell and extreme basal end of second radial cell including distal section

of R_1 , costal pale spot 2 covering almost entire second radial cell and not reaching vein M_1 ; costa ending at basal 0.72 of wing length (54:75) and slightly beyond level of tip of M_{3+4} , R_s about 1.8 \times as long as R_1 (21:12) and ending slightly before costal dark spot 3, second radial cell large and longer than first (12:10), relative lengths of R, M and stem of fMCu about 25.5:23:35, fMCu under middle of first radial cell, M_{3+4} somewhat deflected from stem and twice as long as Cu_1 (20:9.5). Halter with stem yellow and knob brown. Abdomen mainly rather pale brown, with penultimate segment and pleuron brown, ultimate segment and cercus yellow. Spermathecae (fig. 41d) brown, round, with neck parts hyaline and large; 1 large (9.5 units by 8.5 units) and 2 also well developed but smaller and equal (7 units by 7 units and 6 units by 6 units respectively).

DISTRIBUTION: India, Thailand, Malaya, Borneo and New Guinea.

NE NEW GUINEA: Wum, Jimmi Valley, ♀, 16 July 1955, Gressitt.

According to a private communication from Wirth, this species is different from *C. varipalpis* Smith in its uniformly yellowish scutum and from other yellow species in the number and shape of mandible teeth. Wirth also informed me that he has specimens of this species from Malaya, Thailand and Borneo, besides from India.

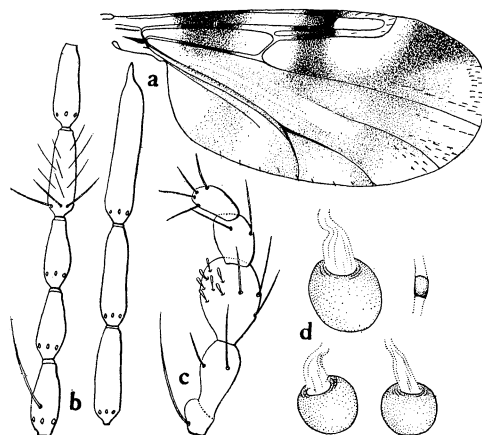


Fig. 41. *Culicoides palpifer*, female. a, wing; b, apical 8 antennal segments; c, maxillary palpus; d, spermathecae and basal ring.

47. *Culicoides* (*Trithecoides*) *flavescens* Macfie. Fig. 42.

Culicoides anopheles var. *flavescens* Macfie, 1937, Roy, Ent. Soc. Lond., Proc. (B) 6(6): 114.

Culicoides (*Trithecoides*) *flavescens*, Wirth and Hubert, 1959, Pacific Ins. 1: 13.

Small yellow and brown species. Maxillary palpus with segment 3 longer than 2 and

with scattered sensillae. Antenna with basal short flagellar segments elongate-oval and fully twice as long as wide, AR about 1.0, varying from 0.9 to 1.06. Thorax with yellow to brown ground-color, but dorsum almost entirely yellow. Legs mainly brown, fore and hind legs with broad yellow bands before and beyond brown knee-joints and hind leg with pale brown bands on both ends of tibia, but in yellow specimens legs almost entirely yellowish brown or yellow, fore and mid femora slightly brownish on sub-basal parts and fore tibia brownish on apical 1/2; hind TR about 2.2, varying from 2.14 to 2.32. Wing with macrotrichia

very sparse and spread on apical 1/4, wing marking ill-defined, costal pale spots 1 and 2 very large and broadly touching costal margin, costal pale spot 2 not reaching vein M_1 , costal pale spot 3 occupying apical 1/4 cell R_5 but in darker specimens often obscure, second radial cell very large and extending almost to costal dark spot 3. Three spermathecae, well developed, spherical and equal.

Female: Body about 1.29 mm long. Wing about 1.13 mm by 0.49 mm. Coloration extensively yellow and narrowly brown. Head brown, with eyes contiguous above, mouthparts mainly yellowish brown, clypeus with 3 lateral setae on either side, proboscis about 1/3 as long as head height. Maxillary palpus (fig. 42c) yellow, with very large segment 3 and scattered sensillae, 5 segments in proportion of 5:10:15.5:7:7.5. Antenna (fig. 42b) with scape brown, basal short segments rather elongate-oval, 4 basal segments pale brown and rest brownish as in distal 5 segments; AR about 1.06; relative lengths of distal 8 segments about 15:15:15:20.5:21.5:24.5:25:36. Thorax with

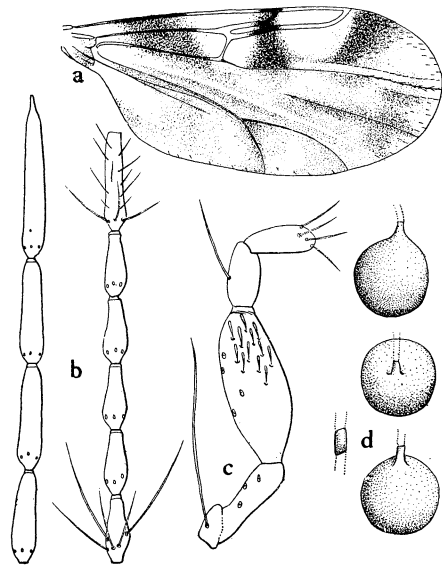


Fig. 42. *Culicoides flavescens*, female. a, wing; b, apical 10 antennal segments; c, maxillary palpus; d, spermathecae and basal ring.

tergites almost entirely yellow, but postscutellum very slightly brownish, sternum and ventral 1/2 each pleuron brown and dorsal 1/2 each pleuron yellow; scutellum with only 3 bristles. Legs extensively yellow, with coxae very pale brownish yellow, fore and middle femora with very pale brown clouds on sub-basal parts and fore tibia with similar cloud on apical 1/2; hind TR about 2.31; leg segment, except for basal 2, in proportion of 100.5:101:50:18:13:10:14 in fore, 133:133:70:19.5:15:10:13 in middle and 124:126:60:26:16:10.5:11.5 in hind leg.

Wing (fig. 42a) with macrotrichia sparsely spread on apical 1/4, very few trichia close to anal margin, bare areas along apical 1/2 M_1 distinct; wing markings ill-defined, costal pale spots 1 and 2 large, rather well defined and semicircular, costal dark spot 2 covering apical 1/2 of first and basal end of second radial cell and narrower than in *C. anophelis*, costal pale spot 3 rather distinct and subtriangular, other pale spot ill-defined; costa ending at basal 0.75 of wing length and above tip of M_{3+4} , R_s longer than twice R_1 (28:13) and ending just before costal dark spot 3, second radial cell very large and about twice as long as first (19:10), relative lengths of R, M and stem of fMCu about 30:28:37, fMCu

just before level of center of first radial cell, M_{3+4} somewhat deflected from stem and twice as long as Cu_1 (26:12.5), Halter entirely yellow. Abdomen almost entirely yellow, tergites from 2 to 5 rather broad and very slightly brownish. Three spermathecae (fig. 42d) well developed, brown, round, equal (1.5+8 units or 1.5+9 units by 7-8 units) and with small neck parts.

DISTRIBUTION: Malaya, Borneo, Thailand and New Guinea.

NE NEW GUINEA: Wum, Jimmi Valley, ♀, 17 July 1955, Gressitt.

According to Wirth's communication, this species is distinct *C. anophelis* Edwards and differs in the structure of the palpus and mandibular teeth. Wirth and Hubert have indicated it as an independent species of their subgenus *Trithecoides* in the preceding issue of this journal.

48. *Culicoides maculiscutellaris* Tokunaga, n. sp. Fig. 43.

Small brown and yellow species very similar in appearance to *C. magnimaculatus* Lee and Reye. Maxillary palpus slender and with scattered sensillae on segment 3. Antenna with basal short flagellar segments rather elongate and oval and AR about 1.18. Thorax mainly brown, scutum with pair of yellow median vittae and several ill defined yellowish brown spots, scutellum with brown median spot on yellow ground color. Legs with yellow bands, hind TR about 2.15. Wings with rather dense macrotrichia almost all over surface, wing markings well defined, paler spots rather large and those of peripheral part broadly touching wing margin, second radial cell ending far beyond middle of costal pale spot 2, no additional pale spots on vein M_1 . Two spermathecae, well developed and short-oval and 1 vestigial. Male unknown.

Female: Head brown but slightly yellowish, mouthparts brown, eyes very narrowly separated above by less than 1/2 facet, clypeus with 2 lateral setae on either side, proboscis about 0.6 as long as head capsule (16:26). Maxillary palpus (fig. 43a) slender, with segment 3 slightly fusiform and scattered sensillae, no sensory pore, 5 segments in proportion of 6:21:23:9:8.5. Antenna (fig. 43b) with scape brown, basal short segments mainly yellow, but 2 or 3 apical short segments and apical margins of other basal short segments yellowish brown as in apical 5 elongate segments, short flagellar segments elongate-oval and tapered; AR about 1.17; apical 8 segments in proportion of about 11.5:11.5:12:18.5:19:21:24:29. Thorax mainly brown, with yellowish brown and yellow spots on scutum and scutellum; scutum dark brown on anterior margin, with pair of yellow oval spots at center between foveae, small yellowish brown cloud on each shoulder part covering humeral pit, larger yellowish brown cloud on middle of each lateral part enveloping free part of scutal suture, caudoscuteal area extensively yellowish brown and brown clouds on anterior part just caudad of yellow vittae and on caudal part before scutellum; scutellum yellow, with brown median spot, 4 bristles and 4 small accessory setae. Legs mainly brown, tarsi yellowish brown, but last segments very pale brown and hind tarsal segment 1 brown; fore leg with yellow bands before and beyond brown knee-joint, middle leg with knee-part broadly yellow and without brown joint, hind leg with single yellow band on base of tibia. Hind TR about 2.15; relative lengths of distal 7 segments about 102:98:51:20.5:13:11:14 in fore, 127:125:65:22:15:14:14 in middle and 125:120:56:26:16.5:13:15 in hind leg.

Wing (fig. 43c) with macrotrichia moderately spread almost all over surface, bare areas

along veins rather distinct, wing markings well defined and pale spots large, those of peripheral part broadly touching wing margin; wing base very widely pale, costal pale spot 2

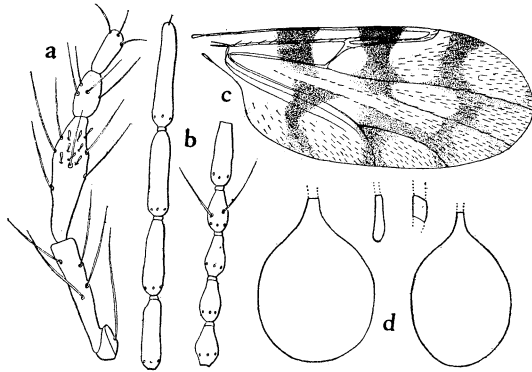


Fig. 43. *Culicoides maculiscutellaris*, female. a, maxillary palpus; b, apical 9 antennal segments; c, wing; d, spermathecae and basal ring.

enveloping r-m and basal 1/3 of first radial cell and confluent with posterior pale spot of cell M_2 , costal dark spot 2 covering apical 2/3 first radial, apical section of R_1 and basal end of second cell, costal pale spot 2 large enveloping almost entire second radial cell and well reaching to vein M_1 , costal dark spot 3 extending below to tip of M_{3+4} forming zigzag band, costal pale spot 3 occupying apical 1/3 cell R_5 and separated from apical pale spot of cell M_1 , basal pale spot of cell M_1 large, oval and broadly touching 2 veins, pale spot of cell M_4 large and touching M_{3+4} , pale spot just

before fMCu and apical spot of anal cell quite confluent enveloping apical 1/4 stem of fMCu, no additional pale spots enveloping vein M_1 . Costa rather long, ending at basal 0.7 of wing length and slightly before level of tip of M_{3+4} , Rs about $1.7\times$ as long as R_1 (25:15) and ending distinctly beyond middle of costal pale spot 2, second radial cell $1.3\times$ as long as first (14:11), rather large and elongate-triangular, proportional lengths of R, M and stem of fMCu about 19:15:39, fMCu slightly beyond level of origin of r-m, M_{3+4} somewhat deflected from stem, slightly curved and twice as long as Cu_1 (23:11). Halter entirely white. Abdomen mainly brown, with tergites and sternites normal, pleural areas slightly fuscus, cercus yellowish brown. Spermathecae (fig. 43d) brown; 2 large, short-oval, slightly unequal (3+17 units by 14 units and 3+16.5 units by 12 units respectively) and with short neck parts; 1 vestigial and tubular (6 units by 1 unit).

DISTRIBUTION: New Guinea.

Holotype, ♀ (BISHOP 2878), Hollandia, 100 m, Neth. New Guinea, 23 Aug. 1955, Gressitt.

This species is closely allied to *C. magnimaculatus* Lee and Reye, but in the present species wings are not provided with additional pale spots which envelope vein M_1 , costal pale spot 2 reaches vein M_1 , costal pale spot 3 is separated from the apical spot of cell M_1 , AR is slightly larger, the maxillary palpus bears scattered sensillae, the thorax is provided with more yellowish spots on dorsal side, and hind TR is far larger, all of which differ from the allied species. Another allied species may be Micronesian *C. peliliouensis* Tokunaga; however, allied species is highly different in the following points: apical 3 pale spots of wings are separated from wing margin, pale spot of cell M_4 is small and does not touch M_{3+4} , apical pale spot is not confluent with a pale spot just above fMCu, and maxillary palpus bears 2 or 3 groups of sensillae on distal part of segment 3.

49. *Culicoides magnimaculatus* Lee and Reye, 1953, Linn. Soc. N. S. Wales, Proc. 77 (5-6): 388. Fig. 44.

Small brown species. Thorax mainly brown, scutum with pair of long pale yellowish brown median vittae at central part between foveae, scutellum entirely yellowish pale brown and with 4 bristles and several small accessory setae. Legs mainly brown, with knee-joints brown and preapical bands of femora and sub-basal bands of tibiae yellow or pale brown and distinct; hind TR about 1.73. Wing with moderately dense macrotrichia spread almost all over surface, wing markings well defined, pale spots large, costal pale spot 2 enveloping larger part of second radial cell except for extreme base, marginal pale spots, except for apical one of cell M_1 , broadly touching wing margin, basal pale spot of cell M_1 broadly confluent with above pale spot covering sub-basal part of vein M_1 and behind spot in cell M_2 , forming large spot, costal pale spot 3 occupying more than 1/3 of apical area of cell R_5 and broadly confluent with apical spot of cell M_1 beyond vein M_1 . Two spermathecae well developed, short-oval (subspherical in Australian type specimen), sub-equal, and 1 vestigial. According to original description, basal short flagellar segments elongate and oval, AR about 1.03 and maxillary palpus slender, with segment 3 slender and preapical sensory pore rather large.

Female: Body length about 0.95 mm. Wing about 0.73 mm by 0.29 mm. Coloration brown and yellowish brown or yellow. Head mainly brown, with eyes narrowly separated above as wide as 1/2 facet from each other, proboscis about 0.8 as long as length of head capsule (19: 24), clypeus with 3 marginal setae on either side. Maxillary palpi and antennae broken and missing. Thorax extensively brown; scutum with anterior margin dark, humeral pits pale brownish yellow, paired median vittae short and pale yellowish brown, shoulder parts just behind dark anterior margin pale brown; scutellum entirely yellow and with 4 strong bristles and several minute accessory setae. Legs mainly brown, with bases of femora pale brown, knee-joints brown; anterior 4 legs with distinct rather broad yellow bands before and beyond knee-joints; hind leg with pale brown bands before knee-joint and on apical part of tibia and yellow band beyond knee-joint. Hind TR about 1.73 relative lengths of leg segments, except for basal 2, about 78: 74: 38: 16: 12: 13: 10 in fore, 98: 95: 53: 22: 13: 6.5: 7.5 in middle and 84: 86: 39: 22.5: 13.5: 9.5: ? in hind leg.

Wing (fig. 44a) with macrotrichia moderately spread almost all over surface, bare areas along veins broad, wing markings well defined and pale spots large and some confluent with each other; wing base very broadly pale, marginal pale spots, except for cell M_1 , round and widely touching wing margin, costal pale spot 1 enveloping r-m and almost entire length of first radial cell except apical end and confluent with posterior pale spots of cell M_1 and anal cell forming irregular large pale band, costal pale spot 2 rather small, enveloping almost entire second radial cell except base and vein R_1 and separated distinctly from vein M_1 or posterior pale spot, costal pale spot 3 occupying 2/5 of cell R_5 and confluent with additional posterior pale oval spot covering pre-apical part of vein M_1 and with apical pale spot of cell M_1 which is rather small, oval and distinctly separated from apical wing margin, basal pale spot of cell M_1 rather small, oval and confluent with above additional pale spot which is also small, oval and covers sub-basal part

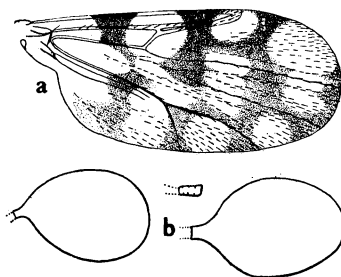


Fig. 44. *Culicoides magnimaculatus*, female. a, wing; b, spermathecae.

of vein M_1 and with posterior pale spot of cell M_2 which is similar in shape to above 2 spots, pale spot located in center of cell and broadly touching middle part of M_{3+4} , pale spot above fMCu confluent with preapical anal spot beyond apical part of stem of fMCu and with costal pale spot 1 beyond furrow in cell M_2 . Costa ending at basal 0.67 of wing length (53: 79) and just before level of tip of M_{3+4} , Rs about $1.4\times$ as long as R_1 (20: 14) and ending beyond middle of costal pale spot 2, second radial cell somewhat longer than first (10: 8) and subtriangular, relative lengths of R, M and stem of fMCu about 27: 26: 35, fMCu before level of middle of first radial cell, M_{3+4} somewhat deflected from stem, very slightly curved and about twice as long as Cu_1 (23: 11). Halter entirely white. Abdomen pale brown, with tergites and sternites normal and pleural membranes very pale; 2 spermathecae brown, well developed, short-oval, slightly unequal (2.5+16 units by 12 units, 2+14 units by 11 units) and with small neck parts (fig. 44b); 1 vestigial, brown and cylindrical (2.5 units by 1 unit).

DISTRIBUTION: Australia and New Guinea.

NETH. NEW GUINEA: Hollandia, 100 m, ♀, 23 Aug. 1955, Gressitt.

The New Guinea specimen is unfortunately broken and has lost its antennae and maxillary palpi, but the wing markings, distribution of wing macrotrichia and value of TR are entirely identical with the Australian specimen described by Lee and Reye. The main differences may be the smaller size of the wing (in the Australian type about 1.58 mm) and absence of a dark brown spot on scutellum.

50. *Culicoides flaviscriptus* Tokunaga, n, sp. Fig. 45.

Small brown and yellow species. Maxillary palpus rather stout and with sensory pore large. Antenna with basal short flagellar segments short-oval and distal 5 cylindrical; AR about 1.56. Thorax with scutum extensively yellow, dark brown on anterior 1/4 and lateral sides and brown on caudoscuteal area, scutellum entirely yellow and with 4 strong bristles. Legs with yellow bands on preapical part of middle femur and sub-basal parts of all tibiae; hind TR about 2.58. Wing with macrotrichia on apical 2/5, all marginal pale spots touching wing margin, second radial cell almost entirely enveloped in costal dark spot 2 except for extreme ends of costa and Rs, costal pale spot 3 occupying apical 1/3 cell R_5 . Three spermathecae well developed and subspherical. Male unknown.

Female: Body length about 1.26 mm. Wing about 0.95 mm by 0.44 mm. Head almost entirely brown, with eyes barely separated above as wide as 1/2 facet, proboscis about 3/5 as long as head height, clypeus with 3 pairs of lateral setae. Maxillary palpus (fig. 45e) stout, with segment 3 large and bearing large sensory pore just beyond middle, 5 segments in proportional length of 6: 12: 15: 6.5: 8; mandible (fig. 45c) with about 12 or 13 minute teeth. Antenna (fig. 45b) with scape dark brown, basal short segments and oval and mainly yellowish, but apical margins of distal short segments and entire length of segment 9 brownish, distal 5 elongate segments brown and cylindrical; AR about 1.56; relative lengths of apical 8 segments about 8: 9: 10: 18.5: 20.5: 23: 22.5: 27. Thorax with scutum extensively yellow and scutellum entirely yellow and other parts deep brown; scutum with specific yellow and brownish markings: anterior 1/2 and lateral margins of presutural 1/2 scutum broadly dark brown and containing white humeral pits and pair of small yellowish clouds at shoulder angles, central part of scutum yellow, pair of slender dark lines extending caudad from anterior dark part along foveae, 2 confluent yellow spots present just before scutal suture on either side and confluent with broad yellow area of caudal

part, postsutural area mainly yellow, but dark brown on anterior part of lateral margin and along scutal sutures, caudoscuteal area with pair of semicircular white spots on sides and central part brownish; scutellum with 4 strong bristles and about 6 minute accessory setae. Legs mainly brown but all femoral bases and tibial ends pale brown and all knee-joints dark; fore and hind legs with broad yellow bands on preapical parts of tibiae and middle leg with similar yellow bands before and beyond knee-joint; hind TR about 2.58; leg segments, except for coxae and trochanters, in proportion of 90: 82: 44: 17: 12: 9: 12 in fore, 116.5: 106: 60: 15.5: 12: 9: 10.5 in middle and 106: 98.5: 49: 19: 13: 10: 12 in hind leg.

Wing (fig. 45a) with macrotrichia on apical 2/5, bare areas along veins M_1 and M_2 distinct, very few macrotrichia in cell M_4 along anal margin; wing marking rather obscure, pale spot rather large, all marginal pale spots broadly touching wing margin, basal area very broadly pale, costal pale spot 2 enveloping r-m and basal 1/3 of first radial cell, costal dark spot 2 broadened towards costa, covering apical 2/3 of first radial cell and almost entire second, costal

pale spot 2 somewhat oblique and ending slightly before vein M_1 , extreme tips of costa and R_s paler, costal pale spot 3 very large and occupying apical 1/3 cell R_5 . Costa ending at basal 0.64 of wing length (48: 75) and slightly beyond level of midway of anal margin of cell M_4 , R_s about 1.5x as long as R_1 (15: 10), 2 radial cells equal in length (7: 7), relative lengths of R, M and stem of fMCu about 25: 22: 32, fMCu under middle of first radial cell, M_{3+4} somewhat deflected from stem, slightly curved and about twice as long as Cu_1 (20: 9). Halter with knob brown and stem yellow. Abdomen mainly pale brown, with tergites subsquare, sternites reduced into hemisternites, penultimate caudal segment more brownish, ultimate segment and cercus yellow, pleural membranes fuscous pale brown. Three spermathecae (fig. 45d) well developed, subspherical, subequal (3+12 units by 11 units, 2.5+12 units by 10 units and 2+10 units by 10 units respectively), and with short neck parts.

DISTRIBUTION: New Guinea.

Holotype, ♀ (BISHOP 2879), St. Paul's, 300 m, Baining Mts., Gazelle Pen., New Britain, 9 Sept. 1955, Gressitt.

This species is highly specific in the development of 3 spermathecae and yellow markings of the scutum, but the wing markings are not highly specific and are similar to *C. pungens* de Meijere, *C. ornatus* Lee and Reye and *C. robertsi* Lee and Reye. These 3 allied species, however, may be easily distinguished by the following differences from the present species, in addition to the development of spermathecae and scutal markings: in the Ori

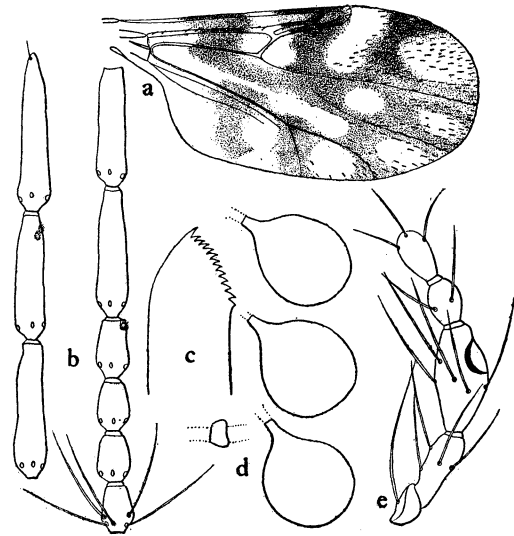


Fig. 45. *Culicoides flaviscriptus*, female. a, wing; b, apical 9 antennal segments; c, apical end of mandible; d, spermathecae and basal ring; e, maxillary palpus.

ental, first allied species, the second radial cell of wing is so narrow as to be scarcely distinguishable, the apical half of the second radial cell is enveloped by costal pale spot 2, which is not oblique but circular, and macrotrichia are very few and distributed only along the apical margin. In the Australian, third allied species, the second radial cell is completely dark, a dark sub-basal spot is present covering the base of the stem of fMCu, macrotrichia of wing are more broadly spread on the basal part beyond the level of r-m, basal short flagellar segments are longer and subcylindrical, AR is about 1.2 and hind TR is about 1.9. In the last Australian species, the second costal pale spot is subsquare and not oblique, AR is about 1.05 and hind TR is about 1.6.

51. *Culicoides orientalis* Macfie, 1932, Ann. Mag. Nat. Hist. ser. 10 (9): 490. Figs. 46 and 47.

Small dark brown species. Maxillary palpus slender, with segment 3 elongate-oval, in female, shallow sensory pore on apical part and in male, a group of sensillae seeming to grow directly from preapical part. Female antennae with short basal segments elongate and oval, with AR about 1.08. Thorax with scutum entirely dark brown; scutellum with 3 strong bristles in female and single median bristle in male. Legs mainly brown in female and very pale in male, female with yellow bands on basal parts of tibiae and apical yellow band on hind tibia; hind TR about 1.92 in female and 1.7 in male. Wing with large, pale spots, marginal spots all broadly touching wing margin, in female macrotrichia sparsely spread on apical 1/4 and in male very few trichia arranged in line close to apical margin of cell R₅; costal pale spot 2 enveloping apical tip of second radial cell, costal pale spot 3 occupying distal 1/3 in female and 1/4 in male of cell R₅. Spermathecae: 2 well developed, subspherical and slightly unequal and 1 vestigial. Male hypopygium with caudal emargination of sternite 9 rather deep, parameres as long as aedeagus, rather broad and triangular on basal parts, sharply pointed and almost straight on apical parts.

Female: Body about 1.24 mm long. Wing about 1.0 mm by 0.42 mm. Coloration generally dark brown and legs with distinct yellow tibial bands. Head entirely brown including mouthparts, with proboscis about 1/2 as long as head height (12:22). Maxillary palpus (fig. 46d) slender, with segment 3 long-oval and sensory pore small and shallow, 5 segments in proportion of 6:17:15:9:8. Antenna (fig. 46b) with scape brown, short basal segments yellowish pale brown, far longer than wide and oval, apical 5 segments pale brown and cylindrical; AR about 1.08; distal 10 segments with proportion of 9.5:9.5:9:9.5:10.5:16:15.5:15.5:16:27. Thorax entirely brown, with humeral pits and puncture-like setae bases pale; scutellum with 3 bristles and without accessory minute setae. Legs mainly brown, with trochanters and bases of femora pale brown, tarsal segments yellowish pale brown in fore and middle legs, knee-joints brown, preapical parts of femora pale brown; sub-basal parts of tibiae broadly yellow; in hind leg, femur without preapical pale band, knee-joint not distinctly more brown, tibia with basal and apical 1/4 yellow and tarsal segment 1 brown; hind TR about 1.92; leg segments, except for basal 2, in proportion of 89.5:87:47:18:12:8.5: ? in fore, 111:107:67:21:13:?: ? in middle and 105:106:50:26:14:9:11 in hind leg.

Wing (fig. 46a) with macrotrichia rather sparsely spread on apical 1/4, very few along anal margins of cell R₅ and on apical part of anal cell, and arranged in single lines along both sides of distal part of vein M₁ and spaces between lines of macrotrichia and the vein bare; wing markings: pale spots rather large and those of peripheral part broadly touching

wing margin, wing base very broadly pale, costal pale spot 1 subsquare and enveloping r-m and basal 3/4 of first radial cell, pale spot 2 as large as 1, and enveloping apical 1/3 of second radial cell, pale spot 3 very large, oval and occupying apical 1/3 of cell R_5 , costal dark spot 2 slightly smaller than 1 and covering apical 1/4 of first radial and basal 2/3 of second radial cell, costal dark spot 3 very narrow and oblique, pale area covering apical 2/3 of vein M_1 distinct and subconfluent with costal 3 above and apical oval pale spot below, 2 subconfluent small dark clouds present at end of M_1 , basal pale spot of cell M_1 small and round, pale spot of cell M_4 rather large, semicircular and almost touching vein M_{3+4} . Costa ending at basal 0.65 of wing length (50:77) and above center of anal margin of cell M_4 , R_s about 1.7 \times as long as R_1 (19:11) and ending midway before costal margin of costal pale spot 2, second radial cell subtriangular and as long as first (8:8), proportional lengths of R, M and stem of fMCu about 25:23:37, fMCu before level of apical end of first radial cell, M_{3+4} slightly curved, somewhat deflected from stem of fMCu and twice as long as Cu_1 (18:9). Halter entirely yellowish white. Abdomen mainly brown including cercus, with tergites and hemisternites normal and pleural membranes with fine dark brown striation. Spermathecae (fig. 46c): 2 brown, well developed, subspherical, slightly unequal (13 units by 11.5 units and 11.5 units by 10.5 units respectively) and with very short neck parts; 1 vestigial, hyaline and subspherical (2 units by 1 unit).

