

## BITING MIDGES OF THE PALPOMYIINAE FROM NEW GUINEA (Diptera: Ceratopogonidae)<sup>1</sup>

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*Abstract:* *Palpomyia-Bezzia* group of the Ceratopogonidae is raised to rank as Palpomyiinae and divided into 3 tribes: Stenoxenini, Palpomyiini and Bezziini. To the 10 known species of this subfamily from New Guinea, 1 Australian species is newly recorded and 42 new species are added.

In this paper, many New Guinea specimens of the *Palpomyia-Bezzia* group chiefly collected by Bishop Museum, Hawaii, are represented as the subfamily Palpomyiinae excluding the *Macropeza* group. The Palpomyiinae have been so little known from New Guinea as there have been reported only 2 species: *Clinohelea tenuissima* and *Xenohelea australiensis*, by Kieffer (1917); 2 species: *Nilobezzia whartoni* and *Dicrohelea lalokiensis*, by Lee (1947-1948); and 6 species: *Bezzia longiforceps*, *Echinohelea pictipennis*, *E. zonata*, *E. flava*, *E. hardyi*, and *E. laensis*, by myself (1959, 1964). In this paper, *Xenohelea tonnoiri* Lee is newly recorded and 43 other species of various genera are newly described from New Guinea. The New Guinean fauna of the Palpomyiinae consists of 54 known species, suggesting an endemic zoogeographic nature.

The Palpomyiinae are divided into 3 tribes: Stenoxenini, Palpomyiini and Bezziini. Stenoxenini is rather special in its structure of the wings. Palpomyiini and Bezzini are distinctive in their wing venation: however, the generic differentiations of these tribes are most evident in the development of the legs which are the main predatory organs for these midges and, moreover, these differentiations are thought to have some parallel relationship between the 2 tribes.

The majority of the specimens examined was mounted in Gater's solution sealed by ringing with paraffin-balsam mixture and the remainder was mounted in balsam by a modified phenol-balsam method from Wirth's.

Morphological terms used in this paper are mainly adopted from my serial papers on the Ceratopogonidae from New Guinea (1959-1964).

Most of the material, including holo- and allotypes, is deposited in Bishop Museum. Paratypes and duplicates, when available, will be deposited in the School of Public Health, University of Sydney Australia; U. S. National Museum, Washington; Department of

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Public Health, Port Moresby, New Guinea; and my collection.

*Abbreviations:* AR is the antennal ratio showing the combined length of the distal 5 segments X-XIV to that of the basal preceding 8 segments II-IX. CR is the costal ratio showing the length of the costal vein to that of the wing both measured from the incision between the alula and squama. CRL is the combined relative length of the antennal segments. PR is the maxillary palpal ratio showing the length of the palpal segment III to the width of the broadest part of the segment. RL is the relative length measured by an ocular micrometer under a magnification of 150 (1 unit=0.013 mm) in the case of wings, wing veins, and leg segments; and under a magnification of 600 (1 unit=0.003 mm) in the case of antennae, maxillary palpi, details of tarsal structures of legs, spermathecae and hypopygia. RL-A is RL of antennal segments (arabic numeral prefixed before A shows the number of the distal antennal segments). RL-L is RL of leg segments, excluding coxa and trochanter. RL-P is RL of palpal segments. RL-V is RL of wing veins R, M, stem of fMCu, R<sub>1</sub> and R<sub>s</sub> or R<sub>s</sub>+R<sub>4+5</sub>. TR is the tarsal ratio showing RL of tarsal segment I to II. W is the relative width of the broadest part measured in the perpendicular position to the long axis. Roman numeral shows the ordinal number of the segment of the antenna, palpus, tarsus, abdomen, the 1st and 2nd apical radial cell in the case of generic and specific description and also shows the date of the collection. NG is the abbreviation for New Guinea, and NE, NW, SE and SW are the abbreviations of the 4 geographic divisions of New Guinea.

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#### Subfamily PALPOMYIINAE n. stat.

*Palpomyia-Bezzia* group, Macfie, 1940, Ann. Trop. Med. Parasit 34: 13-30.—Johannsen, 1943, Ann. Ent. Soc. Amer. 36: 763-91.

Stenoxenini Coquillett of Heleinae Speiser, Wirth, 1952, Univ. Calif. Publ. Ent. 9 (2): 95-266.