Male: Body about 0.95 mm long. Wing about 0.92 mm by 0.29 mm. Coloration mainly brown and generally as in female, but legs far paler being mainly yellow and wing dark marking far paler, and other specific characters mainly similar to those of female with usual sexual differences. Head mainly brown, with eyes separated above as wide as 2 facets, mouthparts pale brownish yellow and proboscis about 0.46 as long as head height (34:74). Maxillary palpus (fig. 47c) yellow and with group of several sensillae on very shallow depression on apical part of segment 3; 5 segments in proportion of length about 4:12.5:10.5:6.5:7.5. Antenna (fig. 47b) with scape brown, short basal segments and plumose hairs yellow, last 3 elongate segments pale brownish yellow; combined lengths of segments 2 to 11 and 12 to 14 about 109:72; relative lengths of distal 8 segments about 10.5:11:9.5:8.5:8:25.5:21.5:25. Thorax entirely brown; scutellum with single median bristles differing from 3 in female. Legs entirely yellow, with exception of brownish coxae; hind TR about 1.7; leg segments, except for basal 2, about 80:74:38.5:16:12:8:10 in fore, 96.5:96:53:21.5:13:8:10 in middle and 85:82:39:23:14:9: ? in hind leg.

Wings (fig. 47a) with very few macrotrichia sparsely arranged in line closely along distal 1/2 wing margin of cell R_5 ; wing markings: pale spots along peripheral part very broadly touching wing margin, costal dark spot 2 enveloping distal 2/5 first and almost entire second radial cell excepting tip, costal dark spot 3 rather broad forming preapical band, no

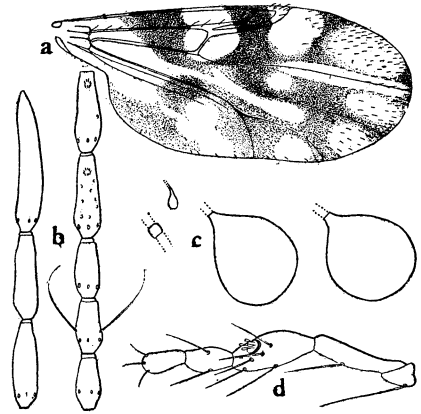


Fig. 46. *Culicoides orientalis*, female. a, wing; b, apical 8 antennal segments; c, spermathecae and basal ring; d, maxillary palpus.

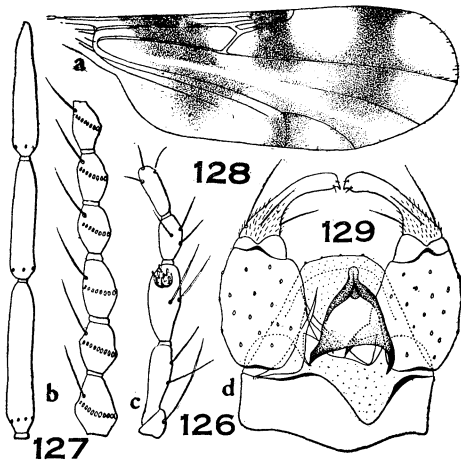


Fig. 47. *Culicoides orientalis*, male. a, wing; b, apical 9 antennal segments; c, maxillary palpus; d, hypopygium.

dark spots at tip of vein M_1 , costal pale spot 2 round, enveloping apical end of R_s and not closely touching vein M_1 , costal pale spot 3 occupying apical $1/4$ cell R_5 . Costa ending at middle of wing (31 : 63) and slightly beyond level of $fMCu$, R_s only $1.3\times$ as long as R_1 (9 : 7) and ending just beyond costal dark spot 2, second radial cell subtriangular and much shorter than first (3.5 : 5), relative lengths of R , M and stem of $fMCu$ about 22 : 21 : 33, M_{3+4} not deflected from stem and slightly curved, Cu_1 about $1/2$ as long as M_{3+4} (5.5 : 12), meeting anal margin in about 90 degree angle and inner angle of $fMCu$ about 60 degrees. Halter entirely white. Abdomen almost entirely yellowish, but hypopygium (fig. 47d) pale brown; tergite 9 with caudal margin somewhat round, anal points atrophied; sternite 9 with caudal median emargination broad and V-

shaped, caudal membrane bare; coxite about $1.5\times$ as long as wide, not distinctly conical and mesal base with 2 pointed processes; style shorter than coxite (19 : 21), slightly curved and slightly clavate at apex; aedeagus subtriangular, slightly shorter than coxite and with basal arch very low and caudal lobe very small; paramere as long as style, with basal part broad and triangular and caudal part very sharply pointed and straight.

DISTRIBUTION: Malaya, India, Java, and New Guinea.

NE NEW GUINEA: Wum, 850 m, Jimmi Valley, ♀, 16 July 1955, Gressitt. NETH. NEW GUINEA: Hollandia, 100 m, ♂, 23 Aug. 1955, Gressitt.

The New Guinea specimens are somewhat different from the description of Macfie, but the wing markings of female quite coincides with that of the Malayan specimens.

Genus *Forcipomyia* Meigen

At present 41 species of *Forcipomyia* are known from New Guinea, of which 30 belong to the subgenus *Forcipomyia* (sen. str.), two to *Proforcipomyia*, one to *Caloforcipomyia*, one to *Neoforcipomyia*, three to *Pterobosca*, two to *Trichohelea*, one to *Lasiohelea* and one to an undetermined subgenus. Six species are not described at this time, although some of them are listed in the keys. The specific descriptions shall be reserved until additional material can be made available.

Subgenus *Forcipomyia* Meigen

KEY TO NEW GUINEA SPECIES OF SUBGENUS FORCIPOMYIA

1. Tibiae of all legs with 2 (basal or sub-basal and apical or preapical) bands distinctly brown or dark and well defined from yellow or whitish ground color...2

- Tibiae of all legs without 2 distinctive bands..... 8
- 2 (1). Hind femur with 2 (sub-basal and preapical) brownish bands; scutum with yellowish subconfluent and irregular marking **52. palliscuta**
Hind femur with only 1 brownish band or almost entirely brown and without yellowish median part; scutum almost uniformly brownish and without distinct yellow spots..... 3
- 3 (2). Hind femur yellow on basal 1/2 and brown on apical 1/2..... **53. pictisquamipennis**
Hind femur entirely brownish and without distinctive bands..... 4
- 4 (3). Middle femur with only 1 apical brown band and without distinctive sub-basal or basal band **54. penniornata**
Middle femur with 2 (1 apical or preapical and 1 basal or sub-basal) bands or without distinctive apical or preapical brownish band..... 5
- 5 (4). Middle femur brownish on basal 1/2 or more and without distinctive brown band... 6
Middle femur with 2 basal and apical bands or at least with 1 distinctive sub-basal band 7
- 6 (5). Hind TR 0.76-0.77 in female NG No. 1
Hind TR 0.93 in female NG No. 2
- 7 (5). Hind TR 0.64-0.68..... **55. unifascicornis**
Hind TR 0.8-0.91 **56. maculosicrura**
- 8 (1). Scutum with yellow or whitish marking or brown vittae distinct from brownish or pale ground color 9
Scutum without distinctive marking or vittae, almost unicolorous 13
- 9 (8). Tibiae with dark tips; femora each with single dark sub-basal ring at least on fore and hind legs **57. stigmatipennis**
Tibiae and femora uniformly yellowish or pale brown, or without femoral subbasal and tibial apical dark rings..... 10
- 10 (9). Scutum with brown vittae separated by yellowish stripes. Female tibiae with large spatulate scales **58. squamitibialis**
Scutum with 1 or more yellowish spots on brownish ground color. Female tibiae without large spatulate scales or spines or with very slender spine-like scales... 11
- 11 (10). Scutum at least with 4 yellowish vittae; scutellum with brown median spot on yellow ground color **59. pictiscutaris**
Scutum with 1 or 2 yellowish or paler spots; scutellum uniformly monochromatic 12
- 12 (11). Scutum with large median, square and yellow spot on anterior half; scutellum dark brown; wing with dark spot covering second radial cell. Male hypopygium with coxites not spinulose on mesal sides of basal parts and caudal lobes of parameres fused with each other on basal 1/2 or more..... **60. quadriflava**
Scutum with 2 very pale spots on shoulder parts; scutellum pale brown; wing with dark spot little beyond tip of second radial cell. Male hypopygium spinulose on mesal sides of basal parts and caudal lobes of parameres not fused with each other..... **61. mira**
- 13 (8). Hind tibia mainly dark brown or brownish and sometimes with yellow or pale distal and basal ends or either of them 14
Hind tibia mainly yellow or very pale, at most basal 1/2 brownish or with

- sub-basal brownish band..... 20
- 14 (13). Wings almost unicolorous and without distinctive dark, yellow or white costal spots..... 15
Wing with distinct dark, yellow or white costal spots 17
- 15 (14). Hind femur yellowish on basal 1/2 **62. swezeyiana**
Hind femur almost entirely brown, except for pale extreme base or apex 16
- 16 (15). Wing without first radial cell..... **63. lepidopus**
Wing with slit-like first radial cell **76. novaguineae** (female)
- 17 (14). Wing with second radial cell enveloped by pale or yellowish costal spot.....
..... **64. spinuliforceps** (male)
Wing with second radial cell covered with dark costal spot 18
- 18 (17). Last 2 segments of maxillary palpus incompletely segmented; wing with 1 costal dark spot. Male hypopygium with styles distinctly shorter than caudal lobes of parameres (27:37)..... **65. geniflava**
Last 2 segments of maxillary palpus completely segmented; wing with 2 or more costal dark spots. Male hypopygium with styles at least as long as caudal lobes of parameres..... 19
- 19 (18). Wing with large pale costal spot arising just from costal end and basal costal dark spot uniformly covering costal cell and second radial cell. Hind TR of male about 0.5. Caudal lobe of paramere simple and sharply pointed.....
..... **66. flavipectoralis**
Wing with small pale costal spot just beyond second radial cell and pale basal costal spot at position of r-m. Hind TR of male about 0.84. Caudal lobe of paramere bifid at tip **67. bifurcifera**
- 20 (13). Hind femur with distinct brown preapical band before yellow knee-part..... 21
Hind femur almost unicolorous, only brownish or dark at tip or gradually darkened towards apex 24
- 21 (20). Aedeagus broadened caudad, with lateral thickenings and finely serrulate on lateral parts of caudal margin **68. serrulifimbria**
Aedeagus more or less tapered on caudal part, without lateral thickenings and smooth on caudal margin..... 22
- 22 (21). Median caudal lobes of parameres broad. Hind tibia of female uniformly yellowish and rarely with ill-defined obscure brown sub-basal cloud ... **69. flavitibialis**
Median caudal lobes of parameres slender. Hind tibia of female with distinct dark brown sub-basal band 23
- 23 (22). In male, lobes of parameres fused basally about 1/3 of length. In female, segment 3 of maxillary palpus gradually narrowed apically and somewhat fusiform; spermathecae subspherical and small; cerci brown **70. esakiana**
In male, lobes of parameres fused basally only about 1/5 of length or less. In female, segment 3 of maxillary palpus suddenly narrowed apically; spermathecae oblong and large; cerci yellowish white..... **71. ornata**
- 24 (20). Hind femur brownish or fuscous apically..... 25
Hind femur entirely pale and without dark or brownish marking 29
- 25 (24). Hind femur narrowly fuscous only at distal end **72. adjecta**

- Hind femur broadly brownish on apical 1/2 26
- 26 (25). Hind TR larger than 1.0, being about 1.16 NG No. 3
Hind TR less than 1.0 27
- 27 (26). Wings without pale costal spots and with dark shaggy slender scales on costal and radial veins. Caudal lobes of parameres fused basally with each other on basal parts and not filiform..... **73. fuliginosa**
Wings with distinct pale costal spots covering second radial cell. Caudal lobes of parameres quite separated from each other and filiform..... 28
- 28 (27). Wing with three white costal spots **74. fascicauda**
Wing with only one small and white costal spot **75. albumpuncta**
- 29 (24). Hind TR about 2.0 (1.93–2.17). Caudal lobes of parameres fused basally with each other..... **76. novaguineae**
Hind TR usually less than 1.0 and at most 1.07..... 30
- 30 (29). Maxillary palpus with scattered sensillae on surface of segment 3 besides sensory pit..... **77. flaviventris**
Maxillary palpus without scattered sensillae on surface of segment 3 besides sensory pore 31
- 31 (30). Wing with pale costal spot covering second radial cell. Hind tibia of female with long slender spine-like scales. Caudal lobes of parameres quite separated and filiform apically; coxites with minute spinules on mesal sides of basal parts **64. spinuliforceps**
Wing without pale costal spots. Hind tibia of female without spine-like scales NG No. 4

52. Forcipomyia (Forcipomyia) palliscuta Tokunaga, n. sp. Fig. 48.

Medium-sized pale brownish yellow species, legs with double brownish bands on all femora and tibiae. Legs, wings and abdomen with rather broad scales. Short flagellar segments of female antenna flask-shaped, yellow, but with bases brownish. Thorax yellowish pale brown, with brown irregular and subconfluent clouds. Hind TR of female about 0.83; claws stout and with minute hump at middle. Wing of female almost entirely yellowish pale brown, with costa ending beyond middle of wing and second radial cell rather large. Two spermathecae, unequal and without hyaline minute punctures. Male unknown.

Female: Body about 1.73 mm long. Wing about 1.09 mm by 0.39 mm. Head pale brown including mouthparts, with eyes broadly contiguous above, proboscis about 1/2 length of head capsule; clypeus with 9 setae on median part. Maxillary palpus (fig. 48b) stout, segment 3 somewhat inflated at middle, with sensory pore small, round and situated at middle and group of short spoon-like sensillae on preapical part; 5 segments about 7: 9: 20: 9: 10 in relative length. Antenna with scape brownish, basal short flagellar segments yellowish pale brown, but with basal 1/2 of basal node of each segment more brownish, about twice as long as wide (16: 8–8.5) and each with neck part about 1/3 as long as segment; distal segments broken off and missing. Thorax with tergum mainly yellow, pleuron and sternum almost uniformly yellowish pale brown; scutum with anterior 1/4 and caudal 1/2 caudoscuteal area brown, pair of stripes on foveae very slender, brown and faintly brownish cloud on either side above wing base; scutellum with 1 small central and 2 late-

ral brown spots and 8 strong, 5 small median, 4 small lateral bristles along caudal margin and 25 minute setae on anterior 1/2; postscutellum brown along caudal margin. Legs (fig. 48c) with coxae and trochanters yellowish pale brown, fore and middle femora with apical and basal incomplete pale brown bands on yellow ground color, hind femur with 2 broad bands, complete and more brownish, fore and middle tibiae with apical and basal bands pale brown, hind tibia with 2 bands more distinct, knee-parts and apical ends of tibiae more or less yellow, tarsal segment brownish, but gradually paler on distal segments and with yellow inter-segmental bands on 2 basal segments; all claws (fig. 48d) stout, slightly broadened on middle part and with minute hump at middle; hind TR about 0.83; hind tibial comb with 7 apical bristles; scales of legs 4- to 6-stripped. RL about 124:118:55:30:24:21:21.5 in fore, 155:165:51:45:?:?:? in middle and 168:182:45:54:38:27:?:? in hind leg.

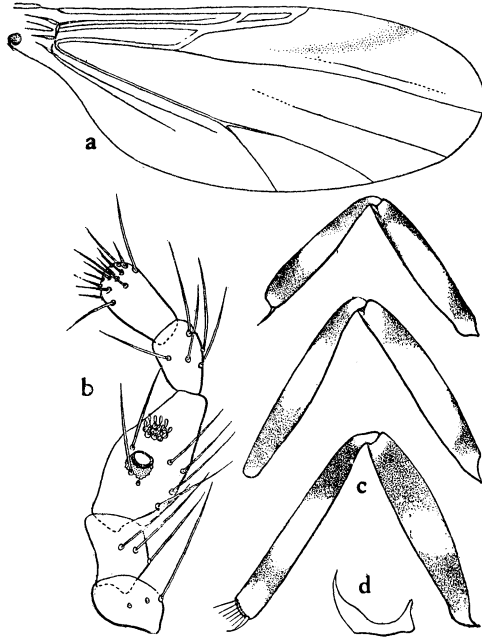


Fig. 48. *Forcipomyia (Forcipomyia) palliscuta*, female. a, wing; b, maxillary palpus; c, femora and tibiae; d, tarsal claw.

Wing (fig. 48a) entirely yellowish pale brown, with scales 2- or 3-stripped and only on costal and radial veins. Costa ending beyond middle of wing (51:84) and beyond tip of Cu_1 , relative lengths of R, M and stem of $fMCu$ about 23:21:35, Rs about twice length of R_1 (21:10), first radial cell absent, second cell long and about 1.5 \times as long as first (10:7), $fMCu$ under base of second radial cell, M_{3+4} about twice length of Cu_1 (27:14). Halter white. Abdomen yellowish pale brown; tergites wholly with 3-stripped scales, pleural membranes also wholly with 4-stripped, more brownish scales, sternites with 3-

striped scales and simple hairs; 2 caudal segments, and cercus more brownish; 2 spermathecae brown, short-oval, without hyaline minute punctures, somewhat unequal, 2+15 units by 13 units and 2+13 units by 12 units respectively and each with short chitinized basal part of duct.

DISTRIBUTION: New Guinea.

Holotype, ♀ (BISHOP 2880), Lae (in botanical garden), NE New Guinea, 25 Aug. 1955, Gressitt.

This species is somewhat allied to Sumatran *F. grata* Macfie in the coloration of the various parts, but in this allied species the hind femur is almost entirely dark brown and hind TR is smaller, about 0.6 to 0.7, distinctly differing from the New Guinea species.

53. *Forcipomyia (Forcipomyia) pictisquamipennis* Tokunaga, n. sp. Figs. 49 and 50.

Medium sized brown and yellow species; legs with many rather distinct brown bands

on yellow ground color, hind femur yellow on basal 1/2 and brown on apical 1/2, fore and middle femora with brown preapical band or cloud, all tibiae with middle or preapical and subbasal brown bands; wing with many dark and pale spots, costal area with 3 dark spots. Scales of legs and wings rather well developed. Maxillary palpus of female with segment 3 strongly inflated and sensory pit deeply indented, forming large round sensory pore. Female antenna with basal short flagellar segments each with distinct neck part; segment 11 of male antenna about $3\times$ as long as preceding one. TR about 0.9–1.0. Two spermathecae, short-oval and equal. Male hypopygium with coxites brown on apical part and yellow on basal 1/2, aedeagus broad and caudal lobes of parameres separated and sharply pointed at tip, but not filiform.

Male: Body about 1.98 mm long. Wing about 1.3 mm by 0.36 mm. Head brown including mouthparts, with eyes contiguous above, proboscis rather short and somewhat shorter than 1/2 height of head capsule. Maxillary palpus (fig. 49c) stout, segment 3 somewhat oval and with rather small sensory pit at middle, 5 segments with proportional lengths about 10: 15: 24: 10: 10. Antenna (fig. 49a) with scape brown, short basal segments 2 to 10 yellow, 4 long apical segments more or less brownish, plumose hairs bicolored, brown on basal and yellow on apical 1/2; segment 11 longest and about $3\times$ as long as preceding 1 or preceding 3 segments combined; 8 distal segments in proportion of 15: 16: 16: 16: 47: 32: 30: 34; combined relative lengths of segments 2 to 10 and 11 to 14 about 147: 148. Thorax entirely brown; scutellum with 11 strong bristles along caudal margin and many small setae on anterior 1/2. Legs mainly yellow and with many brown bands; in fore and middle legs, femora with preapical and, in hind leg, femur broadly brown on apical 1/2; in all legs, tibiae with small sub-basal and larger middle brown band and basal 4 tarsal segments broadly brown on middle part; scales of legs rather broad and 4-stripped, claws rather slender, hind TR about 0.9; RL of fore leg about 131: 132: 64: 43: 30: 25: 22, that of middle 156: 163: 55: ? : ? : ? : ?, that of hind 164: 176: 56: 62: 42: 29: 24.5.

Wing (fig. 49b) with 2-stripped narrow dark scales, with about 10 pale sub-confluent spots; middle costal pale spot very large and enveloping tip of second radial cell. Costa ending just before middle of wing (49: 100), relative lengths of R, M and stem of fMCu about 25: 23: 41, Rs short and about 1.5 as long as R_1 (14: 10), first radial cell absent, second cell triangular and as long as stem vein, M_{3+4} about 2.5 as long as Cu_1 (31: 12), fMCu under tip of second radial cell.

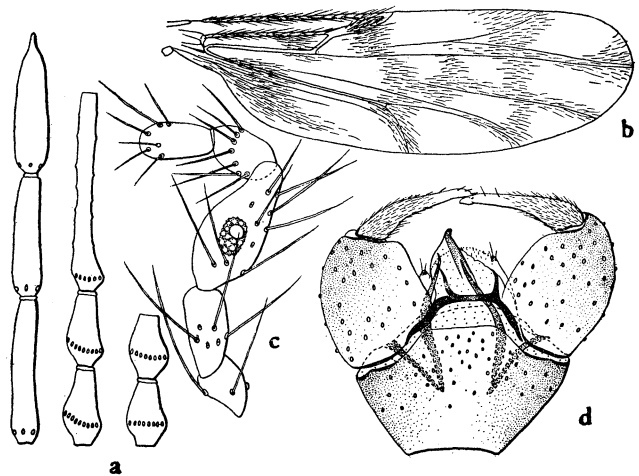


Fig. 49. *Forcipomyia* (*Forcipomyia*) *pictisquamipennis*, male. a, distal 8 antennal segments; b, wing; c, maxillary palpus; d, hypopygium.

Halter white. Abdomen mainly brown, but intersegmental parts yellow and anterior 4 tergites with middle part broadly yellow and following 3 tergites each with narrow dark middle band; tergites with 1- or 2-striped narrow scales, sternites without scales. Hypopygium (fig. 49d) with tergite and sternite 9 brown, coxite yellow on basal 1/2 and brown on apical 1/2, style entirely yellow; tergite 9 somewhat hexagonal, about 1/2 as long as wide (30-35: 65), setigerous on caudal 1/2 and without caudal incision; tergite 9 suddenly narrowed beyond middle, round on caudal margin and distinctly shorter than basal width (47: 65). Coxite stout, shorter than $1.5\times$ basal width (43: 32); style slender, tapered, rather sharply pointed, very slightly arcuate and somewhat shorter than coxite (36: 43). Aedeagus broad, with basal lateral roots slender, U-shaped thickening on central broad area, caudal projection rather sharply pointed, curved ventrad and extending slightly beyond tergite; parameres quite separated, slender, with caudal lobes slightly arcuate, sharply pointed at tip, extending caudad not beyond tergite, slightly longer than coxites (47: 43) and twice as long as basal arms (47: 23).

Female: Body about 1.61 mm long. Wing about 1.07 mm by 0.37 mm. General coloration similar to male, but wing much darker, with costal and basal paler spots yellowish and paler areas distinctly narrower than in ♂. Head with proboscis entirely brown and about 1/2 length of head capsule; clypeus with about 7 setae on median part. Maxillary palpus (fig. 50c) robust, with segment 3 strongly inflated, sensory pit of segment 3 very

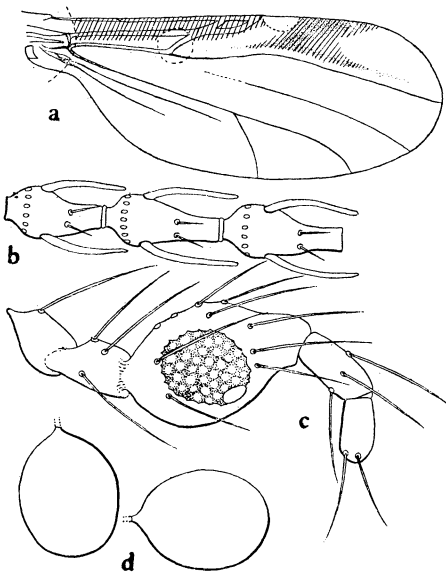


Fig. 50. *Forcipomyia* (*Forcipomyia*) *pictisquamipennis*, female. a, wing; b, basal antennal segments 4-6; c, maxillary palpus; d, spermathecae.

large, round and situated at middle of segment, 5 segments in proportion of 9.5: 9: 22.5: 9.5: 8. Antenna (fig. 50b) brown, basal short flagellar segments flask-like, with long neck parts and 2 large and 2 small sensillae besides verticils; distal segments broken and missing. Thorax mainly brown, but sternum yellowish. Legs with coxae yellow, scales rather broad and 5 striped; middle femora with pre-apical brown band rather faint; hind tibial comb with 7 apical bristles; hind TR about 1.0. RL about 114: 120: 52: 33: 24: 21.5: 22 in fore, 144: 157: 52: 46: 29.5: 23.5: 21 in middle and 152: 160: 54: 54: 36: 27: 24 in hind leg.

Wing (fig. 50a) with pale spots at base of wing, covering r-m and just beyond second radial cell, small and yellowish, dark spot covering R and costa elongate, dark spot covering first and second radial cells confluent with basal dark spot along costa and subsquare, costal dark spot 3 covering anterior arm of intercalary fork large, other dark spots covering other veins slightly paler than costal dark spots, broadened and confluent

with each other remaining narrow pale brown areas. Scales of costal and radial veins lanceolate and 3-striped, on other parts of wing very slender and at most 2-striped. Costa

extending beyond middle of wing (41.5:76), relative lengths of R, M and stem of fMCu about 21:18:31, Rs about twice length of R_1 (14:7), first radial cell absent, second cell fully as long as stem vein (7:6), fMCu under middle of second cell, M_{3+4} slightly shorter than twice length of Cu_1 (22:12). Halter white.

Abdomen entirely brown, tergites and pleural membranes with scales 3- or 4-striped; cercus brown; 2 spermathecae (fig. 50d), short-oval, brown, equal, without hyaline punctures, about 0.8+15 units by 13 units and 0.8+14 units by 12.8 units and each with very short basal chitinized part of duct.

DISTRIBUTION: New Guinea.

Holotype, ♂ (BISHOP 2881), Wum, 850 m, Jimmi Valley, NE New Guinea, 17 July 1955, Gressitt. Allotype, ♀ with holotype.

The colored markings of the wings and legs of the present species are very similar to those of Patagonian *F. multipicta* Ingram and Macfie, African *F. biannulata* Ingram and Macfie and *F. squamipennis* Ingram and Macfie, Sumatran *F. grata* Macfie and Micronesian *F. penniornata* Tokunaga and Murachi, but the structure of the male hypopygium is obviously different and the coloration of the legs in detail is also somewhat different. The structure of the male hypopygium is close to that of *F. multipicta*, with only slight differences of the caudal lobes of the parameres, which are filiform on the apices and much longer in the allied species. The hind femora of the present species are quite yellow on the basal half and brown on the apical half, being distinctly bicolored and differing from all allied species, including other new New Guinea ones reported in this paper.

54. *Forcipomyia* (*Forcipomyia*) *penniornata* Tokunaga and Murachi, 1959, Ins. Micronesia (Bishop Mus.) 12 (3): 163.

DISTRIBUTION: Bonin Is., Mariana Is., Caroline Is. and New Guinea.

NETH. NEW GUINEA: Hollandia, 100 m, ♂, 23 July 1955, Gressitt.

55. *Forcipomyia* (*Forcipomyia*) *unifascicornis* Tokunaga n. sp. Fig. 51.

Medium-sized yellow and brown species; legs with many brown bands on yellow ground color as in New Guinea *F. maculosicrura*, but bands of fore and middle femora somewhat faint, wing brownish gray, with several fuscus clouds on veins and membrane sub-confluent, ill defined and obscure and with more distinct costal dark spot covering costal and radial veins. Clypeus with very many setae; antennal segment 11 of male about equal to preceding 3 segments combined and shorter than following 2 combined. Legs, wings and abdomen with rather broad scales. Hind TR about 0.68 in male and 0.64 in female. Male hypopygium with slender and yellow styles, slender aedeagus, triangular basal arms of parameres, caudal lobes of parameres short and quite separated. Female cercus yellow and 2 spermathecae, oval and equal.

Male: Body length about 1.89 mm. Wing about 1.21 mm by 0.37 mm. Head mainly brown including mouthparts, with proboscis about 0.4 height of head capsule (9.5:23), eyes contiguous above; clypeus with 12 setae on middle and dorsal parts. Antenna (fig. 51c) distinctly bicolored, basal segments 1 to 7, apical 13 and 14 including plumose hairs brown, segments 8 to 12 including plumose hairs yellow, segment 11 as long as preceding 3 com-

bined (41: 42), but somewhat shorter than following 2 combined (41: 49), relative lengths of segments 2 to 10 and 11 to 14 put together about 138: 122, 8 distal segments in proportion of 13: 14: 14: 14: 41: 28: 20: 29. Thorax brownish, but scutum and scutellum much paler and scutum with anterior marginal area and foveae more brownish; scutellum with 9 strong and 2 small bristles along posterior margin and 14 minute setae on anterior 1/2. Legs with many brown bands on yellow ground color, but hind femur almost entirely brown, sub-basal band of fore femur and apical band of middle femur very obscure; scales rather broad and 5- or 6-stripped; claws thickened on preapical parts; hind tibial comb with 6 or 7 apical bristles; hind TR about 0.68. RL about 125: 122: 52: 45: 31: 23: 19 in fore, 152: 153: 47: ? : ? : ? : ? in middle and 160: 165: 43: 63.5: 44: 30: 23 in hind leg.