Body rather stout, well sclerotized, usually not very small. Eyes bare; antenna 14-segmented; palp 5-segmented. Thorax not narrowed or conical in front, but rather broad and round. Legs strong, with or without vestigial minute empodia. Wing with costa usually extending far beyond middle of wing, 1 or 2 well developed apical radial cells, cross-vein r-m present, M<sub>1+2</sub> 2-branched at or proximad of end of r-m, M<sub>3+4</sub> occasionally interrupted only at base, 1A bent upwards near middle, a shallow fold arising from the bent, no intercalary fork of cell R<sub>s</sub>. ♂ hypopygium usually with simple styles, parameres usually more or less fused, but sometimes completely separated. ♀ with mandibles tapered, with large cutting teeth.

Larva aquatic swimming eel-like form, without prolegs and claw-like hooks; head-cap-sule narrow, well sclerotized, mouth-parts reduced; no spines on body segments, last abdominal segment with bristles.

Pupa free from larval exuvia; thoracic respiratory organ elongate, clavate or spoon-like, anal segment with only apicolateral processes, without accessory setigerous tubercles.

KEY TO GENERA OF PALPOMYIINAE

1. Wing broad, especially on basal area, with anal lobe large, well produced (tribe Stenoxenini)..... 2  
 Wing usually of moderate width, often very narrow, especially on basal area, with anal lobe obtusely angled, not produced ..... 3
- 2(1). Wing vein  $M_2$  elbowed in ♀; anterior radial cell simple, very narrow, extending to wing tip very closely along costal margin. Tarsal segments IV sub-cylindrical, V unarmed; claws of ♀ small and equal.....**Stenoxenus\***  
 Wing with vein  $M_2$  not elbowed; anterior radial cells 1 or 2, not very narrow, hardly extending to wing tip. Tarsal segments IV cordate or bell-shaped, V armed with strong ventral batonnets; claws of ♀ large and subequal.....**Jenkinshalea**
- 3(1). Wing with 2 apical radial cells (tribe Palpomyiini).....4  
 Wing with 1 apical radial cell (tribe Bezziini) ..... 15
- 4(3). Femur of fore leg greatly swollen and armed with ventral spines, the corresponding tibia strongly arched and distinctly projected beyond joint to basitarsus ..... **Heteromyia**  
 Femur of fore leg not swollen, or if moderately so, fore tibia not arched and not projected beyond joint to basitarsus..... 5
- 5(4). Last tarsal segment of fore leg strongly inflated ..... 6  
 Last tarsal segment of fore leg not inflated ..... 7
- 6(5). Costal wing vein distinctly produced beyond end of  $R_{4+5}$ ; claws of ♀ legs all equal and barbed.....**Neurohelea\***  
 Costal wing vein not or only just produced beyond end of  $R_{4+5}$ ; claws of ♀ legs equal and simple in fore, single and barbed in mid and hind.....**Clinohelea**
- 7(5). Tarsal segments IV ending in 2 bilobated lobes, the lower lobe bearing a spine-like bristle on each side ..... **Metahelea\***  
 Tarsal segments IV not ending in 2 bilobated lobes ..... 8
- 8(7). Femora and tibiae of all legs irregularly armed with sharp strong scattered spine-like bristles .....**Echinohelea**  
 Femora either unarmed, or, if armed, spine-like bristles or spines short, stout and arranged on ventral side..... 9
- 9(8). Claws of ♀ legs all single and barbed.....**Xenohelea**  
 Claws of ♀ legs all paired, although sometimes unequal..... 10
- 10(9). Claws of ♀ legs unequal at least in mid and hind legs ..... 11  
 Claws of ♀ legs all equal..... 12
- 11(10). Abdomen not distinctly petiolate basally; claws of ♀ fore leg equal ... **Dicrohelea**  
 Abdomen distinctly petiolate basally; claws of ♀ fore leg unequal ..... **Dibezzia\***
- 12(10). Fore femur unarmed, lacking ventral spines..... 13  
 Fore femur armed, with ventral spines..... 14

\* not recorded from New Guinea.