Wing (fig. 51a) pale brownish gray, with obscure brownish clouds and dark long spot

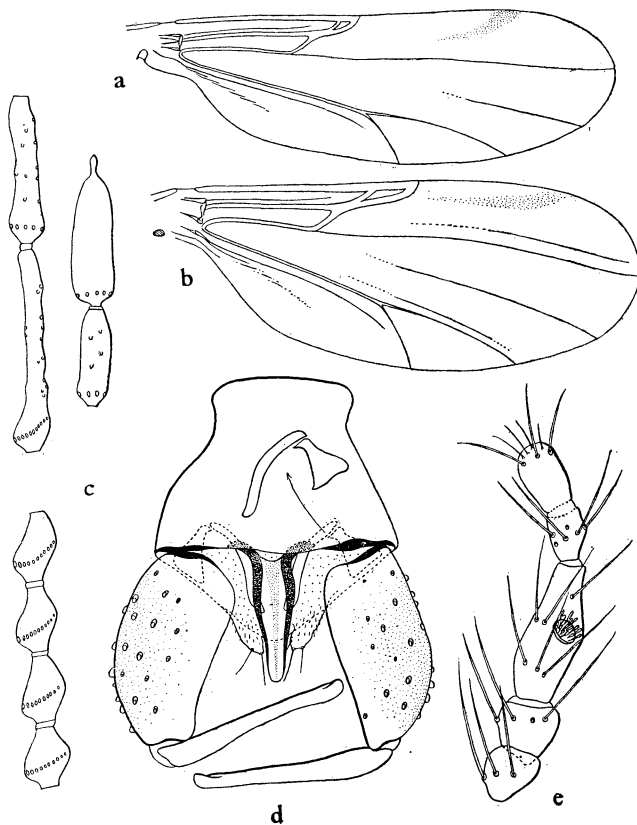


Fig. 51. *Forcipomyia* (*Forcipomyia*) *unifascicornis*. a, wing, male; b, wing, female; c, distal 8 antennal segments, male; d, hypopygium, male; e, maxillary palpus, female.

on basal part of costal margin covering costal and radial veins, scales on costal and radial veins 3- or 4-stripped and those of other parts without or with only 1 stripe. Costa ending just before middle of wing (45: 94), relative lengths of R, M and stem of fMCu about 24: 22.5: 38.5, Rs about 1.5 \times length of R₁ (11: 7), first radial cell absent, second cell small, subtriangular and as long as stem vein (5: 5), fMCu under costal tip, M₃₊₄ 2.4 \times length of Cu₁ (29: 12). Halter yellow. Abdomen mainly brown, but anterior 4 tergites yellowish on middle parts and brownish on sides, tergites and pleural membranes with 3-stripped scales and ordinary setae, but sternites without scales. Hypopygium (fig. 51d) long, mainly brown, but style and basal and mesal parts of coxite yellow. Tergite 9 as long as wide (51: 53),

ending at middle of coxites and triangular on caudal margin; sternite 9 also rather long, about 0.7 width and without caudal concavity. Coxite rather long, oval and about twice as long as wide (38: 20); style almost straight, slender, very slightly tapered, not sharply pointed and almost as long as coxite (37: 38). Aedeagus slender, with basal roots slender,

basal arch small and low, median part chitinized along lateral margins, slightly broadened on basal 2/3, tapered, ending in round tip of median lobe distinctly beyond caudal end of tergite and about 2.5× as long as wide; parameres quite separated, with basal arms subtriangular and broadened laterad, caudal lobes widely separated at base, slightly arcuate, twice as long as basal arms (20:11), 2/3 total length of aedeagus (20:30), almost uniform in thickness, with blunt tips, converging apically and ending at middle of aedeagus.

Female: Body about 1.89 mm. Wing about 1.05 mm by 0.37 mm. General color and structure similar to male with usual sexual differences. Head with 15 setae on median part of clypeus. Maxillary palpus (fig. 51 e) robust, with sensory pore at middle of segment 3 and 5 segments in proportion of 10:11:24:7:12. Antennae missing. Thorax with caudocutal area of scutum broadly pale; scutellum with 9 strong and 4 small bristles along caudal margin and 35 minute setae on anterior 1/2. Legs with scales broad and 4- to 6-stripped, 2 brown bands of fore femur and apical band of middle femur obscure; hind tibial comb with 7 apical bristles; claws stout; hind TR about 0.64. RL about 128:125:47:38:24:22:20 in fore, 158:168:41.5:54:30:23.5:20 in middle and 173:167:41:65:?:?:? in hind leg.

Wing (fig. 51 b) entirely scaly, costal and radial veins with scales dark, broad, 4-stripped and forming large costal dark spot, membrane and other veins with scales slender, brown and 2- or 3-stripped. Costa ending somewhat beyond middle of wing (43:81), proportional lengths of R, M and stem of fMCu about 21:19:35, Rs about twice length of R₁ (13.5:7), first radial cell absent, second longer than its stem vein (7:5), fMCu under middle of second radial cell, M₃₊₄ about twice length of Cu₁ (23:11). Abdomen entirely brown, but with cercus yellow; tergites and pleural membranes with 4-stripped scales, sternites subdivided into hemisternites and without scales. Two spermathecae, oval, brown, equal, about 40 units by 24 units and 41 units by 22 units respectively and chitinized parts of ducts almost absent.

DISTRIBUTION: New Guinea.

Holotype, ♂ (BISHOP 2882), Wum, 850 m, Jimmi Valley, NE New Guinea, 16 July 1955, Gressitt. Allotype, ♀, Lae, NE New Guinea, 25 Aug. 1955, Gressitt.

This insect resembles the Sumatran *F. grata* Macfie in the coloration of legs, wings and other parts and the value of hind TR. But these two species are distinctly different in the structure of the male hypopygium. The identification of allied species which have mottled wings and double dark bands of the tibiae is difficult and almost impossible without the close observation of the male hypopygia. However, other related species have highly characteristic markings or structures.

56. *Forcipomyia (Forcipomyia) maculosicrura* Tokunaga, n. sp. Figs. 52 and 53.

Medium-sized yellow and brown species; legs with many brown bands and wing with 4 pale and 3 dark costal spots alternately arranged. Segment 11 of male antenna as long as 3 preceding segments combined; basal short flagellar segments of female flask like and with rather long neck parts. Hind TR 0.86-0.91 in male and 0.8 in female. Hind femur entirely brown, fore and middle femora with apical and basal brown bands, all tibiae with apical or preapical and basal or subbasal brown bands. Scales of legs and wings rather broad and 3- to 5-stripped. Two spermathecae, subequal. Male hypopygium with styles slight-

ly sinuous and clavate at tips, parameres quite separated, with basal arms triangular and caudal lobes almost straight, uniformly thickened, suddenly and sharply pointed at extreme tips.

Male: Body length about 1.89 mm. Wing about 1.02 mm by 0.29 mm. Head almost entirely brown including mouthparts, with eyes contiguous above, proboscis about $1/3$ length of head capsule; clypeus with about 7 median setae. Maxillary palpus (fig. 52 c) robust, segment 3 elongate, oval and with round sensory pit at middle, 5 segments about 7.5:11:23:8.5:10.3 in relative length. Antenna (fig. 52 d) with scape brown, flagellar segments pale brown including plumose hairs, segment 11 subequal to 3 preceding segments combined, relative lengths of segments 2 to 10 and 11 to 14 together about 120:118, 8 distal segments in proportion of 12:13:14:14:41:26:20:28. Thorax almost entirely brown, but humeral and caudoscuteal areas somewhat paler; scutellum with 8 strong and 5 to 7 smaller bristles along caudal margin and 2 lateral small and 18 minute setae on anterior $1/2$. Legs densely covered with scales, broad, oval and 4- or 5-stripped, colored markings very similar to that of Micronesian *F. unitheca* Tokunaga; coxae and trochanters brownish, fore and middle femora yellow and each with sub-basal and apical brown bands, hind femur entirely brown, fore and middle tibiae yellow on middle part and with broad apical and smaller basal brown bands, but extreme ends and bases somewhat paler, hind femur with sub-basal and preapical brown band on yellow ground color, all tarsal segments, except for pale last ones, with articular parts yellow and with middle brown bands; hind tibial comb with 7 apical bristles; claws slender; hind TR about 0.89 (0.86-0.91) RL about 113.8:109:45.5:28.8:21.5:19:21 in fore, 131.5:134:43.5:43.3:27:19:21 in middle and 137.5:139.5:43.8:49:34:24:22 in hind leg.

Wing (fig. 52 a) brownish gray, with scales on costal and radial veins lanceolate and

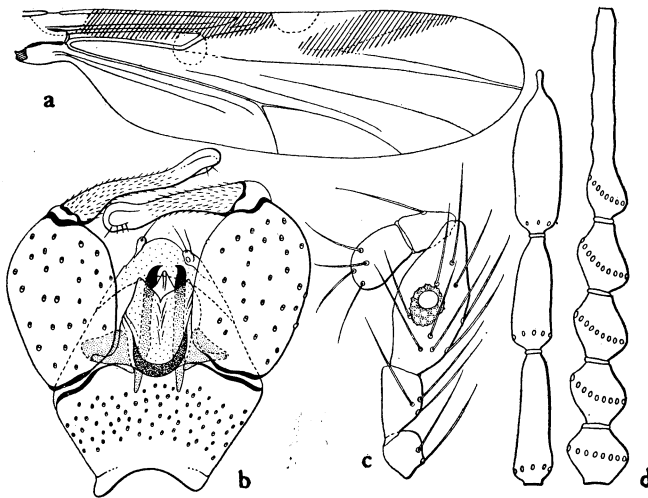


Fig. 52. *Forcipomyia* (*Forcipomyia*) *maculosicrura*, male. a, wing; b, hypopygium; c, maxillary palpus; d, distal 8 antennal segments.

3-striped, 3 pale and 3 dark costal spots alternately arranged; pale spots small, first at base, second covering r-m, third just beyond tip of Rs, dark spots large, first covering costa and R, second covering first and second radial cells and third beyond costal end as wide as semicircular pale spot and covering anterior arm of intercalary fork. Costa ending at middle of wing (40.5:79), relative lengths of R, M and stem of fMCu about 21:19.5:3.5, Rs hardly twice length of R₁ (12.5:7), first radial cell absent, second subtriangular and

somewhat longer than stem vein (6.3:5), fMCu under tip of Rs, M_{3+4} about 2.5 times length of Cu_1 (23.5:9). Halter brown. Abdomen mainly brown, but 3 anterior tergites slightly paler, with 3- or 4-stripped scales on tergites and pleural membranes. Hypopygium (fig. 52b) brown, styles yellow. Sternite 9 about 1/2 as long as wide and with many hairs scattered broadly on transverse zone at middle; 9th tergal side triangular on caudal margin, but tergite round on caudal margin. Coxite oval and about 1.4 \times as long as wide (39:28); style rather slender, almost uniformly thickened, slightly undulate, round at apex and somewhat shorter than coxite (36:39). Aedeagus with basal roots rather slender and directed laterad, median part broad, convex on basal margin and with 3 triangular lobes on caudal part including median caudal lobe ending at level of coxite center and far before caudal end of tergal lobe; parameres quite separated, with basal arms triangular and broadened laterally, caudal lobes thickly chitinized, rod-like, extending caudad parallel, about 2.5 \times as long as basal arms (30:12), longer than aedeagus (30:25), but shorter than styles (30:36), sharply pointed and hooked mesad at extreme tips and ending just beyond tip of aedeagus.

Female: Body about 1.08 mm. Wing about 0.91 mm by 0.33 mm. General coloration and structure as in male with usual sexual differences. Head with proboscis about 1/2 length of head capsule, clypeus with 6 median setae. Maxillary palpus (fig. 53c) with 5 segments in proportion of 9:10:20:9:11, segment 3 slightly swollen on basal 1/2 and with shallow sensory pore at middle. Antenna brown, basal short flagellar segments flask-like, about twice as long as basal width and with rather long neck parts; distal segments broken and missing. Thorax with 8 strong and 4 small bristles along caudal margin of scutellum and 17 minute setae on anterior 1/2. Legs (fig. 53b) with brown markings on yellow ground color as in male, scales broad and 5-stripped, claws stout and slightly broadened on preapical parts; hind tibial comb with 5 or 6 apical bristles; hind TR about 0.8. RL about 104:99:47:28:21:19:18 in fore, 140:136:42:43:26:20:19 in middle and 146:141:40:50:32:22:20 in hind leg.

Wing (fig. 53a) pale brownish gray, with scales on costa and radial veins 3- or 4-stripped, pale and dark costal spots as in male, but basal 2 dark spots very conspicuous and separated by pale spot, dark spot 3 covering anterior arm of intercalary fork indistinct. Costa ending just beyond middle of wing (37:70), relative lengths of R, M and stem of fMCu about 16:15:29, Rs twice as long as R_1 (14:7), first radial cell absent, second cell rather large and distinctly longer

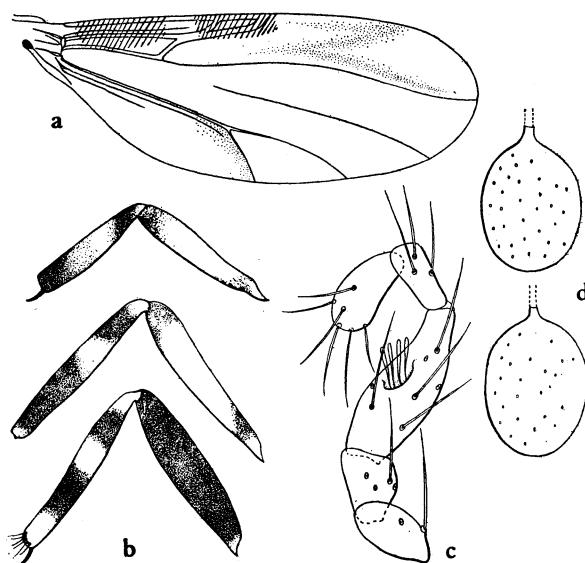


Fig. 53. *Forcipomyia* (*Forcipomyia*) *maculosicrura*, female. a, wing; b, femora and tibiae; c, maxillary palpus; d, spermathecae.

than stem vein (7:5), fMCu under middle of second radial cell, M_{3+4} about twice length of Cu_1 (21:10). Abdomen brown, scales present on tergites and pleural membranes and 3- or 4- striped; cercus paler; 2 spermathecae (fig. 53 d), rather large, oval, brown, with many hyaline punctures, about 2+24 units by 18 units and 2+24 units by 18.5 units respectively, each with small chitinized part of duct.

DISTRIBUTION: New Guinea and New Britain.

Holotype, ♂ (BISHOP 2883), St. Paul's, 300 m, Baining Mts., Gazelle Pen., New Britain, 9 Sept. 1955, Gressitt. Allotype, ♀, Hollandia, 100 m, Neth. New Guinea, 23 Aug. 1955, Gressitt. Paratype, ♂, with allotype.

This species is similar in coloration to the Sumatran *F. grata* Macfie, especially in the adornment of the legs; but the Sumatran species is provided with a smaller value of the hind leg, about 0.6-0.7, and different structures of aedeagus and parameres of male hypopygium (the styles are nearly identical); the aedeagus is triangular (lateral sides slightly concave) and the caudal lobes of the parameres are short, being subequal to the basal arms and about a half of the total length of aedeagus.

57. Forcipomyia (Forcipomyia) stigmatipennis Tokunaga, n. sp. Fig. 54.

Medium-sized yellowish species, with specific markings of legs and wings and fused apical 2 segments of maxillary palpus, differing from known species of the genus. Thorax brown and yellow, scutum mainly brown and with median part of anterior 1/2 and sides yellow, sternum and ventral 1/2 pleuron brown and dorsal 1/2 pleuron yellowish. Legs with femora and tibiae largely yellow, but femora with sub-basal fuscus bands and tibiae with brown apical tips. Wing yellowish gray, but with distinct dark spot consisting of very narrow dark scales and covering second radial cell. Male unknown.

Female: Body about 1.6 mm long. Wing about 0.91 mm by 0.37 mm. Head almost entirely brown, including mouthparts, with eyes broadly contiguous above, 2 frontal tubercles, small and blunt, proboscis short and about 1/4 height of head capsule; clypeus with about 9 setae on middle part. Maxillary palpus (fig. 54 b) stout, 4-segmented, last 2 segments being completely fused, and about 5:10:16:12 in relative length; segment 3 inflated and with shallow sensory pit before apex. Antennae missing. Thorax generally pale brown, scutum with yellow median vitta on anterior 1, 2 and yellowish lateral sides, scutellum with yellowish median part, pleuron yellowish on dorsal 1/2; scutellum with 8 bristles along caudal margin and about 15 small setae on anterior 1/2. Legs mainly yellow, but coxae brown, tarsal segments pale brown, all femora with single sub-basal fuscus bands, most distinct on hind legs and very faint on middle, apical ends of all tibiae more or less brownish or fuscus; scales of legs very slender and sparse. Hind TR about 1.13; RL about 95:98:41:25.5:20:18:19 in fore, 112:124:37:27:22:18.5:17 in middle and 126:125:44:39:28:22:20 in hind leg.

Wing (fig. 54 a) yellowish gray, with single distinct dark spot of very narrow dark scales on second radial cell. Costa ending distinctly beyond middle of wing length (47:78), relative lengths of R, M and stem of fMCu about 20:16:30, R_s longer than $1.7 \times$ length of R_1 (21:12), first radial cell slit-like, second radial cell well formed and as long as first (9:8), M_{1+2} and base of M_2 atrophied, fMCu under distal part of first radial cell, M_{3+4} about $2.5 \times$ length of Cu_1 (25:10). Halter entirely yellow. Abdomen pale brown, with

very slender scales on tergites, pleural membranes yellowish brown; cercus yellow; 2 spermathecae (fig. 54 c), brown, oval, equal, about 1.5+25 units by 16 units and 2+24 units by 15 units respectively and each with short hyaline basal part of duct.

DISTRIBUTION: New Guinea.

Holotype, ♀ (BISHOP 2884), Wum, 850 m, Jimmi Valley, NE New Guinea, 16 June 1955, Gressitt.

This species is highly specific in the presence of characteristic markings of the wings and legs.

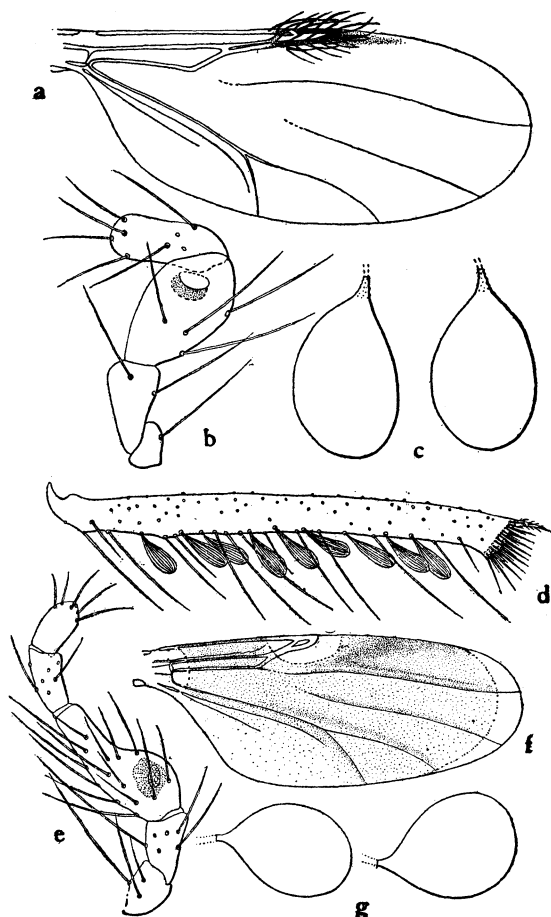


Fig. 54. *Forcipomyia* (*Forcipomyia*) spp. a-c, *stigmatipennis*, female. a, wing with scales on stigmal spot; b, maxillary palpus; c, spermathecae. d-g, *squamitibialis*, female: d, hind tibia; e, maxillary palpus; f, wing; g, spermathecae.

58. *Forcipomyia* (*Forcipomyia*) *squamitibialis* Tokunaga, n. sp.

Fig. 54.

Rather large brown species with yellowish legs. Scutum with 3 pairs of brown vittae separated by yellowish pale brown stripes; all tibiae of female with 9-12 suboval large scales on extensor side; female wing pale brownish gray, with semicircular large pale spot covering second radial cell and its stem vein and yellowish on base of wing and obscurely paler on apical marginal area of wing. Abdomen, wings and tarsal segments of legs without scales. Hind TR of female about 0.8. Male unknown.

Female: Body about 2.02 mm long. Wing about 1.33 mm by 0.52 mm. Head brown including mouthparts, eyes widely contiguous above, proboscis about 1/2 length of head capsule; clypeus setigerous and with about 18 setae on middle part. Maxillary palpus (fig.

54e), rather stout, segment 3 slightly swollen on basal 1/2 and with sensory pit on basal area, 5 segments in proportion of 9:11:30:14:12. Antenna with scape yellow, flagellar segments missing. Thorax with 3 pairs of brown vittae separated by very slender yellowish stripes on scutum, median vittae ending just before pale brown caudoscuteal area, next lateral vittae extending from shoulder margins to scutellum, outer lateral vittae short and ending slightly beyond scutal sutures; scutellum and postscutellum brown; pleural sclerites brown; pleural membranes and sternum yellow; scutellum with 8 strong bristles and about 10 small setae. All tibiae (fig. 54 d) with about 10 (9-14) large scales, mainly oval, but some slightly pointed at tips, 11-stripped and arranged in single lines on extensor side; other scales of legs quite absent. Hind TR about 0.8 (0.75-0.81); hind tibial comb with 9 apical bristles; claws slender. RL about 133:133:43:45:28:20:?? in fore, 165:173:41:58:32:26:25 in middle and 181:171:49:65:38:28.5:?? in hind leg.

Wing (fig. 54 f) pale brownish gray, yellowish on basal area, pale on apical marginal area and with semicircular pale spot on costal margin enveloping second radial cell and stem vein; scales absent. Costa ending just before center of wing (49:102), relative lengths of R, M and stem of fMCu about 24:21:43, Rs about 1.5× length of R₁ (14:9) and round at tip, first radial cell absent, second cell suboval and somewhat shorter than stem vein (5:7), fMCu under tip of second radial cell, M₃₊₄ about 1.7× length of Cu₁ (32:19). Halter entirely white. Abdomen mainly brown, with pleural membranes very pale, posterior 2 segments and cercus yellow; scales absent. Spermathecae (fig. 54g) brown, short-oval, slightly unequal, about 2+27 units by 17 units and 2+26 units by 15 units respectively and each with short chitinized part of duct.

DISTRIBUTION: New Guinea.

Holotype, ♀ (BISHOP 2885), Wum, 850 m, Jimmi Valley, NE New Guinea, 16 July 1955, Gressitt.

This species is somewhat allied to *F. lanceolata* Macfie from Sumatra and *F. mira* Johansen from West Java and New Guinea. In the first allied species, however, the legs are almost uniformly brown and the tibial spine-like scales are all lanceolate, tapering to sharp points and not very broad, unlike those of the new species. The second allied species is also different from *squamitibialis* in the following points: all tibiae are provided with lanceolate spine-like scales and the wing bears an elongate rectangular patch of yellow hairs on costal area covering the second radial cell. The shape of tibial spine-like scales of the present species is very similar to that of *F. chilensis* Ingram and Macfie.

59. Forcipomyia (Forcipomyia) pictiscutaris Tokunaga, n. sp. Fig. 55.

Medium-sized species with yellow and brown distinct markings on thorax and abdomen. Scutum with 4 distinct yellow spots on brown ground color, scutellum with median brownish spot on yellow ground color and abdominal tergites each with T-shaped brown band on anterior part. Legs almost entirely yellow; wing uniformly pale brown; abdominal tergites and legs with 3-stripped scales and wing with 1-stripped, very narrow scales. Segment 11 of male antenna as long as preceding 4 segments together (52:52); maxillary palpus rather stout; hind TR about 0.4; wing with costa ending just before middle; hypopygium with sternite 9 very large and with pair of horn-like membranous lobes on caudal mar-

gin, parameres stout and with caudal lobes well separated on basal 1/2 and closely applied to each other on distal 1/2. Female unknown.

Male: Body about 1.61 mm long. Wing about 1.07 mm by 0.31 mm. Head brown, including mouthparts, with eyes narrowly separated above as wide as 1 facet, proboscis about 1/3 as long as length of head capsule; clypeus with 8 setae on middle part. Maxillary palpus (fig. 55 b) rather stout; segment 3 swollen on basal 2/3 and with round sensory pore just before middle, 5 segments in proportion of 8:9:23:8:8. Antenna (fig. 55 a) with scape brown, flagellum and plumose hairs pale brown, segment 11 as long as preceding 4 segments taken together, distal 3 segments missing, flagellar segments about 24:12:12.5:12.5:13:13:13:13:12.7:52:?:?:?. Thorax with scutum brown, with 6 distinct yellow spots, lateral vittae undulate and narrowed cephalad, median vittae ending just beyond level of scutal sutures and diverging slightly cephalad, 2 round spots on caudo-scutal area, areas of humeral pits also yellow; scutellum yellow and with median brown spot; postscutellum dark brown, but paler on anterior part; pleuron and sternum yellow, but central area of sternum between fore and middle coxae brown. Scutellum with 11 strong and 2 small bristles along caudal margin and 6 small setae and 10 minute hairs on anterior part. Legs almost entirely yellow, but knee-parts and tarsi very slightly fuscus; tibiae with narrow 1-stripped scales and tarsi with 2- or 3-stripped scales; claws very slender; hind tibial comb with 6 apical bristles. Hind TR about 0.4-0.41; RL about 108:116:34:49:26:22:18 in fore, 130:147:24:64:29:?:? in middle and 135:138:28:65:36:25:18 in hind leg.

Wing (fig. 55 e) entirely pale brown, without distinct pale and dark spots, costal and radial veins with very narrow 1-stripped scales. Costa ending just before middle of wing length (39:82), relative lengths of R, M and stem of fMCu about 20:18:34, Rs about 1.6× length of R₁ (11:7), first radial cell slit like, second as long as first (5:5) and fusi-form, M₃₊₄ about 2.5× length of Cu₁ (25:10), fMCu under tip of Rs. Halter entirely yellow. Abdomen mainly yellow, but tergite 1 brown and with W-shaped yellow area on anterior part along caudal margin of postscutellum, tergites of segments 2 to 5 yellow and each with T-shaped brown band on anterior 1/2, following caudal segments more extensively brown; scales of tergites narrow and 3-stripped. Hypopygium (fig. 55 d) entirely brown; tergite and sternite 9 broad, almost equal in shape and size, being subpentagonal, and 2/3 total length of hypopygium; sternite with pair of small horn-like membranous lobes on caudal margin, many setae arranged on transverse band at middle and without caudal incision, but slightly convex caudad. Coxite stout, but somewhat shorter than length of sternite (36:41) and about

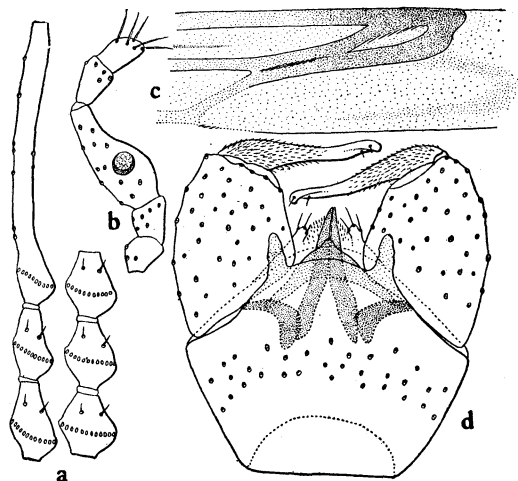


Fig. 55. *Forcipomyia (Forcipomyia) picti-scutaria*, male. a, antennal segments 6-11; b, maxillary palpus; c, wing venation of radial field; d, hypopygium.

1.5× as long as basal width (36:24); style very slender, slightly undulate and slightly shorter than coxite (31:36). Aedeagus small, very short, about 1/2 basal width (12:25), with basal arch very low and median caudal lobe small and curved towards tergite at extreme tip; parameres stout, with basal arms rather broad and arcuate, caudal lobes about 2.7× length of basal arms (27:10), tapered, rather widely separated at bases, but convergent distad, rather pointed at tips and just beyond caudal margin of tergite.

DISTRIBUTION: New Guinea.

Holotype, ♂ (BISHOP 2886), Wum, 850 m, Jimmi Valley, NE New Guinea, 16 July 1955, Gressitt.

This species is highly specific in the coloration of the thorax and abdominal tergites, in the development of peculiar caudal lobes of the ninth sternite and in the shape of the broad sternite and stout parameres. New Guinea *F. flaviventris* Kieffer may be an allied species, but here the scutum is provided with only one large yellow median vitta and the scutellum is reddish brown similarly to the postscutellum, differing from the present new species. Kieffer (1917) did not describe the structure of the male hypopygium of this species.

60. Forcipomyia (Forcipomyia) quadriflava Tokunaga, n. sp. Fig. 56.

Medium-sized dark brown and yellow species; thorax with pleuron and sternum quite yellow, scutum with square large yellow spot on anterior 1/2; legs entirely yellow; maxillary palpus brown on basal 1/2 and yellow on apical 1/2; wing with dark small spot covering second radial cell between 2 long paler areas along costal margin. Legs, wings and abdominal tergites with very slender scales. Male with eyes separated above as wide as 1 facet; maxillary palpus robust, with segment 3 swollen on basal 1/2 and sensory pore round, rather shallow and situated just before middle of segment 3. Segment 11 of male antenna very long but somewhat shorter than preceding 4 segments put together. Hind TR of male about 0.97. Male wing with costa ending just before middle of wing and 2 radial cells obsolete and slit-like, Hypopygium without caudal concavity of sternite 9, parameres with caudal lobes fused with each other on basal 2/5, styles slender and tapered. Female unknown.

Male: Body about 1.95 mm long. Wing about 1.11 mm by 0.33 mm. Head brown, with eyes narrowly separated above as wide as 1 facet, proboscis rather short and about 0.4 of height of head capsule (12:30); clypeus with 12 setae on middle part. Maxillary palpus (fig. 56 b) robust, brown on basal 2 segments and swollen basal 2/3 of segment 3 and yellow on remaining distal part, sensory pore rather large, shallow and situated just before middle of segment 3; 5 segments showing following proportional lengths: 8:10:27:10:8. Antenna (fig. 56 a) with scape dark brown, flagellum including plumose hairs brown, but distal 3 segments missing; segment 11 very long and somewhat shorter than preceding 4 segments combined (50:54); relative lengths of segments 6 to 11 about 11:11:12:14:15:50. Thorax distinctly bicolored, with dorsum mainly brown and pleuron and sternum quite yellow, but scutum dark brown, with distinct large yellow spot between foveae on anterior 1/2, caudoscuteal area and postscutellum brown, scutellum dark brown; scutellum with 11 strong bristles and 2 small hairs on caudal part and about 15 small setae on anterior part. Legs including coxae entirely yellow and with 2-striped slender scales; hind tibial comb with 6 apical bristles; hind TR about 0.97. RL about 127:131:55:43:28:26:16 in fore, 147:150:52:53:30:25.5:16 in middle and 141:144:56:57.5:36:30:16 in

hind leg.

Wing (fig. 56 c) pale brown, with small dark costal spot on second radial cell, 2 long costal pale areas beyond and before this dark costal spot, scales of anterior veins very slender and 1-stripped. Costa ending somewhat before middle of wing length (40:85), relative lengths of R, M and stem of fMCu about 20:19:36, Rs short, about 1/2 R, slightly longer than R₁ (11:8) and abruptly curved towards costa at pre-apical part, both radial cells obsolete, slit-like and equal in length (5:5), fMCu slightly beyond level of costal tip, M₃₊₄ about twice length of Cu₁ (29:14). Halter yellow. Abdomen brown and with slender scales on tergites. Hypopygium (fig. 56 d) entirely dark brown; sternite 9 with about 27 setae on caudal 1/2, middle area of caudal part membranous but with no definite caudal concavity; tergite 9 with caudal margin round and caudal lobes ending distinctly before tips of coxites. Coxites subcylindrical and about twice as long as wide (41:20); style slender, about 0.8 length of coxite (32:41), almost straight and distinctly tapered. Aedeagus rather broad, with basal roots slender and extending obliquely laterad, basal arch crescent-like and about 1/3 total length (7:23), middle part broadest at sub-basal part, tapered and with caudal lobe slightly projected; parameres with lateral arms slender, caudal lobes fully as long as style (34:32), 2.3× as long as lateral arms (34:15), fused on basal 3/5 (20:34), separated apically; very sharply pointed and slightly produced beyond caudal margin of tergal lobes, basal fused part of lobes very slightly tapered and with basal width about 1/2 length of lateral arms (8:15).

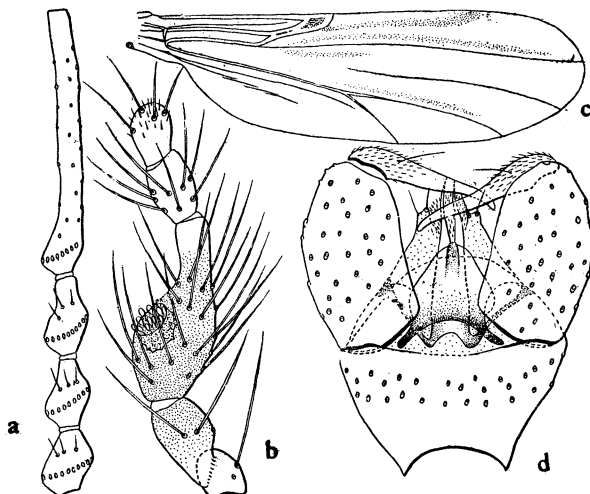


Fig. 56. *Forcipomyia* (*Forcipomyia*) *quadriflava*, male. a, antennal segments 8-11; b, maxillary palpus; c, wing; d, hypopygium.

DISTRIBUTION: New Britain.
 Holotype, ♂ (BISHOP 2887), St. Paul's, 300 m, Baining Mts., Gazelle Pen., New Britain, 9 Sept. 1955, Gressitt.
 The male hypopygium is somewhat similar to *F. flavitibialis* Tokunaga and Murachi from Micronesia and New Guinea, but the adornments of the scutum and the legs of these two species are distinctly different. The bicolored maxillary palpi of the present species is another important specific character differing from the allied species.

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61. *Forcipomyia* (*Forcipomyia*) *mira* Johannsen, 1931, Arch. Hydrobiol., Suppl. 9:410. Tropische Binnengewässer 2:410-411. Fig. 57.

Medium-sized pale brownish and yellow species; scutum pale brownish yellow and

with shoulder parts white; legs almost entirely yellow and without colored markings; wing very pale and with distinct dark costal spot beyond second radial cell. Segment 11 of male antenna fully as long as preceding 4 segments combined; hind TR about 0.73; male wing with costa ending before middle of wing; male hypopygium almost entirely yellowish white, coxites long, cylindrical and with many minute spinules on mesal sides at bases, parameres with caudal lobes separated from each other and filiform on apices. Female unknown.

Male: Body length about 1.71 mm. Wing about 1.12 (1-1.5) mm by 0.35 (0.33-0.41) mm. Head mainly dark brown, with eyes broadly contiguous above, mouthparts brownish, proboscis about 1/3 as long as length of head capsule (9:24); clypeus with 7-9 setae on middle part. Maxillary palpus (fig. 57 b) slender, with 5 segments in proportion of 8.2:11.8:25:10.8:9.9; segment 3 with basal part slightly swollen and basal, round sensory pore. Antenna (fig. 57 d) with scape brown, flagellum and plumose hairs slightly pale brown, segment 11 very long and slightly longer than preceding 4 segments taken together, combined relative lengths of segments 2 to 10 and 11 to 14 about 126.3:136,

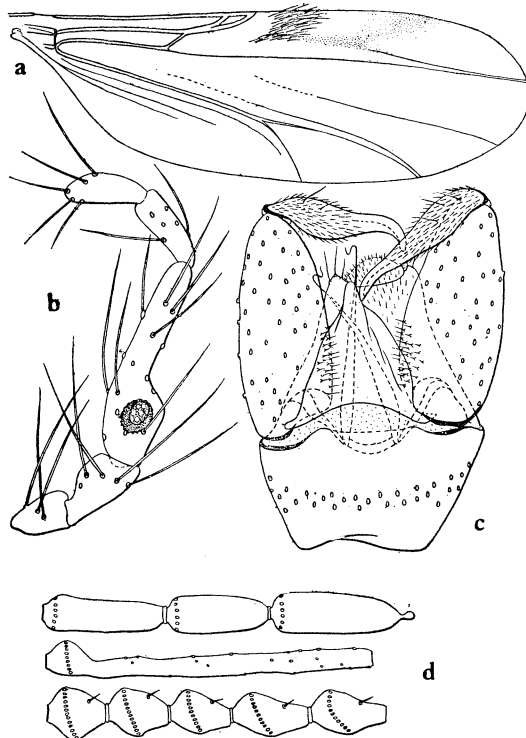


Fig. 57. *Forcipomyia (Forcipomyia) mira*, male. a, wing; b, maxillary palpus; c, hypopygium; d, distal 9 antennal segments.

segments in proportional length of 11:11.4:12:12.1:52.8:24.8:20.9:28. Thorax with pale brownish yellow scutum, but with anterior marginal area more brownish and shoulder parts whitish; scutellum yellowish; postscutellum, pleuron and sternum brown; scutellum with 8-10 strong and 3-4 small bristles along caudal margin and usually several small and 1 strong central hairs on anterior 1/2. Legs almost entirely yellow, with tarsi slightly fuscus; scales very slender, 1-stripped and only present on tarsal segments; claws very slender; hind tibial comb with 7-8 apical bristles. Hind TR about 0.73, varying from 0.7 to 0.77; RL about 110.3:108.9:37.3:38.3:24.3:19.8:19.3 in fore, 144.8:138.3:31.8:47.5:28.5:21.3:19.3 in middle and 140.6:136.3:37.8:51.8:32.8:24.6:18 in hind leg.

Wing (fig. 57 a) very pale brown, with dark costal spot consisting of dark shaggy hairs beyond very pale second radial cell and without scales. Costa ending before middle of wing length (41.7:86.2), relative lengths of R, M and stem of fMCu about

22.8:20.6:40.2, Rs somewhat longer than $1.5\times$ length of R_1 (12:7.7), first radial cell absent or slit-like, second cell subtriangular and as long as stem vein (5.3:5.2), M_2 widely

atrophied on basal part, fMCu distinctly beyond level of costal end and under basal margin of costal dark spot, M_{3+4} slightly longer than twice length of Cu_1 (25.7:11.6). Halter entirely yellow. Abdomen mainly yellowish white, but anterior 4 tergites brownish on sides, following 3 tergites each with middle brownish band, other posterior segments including hypopygium uniformly yellowish white. Hypopygium (fig. 57 c): tergite 9 elongate, trapezoid, tapered and almost twice as long as sternite; sternite slightly shorter than $1/2$ width (22.7:52.3), with setae arranged on transverse middle band, caudal incision almost absent and caudal membrane quite bare. Coxites elongate, subcylindrical, about twice as long as basal width (44.7:22), extending beyond tip of tergite and with many minute spinules on mesal sides of basal parts; styles tapered, slightly sinuate, about $2/3$ as long as coxites (31.3:44.7). Aedeagus subtriangular, as long as basal width, with basal roots small, basal arch low and with caudal lobe blunt; parameres slender, with caudal lobes quite separated, as long as coxites (46.2:44.7) and filiform on apical parts, basal lateral arms about $1/3$ as long as caudal lobes (16.8:46.2).

DISTRIBUTION: New Guinea and Java.

NE NEW GUINEA: Daulo Pass, 2500 m, ♂, 12 July 1955, Gressitt. Wum, 850 m, Jimmi Valley, ♂, 16 July, ♂, 17 July 1955, Gressitt. NETH. NEW GUINEA. Hollandia, 100 m, 6 ♂, 23 Aug. 1955, Gressitt.

The New Guinea specimens are slightly different in the coloration of the thorax and legs from the original description of the specimens from West Java, but many important specific characters quite coincide, except for the value of hind TR which is at least about 0.7 in New Guinea specimens and about 0.57 in a Javanese specimen. Johannsen did not discuss the basal spinules of the coxites of male hypopygium.

62. *Forcipomyia (Forcipomyia) swezeyiana* Tokunaga, 1959, Ins. Micronesia (Bishop Mus.) 12 (3): 145.

DISTRIBUTION: Mariana Is., Caroline Is., New Guinea and New Britain.

NE NEW GUINEA: Wum, 850 m, Jimmi Valley, ♂, 17 July 1955, Gressitt. NETH. NEW GUINEA. Hollandia, 100 m, ♀, 23 Aug. 1955, Gressitt. NEW BRITAIN: St. Paul's, Gazelle Pen: Baining Mts., ♂, 9 Sept. 1955. Gressitt.

63. *Forcipomyia (Forcipomyia) lepidopus* Kieffer, 1917, Mus. Nat. Hung., Ann. 15: 179.

DISTRIBUTION: New Guinea.

64. *Forcipomyia (Forcipomyia) spinuliforceps* Tokunaga, n. sp. Fig. 58.

Medium-sized brown species, with yellow distinct costal spot enveloping entire second radial cell. Male antenna with segment 11 very long, fully as long as preceding 5 segments combined and somewhat shorter than following 3 segments put together. Female antenna with segments 10 to 13 oval, about $1.5\times$ as long as basal width, equal in size, provided with narrowed neck part; AR only about 0.61. Maxillary palpus with segment 3 slightly swollen on basal $1/2$. Legs almost uniformly brown, hind TR about 0.74–0.79 in male and 0.83–0.86 in female. Female tibiae with scale-like lanceolate spines on extensor side. Male hypopygium closely allied to *F. mira* Johannsen, but sternite 9 with shallow caudal conca-

vity, coxites not so slender and styles slightly undulate, differing from the allied species. Two spermathecae, oval and unequal.

Male: Body about 1.99 mm long. Wing about 1.39 mm by 0.43 mm. Head entirely brown including mouthparts and antennae, eyes contiguous above, proboscis about 1/2 length of head capsule; clypeus with 10 setae on middle part. Maxillary palpus (fig. 58 b)

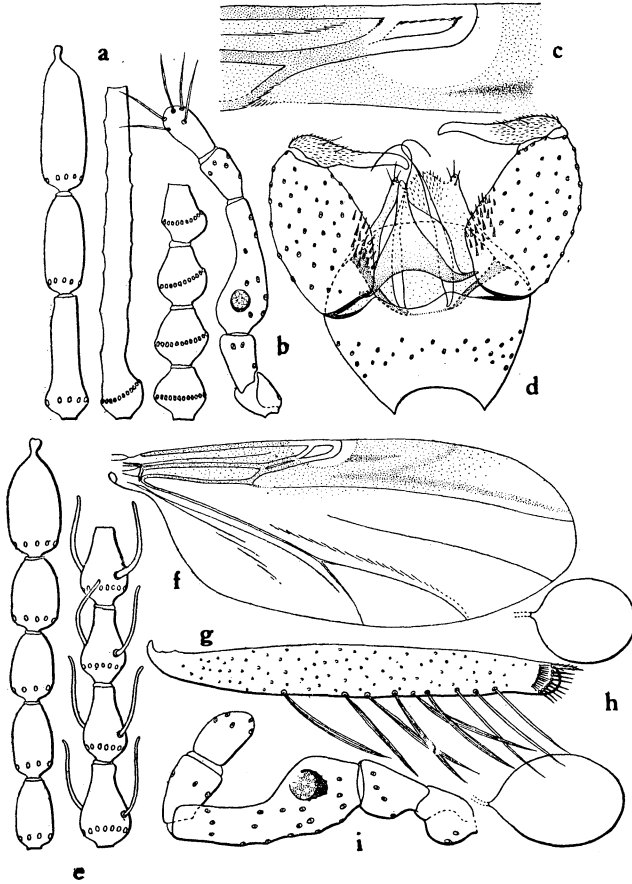


Fig 58. *Forcipomyia (Forcipomyia) spinuliforceps*. a, distal 8 antennal segments, male; b, maxillary palpus, male; c, wing venation of radial field, male; d, hypopygium, male; e, distal 9 antennal segments, female; f, wing, female; g, hind tibia, female; h, spermathecae; i, maxillary palpus, female.

and without scales. Costa ending distinctly before middle of wing length (49:107), relative lengths of R, M and stem of fMCu about 28:25:50, Rs somewhat shorter than 1/2 length of R (13:28) and about as long as 1.5× length of R₁ (13:9), first radial cell absent, second subtriangular and distinctly shorter than its stem vein (5:7), fMCu far be-

hind; 5 segments about 8:12:25:10:12 in relative length. Antenna (fig. 58 a) with segment 11 very long, fully as long as preceding 5 segments combined (65:59), somewhat shorter than following 3 taken together (65:74); combined relative lengths of segments 2 to 10 and 11 to 14 about 129:141; distal 10 segments in proportion of 11:10.5:10.5:11:12:12:65:26:20:27.5. Thorax entirely brown; scutellum with 11 strong bristles and 8 small setae on posterior 1/2 and many minute hairs on anterior 1/2. Legs entirely brown as in thorax, without scales; hind tibial comb with 6 apical bristles; all claws very slender and equally bifid only at extreme tips. Hind TR about 0.77 (0.74-0.79); RL about 127:126:41:47:30.5:24:22 in fore, 155:161:37:53:35:24.5:? in middle and 167:165:44:59:40:27:20 in hind leg.

Wing (fig. 58 c) brownish gray, with costal yellow spot semicircular, small, covering entire second radial cell, but not stem vein of that cell,

yond level of costal end and short distance beyond yellow costal spot, M_{3+4} about $2.3\times$ length of Cu_1 (32:14). Halter pale brown. Abdomen entirely brown, without pale or yellow intersegmental bands; no scales. Hypopygium (fig. 58 d) brown, but with styles yellow; sternite 9 about $1/2$ as long as wide (22.5:55), with setae arranged in transverse band, caudal concavity very shallow and caudal membrane quite bare; tergite 9 rather long, tapered, slightly shorter than wide (45:55) and with sides slightly and evenly concave. Coxites oval, distinctly beyond caudal margin of tergite, slightly shorter than twice as long as wide (45:25) and with many basal minute spinules on mesal sides; styles tapered, slightly sinuous and somewhat longer than $2/3$ length of coxites (33:45). Aedeagus rather broad, with basal roots slender, tapered and directed laterad, basal arch very low, lateral parts membranous, convex and round, caudal lobe short, reaching caudal margin of tergite and blunt at tip; parameres slender, with caudal lobes tapered, ending in fine filaments, extending far beyond aedeagus, about $2.7\times$ length of lateral basal arms and widely separated from each other throughout entire length.

Female: Body about 1.77 mm long. Wing about 1.38 mm by 0.55 mm. Coloration generally as in male, but somewhat paler. Head with robust maxillary palpus (fig. 58 i), segment 3 only slightly swollen on basal $1/2$ and with sensory pore on sub-basal part round and shallow, 5 segments in proportion of 8:10:27:10:9. Antenna (fig. 58 e) with scape and apical 5 segments dark brown, other flagellar segments rather paler; segments 3 to 9 suboval, about $1.5\times$ as long as basal width and each with short neck part, segments 10 to 13 subequal to preceding segment and elongate-oval, last segment about $1.5\times$ length of preceding one; AR about 0.61 (0.6–0.62), relative lengths of last 8 segments about 15:15:15:15:15:15:15:23. Thorax with 10 strong and 3 small bristles along caudal margin of scutellum and about 9 small bristles and about 18 minute hairs on anterior $1/2$. Legs mainly brown, but slightly paler than pleuron of thorax, all knee-parts and apical end of hind femur indistinctly or very faintly yellowish, tibiae of all legs with strong scale-like spines besides strong bristles on extensor side, scale-like tibial spines very slender, sharply pointed, 5-stripped and only 1 at middle or just beyond middle of fore tibia, 2 or 3 on apical $1/2$ or $2/3$ on middle and 6 or 7 on middle $1/3$ on hind tibia (fig. 58 g), other small scales of legs quite absent; hind tibial comb with 8 apical bristles, claws slender; hind TR about 0.83–0.86; RL about 115:119 42:42:25:19:18 in fore, 145:160:37:45.5:28.5:20:18 in middle and 159:157:46:55:35:24:19 in hind leg.

Wing (fig. 58 f) dark, but yellow on basal area and with middle yellow costal spot, scales present on costal and radial veins, dark, shaggy, very slender and 1-stripped. Costa ending at middle of wing (54:106), relative lengths of R, M and stem of fMCu about 27:25:45, both radial cells present: first very narrow and second subtriangular and somewhat longer than first (8:6), Rs about $1.4\times$ length of R_1 (17:12), fMCu under tip of costal end, M_{3+4} about $2.2\times$ length of Cu_1 (35:16). Halter white. Abdomen without scales; tergites dark brown, sternites uniformly pale brown, pleuron paler than tergites; cercus yellow; 2 spermathecae (fig. 58 h), brown, unequal, about 29 units by 20 units and 19 units by 13 units respectively and each with very short chitinized part of duct.

DISTRIBUTION: New Guinea.

Holotype, ♂ (BISHOP 2888), Daulo Pass, 2500 m, Asaro-Chimbu Divide, NE New Guinea, 12 June 1955, Gressitt. Allotype ♀, with holotype.

This species is closely allied to *F. lanceolata* Macfie from Sumatra which is known

only from the female sex. The following structures of that species are distinctly different from the present new species: Female with larger wings which are about 1.6 mm by 0.6 mm. Yellow costal spot of wing covering almost the entire second radial cell as in the new species, but not extending beyond it towards the wing tip. Female AR far larger, about 0.8 instead of 0.6-0.63.

65. *Forcipomyia (Forcipomyia) geniflava* Tokunaga, n. sp. Fig. 59.

Medium-sized brown species; wing with square dark spot covering second radial cell; scutellum brown and with 2 yellow spots; legs mainly brown and with knee-parts and distal ends of tibiae distinctly yellow; abdomen brown, but middle parts of anterior tergites pale brown and with hypopygium yellow. Scales of legs, wings and abdomen slender. Antennal segment 11 of male about as long as preceding 3 segments combined and only slightly longer than following 1. Maxillary palpus robust, segment 3 subfusiform and with sensory pore on subbasal part shallow and round. Hind TR of male about 1.27. Male wing with dark shaggy scales on veins surrounding radial cells, square dark costal spot covering second radial cell, extending below to vein M_1 but not far beyond level of costal end. Hypopygium of male with sternite 9 almost straight on caudal margin, styles small and distinctly tapered, aedeagus broad and round on caudal margin, parameres quite separated and with caudal lobes sharply pointed. Female unknown.

Male: Body length about 1.76 mm. Wing about 0.98 mm by 0.31 mm. Head brown including mouthparts, eyes contiguous above, proboscis short and only 1/3 height of head capsule (7:27); clypeus with about 9 setae on middle part. Maxillary palpus (fig. 59 b) robust; segment 3 subfusiform, narrowed apically and with sensory pore on sub-basal part rather large, shallow and round; last 2 segments not distinctly segmented from each other; 5 segments in proportion of 7:9:21:7:7. Antenna (fig. 59 a) entirely brown, segment 11 as long as preceding 3 segments combined (31.5:31) and somewhat shorter than following 1; relative lengths of segments 2 to 10 and 11 to 14 together about 102:104; distal 8 segments about 9.5:9.5:10:10:31.5:29:21:27.5. Thorax almost entirely dark brown, but scutellum with pair of yellow small spots, sternum and pleuron brown; scutellum with only 9 bristles along caudal margin and 7 small setae arranged in transverse line on middle part and about 25 minute hairs on anterior 1/2; scutum with 1-striped scales. Legs mainly brown, but apical 1/3 of all femora and both ends of all tibiae distinctly yellow; scales of legs slender and 2-striped; claws slender; hind tibial comb with 8 apical bristles; TR of all legs larger than 1.0 and that of hind leg about 1.27; RL about 100:100:41:23.5:17.5:16:15 in fore, 120:119:38:29:21:18.5:? in middle and 123:115:42:34:25:19:? in hind leg.

Wing (fig. 59 c) with 2-striped slender scales on anterior veins, on radial branches dark and other scales and hairs very pale, with dark costal spot at middle of wing, being rather small, square, covering entire second radial cell, extending below to vein M_1 but only slightly extending towards wing tip beyond level of costal end, costal and basal radial cell slightly fuscous, obscure ill-defined fuscous clouds covering entire lengths of anterior arm of intercalary fork and stem of $fMCu$ and Cu_1 , pale area rather distinct beyond dark costal spot and before fuscous cloud covering anterior arm of intercalary fork. Costa extending to about middle of wing length (36:75), relative lengths of R, M and stem of $fMCu$ about 21:18.5:33.5, R_s short, distinctly shorter than 1/2 length of R (9:21) and about twice as

long as R_1 (9:4), first radial cell absent, second obscure and as long as stem vein (4:4), fMCu just beyond level of costal end, M_{3+4} about $2.5\times$ length of Cu_1 (24:9.5). Halter brown. Abdomen mainly brown, but mid dorsal parts of 4 anterior segments paler; tergites and pleural membranes with 2-striped slender scales. Hypopygium (fig. 59 d) mainly yellow, but sternite 9, lateral parts of coxites, basal parts of styles and basal arch of aedeagus brown. Sternite 9 transverse, about $1/2$ as long as wide (25:55), with setae widely scattered, caudal membrane quite bare, caudal margin without concavity; tergite subtriangular. Coxites oval and slightly shorter than twice as long as wide (40:24); styles rather small, about 0.6 length of coxites, tapered, almost straight, but slightly curved at tips. Aedeagus broad, with basal roots directed laterad, basal arch not concave, median area as long as basal width (17:18), round on caudal margin and with median caudal lobe very

indistinct; parameres quite separated, slender, with basal arms slender and as long as aedeagus (17:17), caudal lobes rather broad, but tapered apically, ending very sharp pointed apices and somewhat longer than twice length of basal arms (37:17).

DISTRIBUTION: New Guinea.

Holotype, ♂ (BISHOP 2889), Wum, 850 m, Jimmi Valley, NE New Guinea, 17 July 1955, Gressitt.

This insect is very similar to *F. lepidopus* Kieffer from New Guinea in coloration, but in Kieffer's species, the distal four antennal segments of the male are much more slender and especially the eleventh is much longer, about twice as long as the following one and the wing is hyaline and not provided with a dark costal spot, distinctly differing from the present species.

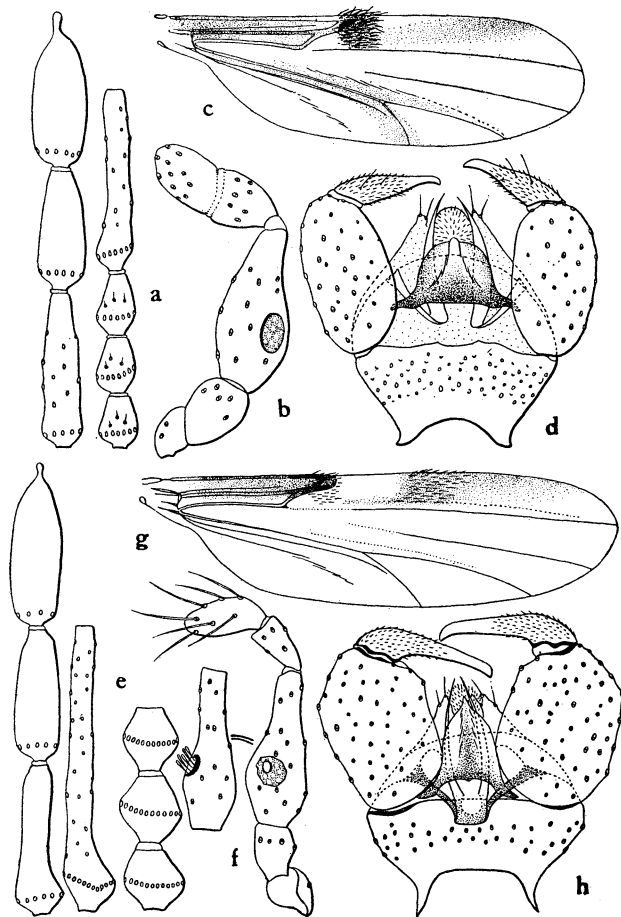


Fig. 59. *Forcipomyia* (*Forcipomyia*) spp. a-d, *geniflava*, male: a, distal 7 antennal segments; b, maxillary palpus; c, wing; d, hypopygium. e-h, *flavipectoralis*, male: e, distal 7 antennal segments; f, maxillary palpus and segment 3 (showing variation); g, wing; h, hypopygium.

66. *Forcipomyia* (*Forcipomyia*) *flavipectoralis* Tokunaga, n. sp. Fig. 59.

Medium-sized brown or dark brown species; wing pale gray, with 2 dark elongate costal spots, basal 1 enveloping second radial cell and 1 situated far beyond second radial cell, space between 2 dark spots rather widely pale; legs mainly brown, with knee-parts, femoral bases, tibial ends and tarsi paler or yellowish; thorax and abdomen largely brown or dark brown; anterior 3 abdominal segments with middle parts of tergites paler. Scales of legs very slender, but on wings and other parts quite absent. Segment 11 of male antenna as long as following 2 segments combined and preceding 4 segments together; hind TR of male about 0.48-0.55; male hypopygium with styles almost straight and tapered, parameres slender and connected by short median bar, caudal lobes slender, sharply pointed and quite separated. Female unknown.

Male: Body about 2.13 mm long. Wing about 1.32 (1.2-1.51) mm by 0.39 (0.35-0.42) mm. Head entirely brown including mouthparts and antennae, with eyes contiguous above, proboscis about 1/2 length of head capsule (15.7:31); clypeus with about 13-15 setae on middle part. Maxillary palpus (fig. 59 f) rather stout, with 5 segments in proportion of 11:13:32:11.5:14, segment 3 slightly swollen on basal 1/2 and with sensory pit before middle rather small. Antenna (fig. 59 e) entirely brown, segment 11 equal to following 2 or preceding 4 segments together, combined length of segments 2 to 10 slightly shorter than segments 11 to 14 (141:146.5), 8 distal segments about 14.2:14.3:14.7:15:61:33.3:27.3:34.2 in relative length. Thorax entirely dark brown; scutellum with 11-13 strong bristles, 7-15 small setae and many minute hairs. Legs mainly brown, trochanters, femoral bases, knee-parts and tarsal segments pale brown, tibial ends including setae, spurs and spines yellow. Scales of tarsi very slender and at most 3-stripped; hind tibial comb with 8-10 apical bristles; hind TR about 0.52 (0.48-0.55); claws slender. RL about 141:137:51:45:27.5:23.5:20 in fore, 158.5:171.5:32.5:70.5:33:25.5:21 in middle and 171:176:37.3:71:41:29.3:24 in hind leg.

Wing (fig. 59 g) pale gray, with 2 dark costal spots of shaggy hairs (not scales), basal one elongate, ending at level of costal apex, covering second radial cell and its stem vein, apical one subsquare, arising far beyond costal apex and ending just before anterior arm of intercalary fork, space between 2 dark costal spots very pale. Costa ending far before middle of wing length (43.3:101.7), relative lengths of R, M and stem of fMCu about 27.5:23.3:40.8, Rs very short, only somewhat longer than 1/3 length of R (9.8:27.5) and 1.5× length of R₁ (9.8:6.5), first radial cell absent, second subtriangular and at most as long as its stem vein (4:4.5), fMCu far beyond level of costal end and under middle of costal pale spot, M₃₊₄ about twice length of Cu₁ (33:16). Halter pale brownish white. Abdomen without scales and almost uniformly brown or dark brown, but middle parts of anterior 3 tergites somewhat paler. Hypopygium (fig. 59 h) entirely dark brown; tergite 9 subtriangular and much shorter than wide; sternite 9 transverse, very short, with setae arranged in transverse band, caudal median part membranous and without definite caudal concavity. Coxites stout, about 1.6× as long as wide, produced beyond tip of tergite; styles about 0.8 length of coxites (37.7:49), tapered, almost straight, but slightly curved at base and tip. Aedeagus shield-like, longer than basal width (24:21), with caudal tip pointed and basal arch very low; parameres connected by median short bar, with basal arms slender, caudal lobes slender, sharply pointed, twice as long as basal arms and quite separated.

DISTRIBUTION: New Guinea and New Britain.

Holotype, ♂ (BISHOP 2890), St. Paul's, 300 m, Baining Mts., Gazelle Pen., New Britain, 9 Sept. 1955, Gressitt. Paratypes, ♂ with type; ♂, Wum, 850 m, Jimmi Valley, NE New Guinea, 16 July 1955, Gressitt.

This is very similar to *Forcipomyia* sp. *a.* Macfie from Sumatra in coloration; the distinct differences, however, are shown in the following points: the hind TR is larger, about 0.6, and the white costal spot envelops the distal half of first radial cell and the whole of second cell, unlike the present species.

67. *Forcipomyia* (*Forcipomyia*) *bifurcifera* Tokunaga, n. sp. Fig. 60.

Medium-sized brown species thickly covered with slender scales, with legs mainly brown, but tibial end of hind leg yellow and hind TR of male about 0.84. Antennal segment 11 of male rather short, not longer than preceding 3 combined, distal 4 segments together much shorter than basal short segments 2 to 10 combined. Wing with 3 costal dark spots and 2 paler spots alternately arranged, middle dark spot small and covering entire second radial cell and 2 paler spots before and beyond second radial cell very small and faint. Male hypopygium highly specific, with very slender styles, long aedeagus and bifid caudal lobes of parameres arising from triangular basal lateral arms. Female unknown.

Male: Body length about 1.74 mm. Wing about 0.96 mm by 0.27 mm. Head entirely brown including mouthparts and antennae, with proboscis slightly shorter than 1/2 height of head capsule (10:23), eyes broadly contiguous above; clypeus with about 9 setae on middle part. Maxillary palpus (fig. 60 b) slender on apical 1/2, segment 3 swollen on basal 1/2 and with sensory pore rather small and situated before middle of segment, 5 segments in proportion of 6:10:20:9:9. Antenna (fig. 60 d) rather stout, segment 11 much shorter than preceding 3 or following 2 combined (25:30:34), relative lengths of segments 2 to 10 and 11 to 14 together about 96:75, those of apical 8 segments 10:10:10:10:25:18.5:15:18. Thorax entirely brown, scutum with 1-striped scales, scutellum with 8 strong bristles and 3 small setae along caudal margin and about 22 minute setae on anterior 1/2. Legs almost entirely brown, but tibial end of fore leg yellow, middle of hind leg very slightly paler and ill-defined; hind tibial comb with 6-7 apical bristles; scales of legs rather broad and 4-striped; hind TR about 0.84. RL of fore leg about 98:93:35:27:21:17:16, that of middle 115:116:34:39:24:18:15 and of hind 120:123:35:41:30:21:16.

Wing (fig. 60 a) with 1-striped slender scales on radial and costal veins, 3 dark and 2 pale spots alternately arranged on costal area, dark spot 1 long, covering costa and R and ending before r-m, dark spot 2 small, covering entire second radial cell and apical 1/2 of its stem vein and not extending towards wing tip beyond costal end, dark spot 3 somewhat paler than others, long, arising beyond second radial cell short distance and ending on anterior arm of intercalary fork, pale spot 1 small and subsquare, pale spot 2 very small and ill-defined. Costa ending before middle of wing length (35:74), relative lengths of R, M and stem of fMCu about 17:15.5:31, Rs hardly twice as long as R₁ (10:5.5), first radial cell absent, second subtriangular and shorter than its stem vein (4:5), fMCu far beyond level of tip of Rs, M₃₊₄ slightly shorter than twice length of Cu₁ (21:12). Halter white. Abdomen almost entirely brown, with 3-striped scales on tergites and pleural membranes, sternites without scales, anterior 2 segments membranous, following 2

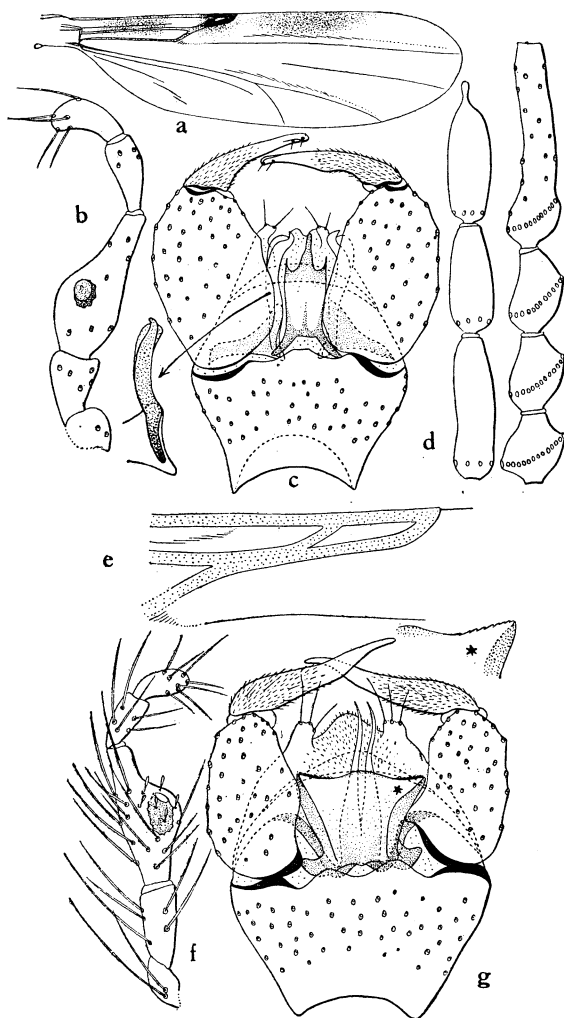


Fig. 60. *Forcipomyia (Forcipomyia)* spp. a-d, *bifurcifera*, male; a, wing; b, maxillary palpus; c, hypopygium and caudal lobe of paramere; d, distal 7 antennal segments; e-g, *serrulifimbria*, male; e, wing venation of radial field; f, maxillary palpus; g, hypopygium.

of *Forcipomyia* *sen. str.* with only the exception of the structures of the aedeagus and parameres. The aedeagi of the species of the subgenus are almost always shield-like or subtriangular and never elongated as long as caudal lobes of parameres as in the case of the present species. The structure of the parameres of the new species is more closely related to that of the species of subgenus *Synthyridomyia* than *Forcipomyia* *sen. str.* These peculiar structures of the male hypopygium of the new species are thought to be highly specific differing from the known members of the subgenus.

segments reduced into hemisternites and remaining posterior segments normal and not reduced. Hypopygium (fig. 60c) entirely brown; sternite 9 about 1/2 as long as wide, with many scattered setae on almost entire surface and without caudal concavity; tergite 9 as long as wide (39:41), round on caudal margin and with caudal lobes very short. Coxites large, about twice as long as wide (36:19) and far beyond caudal end of last segment; styles very slender, tapered, not sharply pointed, very slightly arcuate and about 5/7 as long as coxites (25:36). Aedeagus slender, slightly broadened apically, with basal roots slender, basal arch trapezoid, apical median lobe slender and extending caudad as far as last segment, lateral ends of apical part produced, but much shorter than median lobe and sharply pointed; parameres quite separated from each other, with basal arms large, subtriangular, caudal lobes as long as aedeagus, slightly undulate, rod-like, bifid on apical part into finger-like dorsal and recurved pointed ventral branch on each lobe.

DISTRIBUTION: New Guinea.

Holotype, ♂ (BISHOP 2891), Lae, 10 m, NE New Guinea, 25 July 1955, Gressitt.

This species is provided with almost all subgeneric characters

68. *Forcipomyia* (*Forcipomyia*) *serrulifimbria* Tokunaga, n. sp. Fig. 60.

Medium-sized brown species; legs and abdomen mainly yellow and with brown bands; wings brownish gray and without distinct spots; scales of legs and wings of male very slender and those of abdomen absent in male. Segments 3 of male maxillary palpus slightly swollen ventrad at middle, with oval sensory pit, several spoon-like sensillae on surface. Middle and hind legs with distinct brown bands before and beyond yellow knee-parts, fore legs with single small brown spots beyond knee-parts; hind TR of male about 0.36. Male hypopygium with styles long and fully as long as coxites, aedeagus distinctly broadened caudad and with minute serrulation on lateral parts of caudal margin, parameres with caudal lobes gradually tapered, fused with each other on basal 1/4 and not distinctly narrowed at base of fused part. Female unknown.

Male: Body length about 2.6 mm. Wing about 1.65 mm by 0.48 mm. Head dark brown, with mouthparts brown, proboscis longer than 1/2 head capsule, eyes contiguous above; clypeus with about 7 median setae. Maxillary palpus (fig. 60 f) rather slender, segment 3 swollen ventrad on middle 1/2, with sensory pit at middle deep and oval and several hyaline spoon like sensillae on swollen part, 5 segments in proportion of 15:22:37:16:15. Antenna missing. Thorax almost uniformly brown or dark brown, but scutum with 4 very pale vittae on anterior 1/2, and paler caudoscuteal area. Legs mainly yellow, but coxae somewhat brownish, tibiae of all legs each with small dark sub-basal band, band of fore leg obscure, but of hind leg distinct, each femur of posterior 2 pairs with large dark preapical band. Scales of legs slender and 3- or 4-stripped; claws very slender; hind tibia with 8 apical bristles of distal comb; hind TR about 0.36 (0.35–0.37). RL about 160:162:44:88:48:39:27 in fore, 180:191:30:?:?:?:? in middle and 196:199:42:111:56:40:28 in hind leg.

Wing (fig. 60 e) brownish gray, without distinct spots, but with dark scales on costal and radial veins very slender, 1-stripped and shaggy. Costa ending just beyond middle of wing length (68:127), relative lengths of R, M and stem of fMCu about 37:32:54, Rs about 1/2 length of R and 1.6× of R₁ (19:37:12), first radial cell absent, second cell elongate-triangular and as long as its stem vein (8.5:9), fMCu just under tip of second radial cell, M₃₊₄ slightly longer than twice length of Cu₁ (41:18). Halter white. Abdomen yellow on anterior segments and brown on posterior segments, but anterior tergites each with median brown band; scales absent. Hypopygium (fig. 60 g) entirely dark brown; sternite 9 trapezoid, about 1/2 as long as wide (35:78), with setae scattered, caudal margin sinuous, with caudal concavity very shallow and caudal membrane quite bare; tergite 9 about twice as long as sternite and round on caudal margin. Coxites stout, about 1.8 times basal width (48:27) and not extending beyond caudal tip of tergite; styles tapered, somewhat longer than coxites (52:48) and very slightly undulate. Aedeagus broad, subtrapezoid, broadened apically, thickened on sides, very slightly convex on middle part of caudal margin, very finely serrulate on sides of caudal margin, with basal roots subtriangular, stout and directed caudad, basal arch very shallow; parameres with slender lateral arms, caudal lobes fused on basal 1/5 (10:45), suddenly tapered beyond middle, ending in sharp points, total length about 4× as long as basal width of fused part (45:12) and about 1.5× basal arm (45:30).

DISTRIBUTION: New Guinea.

Holotype, ♂ (BISHOP 2892), Wum, 850 m, Jimmi Valley, NE New Guinea, 16 July

1955, Gressitt.

This species is very similar to *F. esakiana* Tokunaga and *F. ornata* Tokunaga, known from Micronesia and New Guinea, in coloration. The structures of the male hypopygia of these three species, however, are distinctly different in detail of the caudal median lobes of the parameres.

69. *Forcipomyia (Forcipomyia) flavitibialis* Tokunaga and Murachi, 1959, Ins. Micronesia (Bishop Mus.) 12 (3): 170

DISTRIBUTION: Mariana Is., Caroline Is., Marshall Is., Gilbert Is. and New Guinea.

NE NEW GUINEA: Daulo Pass, 2500 m, Asaro-Chimbu Divide, ♂, 12 July 1955, Gressitt. Wum, 850 m, Jimmi Valley, ♂, 16 July, ♂, 17 July 1955, Gressitt. NETH. NEW GUINEA: Itouda, Wisselmeren, 1500 m, ♂, 12 Aug. 1955, Gressitt; Hollandia, 2 ♂, 23 Aug. 1955, Gressitt.

70. *Forcipomyia (Forcipomyia) esakiana* Tokunaga

Forcipomyia esakiana Tokunaga, 1940, Philip. Jour. Sci. 71:206; 1940, Tenthredo 3:166.—Tokunaga and Murachi, 1959, Ins. Micronesia (Bishop Mus.) 12(3): 176

DISTRIBUTION: Mariana Is., Caroline Is., Marshall Is., New Guinea and New Britain.

NE NEW GUINEA: Wum, 850 m, Jimmi Valley, ♂, 16 July 1955, Gressitt. NETH. NEW GUINEA: Hollandia, 100 m, ♂, 23 Aug. 1955, Gressitt. NEW BRITAIN: St. Paul's, Baining Mts., Gazelle Pen., ♂, 9 Sept. 1955, Gressitt.

71. *Forcipomyia (Forcipomyia) ornata* Tokunaga

Forcipomyia ornata Tokunaga, 1940, Tenthredo 3:166; 1941, Philip. Jour. Sci. 20:109.—Tokunaga and Murachi, 1959, Ins. Micronesia (Bishop Mus.) 12(3): 180

DISTRIBUTION: Mariana Is., Caroline Is., Marshall Is. and New Guinea.

NE NEW GUINEA: Busu R., 30 m, nr. Lae, ♀, 15 Sept. 1955, Gressitt. Wum, 850 m, Jimmi Valley, ♀, 17 July 1955, Gressitt.

72. *Forcipomyia (Forcipomyia) adjecta* Tokunaga, n. sp. Fig. 61.

Medium-sized yellow and brown species, without scales. Antennal segment 11 of male very long and longer than following 2 segments combined; flagellar segments of female, except for last 1, not distinctly differentiated on distal segments. Legs mainly yellow, hind femur with apical end rather broadly indistinctly fuscus, TR about 0.76 in male and 0.86 in female. Wing with paler spot covering second radial cell and dark spot beyond this pale spot before intercalary fork. Abdomen with caudal segments mainly yellow; male hypopygium with caudal lobes of parameres very slender and filiform on apical part; 2 spermathecae, oval and unequal.

Male: Body about 1.79 (1.64-1.95) mm long. Wing about 1.08 (1.06-1.12) mm by 0.33 (0.31-0.34) mm. Head brown, including mouthparts; eyes widely contiguous above, proboscis slightly longer than 1/2 height of head; clypeus with about 9 setae on middle part.

Maxillary palpus (fig. 61 c) rather slender, segment 3 swollen on basal 1/2, slender on apical 1/2 and with round sensory pore on basal part, 5 segments about 8:10.2:24.9:11.6:10 in proportional length. Antenna (fig. 61 b) with scape and plumose hairs brown and flagellar segments far paler; segment 11 usually shorter than and rarely as long as following 2 combined, segments 2 to 10 and 11 to 14 together about 118:128.6, relative lengths of 8 distal segments about 8.9:8.9:10.4:10.5:50.8:27:20.3:27.1. Thorax with tergal side and dorsal 1/2 pleuron brown, sternum and ventral 1/2 of pleuron yellow; scutellum with 11 bristles along caudal margin and about 25 small setae on anterior area. Legs almost entirely yellow, but tarsi pale brownish and hind femur narrowly fuscus on apical end; claws very slender. Hind leg with TR about 0.76, varying from 0.71 to 0.85; RL about 115.6:112.4:40.8:36.9:23.6:20.5:18.5 in fore, 140:141.1:34:45.7:28.4:22.3:18.6 in middle and 143.4:137.4:41.1:54:33.9:24.5:18.6 in hind leg.

Wing (fig. 61 a) with semicircular pale anterior spot covering second radial cell, dark anterior spot beyond this pale spot, obscure pale spot between

middle dark spot and anterior arm of intercalary fork; obscure fuscus spots: 1 covering middle parts of costa, R and M, 1 on anterior arm of intercalary fork, 1 on Cu_1 and 1 on apical part of M_{3+4} . Costa ending at middle of wing length (42:83.3), relative lengths of R, M and stem of fMCu about 22:19.4:37.4, Rs about $1.5 \times$ length of R_1 (10.1:6.4), first radial cell absent, second triangular and as long as stem vein (5.1:4.9), M_{3+4} about 2.4 as long as Cu_1 (24:10.1), fMCu beyond level of tip of costa. Halter entirely yellow. Abdomen mainly yellow, but 3 anterior tergites each with pair of fuscus lateral spots, 4

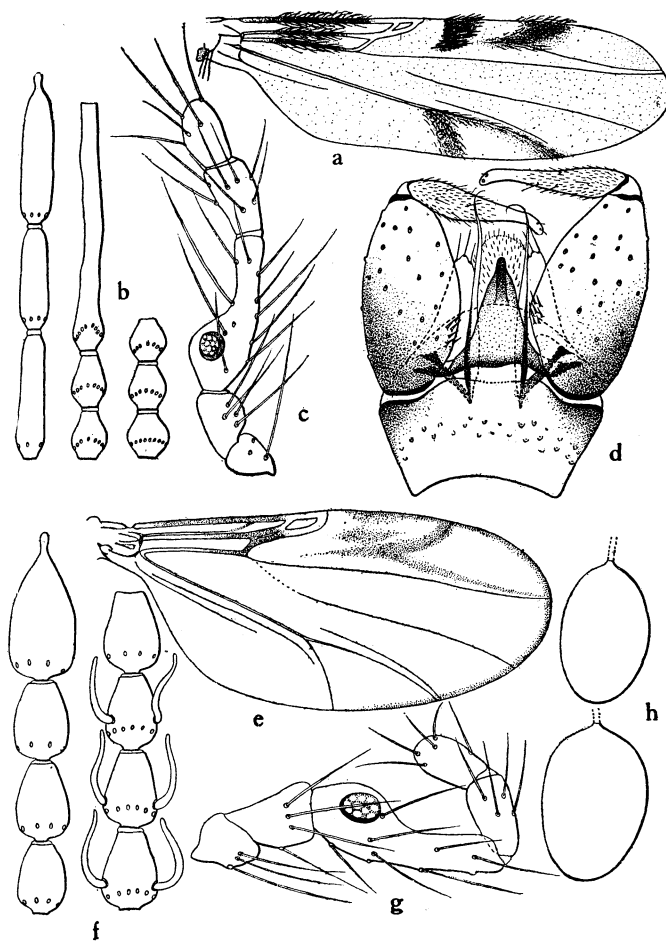


Fig. 61. *Forcipomyia (Forcipomyia) adjecta*. a, wing, male; b, distal 9 antennal segments, male; c, maxillary palpus, male; d, hypopygium, male; e, wing, female; f, distal 8 antennal segments, female; g, maxillary palpus, female; h, spermathecae.

following tergites each with middle fuscus band, segment 8 entirely yellow. Hypopygium (fig. 61 d) mainly yellow, but segment 9 somewhat fuscus on lateral sides and on basal parts of coxites. Tergite 9 distinctly tapered, round on caudal margin; sternite 9 transverse, shorter than 1/2 width (19:48), without caudal excavation, with setae arranged in transverse band and caudal membrane without spinules. Coxite rather long, oval, about twice as long as wide (42:22), extending beyond tergite 9 and with several small spines on mesal side of basal part; style slender, tapered, almost straight and about 3/4 as long as coxite (30:42). Aedeagus triangular, rather pointed apically, with basal roots extending laterad and basal arch very low; parameres very slender, quite separated, with caudal lobes somewhat longer than coxites (46.6:42) and filiform on apical part, basal lateral arms about 1/3 as long as caudal lobes (16.4:46.6).

Female: Body about 1.61 (1.53-1.77) mm long. Wing about 0.96 (0.92-1.04) mm by 0.39 (0.36-0.42) mm. Coloration generally as in male, but wings darker, costal pale spot covering second radial cell and base of wing somewhat yellowish. Head with proboscis rather short and about 1/2 as long as height of head capsule; clypeus with 7 to 10 setae on middle part. Maxillary palpus (fig. 61 g) with 5 segments in proportion of 7.8:10.5:23.3:10.5:9.6. Antenna (fig. 61 f) with segments 3 to 14 oval, almost equal in shape and size, not distinctly elongate on apical segments, basal 8 flagellar segments each with pair of rather strong hyaline sensillae, last segment oval and about twice as long as wide. AR about 0.64, varying from 0.62 to 0.66; relative lengths of 8 apical segments about 12:11.4:11.5:11.9:11.9:12.3:12.3:19.6. Thorax with tergum brown and pleuron and sternum yellowish brown; scutum with humeral pits small and yellow; scutellum with 8 or 10 strong and 2 or 3 small bristles along caudal margin and 10-24 small or minute setae on anterior 1/2. Legs with color as in male, but tarsi slightly fuscus, without scales; claws slender; hind tibial comb with 7 or 8 apical bristles; hind TR about 0.86, varying from 0.8 to 0.89; RL about 100:100.4:35.8:30:20.4:16.8:19.5 in fore, 126.5:133:35.2:38.1:23:18.7:20.2 in middle and 133.4:132.2:40:46.8:28.6:21.5:19.8 in hind leg.

Wing (fig. 61 e) darker than in male, mainly dark gray and with small costal yellow spot covering second radial cell, base of wing also yellow, anterior marginal parts before and beyond median yellow spot much darker than other parts, thickly provided with black shaggy hairs (not scales). Costa ending slightly before middle of wing length (37.3:78), relative lengths of R, M and stem of fMCu about 17.3:16:30.7, Rs somewhat longer than 1.5× length of R₁ (10.3:6.2) and somewhat round at end, first radial cell very narrow, but not closed, second radial cell well formed and fully as long as first (5.5:5), fMCu under second radial cell, M₃₊₄ shorter than twice length of Cu₁ (22.7:12.3). Halter yellow. Abdomen mainly brown on dorsum, yellow laterally and ventrally, but last 2 segments yellow and each with pair of faint brownish clouds at sides of tergite; sternites reduced into hemisternites. Cercus yellow; 2 spermathecae (fig. 61 h) oval, about 1+26 units by 18.1 units and 1+19.8 units by 13.4 units respectively and each with minute chitinized part of duct.

DISTRIBUTION: New Guinea and New Britain.

Holotype, ♂ (BISHOP 2893), Hollandia, 100 m, Neth. New Guinea, 23 Aug. 1955, Gressitt. Allotype, ♀, St. Paul's, 300 m, Baining Mts., Gazelle Pen., New Britain, 9 Sept. 1955, Gressitt. Paratypes, 3 ♀, 10 ♂, with allotype; ♀, Wum, 850 m, Jimmi Valley, NE New Guinea, 17 July 1955, Gressitt.

This species is closely allied to New Guinea *F. punctumalba* Kieffer and Australian *F. albopunctata* Skuse. In the first allied species, the eleventh antennal segment of the male is only thrice as long as the tenth and the combined length of the male antennal segments 2 to 10 is a little longer than that of four remaining distal segments taken together and the femora of the middle and hind legs of both sexes are provided with preapical brown bands and the tibiae of the same legs have similar sub-basal bands, distinctly differing from the new species. The second allied species is also distinctly different from the present species in the following points: the hind TR is about 0.92 in the male and 1.0 in the female and the male wing is not provided with a dark costal spot beyond the pale costal spot which covers the second radial cell.

73. *Forcipomyia* (*Forcipomyia*) *fuliginosa* (Meigen)

Ceratopogon fuliginosa Meigen, 1818; *Forcipomyia fuliginosa*, Goetghebuer, 1933; *Ceratopogon crudelis* Karsch, 1886; *Forcipomyia crudelis*, Mayer, 1934; *Ceratopogon eriophorus* Williston, 1896; *C. propinquus* Williston, 1896; *C. galapagensis* Coquillett, 1901; *C. hirtipes* de Meijere, 1907; *Forcipomyia hirtipes*, Edwards, 1926, *F. brevimanus* Lundström, 1910; *Ceratopogon inornatipennis* Austen, 1912; *Forcipomyia inornatipennis*, Ingram and Macfie, 1924; *F. inornatipennis* var. *ornaticrus* Ingram and Macfie, 1924; *F. squamosa* Lutz, 1914; *F. erucicida* Knab, 1914; *F. crudelis* Knab, 1914; *Ceratopogon australiensis* Kieffer, 1917; *C. coquilletti* Kieffer, 1917; *Forcipomyia coquilletti*, Johannsen, 1943; *Ceratopogon tropicus* Kieffer, 1917; *Atrichopogon microtomus* Kieffer, 1917; *Ceratopogon alboclavatus* Kieffer, 1919; *Forcipomyia alboclavata*, Edwards, 1923; *Ceratopogon canaliculatus* Goetghebuer, 1920; *Forcipomyia* sp. Tokunaga, 1939; *F. brookmani* Wirth, 1952.

The above list of synonymy is cited from Wirth (1956, *Ent. Soc. Amer., Ann.* 49: 357-358). The distribution and the host insects shown below are also cited from Wirth (l.c.).

DISTRIBUTION: Europe, South Manchuria, North America, Central America, South America, Africa, Australia, New Guinea, Malaya, Formosa, Borneo, Ceylon, Sumatra, Java, Samoa, Fiji, Marquesas, Tahiti and West Indies.

NETH. NEW GUINEA: Enagotadi, ♀, 5 Aug.; Okaitadi, ♀, 6 Aug.; Itouda, Kamo Valley, 2 ♀, 2 ♂, 12 Aug.; all Wisselmeren, 1955, Gressitt.

Hosts: *Pikonema alaskensis* Rohwer (Wirth, 1956), sawfly larva (Karsch, 1886), *Cabera* larva (Mayer, 1937), *Malanchroia geometroides* Walker (Baker, 1907), *Orthreis fullonia* Clerck (Edwards, 1928), *Doleschallia bisaltide australis* Felder (Lever, 1939), *Papilio polytes* Linnaeus (Tokunaga, 1940), *Laphygma exempta* Walker (Macfie, 1937), Sphingid larva (Lane, 1947), caterpillars (Lutz, 1914), *Erimys ello* Linnaeus (Knab, 1914), caterpillars (Knab, 1914), *Deilephila galii* Rottenberg (Edwards, 1923), *Antheraea pernyi* Guérin-Ménéville (Tokunaga, 1939), *Protoparce sexta* Johansson (Wirth, 1956), *Deilephila nerii* Linnaeus (Wirth, 1956), *Stictoptera subobliqua* Walker (Wirth, 1956), *Hippotion celerio* Linnaeus (Wirth, 1956).

74. *Forcipomyia* (*Forcipomyia*) *fascicauda* Tokunaga

Forcipomyia fascicauda Tokunaga, 1940, *Tenthredo* 3: 167.—Tokunaga and Murachi, 1959, *Ins. Micronesia* (Bishop Mus.) 12 (3): 159.

DISTRIBUTION: Mariana Is., Caroline Is., New Guinea and New Britain.

NE NEW GUINEA: Lae, ♀, 4 ♂, 25 July, 3 ♀, 25 Aug. 1955; Busu R, ♀, 14 Sept. 1955, Gressitt; Wum, 850 m, Jimmi Valley, 5 ♂, 16 July, ♀, ♂, 17 July 1955, Gressitt. NETH. NEW GUINEA: Hollandia, ♀, 23 Aug. 1955, Gressitt. NEW BRITAIN: St. Paul's, Baining Mts., Gazelle Pen., 3 ♀, 9 Sept. 1955, Gressitt.

75. *Forcipomyia* (*Forcipomyia*) *punctumalba* Kieffer Fig. 62.

Ceratopogon punctum-album Kieffer, 1917, Mus. Nat. Hung., Ann., 15: 178. *Forcipomyia punctum-album*, Macfie, 1939, Linn. Soc. N. S. Wales, Proc. 64: 384.

Rather large brown and yellow species. Scales of legs, wings and abdomen almost absent. Antennal segment 11 of male somewhat longer than preceding 3 segments combined but slightly shorter than following 2 segments together. Legs mainly yellow, middle and hind tibiae each with sub-basal brown band and hind femur with apical 1/2 brown; hind TR of male about 0.65. Wing brownish gray, with small pale costal spot covering second radial cell, cell small and oval. Hypopygium missing.

Male: Body length about 2.34 mm. Wing about 1.51 mm by 0.46 mm. Head brown including mouthparts, eyes contiguous above, proboscis about 1/2 height of head capsule; clypeus with about 11 setae on middle part. Maxillary palpus (fig. 62 a) rather stout, segment 3 slightly thickened on basal 1/2 and with round sensory pit on sub basal part; 5 segments about 11: 17: 29: 14: 12 in relative length. Antenna (fig. 62 b) brown, with distal 8 segments in proportion of 14: 14: 14: 15: 50: 31: 21: 32; relative lengths of segments 2 to

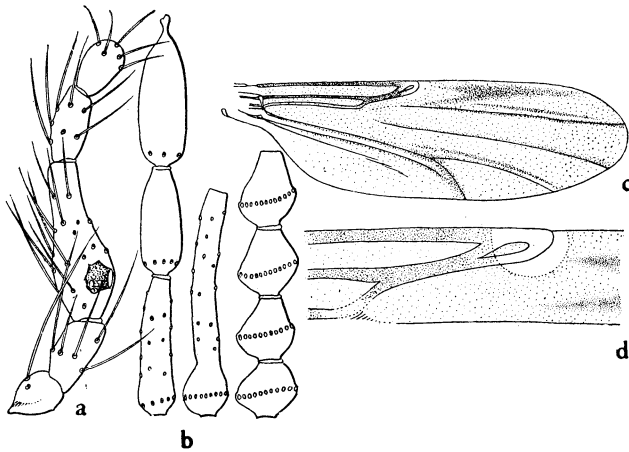


Fig. 62. *Forcipomyia* (*Forcipomyia*) *punctumalba*, male. a, maxillary palpus; b, distal 8 antennal segments; c, wing; d, wing venation of radial field.

10 and 11 to 14 together about 147: 134. Thorax entirely brown; scutellum with 11 strong bristles, about 10 small setae and 34 minute setae. Legs mainly yellow, all coxae slightly brownish, middle tibia with faint brownish sub-basal band, hind femur with apical 1/2 distinctly brown, hind tibia with distinct brown sub-basal band; hind TR about 0.65 (0.7 by Macfie), hind tibial comb with 8 apical bristles. RL about 146: 142: 51: 50: ? : ? : ? in fore, 175: 180: 47: 64.5: ? : ? : ? in middle and 188: 177: 44.5: 68: 43: 32: ? in

hind leg.

Wing (fig. 62 c) brownish gray, without scales, with small yellow semicircular costal spot covering second radial cell and wing base also yellow. Costa (fig. 62 d) ending slightly before middle of length of wing (55: 116), relative lengths of R, M and stem of fMCu

about 28:26:49, Rs about $1.8\times$ length of R_1 (18:10), first radial cell absent, second somewhat shorter than its stem vein (7:8), somewhat oval and yellow, its stem vein brownish, fMCu under costal end, M_{3+4} slightly longer than twice length of Cu_1 (38:17). Halter white. Abdomen with segmental brown bands and intersegmental yellow bands, but middle parts of anterior tergites yellowish. Hypopygium missing. According to Macfie, caudal lobes of parameres long, slender and with filiform ends.

DISTRIBUTION: New Guinea and New Britain.

NETH. NEW GUINEA: Itouda, 1500 m, Wisselmeren, ♂, 12 Aug. 1955, Gressitt.

This species is closely allied to *F. squamitibialis*, but the markings of the wings and legs are distinctly different in the following points: in the allied species the costal pale spot of wing is larger, covers the second radial cell and its stem vein and the femora and tibiae of all legs are uniformly yellow. Another allied species may be Australian *F. albopunctata* Skuse, in which the wing coloration is very similar to the present species, but the value of hind TR and the markings of the legs are distinctly different. Unfortunately the abdominal end of *punctumalba* is broken off and the structure of hypopygium cannot be shown in this paper.

76. Forcipomyia (Forcipomyia) novaguineae Tokunaga, n. sp. Fig. 63.

Medium-sized brown species with narrow scales on legs, wings and abdomen, legs uniformly brown or slightly yellowish, wings without adornment and abdomen entirely brown. Maxillary palpus with last 2 segments very short in female, segment 3 fusiform and with shallow sensory pore at middle. Female antenna with basal short flagellar segments about twice as long as wide and with narrow neck parts, distal segments 11 to 13 elongate-oval and not much longer than preceding segments; AR about 0.71. Male antenna with segment 11 very long, about as long as preceding 5 segments combined, longer than following 2 segments together and total length of 4 apical segments combined much longer than segments 2 to 10 together. Hind TR about 1.93 in male and 2.17 in female. Wing with costa slightly extending beyond middle of wing, both radial cells present, but first cell very narrow. Male hypopygium brown, but styles yellow, sternite 9 with large caudal concavity, styles almost straight and uniformly thick, aedeagus with basal arch beyond middle, very large, parameres with caudal lobes stout, fused, forming broad basal part.

Male: Body about 1.95 mm long. Wing about 1.34 mm by 0.4 mm. Head uniformly brown including mouthparts and antennae, with eyes broadly contiguous above, proboscis about $1/2$ length of head capsule (14:29); clypeus with 5-8 setae on middle part. Maxillary palpus (fig. 63 d) robust, segment 3 slightly swollen on basal $2/3$ and with sensory pore at middle round and shallow; 5 segments in proportion of 8.5:14.5:24.5:9:10. Antenna (fig. 63 b) entirely brown including plumose hairs, with segment 11 very long, longer than following 2 combined and equal to preceding 5 combined; relative lengths of segments 2 to 10 and 11 to 14 together about 154:136, those of 10 distal segments about 14.5:13.5:13:12.3:13:12.8:6.7:30:25:35. Thorax entirely brown, without scales; scutellum with 11-12 strong bristles on posterior $1/2$ and about 19-22 small or minute hairs on anterior $1/2$. Legs uniformly brown, but paler or more yellowish than pleuron or sternum of thorax, with scales slender, 1- or 2-striped; claws stout; hind tibia with apical spur yellowish and far longer than width of tibial end, comb with 5-6 apical bristles; hind TR about 1.93. RL about 132:132:78.5:31:25:20:19 in fore, 155:157:72:34.5:29:19.5:19

in middle and 160:160:79:40.5:32:22:18 in hind leg.

Wing (fig. 63 a) pale brownish gray, unadorned, anterior veins with slender 1-stripped

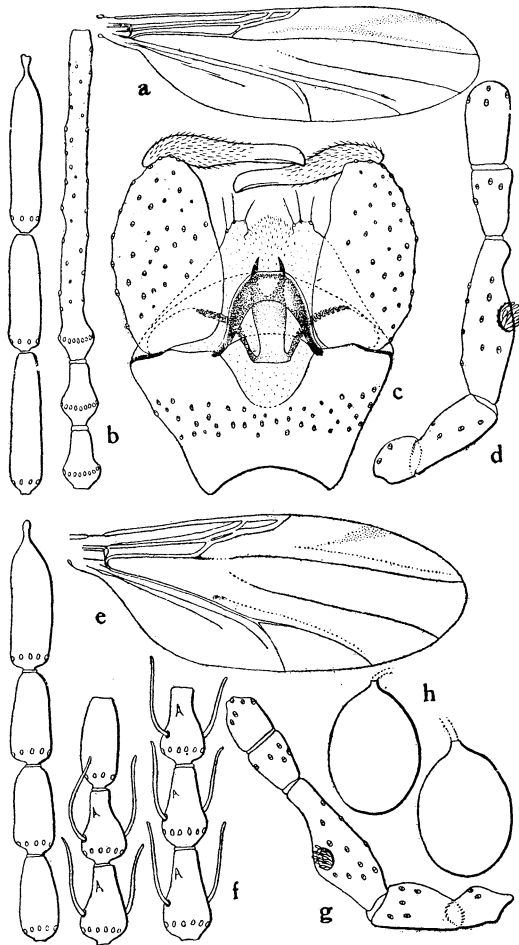


Fig. 63. *Forcipomyia (Forcipomyia) novaguineae*. a, wing; male; b, distal 6 antennal segments, male; c, hypopygium, male; d, maxillary palpus, male; e, wing, female; f, distal 10 antennal segments, female; g, maxillary palpus, female; h, spermathecae.

scales. Costa extending somewhat beyond middle of wing (55.5:103), relative lengths of R, M and stem of fMCu about 30:28:46.5, Rs about 1/2 length of R and about 1.7 \times length of R₁ (14.8:8.5), first radial cell present and slit-like, second cell subtriangular and as long as first (6:5.5), fMCu under tip of second radial cell or costal end, M₃₊₄ about 2.4 \times length of Cu₁ (29:12). Halter whitish. Abdomen almost entirely brown, tergites with very slender scales. Hypopygium (fig. 63 c) brown, but styles yellow except for brown bases; sternite 9 about 1/2 as long as wide (28:55), with many setae spread on transverse band at middle, caudal incision large and U-shaped and caudal membrane quite bare; tergite 9 round on caudal margin, longer than sternite (37:28) and its caudal lobes ending at level of apical 1/3 coxite. Coxites large, somewhat conical and about 1.7 \times as long as wide (40:23); styles almost straight, not distinctly tapered, about 0.8 length of coxites (33:40) and not sharply pointed at ends. Aedeagus hood-like, with round caudal margin, basal arch very large and about 2/3 total length, and without distinct caudal median lobe; parameres with basal arms slender, caudal lobes fused with each other on basal 2/3, rather short being only 1.2 \times length of basal arms (22:18), but rather broad, about 1/3 as wide as long (8:22) and caudal 2 unfused parts point-

ed, extending little beyond aedeagus and space between them U-shaped.

Female: Body about 1.72 mm long. Wing about 1.27 mm by 0.51 mm. Coloration and structure generally as in male with differences as follows: Head with segment 3 of maxillary palpus (fig. 63 g) slightly swollen on basal 1/2, last 2 segments very short and 5 segments in proportional length of 9.5:13.5:26:9:9.5. Antenna (fig. 63 f) brown but somewhat paler than in male, with basal short flagellar segments about twice width and each with narrow neck part, distal segments 10 to 13 oval and also twice as long as wide, last

segment about 1.5× as long as preceding one; AR about 0.71; relative lengths of distal 10 segments about 16:15:14:14:13:15:15.5:17.5:17.5:26. Thorax darker or more brownish than in male, but pleuron and sternum paler than tergum; scutellum with about 8 strong and 5 smaller bristles on posterior half and large central, about 10 small and 34 minute hairs on anterior half. Legs entirely brown; hind TR about 2.17 (2.1-2.24); hind tibial comb with 5-7 apical bristles; RL about 118:120:67.5:25.5:22.5:16:16.5 in fore, 141.5:148:64:31:26.5:19:16.8 in middle and 148.5:152:71:32:28:19:17.5 in hind leg.

Wing (fig. 63 e) with costa extending somewhat beyond middle of wing (59:97.8), relative lengths of R, M and stem of fMCu about 25:23:40.8, Rs about 1.7 length of R₁ (19.5:11.5), 2 radial cells complete, but first very narrow and distinctly shorter than second (6.9:9), fMCu under middle of second radial cell, Cu₁ ending at level of costal end and 1/2 length of M₃₊₄ (15:30). Abdomen brown or dark brown, tergites and pleural membranes with slender 2-striped scales, sternites reduced into paired hemisternites; cerci brown; 2 spermathecae (fig. 63 h), brown, oval, equal, about 1+22 units by 14 units and 1+21 units by 13.5 units respectively and each with short chitinized part of duct.

DISTRIBUTION: New Guinea.

Holotype, ♂ (BISHOP 2894), Karap, 1550 m, upper Jimmi Valley, Sepik drainage, NE New Guinea, 20 July 1955, Gressitt. Allotype, ♀, Wagete, 1750 m, Tigi Lake, Wisselmeren, Neth. New Guinea, 16 Aug. 1955, Gressitt. Paratypes, ♂ with allotype; ♀, Itouda, 1500 m, Kamo Valley, 14, July 1955, Gressitt.

The male hypopygium of the present species is somewhat similar to *F. subspadicifascia* Tokunaga and Murachi from Micronesia, but the coloration of the legs and the structures of various appendages of the head of these two species are quite different from each other. The unusual large value of hind TR in both sexes is exceptional for the species of subgenus *Forcipomyia*.

77. *Forcipomyia* (*Forcipomyia*) *flaviventris* (Kieffer), NEW COMBINATION. Fig. 64.
Ceratopogon flaviventris Kieffer, 1917, Mus. Nat. Hung., Ann. 15:179.

Small dark brown species, with yellow legs, unadorned wings and slender scales rather thickly spread on legs, wings and abdomen. Maxillary palpus of female with segment 3 strongly inflated and truncate apically. Basal short flagellar segments of female antenna spherical or short-oval. Hind TR of female about 0.45. Female wing dark brown, unadorned, with costa extending slightly beyond middle of wing, first radial cell present, but slit-like and obscure, fMCu located before level of costal end. Halter yellowish white. Abdomen brownish, with cercus yellow and 2 spermathecae, oval and slightly unequal.

Female: Body about 1.89 mm long. Wing about 1.22 mm and 0.48 mm. Head almost entirely dark brown including mouthparts, with eyes broadly contiguous above, proboscis about 1/2 length of head capsule; clypeus with only 5 setae on middle part. Maxillary palpus (fig. 64 b) with segment 3 very large, inflated and truncate apically, segment 5 very small and round, sensory pit very large, several scattered hyaline sensillae present on surface of distal ventral part of swollen segment 3, 5 segments in proportion of 11:14:36:13:6. Antenna (fig. 64 d) with scape dark brown, flagellum pale brown, basal short flagellar segments spherical and short-oval; apical segments missing. Thorax almost uniformly dark brown; scutellum with 12 strong and 13 small bristles and about 10 minute hairs.

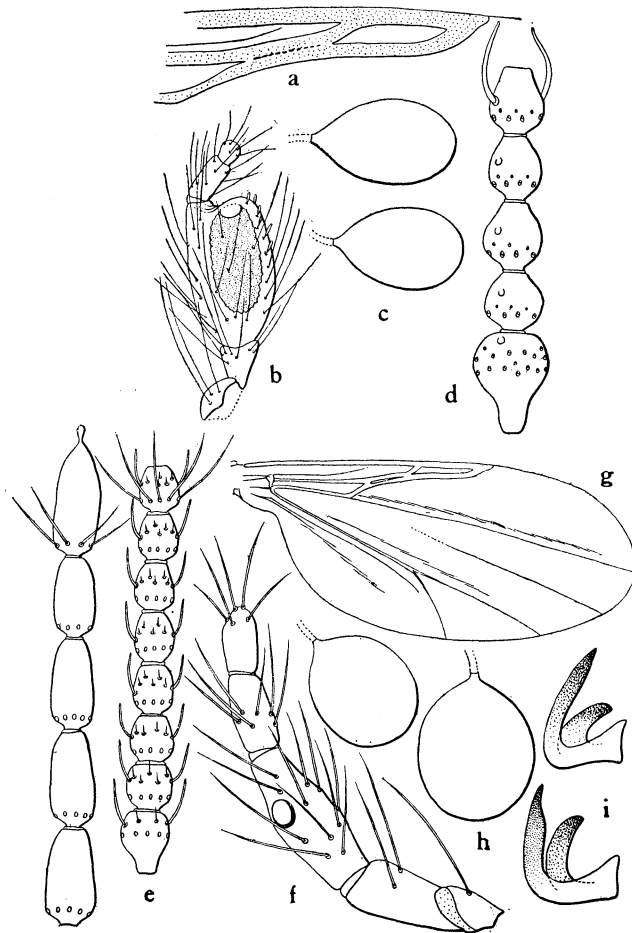


Fig. 64. *Forcipomyia* spp. a-d, *F. (Forcipomyia)* sp. probably *flaviventris*, female: a, wing venation of radial field; b, maxillary palpus; c, spermathecae; d, flagellar segments 2-6 of antenna. e-i *F. (Neoforcipomyia) quateriungula*, female: e, flagellar segments of antenna; f, maxillary palpus; g, wing; h, spermathecae; i, claws of hind leg.

ecae (fig. 64 c), pale brown, oval, subequal, about 24 units by 16 units and 22 units by 15 units and each with very short chitinized part of duct.

DISTRIBUTION: New Guinea.

NETH. NEW GUINEA: Hollandia, 100 m, ♀, 23 Aug. 1955, Gressitt.

This insect is probably *F. flaviventris* Kieffer, but unfortunately the original description was made on the basis of the male sex and only a female was available to me.

Subgenus *Proforcipomyia* Saunders

Two species are in the New Guinea material, viz. *F. sauteri* Kieffer and a small

brown as pleuron of thorax, other segments almost entirely yellow; scales of legs 2-striped, claws slender, hind tibial comb with 8 apical bristles; hind TR about 0.45. RL about 123:126:34:58:27.5:24:18.5 in fore, 144:158:28:70:30:23:18 in middle and 153:150:34:76:35:26:? in hind leg.

Wing (fig. 64 a) dark brown, costal and radial veins with dark 2-striped scales. Costa extending slightly beyond middle of wing length (55:94), relative lengths of R, M and stem of fMCu about 24.5:22:43, Rs about 1.8 times of R₁ (20:12), first radial cell obscurely slit-like and shorter than second which is about 1/2 as long as Rs (10:20), fMCu before level of tip of second radial cell, M₃₊₄ about twice length of Cu₁ (30:14). Halter yellowish white. Abdomen with tergites entirely brown and with slender 2-striped scales, pleural membranes dark and densely clothed with similar scales, sternites entirely pale brown and without scales; cercus yellow; 2 spermathecae

yellow unnamed species. The unnamed species is provided with a brown spot on the anterior margin of the scutum and postscutellum respectively and with rather characteristic aedeagus, but there is only one male specimen which unfortunately lacks both antennae so at this time a name and description are not given.

KEY TO NEW GUINEA SPECIES OF SUBGENUS PROFORCIPOMYIA

- Thorax without distinct brownish spot on anterior margin of scutum and on postscutellum. Male with hind TR about 0.69-0.98 and aedeagus triangular with both sides straight..... *sauteri*
- Thorax with distinct brown spots on anterior margin of scutum and on postscutellum. Male with hind TR about 1.03 and aedeagus somewhat star-shaped with both sides strongly concave as well as basal arch NG No. 5

78. Forcipomyia (Proforcipomyia) sauteri Kieffer

Forcipomyia sauteri Kieffer, 1912, Suppl. Ent. 1: 27.—Tokunaga, 1940, Tenthredo 3: 83; 1941, Annot. Zool. Japan 20: 109.—Tokunaga and Murachi, 1959, Ins. Micronesia (Bishop Mus.), 12 (3): 190.

DISTRIBUTION: Formosa, Micronesia, New Guinea and New Britain.

NETH. NEW GUINEA: Hollandia, ♀, 3 ♂, 23 Aug. 1955, Gressitt. NEW BRITAIN: St. Paul's, Baining Mts., Gazelle Pen., ♀, 9 Sept. 1955, Gressitt.

Subgenus **Caloforcipomyia** Saunders

79. Forcipomyia (Caloforcipomyia) squamiannulipes Tokunaga and Murachi

Forcipomyia squamiannulipes Tokunaga and Murachi, 1959, Ins. Micronesia (Bishop Mus.) 12 (3): 194.

DISTRIBUTION: Micronesia and New Guinea.

NETH. NEW GUINEA: Wagete, 1750 m, ♀, 16 Aug.; Okaitadi 1770 m, 3 ♂, 6-7 Aug.; Itouda, 1500 m, Kamo Valley, 6 ♀, 2 ♂, 12-14 Aug. All Wisselmeren, 1955, Gressitt.

Subgenus **Neoforcipomyia** Tokunaga

80. Forcipomyia (Neoforcipomyia) quateriungula Tokunaga, n. sp. Fig. 64.

Small dark brown species, with tibiae and tarsal segments of all legs somewhat yellowish and pale brown. Maxillary palpus of female robust and segment 3 with sensory pore just beyond middle of segment; basal short flagellar segments of female antenna very short and subspherical, AR about 1.22. Legs of female with very slender scales on tarsal segments, all claws with large basal tooth, hind TR large and about 2.59. Female wing without scales, unadorned, with costa extending far beyond middle of wing, second radial cell long, but Rs not extending so closely along costa as in the subgenus *Lasiohelea*. Abdomen without scales, 2 spermathecae, unequal and short-oval. Male unknown.

Female: Body length about 1.2 mm. Wing about 1.07 mm by 0.47 mm. Head entirely

dark brown, including mouthparts and antennae, with eyes contiguous above, proboscis rather short, much shorter than $1/2$ length of head capsule (12:30); clypeus with about 10 marginal and 2 median setae. Maxillary palpus (fig. 64f) robust; segment 3 stout, but not distinctly inflated and with sensory pore just beyond middle round and shallow; 5 segments in proportion of 7:14:19:10:8. Antenna (fig. 64e) with basal short flagellar segments subspherical, at most short-oval, slightly longer than wide (9.5:8) and each with 2 hyaline sensillae and several minute sensillae beside basal verticils, distal 5 segments elongate, oval, twice as long as wide, except for ultimate being about $3\times$ as long as wide; AR about 1.22; relative lengths of distal 8 segments about 9:9:9.5:15.5:17.5:16:15:26.5. Thorax almost entirely dark brown on dorsum, but scutum with very slender and faintly paler stripes along foveae, brown on pleuron and sternum, scutellum with 7 strong and 2 small bristles along caudal margin and about 20 minute hairs on anterior $1/2$. Legs mainly brown, but somewhat paler than pleuron of thorax, tibiae and 4 basal tarsal segments of all legs pale brownish yellow, last tarsal segments pale brown and slightly fuscus; tarsi with very slender and 1- or 2-stripped scales; hind tibial comb with 6-7 apical bristles; all claws (fig. 64i) large and each with large basal tooth; hind TR about 2.59. RL about 101:101:56:23:20:15:21 in fore, 119:123:57:25:22:16:17 in middle and 127:120:73.5:28:24:16.5: ? in hind leg.

Wing (fig. 64g) entirely brownish gray, without scales, colored markings and bare areas along veins. Costa elongate far beyond middle of wing (52.5:82), relative lengths of R, M and stem of fMCu about 20:18:35, Rs about twice length of R_1 (25:12), first radial cell slit-like, second radial cell long, narrow and about twice as long as first (17:8.5), fMCu under tip of R_1 , M_{3+4} somewhat shorter than twice length of Cu_1 (26:14). Halter with stem brown and knob white. Abdomen pale brown; without scales, pleural membranes paler and slightly fuscus; cercus pale brown; 2 spermathecae (fig. 64h), brown, unequal, short-oval, about 1+18 units by 17 units and 1+16 units by 14 units, each with short chitinized part of duct.

DISTRIBUTION: New Guinea.

Holotype, ♀ (BISHOP 2895), Hollandia, Neth. New Guinea, 23 Aug. 1955, Gressitt.

This insect is quite peculiar in the possession of characteristic tarsal claws. The antennal structure and wing venation of the present species evidently show the subgeneric characters of *Neoforcipomyia* proposed by myself for *F. pectinunguis* de Meijere. The comb-like process of the claw is one of the distinctive characters. Similar structure of the tarsal claws is known in *Lasiohelea pacifica* Macfie (1933) from Tahiti. This allied species, although included by Macfie in *Lasiohelea*, probably belongs to the subgenus *Neoforcipomyia* and distinctly differs from the present species in possession of specific antennal segmentation in which the ninth segment of the female is much longer than the eighth (10:6), shorter than tenth (10:18) and about 1.5 times as long as wide and somewhat cylindrical and differs from the preceding subspherical segments. The antennal structure of *pacifica* somewhat resembles that of the subgenus *Pterobosca*, but the most distinctive difference is that the empodia of all legs are not exceedingly broadened but normal. Except for the characteristic claws, the general structure and coloration of the present new species are somewhat similar to the Australian *F. insignis* Skuse (= *Ceratopogon insignis*). In the Australian species AR of female is about 1.5, hind TR of female is about 2.23, costal vein ends on level of tip of Cu_1 and the halteres are white, which are different from *quateriungula*.

Subgenus *Trichohelea* Goetghebuer**81. *Forcipomyia* (*Trichohelea*) *pennambula* Macfie, NEW COMBINATION**

Lasiohelea pennambula Macfie, 1932, Tijdschr. Ent. 75: 279 (Buru).

DISTRIBUTION: Moluccas.

HOST: Odonata: *Orthetrum signiferum* Lieftinck.

82. *Forcipomyia* (*Trichohelea*) *tipulivora* Macfie, NEW COMBINATION

Lasiohelea tipulivora Macfie, 1936, Roy. Ent. Soc. Lond., Proc. 5: 229 (Cyclops).

DISTRIBUTION: and New Guinea.

HOST: *Tipula demeijerei* Edwards.

These two known species from New Guinea region possess the subgeneric characters of *Trichohelea* given by Saunders (1956) and may be distinguished by the following distinctions: *pennambula*, female—hind TR about 3.5, spermathecae pyriform, AR about 2.4 and segment 3 of maxillary palpus with sensory pore; *tipulivora*, female—hind TR about 2.8, spermathecae subspherical, AR about 2.0 and segment 3 of maxillary palpus without sensory pore, but with sensory hairs on the surface.

Subgenus *Lasiohelea* Kieffer**83. *Forcipomyia* (*Lasiohelea*) *samoensis* Edwards, NEW COMBINATION**

Lasiohelea samoensis Edwards, 1928, Ins. Samoa (Brit. Mus., N. H.) 6(2): 51.—Macfie, 1932, Tijdschr. Ent. 75: 277 (Mamberamo R.).

DISTRIBUTION: Samoa, New Guinea and Moluccas.

HOSTS: Odonata: *Notoneura salomonis* Selys, *Orthetrum signiferum* Lieftinck and *O. villosovittatum* Brauer.

Subgenus *Pterobosca* Macfie**84. *Forcipomyia* (*Pterobosca*) *ariel* Macfie, NEW COMBINATION**

Pterobosca ariel Macfie, 1932, Tijdschr. Ent. 75: 275 (Buru).

DISTRIBUTION: Moluccas.

HOST: Odonata: *Orthetrum sabina* Drury.

85. *Forcipomyia* (*Pterobosca*) *odonatiphila* (Macfie), NEW COMBINATION

Pterobosca odonatiphila Macfie, 1932, Tijdschr. Ent. 75: 274 (Hollandia).

DISTRIBUTION: New Guinea.

HOSTS: Odonata: *Gynacantha moscaryi* Foerster and *G. kirbyi* Krüger.

86. *Forcipomyia* (*Pterobosca*) *adhesipes* Macfie, NEW COMBINATION

Pterobosca adhesipes Macfie, 1932, Tijdschr. Ent. 75: 270.

DISTRIBUTION: New Guinea, Indonesia and Caroline Is.

HOSTS: Odonata: *Orthetrum sabina* Drury, *O. chrysis* Selys, *Agrionoptera insignis* allogens Tillyard, *A. insignis similis* Selys, *Hemicordulia silvarum* Ris, *H. haluco* Asahina, *H. erico* Asahina, *Raphismia bispina* Hagen, *Lestes praemorsus* Selys, *Tramea limbata* Desjardines, *Tholymus tillarga* Fabricius and *Diplacodes bipunctata* Brauer.

All known species of *Pterobosca*, including these three species, are distinguished by the key given by Tokunaga and Murachi 1959.

Genus *Dasyhelea* Kieffer

It is peculiar that only one species has been found in New Guinea, whereas many species of this genus are known in the neighbouring Oriental region.

87. *Dasyhelea myrmedon* Kieffer, 1917, Mus. Nat. Hung., Ann. 15: 188 (Friedrich-Wilhelms hafen).

DISTRIBUTION: New Guinea.

Genus *Alluaudomyia* Kieffer

88. *Alluaudomyia tenuistylata* Tokunaga, n. sp. Fig. 65.

Small yellow species; legs, wings and abdominal tergites with brown markings; scutum with small pale brown spots; scutellum with 4 bristles. Wing with macrotrichia only close to margins of cells R_5 and M_1 . Hind TR of male about 2.8; femora and tibiae of all legs each with two brownish or fuscus bands. Abdominal tergites with rather complicated dark markings. Hypopygium with styles slender, sharply pointed and slightly arcuate; parameres quite separated, with caudal lobes slender, abruptly curved laterad on apical quarter and pointed apically. Female unknown.

Male: Body about 1.35 mm long. Wing about 0.88 mm by 0.29 mm. Head brown, with eyes just separated above or almost touching, mouthparts pale brown, proboscis about 1/3 length of head capsule; clypeus with 2 pairs of setae. Maxillary palpus (fig. 65 c) rather stout, segment 3 with several sensillae on preapical part and without sensory pore, 5 segments in proportion of 5:7:9:7:9. Antenna (fig. 65 b) with scape brown, segments 2 and 3 and distal neck part of segment 11 brownish, other segments and all plumose hairs yellowish; relative lengths of segments 2 to 10, 11 to 14, 2 to 11 and 12 to 14 together about 106:85 and 118:73, 8 distal segments in proportion of length about 10:10:10:10:12:21:25:25. Thorax almost entirely yellow, but scutum white on shoulder parts, with humeral pits dark brown, pale brown star-like spot on posterior 1/3, obscure small pale brown cloud along posterior margin and fuscus line extending along anterior margin of middle part, curving caudad along foveae, then curving again laterad beyond dark humeral pits; scutellum entirely yellow and with 4 strong bristles; postscutellum yellow on lateral parts and brown on middle part; pleuron yellowish brown; sternum yellow. Legs with dark brown markings on pale yellow ground color, coxae fuscus brown, trochanters brown, femur dark at tip and with rather broad dark brown band on middle 1/3, middle femur also dark at tip and with similar dark brown band on sub-basal part before middle, hind femur with rather small dark brown band at middle besides dark distal end, fore tibia

dark brown at both ends and with broad dark brown band on middle 1/3, middle tibia also dark brown at both ends and with small preapical dark brown band just beyond middle, hind tibia dark brown at apical end and with small dark brown band at middle, tarsal segment 1 of hind leg brown; 2 tarsal spines present only at each distal end of basal 3 segments of middle leg; hind TR about 2.8. RL about 90:77:36:16:8.5:7:14 in fore, 117:103:65:22:11:8:14 in middle and 88:90:45:16:10:7.5:14 in hind leg.

Wing (fig. 65 a) with macrotrichia only along costal margin of cell R_5 and apical margin of cell M_1 and 3 dark spots: 1 covering distal ends of R and M just before r-m, 1 very small covering only apical 1/2 R_1 and 1 largest, covering apical 1/2 second radial cell and extending obliquely onto cell R_5 . Costa ending just beyond middle of wing (38:68), relative lengths of R, M and stem of fMCu about 19:18:30, R_s about twice length of R_1 (14:7), first radial cell slit-like, second elongate-

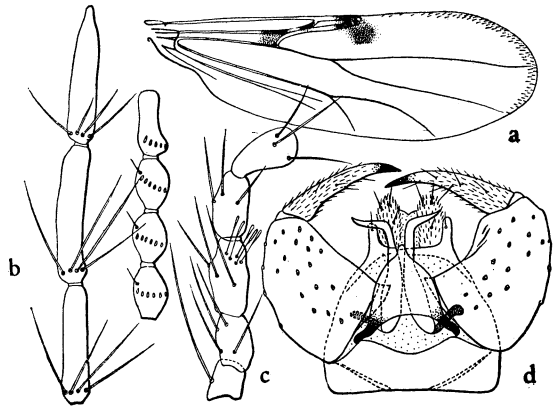


Fig. 65. *Alluaudomyia tenuistylata*, male. a, wing; b, distal 7 antennal segments; c, maxillary palpus; d, hypopygium.

triangular and $1.6\times$ as long as stem vein, fMCu under middle of second radial cell, M_{3+4} about $2.4\times$ as long as Cu_1 (19:8) and moderately arcuate. Halter white. Abdomen white and with dark tergal markings: anterior 3 tergites each with 2 lateral and 1 middle spots, following 2 tergites each with very large subsquare spot, tergite 6 with T-shaped band-like spot, 7 with pair of lateral spots, 8 with caudal slender band-like spot; sternites with poorly developed hemisternites. Hypopygium (fig. 65 d) dark, but parameres and styles mainly brownish yellow, tergite white on caudal 1/2. Tergite 9 longer than wide (35:31), somewhat round on caudal margin and with slender anal points; sternite 9 very short, about 1/3 as long as tergite (11:35), with caudal concavity very slight and caudal membrane quite bare. Coxites divergent caudad, conical and about $1.4\times$ as long as basal width (25:18); styles strongly pointed, evenly and slightly arcuate and somewhat shorter than coxites (22:25). Aedeagus somewhat bell-shaped, as long as basal width (17:17), with basal roots slender, basal arch very low and median caudal lobe very small and hardly reaching caudal margin of tergite; parameres quite separated, with basal lateral arms slender and V-shaped, connected with caudal lobes, being about $4\times$ length of basal arms (20:5), tapered, suddenly curved laterad on apical quarter and sharply pointed.

DISTRIBUTION: New Guinea.

Holotype, ♂ (BISHOP 2896), Hollandia, 100 m, Neth. New Guinea, 23 Aug. 1955, Gressitt.

This is somewhat allied to Micronesian *A. insulana* Tokunaga and Murachi and *A. bipunctata* Tokunaga and Murachi in the dark markings of wings and legs. In the first allied species, however, the shapes of the aedeagus and styles are quite different and the legs are

provided with pale knee-parts, distinctly different from the present species. The second species is more closely allied, but the wing is not provided with a small dark spot near the tip of R_1 and the caudal lobes of parameres are slightly clavate and round at apices, distinctly differing from the present New Guinea species.

Genus *Stilobezzia* Kieffer

There are eight species of this genus, six of which seem to be new to science. These New Guinea species are distinguished by the following key:

KEY TO NEW GUINEA SPECIES OF *STILOBEZZIA*

1. Wings with dark spots..... **89. natata**
Wings without dark or other colored marking..... 2
- 2 (1). Legs with femoral apical spines at least on fore legs of male; last tarsal segments of fore and middle legs of female with ventral spines..... **90. hollandia**
Legs without femoral apical spines; female without ventral spines of last tarsal segments of all legs..... 3
- 3 (2). Hind femur bicolored, basal 1/2 being pale brown or yellow and apical 1/2 brown or dark; scutum with mid-dorsal setae far smaller than other scutal setae and erect..... **91. acrotrichis**
Hind femur uniformly brown, pale brown or yellow; scutum with mid-dorsal setae similar to other scutal setae 4
- 4 (3). Scutum with a rather distinct dark or brown anterior spot on yellow ground color; coxae of fore legs far darker or more brownish than those of posterior 2 pairs..... **92. postcervix**
Scutum almost uniformly unicolored and without distinct marking; legs with all coxae similar in color..... 5
- 5 (4). Scutum almost uniformly brown; scutellum with four strong bristles. Female AR far larger than 1.0, being about 1.56..... **93. spadicitlbbialis**
Scutum almost uniformly pale brownish or yellowish; scutellum with 5 or 6 strong bristles. Female AR at most about 1.01, usually being smaller than 1.0... 6
- 6 (5). Scutellum of either sex with only strong bristles, being devoid of small additional setae. Male hypopygium with large U-shaped caudal incision of sternite 9..... **94. thyridofera**
Scutellum, at least of female, with small additional setae besides strong bristles... 7
- 7 (6). In female, AR about 0.86–0.92, antennal segment 10 about 1.08–1.25× as long as 9, segment 2 about 1.4× length of 3 and wings larger, about 2.13–2.55 mm long..... **95. similisegmenta**
In male, AR about 0.97–1.01, antennal segment 10 about 1.32× as long as 9, segment 2 about 1.6× length of 3 and wings smaller, about 1.71 mm long. Male hypopygium with caudal lobe of paramere unequally bifurcate at middle **96. bifurcata**

89. *Stilobezzia notata* (de Meijere)

Ceratopogon notatus de Meijere, 1907, Tijdschr. Ent. 50:210.

Stilobezzia notata, Johannsen, 1931, Arch. Hydrobiol., Suppl. 9:433.—Macfie, 1934, Tijdschr. Ent. 77:221; 1934, Ann. Trop. Med. Parasit. 28:284.—Tokunaga, 1940, Philip. Jour. Sci. 72:280.

Stilobezzia notata var. *perspicua* Johannsen, 1931, Arch. Hydrobiol., Suppl. 9:433.

Stilobezzia decora Kieffer, 1916, Mus. Nat. Hung., Ann. 14:89; 1921, Philip. Jour. Sci. 18:566; 1922, Soc. Linn. Lyon, Ann. 68:159.

The New Guinea female specimen is somewhat paler than the specimens from other localities and the colored markings of the legs are also somewhat different as in the following notes: Scutum with yellow median vittae which are not surrounded by brown rings and lateral yellow vittae not dark brown at posterior ends. Legs extensively yellow, middle femur with brown preapical band, hind femur mainly dark brown, but with yellow narrow preapical ring, fore femur with about 13 strong spine-like apical bristles. Abdominal tergites: 2 with only 1 median dark spot, 3 with 3 dark spots, 4 extensively dark and with 2 oval yellow spots, 5 with 2 lateral and 2 median dark spots, following each with 2 lateral dark spots.

DISTRIBUTION: Japan, Formosa, Sumatra, Malaya, New Guinea.

NETH. NEW GUINEA: Hollandia, ♀, 23 Aug. 1955, Gressitt.

90. *Stilobezzia hollandia* Tokunaga, n. sp. Fig. 66.

Medium-sized brown species with legs mainly yellowish pale brown, hind femora more brownish on apical 1/2. Maxillary palpus stout; segment 11 of male antenna twice as long as 10, sub-equal to 12 and 1/2 length of 13; female AR about 1.13. Thorax brown, but female scutum with dark spot on anterior marginal area, scutellum with 4 strong bristles and in male with 2 additional small setae; last tarsal segments of fore and middle legs of female each with 2 sub-basal distinct spines; fore tibial spur of male much longer than diameter of tibial end, black and straight. Wing without macrotrichia on membrane in male and with several along apical margin of wing in female, colored markings absent, radial veins without setae, costa rather short ending at 0.7 of wing length and first radial cell very small and only as long as r-m. Hypopygium of male with styles rather robust, caudal lobes of parameres long and finely frilled at tips.

Male: Body about 1.42 mm long. Wing about 0.78 (0.75–0.81) mm by 0.28 mm. Head entirely brown, including mouthparts, with eyes separated above as wide as 1 or 2 facets, proboscis somewhat shorter than 1/3 length of head capsule (6.4:22.6); clypeus with several (4–8) setae on lateral areas. Maxillary palpus (fig. 66 e) stout, with sensory pore on preapical part of segment 3 round and shallow, 5 segments in proportion of 3.6:6.5:8.3:4.9:7.7. Antenna (fig. 66 b) with scape brown, short basal flagellar segments including plumose hairs very pale, segments 11 more brownish on neck part, 3 apical segments brown; combined relative lengths of segment 2 to 10 and 11 to 14 about 90.5:109.1; relative lengths of 8 distal segments about 9.1:8.9:8.5:8.6:15.3:18.6:31:39.1. Thorax entirely brown, scutellum with 4 strong bristles and 2 small setae. Legs mainly pale brownish yellow, but coxae brown, apical 1/2 hind femur more brownish, sometimes basal 1/2 fore femur slightly more brownish; fore tibial spur very strong, straight, dark brown and much

longer than diameter of tibial end (16.5:10) and about 0.32 (0.3-0.35) as long as tarsal segment 1 (16.5:50.8); femora each with 1 or 2 preapical spine-like bristles on fore and middle legs and without or with 1 similar bristle on hind leg; basal 3 tarsal segments of fore and middle legs with similar apical bristle, but segment 3 sometimes without bristle, tarsal segment 1 of hind leg with or without similar bristle; RL about 91.2:80.9:50.8:18:9:7:14.3 in fore, 111.8:103.1:64.5:24:9.4:6.7:12.8 in middle and 100.1:92.6:49.1:19.9:8.9:6.1:14.7 in hind leg.

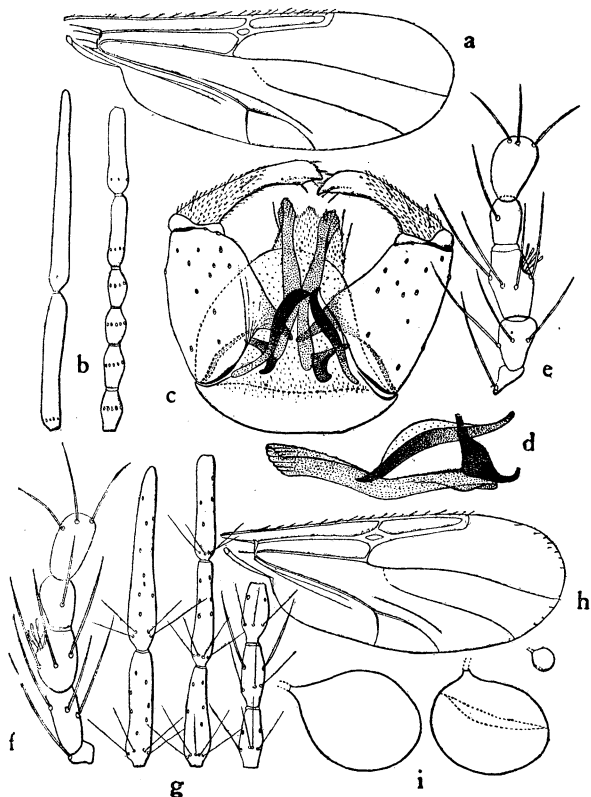


Fig. 66. *Stilobezzia hollandia*. a, wing, male; b, distal 8 antennal segments, male; c, hypopygium, male; d, lateral sclerite of aedeagus and paramere; e, maxillary palpus, male; f, maxillary palpus, female; g, distal 8 antennal segments, female; h, wing, female; i, spermathecae.

Wing (fig. 66 a) very pale brownish hyaline including veins, without colored markings and macrotrichia; radial veins without setae. Costa rather short, extending basal 0.7 of wing length (41.2:59.9) and ending only slightly beyond level of tip of Cu_1 , relative lengths of R, M and stem of fMCu about 21.1:21.3:27.1, Rs somewhat longer than $4\times$ length of R_1 (15.2:3.7), R_1 very short and as long as r-m, first radial cell shorter than r-m (3:4) and almost as long as wide, second radial cell about $4\times$ length of first (11.7:3), petiole of fM as long as r-m, fMCu under tip of R_1 , M_{3+4} about

$2.5\times$ length of Cu_1 (13.2:5.4). Halter yellowish white. Abdomen pale brown, pleural membranes fuscus, sternites reduced into membranes. Hypopygium (fig. 66 c, d) mainly brown or dark brown, but styles pale brownish yellow. Tergite 9 shorter than basal width (23.2:30.4) and round on caudal margin; sternite 9 transverse, $1/4$ as long as wide and gradually changing into spinulous membrane on caudal part. Coxites conical and about $1\frac{1}{3}$ as long as wide (21.7:16.4); styles rather large, only slightly shorter than coxites (18.8:21.7), very slightly clavate and arcuate, somewhat pointed at apices. Aedeagus with pair of sclerites slender, somewhat shorter than styles (16.1:18.8), slightly undulate and sharply pointed; parameres with basal sclerites subtriangular, small and little longer than $1/2$ length of sclerites of aedeagus (9.2:16.1), caudal lobes very long, as long as coxites (21.6:21.7), curved at middle, somewhat flattened and finely frilled at apices.

Female: Body about 0.91 mm long. Wing about 0.7 mm by 0.29 mm. General coloration

tion and structure similar to male with usual sexual differences. Head with proboscis about $1/3$ as long as height of head capsule, eyes separated above as wide as 1.5 facets. Maxillary palpus (fig. 66 f) with 5 segments in proportion of 4:4.5:6:5:7.5. Antenna (fig. 66 g) with scape brown, all other segments pale brown, AR about 1.13, relative lengths of segments 2 to 4 and 8 distal about 14:8.5:8.5 and 9.5:10:10:16:17:16:18:26 respectively. Thorax mainly brown, scutum with small triangular dark spot on anterior area, 2 more brownish obscure stripes on foveae, humeral pits paler, scutellum with only 4 bristles. Legs very pale brown, middle and hind coxae, hind trochanter and apical $1/2$ hind femur slightly fuscus, femoral and tarsal preapical or apical distinct spinelike bristles absent, last tarsal segments of fore and middle legs each with 2 sub-basal spine-like bristles, brown and apically filiform; claws as long as last tarsal segments and each with 1 basal tooth, about $1/4$ (4:15) as long as claw in fore, $1/3$ (6:18) in middle and $1/5$ (2.5:11) in hind leg. RL about 80:72:42:14:8:6:14 in fore, 98:93:56:19:9:7:18 in middle and 88:81:43:15:7.5:6:13 in hind leg.

Wing (fig. 66 h) with about 8 macrotrichia on apical margin of cell R_5 and 3 on M_1 ; Costa extending basal 0.7 of wing length (38:54) and ending at level of midway between tips of M_{3+4} and Cu_1 , relative lengths of R, M and stem of fMCu about 16.5:17.5:23, R_s slightly shorter than $4\times$ length of R_1 (16:4.5), r-m as long as petiole of fM and somewhat shorter than R_1 , first radial cell small, second about $3.5\times$ as long as first (14:4), fMCu under r-m, M_{3+4} about twice length Cu_1 (12:5.5). Halter white. Abdomen uniformly fuscus pale brown as in thorax, with cercus pale brownish yellow; spermathecae (fig. 66 i): 2 large, brown, short-oval and 1+14 units by 11.5 units and 1+14 units by 10.5 units respectively and one small, pale brown, spherical and 2.5 units by 2.5 units.

DISTRIBUTION: New Guinea.

Holotype, ♂ (BISHOP 2897), Hollandia, 100 m, Neth. New Guinea, 23 Aug. 1955, Gressitt. Allotype, ♀ with type. Paratypes, 4 ♂ with types.

This species is thought to be included into Micronesian *calcaris*-group, Ins. Micronesia (Bishop Mus.) 12(3): 121, 1959, in possession of strong tibial spurs of the male fore legs and apically flattened caudal lobes of the parameres; however, it is highly specific in the following points: Apical spur of tibia is almost straight, apically flattened parts of caudal lobes of parameres are finely frilled and in female fifth tarsal segments are provided with double batonnets, highly differing from any other species of the group.

91. *Stilobezzia acrotrichis* Tokunaga, n. sp. Fig. 67.

Medium-sized brownish species, with legs bicolored, yellow and brown: apical $1/2$ femora, entire length of tibiae and distal 2 tarsal segments brown and other parts yellow. Maxillary palpus with last segment hardly as long as 3; segment 2 of female antenna about $4.5\times$ as long as wide and $1.3\times$ as long as 3, following short basal segments cylindrical, about 4.5 to $5.5\times$ as long as wide. Scutum with setae of mid-dorsal line about 12, minute being much smaller than other scutal setae and erect, scutellum with only 4 bristles. Female hind TR about 2.15. Wing of female with macrotrichia sparsely spread on apical part beyond costal end and radial veins setigerous. Male unknown.

Female: Body about 2.35 mm long. Wing about 1.99 mm by 0.61 mm. Head entirely brown, with eyes almost contiguous above, proboscis about $1/2$ height of head capsule;

clypeus with 6 marginal setae. Maxillary palpus (fig. 67 a) slender, with sensory pore on preapical part of segment 3, 5 segments in proportion of 8:17:24:12:22. Antenna with basal short flagellar segments elongate, cylindrical, at least about $4.5\times$ as long as wide, antennal segment 2 about $1.3\times$ length of following and $4.5\times$ width, last 5 long segments missing; relative lengths of segments 2 to 9 about 45:34:35:36:36:36:38:38. Thorax almost uniformly brown, but pleuron and sternum slightly yellowish; scutum with 12 setae of mid-dorsal line minute, much smaller than other scutal setae and erect; scutellum with only 4 bristles. Legs mainly pale brownish yellow, but apical 1/2 femora, almost entire length of tibiae and last 2 tarsal segments more brownish, especially so in middle and hind legs, extreme bases of all tibiae yellow. Tarsal spur-like bristles: in fore leg, basal 3

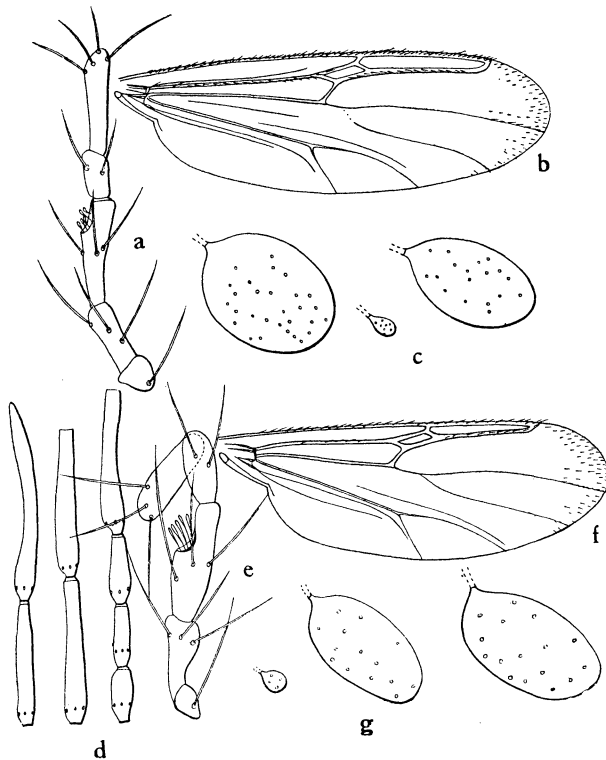


Fig. 67. *Stilobezzia* spp. a-c, *acrotrichis*, female: a, maxillary palpus; b, wing; c, spermathecae. d-g, *postcervix*, female: d, distal 8 antennal segments; e, maxillary palpus; f, wing; g, spermathecae.

than twice length of Cu_1 (43:20). Halter very pale brown. Abdomen pale brown, but pleural membranes more brownish; cercus brownish; spermathecae (fig. 67 c) entirely brown and with hyaline punctures, 2 large, oval, unequal, about $1.5+32$ units by 24 units and $1+29$ units by 18 units respectively, 1 small and about $1+6$ units by 3.5 units.

DISTRIBUTION: New Guinea.

Holotype, ♀ (BISHOP 2898), Busu R, NE New Guinea, 14 Sept. 1955, Gressitt.

segments each with one apical; in middle, 1 with 1 sub-basal and 2 apical and following 2 with 2 apical; in hind, 1 with 1 apical and following 2 with 2 apical. RL about 215:215:122:60:20:23:50 in fore, 275:272:163:59:22:19.5:47 in middle and 265:266:140:65:21.5:19:50 in hind leg; claws and their basal teeth about 42:16 in fore, 40:15 in middle and 46:15 in hind leg; hind TR about 2.15.

Wing (fig. 67 b) very pale brownish hyaline, with macrotrichia sparsely spread on apical part beyond costal end, radial veins, apical $1/4 M_1$ and apical end of M_2 setigerous; Costa extending to basal 0.8 of wing length and ending above tip of M_2 , relative lengths of R, M and stem of fMCu about 62:63:61.5, Rs about $3.6\times$ long of R_1 (59:16), second radial cell about $3\times$ as long as first, r-m somewhat longer than petiole of fM, fMCu slightly before end of r-m, M_{3+4} slightly longer

This is somewhat allied to Micronesian *S. spadicitibialis* Tokunaga and Murachi, but the present species is much paler in general coloration, all tibiae are more broadly brownish with bases pale, femora are pale on basal half and brownish on apical half, scutellum has only four bristles, and mid-dorsal setae of scutum are unusually small, somewhat differing from the allied species.

92. *Stilobezzia postcervix* Tokunaga, n. sp. Fig. 67.

Medium-sized yellow species with rather distinct dark spot on anterior margin of scutum, legs mainly pale brownish yellow, but knee-parts dark or brownish, tibial apical ends more or less brownish, fore leg alone with coxa, trochanter and basal 1/3 femur fuscus. Female with basal short flagellar segments rather short, about 3× as long as wide, segment 2 only 1.5× length of 3, 10 about 1.8 times long as 9, AR about 1.4. Scutellum with only 4 bristles; female hind TR about 2.3; wing of female with macrotrichia sparsely spread on apical part beyond costal end, radial veins setigerous. Halter yellow.

Female: Body about 1.76 mm long. Wing about 1.36 (1.3–1.47) mm by 0.48 (0.45–0.51) mm. Head pale brown or yellow, with eyes narrowly separated as wide as 1 facet, mouthparts slightly more brownish, proboscis somewhat shorter than 1/2 length of head capsule (12.3:32.3); clypeus with 6 or 7 marginal setae. Maxillary palpus (fig. 67 e) with last segment distinctly shorter than 3, sensory pore of segment 3 beyond middle, 5 segments about 6.5:15:18.5:11:15 in relative length. Antenna (fig. 67 d) with scape yellowish, short basal flagellar segments pale brownish yellow, last 5 segments more brownish; AR about 1.4, varying from 1.38 to 1.42; segment 2, 3× as long as wide and 1.5× length of 3, segment 10 about 1.8× length of 9; relative lengths of apical 8 segments about 16:18.8:20.3:36.5:38.5:38.5:38.5:55.5, segments 2 to 4 about 24.5:16:15.5. Thorax entirely yellow, scutum with rather distinct fuscus spot on anterior margin and 8 usual setae arranged in single mid-dorsal line, scutellum with only 4 bristles. Legs extensively pale brownish yellow or yellow, with knee-parts and distal ends of tibiae more or less brownish, especially more brownish on fore leg, coxa, trochanter and basal 1/3 femur of fore leg alone fuscus; tarsal spur-like bristles: in fore leg, basal 2 segments each with 1 apical and 3 with 1 or 2 apical; in middle, 1 with 1 sub-basal and 2 apical, 2 with 1 or 2 apical, following 2 each with 2 apical; in hind leg, 2 with 2 apical, 3 with 1 or 2 apical bristles. Hind TR about 2.3–2.36; RL about 145:146.3:82:43.2:15.3:14.2:30 in fore, 178.3:177:113.7:44.8:16.5:15.7:33.2 in middle and 177.3:179.7:100:43.3:14.3:13.5:28.3 in hind leg; claws somewhat shorter than last tarsal segments and each with long basal tooth being about 1/2 length of claw in fore (13:29.5) and middle (14.5:32.5) and 1/3 in hind leg (8:25).

Wing (fig. 67 f) entirely very pale brownish hyaline, with macrotrichia sparsely spread on apical part beyond level of costal tip and absent or very few along apical margin of cell M_1 , radial veins and distal 1/3 or 1/4 M_1 setigerous, distal end of M_2 with few setae. Costa extending basal 0.82 of wing length and ending above or slightly before tip of M_2 , relative lengths of R, M and stem of fMCu about 39.2:38.7:44.3, R_s $3\frac{1}{2}$ × length of R_1 (37:10.7), second radial cell about $2\frac{1}{2}$ × length of first (26.5:10.3), r-m as long as petiole of fM, fMCu under r-m or slightly beyond r-m, M_{3+4} about twice length of Cu_1 (30.7:14.7). Halter yellow. Abdomen almost uniformly yellow or tergites and cercus very faintly brownish; spermathecae (fig. 67 g): 2 large, oval, unequal, with hyaline punctures, about 23.7 units by 13.5 units and 21.7 units by 12.3 units respectively, 1 small, pale

brown and about 5.5 units by 4.2 units.

DISTRIBUTION: New Guinea.

Holotype, ♀ (BISHOP 2899), Hollandia, 100 m, Neth. New Guinea, 23 Aug. 1955, Gressitt. Paratypes, 2 ♀ with type.

This is closely allied to *S. unifascidorsalis* Tokunaga from the Palau Islands, but rather distinctly different in the following points: AR is somewhat smaller being at most 1.42, fore legs with coxae, trochanters and basal parts of femora fuscus obviously differing from other posterior legs, knee-parts and distal ends of all legs more or less brownish or fuscus; while in the allied species, AR about 1.56 (1.44-1.63) and all legs entirely yellowish white.

**93. *Stilobezzia spadicitibialis* Tokunaga and Murachi, 1959, Ins. Micronesia (Bishop Mus.)
12 (3):**

DISTRIBUTION: Caroline Is. and New Guinea.

NE NEW GUINEA: Wum, 840 m, Jimmi Valley, ♀, 16 July 1955, Gressitt.

The New Guinea female specimen is slightly different in the following points: Scutellum with only four strong bristles and three small additional setae and AR about 1.56, but these differences seem to be individual.

94. *Stilobezzia thyridofera* Tokunaga, n. sp. Fig. 68.

Rather large yellow species. Female AR about 1.0, antennal segment 2 cylindrical, about 3.5× as long as wide and 1.4× length of 3, short basal flagellar segments about 3× or 4× as long as wide, segment 10 to 13 about 1.6× as long as 9. Maxillary palpus slender, with group of few sensillae in very shallow depression of preapical part of segment 3, last segment elongate and almost as long as 3. Scutum with 6 to 8 ordinary setae arranged on mid-dorsal line; scutellum with 5 or 6 bristles. Female wing with macrotrichia sparsely spread on apical areas of cells R₅ and M₁ and radial veins setigerous. Halter yellowish white or white. Hind TR about 2.0-2.33 in female and 1.84 in male. Male hypopygium with styles robust and rather stout, caudal lobes of parameres almost straight tapered and not beyond caudal margin of tergite 9, sternite 9 with caudal incision very large and U-shaped or semicircular.

Male: Body length about 2.18 mm. Wings shrunk. Head entirely brown, with eyes barely separated above, proboscis about 2/5 height of head capsule (13:31); clypeus with 6 marginal setae. Maxillary palpus (fig. 68b) slender, with few spoon-like sensillae in shallow depression of preapical part of segment 3, 5 segments in proportion of 6:12:21:11:21. Antenna with scape brown, flagella missing. Thorax mainly yellow, with scutellum and anterior part of scutum faintly more brownish, scutum with 6 setae arranged on mid-dorsal line, scutellum with 5 bristles. Legs entirely pale brownish yellow; hind TR about 1.84; tarsal spur-like bristles; basal 3 segments of fore leg each with 1 apical, posterior 2 pairs each with 2 apical and tarsal segment 1 of middle leg with sub-basal 1; RL about 175:155:103:52:20:15:21 in fore, 212:182:119:54:22:14:19 in middle and 206:202:101:55:22:14.5: ? in hind leg.

Wing entirely very pale brownish hyaline, with r-m longer than M₁₊₂ and R setigerous on basal 2/3; distal half shrunk. Halter white. Abdomen mainly pale brownish yellow, with pleuron pale brown. Hypopygium (fig. 68a) brown; tergite 9 very large and almost

as long as basal width; sternite 9 with large semicircular caudal concavity and caudal membrane of this concavity finely spinulose. Coxites large, tapered, about $1.6\times$ as long as wide (50: 31) and rather densely setigerous on mesal sides of basal parts; styles stout, barely tapered, about 0.8 as long as coxites (39: 50) and each with preapical concavity. Aedeagus with lateral sclerites slender, undulate, about $3/4$ as long as styles (29: 39) and sharply pointed; parameres with rather long basal sclerites which extend laterad and caudal lobes quite separated, but extending caudad closely side by side, about $1.7\times$ as long as basal sclerites (38: 23) and $1.3\times$ of lateral sclerites of aedeagus (38: 29).

Female: Body about 2.54 mm long. Wings about 2.07 mm by 0.73 mm. General coloration and structure very similar to male, with usual sexual differences. Head with proboscis about $1/2$ as long as length of head capsule (17: 35); clypeus with 6 or 7 marginal setae. Maxillary palpus (fig. 68d) with 5 segments in proportion of 6.8: 18.5: 26: 10.5: 22. Antenna (fig. 58e) entirely pale brown or yellowish, AR about 1.0, relative lengths of 13 flagellar segments 34: 25: 23.5: 24: 25: 25: 26.5: 26: 41: 42: 41: 41: 52, segment 2 about $3.4\times$ as long as wide, 3 about $4\times$, 4, $3.1\times$, 5, $3.4\times$, 6 to 9, $4\times$, 10 to 13, $5.5\times$, and 1 last about $6.5\times$ as long as wide. Thorax with scutum very slightly fuscus along anterior margin, pleuron and sternum slightly brownish, scutellum with 6 bristles; hind TR about 2.0-2.33; RL about 190: 187: 110: 52: 20: 17: 32 in fore, 230: 224: 132: 54: 22: 16: 32 in middle and 240: 243: 126: 54: 22: 16: 35 in hind leg; claws with basal teeth about $2/5$ length of claws (10-11: 24 in fore and middle legs) or $1/3$ (9: 27 in hind leg).

Wing (fig. 68c) with macrotrichia sparsely spread only on apical part beyond level of tip of R_s , radial veins and apical parts of M_1 and M_2 setigerous. Costa ending just before tip of M_2 and extending basal 0.85 of wing length (134.5: 158), R and M somewhat longer than stem of fMCu (64.5: 63.5: 62), R_s about $3.8\times$ as long as R_1 (56.5: 15), first radial cell much longer than r-m, second about $3.5\times$ length of first (41.5: 12), r-m longer than M_{1+2} , fMCu a little before end of r-m, M_{3+4} about twice length of Cu_1 (50: 25). Halter

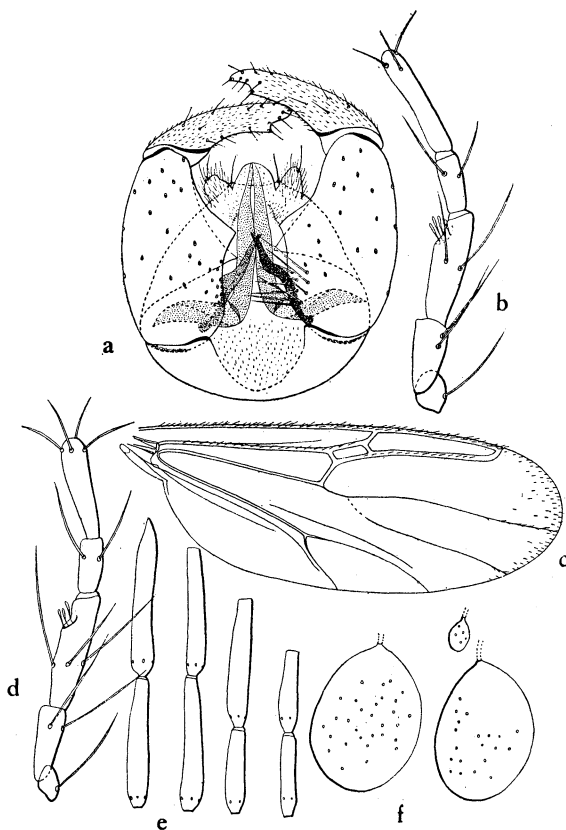


Fig. 68. *Stilobezzia thyridosera*. a, hypopygium, male; b, maxillary palpus, male; c, wing, female; d, maxillary palpus, female; e, distal 8 antennal segments, female; f, spermathecae.

yellow or yellowish white. Abdomen with cercus pale brown or brownish; spermathecae (fig. 68f): 2 brown, short-oval, subequal, with hyaline punctures, about 1+30.5 units by 22.8 units and 1+28 units by 21 units respectively, 1 very small, about 1+8 units by 6 units.

DISTRIBUTION: New Guinea.

Holotype, ♂ (BISHOP 2900), Okaitadi, 1800 m, Paniai Lake, Wisselmeren, Neth. New Guinea, 7 Aug. 1955, Gressitt. Allotype, ♀ with holotype. Paratype, ♀ with types.

This species is somewhat allied to Micronesian *S. flaviscuta* Tokunaga and Murachi and New Zealand *S. ohakunei* Ingram and Macfie and most closely to Javanese *S. soror* Johannsen. These allied species, however, are different from the present New Guinea species as follows: in the first species, the male hypopygium with caudal lobes of parameres flattened, lateral sclerites of aedeagus broadened at middle, caudal incision of sternite 9 very large, female AR far larger being 1.4-1.7, female hind TR larger being about 2.48 and female wing smaller being 1.7-1.8 mm long; in the second species (male not known), scutellum with few additional small setae besides 4 to 5 strong bristles, postscutellum dark brown and wing with few macrotrichia along margin of cell M_4 and anal cell; in the third species, male hypopygium with styles distinctly curved and concave mesally, female AR about 1.2 and fMCu of wing veing under r-m.

95. *Stilobezzia similisegmenta* Tokunaga, n. sp. Fig. 69.

Rather large yellow species. Wings, thorax and legs uniformly very pale. Female with last segment of maxillary palpus, much shorter than segment 3; basal short flagellar segments elongate and distal 5 segments not abruptly longer than preceding ones, AR small and about 0.86-0.92. Scutellum of female with 6 strong bristles and several minute setae. Female wing with sparse macrotrichia on apical part beyond level of tip of costa. Halter with knob slightly brownish. Female with hind TR about 2.5. Male unknown.

Female: Body length about 2.54 mm. Wing about 2.19 (2.13-2.25) mm by 0.78 (0.74-0.83) mm. Head uniformly pale brown or yellowish brown, with eyes barely separated above less than 1 facet, proboscis somewhat shorter than 1/2 length of head capsule (17.5: 38). Maxillary palpus (fig. 69b) slender, with last segment much shorter than segment 3 and about 2/3 length of 3, sensory pore very shallow and situated beyond middle of segment 3, 5 segments in proportion of 9.5: 19.3: 30: 14: 19.5. Antenna (fig. 69a) fuscus brown or brown, with segment 2 elongate, cylindrical, about 5× as long as wide (46.5: 9.5), and about 1.4× as long as 3 (46.5: 32.5), latter also about 4× as long as wide (32.5: 8), following segments elongate, cylindrical and no abrupt change between segments 9 and 10; relative length of 8 distal segments about 35.8: 38.3: 40: 46.5: 50: 53.5: 53.5: 66.5, AR less than 1.0, about 0.89 varying from 0.86 to 0.92. Thorax entirely pale brownish yellow; scutum with 4 to 9 minute setae in addition to 6 strong bristles. Legs entirely yellow or pale brownish yellow, but fore coxae very faintly fuscus in holotype; hind TR about 2.5; RL about 230: 229: 139: 58.5: 20.5: 22: 45.5 in fore, 273: 247.5: 168: 54.5: 22.5: 20.8: 44.5 in middle and 287: 284.5: 157: 63.3: 20.5: 18.5: 41.5 in hind leg; 3 basal segments of middle tarsus each with 2 apical spur-like bristles and first with 1 sub-basal strong bristle; claws somewhat shorter than last tarsal segments, each with 1 basal tooth (about 2/5 or 1/3 as long as claw: 16.5: 42.5 in fore, 16: 41 in middle and 10.5: 33.5 in hind leg).

Wing (fig. 69c) with membrane very pale brown, veins pale brownish yellow, macro-

trichia sparsely spread on apical area beyond level of costal end and few along apical margin of cell M_2 , radial veins and apical parts of M_1 and M_2 setigerous. Costa extending basal 0.8 of wing length (183.3: 168.5) and ending at level of tip of M_2 , R, M and stem of fMCu equal (70: 69.5: 69.5), Rs about 3.4× as long as R_1 (62.5: 18.3), first radial cell much longer than wide, second somewhat shorter than 3× length of first (46.3: 16.5), r-m as long as M_{1+2} , fMCu just or slightly before level of end of r-m, M_{3+4} twice as long as Cu_1 (54.5: 27.3). Halter with stem yellow and knob pale brownish yellow. Abdomen pale brown including cercus; spermathecae (fig. 69d): 2 large, brown, oval, with hyaline punctures, about 1.5+31.5 units 21 units and 1+28 units by 19.5 units respectively, 1 pale brown, oval and about 6.3 units by 4.8 units.

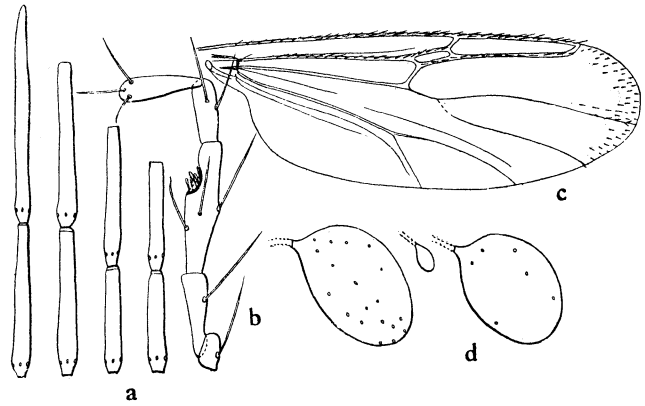


Fig 69. *Stilobezzia similisegmenta*, female. a, distal 8 antennal segments; b, maxillary palpus; c, wing; d, spermathecae.

DISTRIBUTION: New Guinea.

Holotype, ♀ (BISHOP 2901), Karap, 1550 m, upper Jimmi Valley, Sepik drainage, NE New Guinea, 20 July 1955, Gressitt. Paratype, ♀ with holotype.

This is very closely allied to the Micronesian *S. fusistylata* Tokunaga and Murachi; the allied species, however, is much smaller, the wings being only 1.22–1.54 mm long and with following differences: antennal segments of female abruptly elongate between 9th and 10th, the latter being fully twice as long as 9th (12.1: 5.1), AR far larger being about 1.8 and TR little smaller being about 2.3.

96. *Stilobezzia bifurcata* Tokunaga, n. sp. Fig. 70.

Rather large pale brownish yellow species. Male antenna with segment 11 as long as preceding 2 segments together and segment 12 also as long as preceding 2 together; female AR about 1.0. Scutellum with 5 or 6 strong bristles. Wing with sparse macrotrichia on apical part, especially in male very sparse and spread very closely along apical margins; radial veins of male without macrotrichia. Caudal lobes of parameres of male hypopygium bifurcate, each bearing—small branch at middle.

Male: Body about 2.34 mm long. Wing about 1.85 (1.73–1.96) mm by 0.55 (0.52–0.57) mm. Head brown, with eyes just contiguous above, proboscis about 1/2 height of head capsule; clypeus with 5 or 6 setae. Maxillary palpus (fig. 70c) slender, with sensory pore round and situated on preapical part of segment 3, last segment elongate and as long as 3, 5 segments in proportion of 7.8: 16.8: 22: 14.8: 23. Antenna (fig. 70b) entirely pale brownish yellow, relative combined lengths of segments 2 to 10, 11 to 14, 2 to 11 and 12 to 14 about 184.5: 244.5 and 208.5: 220.5; relative lengths of distal 8 segments about 17.3:

16.8: 17: 18.5: 23.5: 44.5: 71: 91.5. Thorax uniformly pale yellow, scutum with 10 usual setae on mid-dorsal line, scutellum with 5 or 6 strong bristles. Legs entirely pale brownish yellow or pale yellow; tarsal spur-like bristles: in fore leg, basal 2 segments each with 1 apical and 3 with 1 or 2 apical; in middle, basal 3 each with 2 apical and 1 with 1 sub-basal, in hind leg, 1 with 1 apical, 2 with 1 or 2 apical and 3 with 2 apical bristles; RL about 196.5: 187.5: 122: 63.5: 20.5: 15: 18.3 in fore, 235: 214: 153: 61: 22: 14.5: 20.5 in middle and 245.5: 242: 135: 67: 23.5: 11: 20.5 in hind leg; hind TR about 2.01-2.02.

Wing (fig. 70a) entirely very pale including veins and with macrotrichia very sparsely arranged in line close to apical margins of cells R_5 and M_1 , radial veins without setae. Costa extending basal 0.83 of wing length (119: 141.8) and more or less beyond level of tip of M_{3+4} , R, M and stem of fMCu subequal (61.5: 60: 61.5), R_s about $2/3$ R (41: 61.5), $4\times$ length of R_1 (41: 11) and subtrophied at tip, second radial cell about $3\times$ as long as first (30.5: 10), r-m shorter than R_1 and subequal to petiole of fM, fMCu under or slightly before end of r-m, M_{3+4} about $22\times$ length of Cu_1 (41.5: 18.8). Halter yellowish white.

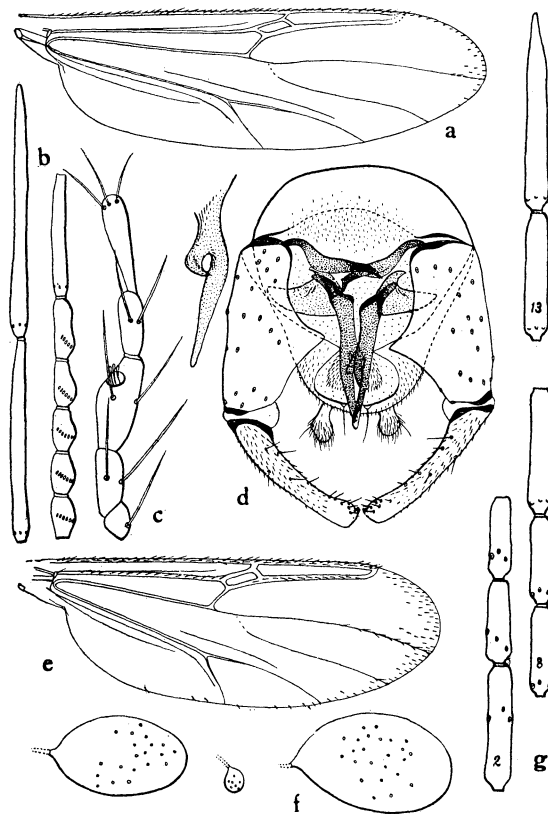


Fig. 70. *Stilobezzia bifurcata*. a, wing, male; b, distal 8 antennal segments, male; c, maxillary palpus, male; d, hypopygium, male; e, wing, female; f, spermathecae; g, distal 8 antennal segments, female.

Abdomen pale brownish, but pleuron rather more brownish; hypopygium (fig. 70d) pale brown or yellowish pale brown, but aedeagus and parameres dark brown and styles brown. Tergite 9 longer than basal width (71.5: 66) and round on caudal margin; sternite 9 transverse, very short (15.5: 66), caudal incision almost absent and with caudal membrane uniformly spinulose. Coxite conical, about $1.4\times$ as long as wide (52.5: 30); style uniformly thickened, almost straight, not sharply pointed at tip and about 0.8 length of coxite (42.5: 52.5). Aedeagus with lateral sclerites slender, slightly sinuous and rather pointed on both ends; parameres quite separated, with basal sclerites rather broad, subtriangular, slightly curved and about 0.7 as long as lateral sclerites of aedeagus (19.5: 29), caudal lobes about $1.5\times$ length of lateral sclerites of aedeagus (46: 29), almost straight, bifurcate at middle into lateral long main branch and short mesal branch, latter more or less curved and more round at tip.

Female: Body length about 2.13 mm. Wing about 1.71 mm by 0.61 mm. Coloration and structure gen-

rally as in male with usual sexual differences. Head with proboscis about $1/2$ as long as head capsule, mouthparts and antennae sometimes more brownish; maxillary palpus with 5 segments in proportion of 6:17.8:22.5:10.8:20.5. Antenna (fig. 70g) with basal short flagellar segments cylindrical and at least $3\times$ as long as wide, segment 2 about $1.6\times$ as long as segment 3 (36:22.5) and $5\times$ as long as wide (36:6.8), relative lengths of segments 2 to 4 and distal 8 about 36:22.5:23.5 and 22:25:25:33:35:35:34:55; AR about 1.0. Thorax with 3 to 5 minute additional setae on scutellum. Legs with RL about 176:175.5:105.5:42.8:15.5:18.5:34.5 in fore, 207:192.5:127.5:39.3:18.5:18:33.5 in middle and 223.5:219:125:47:17:18:35 in hind; relative length of claws and their basal teeth about 30:12 in fore, 35:12 in middle and 29:10 in hind leg; hind TR about 2.61–2.71.

Wing (fig. 70e) with macrotrichia sparsely spread on apical areas of cells R_5 and M_1 and very sparsely arranged in line close to margins of cells M_2 and M_4 , radial veins and apical $1/2 M_1$ setigerous. Costa ending at basal 0.8 of wing length and just before level of tip of M_2 , relative lengths of R, M and stem of fMCu about 50.5:49.5:53, Rs about $4\times$ length of R_1 (46.5:12), second radial cell about $3\times$ length of first (34:11), r-m as long as M_{1+2} , fMCu under end of r-m, M_{3+4} about twice length of Cu_1 (42.5:20). Abdomen entirely pale brownish yellow including cercus; spermathecae (fig. 70f): 2 brown, oval, unequal, with hyaline punctures, about 1+24 units by 16.3 units and 1+21.5 units by 14.5 respectively, 1 small, pale brown, round, with pale punctures and about 1+5 units by 4.8 units.

DISTRIBUTION: New Guinea.

Holotype, ♂ (BISHOP 2902), Karap, 1550 m, upper Jimmi Valley, Sepik drainage, NE New Guinea, 20 July 1955, Gressitt. Allotype, ♀ with holotype. Paratype, ♂ with types; ♀, Wum, 850 m, Jimmi Valley, 16 July 1955, Gressitt.

The male of this species is quite specific in the possession of unequally bifurcate caudal lobes of parameres, but the female is very similar to the preceding New Guinea species with slight differences as shown in the key. Another allied species is Micronesian *S. fusi-stylata* Tokunaga and Murachi, with the following slight differences in the female: in the allied species, AR is larger, about 1.8, antennal segment 10 fully twice as long as 9 and hind TR about 2.3.

Genus *Monohalea* Kieffer

97. *Monohalea novaguinensis* Tokunaga, n. sp. Fig. 71.

Medium-sized dark brown species with spotted wings. Thorax almost dark brown, but scutellum yellow and with median dark spot; legs mainly brownish, with knee-parts and tarsal segments yellow or pale brownish yellow. Wing without macrotrichia, with 3 larger dark spots on costal area and several smaller spots on other part. Abdomen dark brown, but tergite 1 with yellow median spot. Scutellum with 4 strong bristles; in male, hind TR about 2.2, tarsal segment 1 of middle legs with 2 strong basal and apical spines and several spines on ventral side, tarsal segment 1 of hind leg with single spines at base. Aedeagus large, with 2 basal triangular thickenings and large median lobe somewhat fusiform; parameres quite separated, with rhombic large bases and capitate apices which bear granulous sculpture on surface. Female unknown.

Male: Body about 2.47 mm long. Wing about 1.59 mm by 0.47 mm. Head dark brown,

with eyes bare and just touching above, mouthparts brown, proboscis about 1/3 as long as height of head capsule; clypeus with about 5 setae. Maxillary palpus (fig. 71c) with segment 3 as long as segment 5 and sensory pore round, shallow and situated beyond middle of segment, 5 segments in proportion of 6: 10: 16: 13: 16. Antenna (fig. 71b) with scape

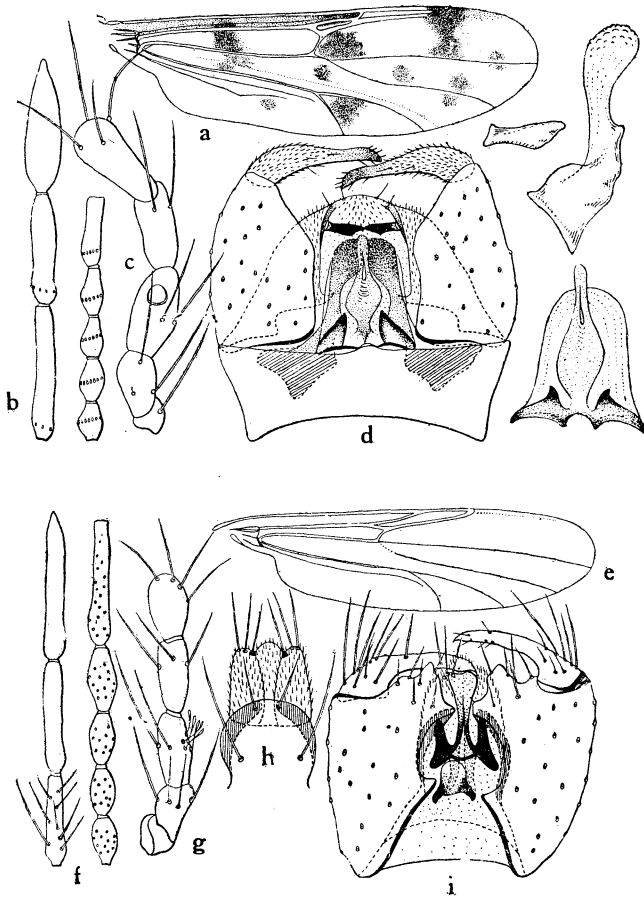


Fig. 71. a-d, *Monohelea novaguinensis*, male: a, wing; b, distal 8 antennal segments; c, maxillary palpus; d, hypopygium and various structures. e-i, *Bezzia (Bezzia) longiforceps*, male: e, wing; f, distal 8 antennal segments; g, maxillary palpus; h, distal part of tergite 9; i, hypopygium.

27: 18.5: 25 in fore, 193: 185: 100: 42.5: 26: 19: 24 in middle and 222: 197: 121: 55: 36: 24: 29 in hind leg.

Wing (fig. 71a) with many dark spots: large costal spot 1 at middle of basal radial cell extending above beyond R and below beyond M, large costal spot 2 on basal area of cell R_5 and apical part of costal cell (above and below first radial cell), large costal spot 3 transverse at apical 1/3 cell R_5 and covering apex of second radial cell, triangular spot on

dark brown, apical 3 segments brown, others including plumose hairs pale brownish yellow; combined relative lengths of segments 2 to 10, 11 to 14, 2 to 11 and 12 to 14 about 150: 130 and 170: 110, relative lengths of 8 apical segments about 12: 12.5: 13: 13: 20: 41: 31: 36. Thorax mainly dark brown, scutellum only yellow on lateral parts and with 4 strong bristles and 8 minute setae. Legs with coxae, femora and tibiae dark brown, trochanters and bases of femora brown, knee-parts distinctly yellow, tarsal segment 1 of hind leg brown, other tarsal segments all pale brownish yellow; claws simple, equal and small; hind TR about 2.2; tarsal spur-like spines: in fore leg, segment 1 with 1 apical and 1 basal, segment 2 with 1 apical; in middle, segment 1 with 2 basal, 2 apical and 7 ventral arranged in line on entire length, segment 2 with 1 apical; in hind leg segment 1 with 1 basal spine; RL about 163: 156: 77: 39:

basal part of cell M_4 , but not covering extreme base of cell, where it is pale and triangular, several small round dark spots: 1 at apical quarter of vein M_1 , 1 at basal 1/3 and 1 at apical 1/3 cell M_2 , 1 above middle of stem of fMCu, 1 under M_{1+2} , 1 under apical spot of cell M_1 , 1 under anterior arm of anal fork; costal and subcostal cells brownish; no macrotrichia. Costa ending at apical 1/5 wing length (95.6: 122) and beyond level of tip of M_{3+4} , relative lengths of R, M and stem of fMCu about 50: 50: 54, Rs about $2.6\times$ length of R_1 (36: 14), first radial cell well defined and narrow, second cell about twice length of first (21: 10), r-m as long as M_{1+2} , fMCu under r-m, M_{3+4} about twice length of Cu_1 (30: 14). Halte pale brown, with knob pale brownish white. Abdomen almost entirely dark brown, tergite 1 with oval yellow basal spot. Hypopygium (fig. 71d) entirely dark brown. Tergite 9 shorter than basal width (53: 79), round on caudal margin, without anal points, median part of sternum somewhat swollen, with slender chitinized lateral edges and pair of small digital chitinized processes articulated on edges; sternite 9 transverse, about 1/3 as long as wide (25: 79) and without caudal incision. Coxite about twice as long as wide (54: 26) and tapered beyond middle; style about 0.7 as long as coxite (37: 54), tapered, slightly undulate and rather pointed. Aedeagus helmet-shaped, somewhat longer than basal width (32: 30), with basal arch small and 2 subtriangular semicircular basal chitinizations, median caudal lobe large, somewhat swollen before middle, tapered, round on apex, and ending just before paired digital processes of tergite; parameres quite separated, with basal parts large and subrhombic, caudal lobes large, narrow on middle parts, slightly curved mesad, capitate at apices, granulous on surface and ending at tip of aedeagus.

DISTRIBUTION: New Guinea.

Holotype, ♂ (BISHOP 2903), Karap, 1550 m, upper Jimmi Valley, Sepik drainage, NE New Guinea, 20 July 1955, Gressitt.

This is closely allied to New Zealand *M. nubeculosa* Macfie in coloration, but the allied species is somewhat different in the following points: the scutellum has about 16 small additional setae, the wing has one small additional spot under apical part of vein M_{3+4} and without paler extreme base of cell M_4 and first tarsal segment of hind leg is armed with a stout spine at the base only.

Genus *Clinohelea* Kieffer

98. *Clinohelea tenuissima* (Kieffer).

Sphaeromyias tenuissima Kieffer, 1917, Mus. Nat. Hung., Ann. 15: 195-196.

Clinohelea tenuissima, Kieffer, 1917, Mus. Nat. Hung., Ann. 15: 316.—Lee, 1948, Linn. Soc. N. S. Wales, Proc. 73: 64.

DISTRIBUTION: New Guinea.

Genus *Dicrohelea* Kieffer

Dicrohelea Kieffer (1917, Mus. Nat. Hung., Ann. 15: 363) is only very slightly different from *Johannsenomyia* Malloch (1915, Ill. State Lab. Nat. Hist., Bull. 10: 332) in the possession of unequal toothed tarsal claws of the hind and middle legs of the female sex alone and it may be it should be included with the latter.

99. *Dicrohelea lalokiensis* Lee, 1948, Linn. Soc. N. S. Wales, Proc. 73: 69.

DISTRIBUTION: New Guinea (Papua).

Genus *Xenohelea* Kieffer

Xenohelea Kieffer (1917, *Mus. Nat. Hung., Ann.* 15: 295) is synonymous with *Mixohelea* Kieffer (1917, *ibid.* 15: 364) and rather similar to *Sphaeromias* Curtis (1829, *Brit. Ent.* 6: 285). The differences between the two genera are shown only in the female sex in the following two points: in *Xenohelea*, the tarsal claws of all legs are unequal and simple and the fourth tarsal segments are obcordate at least on the fore leg, while in *Sphaeromias*, the tarsal claws of all legs are equal and each bears one basal tooth and the fourth tarsal segments are not obcordate or bilobate.

100. *Xenohelea australiensis* (Kieffer)

Mixohelea australiensis Kieffer, 1917, *Mus. Nat. Hung., Ann.* 15: 364.

Palpomyia imparunguis Kieffer, 1917, *ibid.* 15: 194.

Mixohelea australiensis, Lee, 1948, *Linn. Soc. N. S. Wales, Proc.* 73: 66.

DISTRIBUTION: New Guinea (Papua).

Genus *Bezzia* Kieffer

Subgenus *Bezzia* Kieffer

101. *Bezzia* (*Bezzia*) *longiforceps* Tokunaga, n. sp. Fig. 71.

Medium-sized black species with legs mainly yellow, wing milky white and abdomen yellowish pale brown on basal segments and brown on caudal segments. Scutellum with 4 strong and 2 small bristles; fore femur with sub-basal and preapical brown band and 2 spines on apical 1/3; hind TR of male about 2.23. Wing of male with fM at end of r-m, Rs about twice length of R₁. Hypopygium with very large coxites forming round space between them at bases of parameres and aedeagus, each coxite bearing blunt subtriangular projection on mesal side of apical part, styles slender and sharply pointed, tergite 9 constricted into trapezoid basal and round apical part. Female unknown.

Male: Body about 1.98 mm long. Wing about 1.27 mm by 0.36 mm. Head almost dark brown or brown, with eyes very narrowly separated above by less than 1 facet; proboscis about 1/3 as long as height of head capsule; clypeus with about 22 setae. Maxillary palpus (fig. 71g) rather stout, 3 apical segments subequal, 5 segments in proportion of 6.5: 9: 12.5: 12.5: 12. Antenna (fig. 71f) with scape dark brown, segment 2 brownish, segment 3 to 11 and plumose hairs pale brownish yellow, but distal part of segment 11 brownish, last 3 segments brown, but basal nodes yellowish; combined relative lengths of segments 2 to 10 and 11-14 about 153:145; 8 distal segments in proportion of 14.5: 14.5: 16: 20: 39: 26: 35: 45.5. Thorax entirely dark, scutellum with 4 strong and 2 smaller bristles and entirely covered with minute hairs. Legs mainly yellowish, with dark or brownish bands or markings; coxae dark, trochanters and last 2 tarsal segments brown; fore leg with sub-basal and preapical brownish band of femur and brown tibial end, middle leg with femur and tibia unicolored, hind leg with distal ends of femur and tibia dark and tarsal segment 1 entirely

brown; fore femur with only 2 preapical spines, middle tarsus with preapical spur-like spine on segment 1, double apical on following 2 and 1 apical on segment 3, other legs without femoral and tarsal spines; tarsal segment 4 obcordate, claws small, equal and simple; hind TR about 2.23; RL about 139: 117: 63: 27: 16: 14: 25 in fore, 170: 137: 85: 35: 20: 15: 26 in middle and 183: 150: 87: 39: 23: 15: ? in hind leg.

Wing (fig. 71e) milky white, with anal lobe obtuse, without colored markings and macrotrichia; Costa ending at 2/3 wing length (66:98) and before tip of M_{3+4} , relative lengths of R, M and stem of fMCu about 30: 30: 41, Rs about twice length of R_1 (28: 13), r-m as long as basal section of Rs, fM at end of r-m, M_{3+4} about twice length of Cu_1 (26: 14), base of M_2 obscure, anal vein almost invisible. Halter yellow. Abdomen with basal 2 segments yellow, segment 3 yellow and with sides of tergite brownish, segment 4 slightly fuscus pale brown and with sides of tergite more fuscus, following posterior segments brownish black. Hypopygium (fig. 71i) with tergite 9 rather long, as long as basal width (46: 45), constricted at middle into basal trapezoid and apical round part; sternite 9 subtriangular, shorter than basal width (22: 37) and without setae. Coxites very large, with mesal margins distinctly concave forming round space between them at aedeagus and bases of parameres, coxite with blunt triangular projection on mesal side of apical part; style rather slender, about 0.6 as long as coxite, slightly tapered and arcuate and sharply pointed. Aedeagus very small, only as long as basal sclerites of parameres (10: 12) and round on caudal margin; parameres with lateral basal arms strongly thickened; connected with each other, caudal lobes fused forming 1 long spatulate projection somewhat broadened, hyaline apically and extending to apical end of coxites.

DISTRIBUTION: New Guinea.

Holotype, ♂ (BISHOP 2904), Hollandia, 100 m, Neth. New Guinea, 23 Aug. 1955, Gressitt.

This is somewhat allied to the Javanese *B. serena* Johannsen in general coloration. This allied species, however, is provided with 2 spines on the fore femur, the scutellum is yellow and the hind tibia has a middle brown band (structure of male hypopygium not described by Johannsen).

Genus *Nilobezzia* Kieffer

Nilobezzia Kieffer (1921, Soc. Ent. France, Ann. 90: 24) is closely allied to *Probezzia* Kieffer (1905, Gen. Ins. 42: 57); however, in the present genus the female is provided with a cylindrical fourth tarsal segment on all legs instead of cordiform segments and wing vein Rs slightly arcuate and ending considerably before wing tip, which is different from that of the allied genus.

102. *Nilobezzia whartoni* Lee, 1948, Linn. Soc. N. S. Wales, proc. 72: 343. (Port Moresby).

DISTRIBUTION: New Guinea (Papua).