- 13(12). Claws of ♀ legs all simple, lacking basal barbs or teeth ..... **Homohoelea**  
 Claws of ♀ legs all barbed or toothed..... **Johannsenomyia**
- 14(12). Tarsal segments IV short but subcylindrical or cylindrical, V with long blunt black ventral batonnets or spines; claws of ♀ legs large; no abdominal gland rods in ♀ ..... **Sphaeromyias\***  
 Tarsal segments IV cordiform or bilobed, V without ventral batonnets but rarely with fine sharp spine-like bristles; claws of ♀ legs moderate in size, simple, barbed or toothed; abdominal gland rods usually present in ♀ ..... **Palpomyia**
- 15(3). Tarsal segments IV subcylindrical or cylindrical in all legs ..... 16  
 Tarsal segments IV bilobed or cordiform at least in 4 anterior legs.....19
- 16(15). Tarsal segments V armed with ventral spine-like bristles..... 17  
 Tarsal segments V unarmed, lacking ventral batonnets or strong spines or bristles ..... 18
- 17(16). Mid and hind femora with 1 or 2 spinules or spinose bristles on ventral side of apical end ..... **Nilobezzia**  
 All femora with neither ventral spines nor apical spinose bristles.....**Parrotia\***
- 18(16). Fore femur armed with stout ventral spines..... **Homobezzia\***  
 Fore femur unarmed, lacking stout ventral spines ..... **Crespinia\***
- 19(15). Hind tarsal segment IV cylindrical, other IV ending into 2 bifid lobes...**Tetrabezzia\***  
 All tarsal segments IV bilobed or cordiform.....20
- 20(19). Thorax with scutal anterior tubercle prominent, strong, large and sharply pointed ..... **Ceratobezzia**  
 Thorax with scutal anterior tubercle small, vestigial or completely absent..... 21
- 21(20). Femora armed with ventral spines at least on fore legs, tarsal segments V unarmed, lacking ventral batonnets..... **Bezzia**  
 Femora unarmed, lacking ventral spines, tarsal segments V armed with ventral batonnets ..... **Probezzia**

Tribe XENOSTENINI Coquillett

Genus *Jenkinshoelea* Macfie (1934)

*Synonym: Jenkinsia* Kieffer (1913); nec *Jenkinsia* Jordan & Evermann (1896).

1. *Jenkinshoelea papuae* Tokunaga, n. sp. Fig. 1A-C.

Medium-sized dark species, but scutellum fuscous yellow; tarsal segments I-III or I-IV very pale, fore tarsal segment V very thick, mid and hind cylindrical, armed with ventral needle-like spines, all claws equally barbed; wing with only single apical radial cell, Rs about 3× length of R<sub>1</sub>. ♂ unknown.

♀. Body about 2.41 mm long; wing 2.39×0.98 mm. Head black; eyes separated as wide as 2 facets; proboscis dark brown, about 1/2 as long as head-capsule, mandible with 7 cutting teeth; palp small, dark brown, 5-segmented (6 : 13 : 13×7.5 : 10 : 10). Antennal segment I dark brown, other segments missing. Thorax with scutum dark, scutellum fuscous yellow, with about 12 long and several small setae, frontal tubercle of scutum indistinct. Legs with coxae, trochanters and tarsal segment V dark brown,

femora generally dark brown, but basal 1/2 of fore and mid femora slightly paler, tarsi largely very pale; hind tibial comb with 4-5 apical bristles; tarsal apical spur-like bristles present only on mid leg: I-II each with 2, III with 1; tarsal segments IV more or less flattened; V with ventral spine-like strong bristles: 8-9 in fore (fig 1A), 9-10 in mid, 11-12 in hind (fig 1B); claws equal, slender, but far shorter than segments V: 23 : 38 in fore, 25 : 33 in mid, 31 : 44 in hind, each claw barbed with small basal tooth; RL-L 49 : 40.5 : 19.5 : 7 : 4.2 : 3.8 : 10 in fore, 69 : 50 : 35 : 9.5 : 4.5 : 4 : 8.8 in mid, 84 : 70 : 61 : 21 : 10.5 : 7 : 11.5 in hind. Wing (fig 1C) with anterior veins dark brown, CR about 0.93, without macrotrichia; costa ending beyond tip of  $M_1$ , Rs arcuate, extending very closely along costa on apical 1/2, septum of apical radial cell absent, fMCu before base of  $M_1$ , RL-V 62 : 56 : 51 : 36 : 104, r-m slightly longer than base of Rs and far shorter than base of  $M_1$  (7.5 : 6 : 10). Halter brown. Abdomen entirely brown; spermathecae 2, black, short-oval, small, unequal,  $20 \times 17$  and  $14 \times 12$ .

Holotype ♀ (BISHOP 6681), Aiyurop, 1500 m, nr Mendi, S. Highlands, SE NG, 7.X.1958, Gressitt.

This is somewhat related to S. African *rhodesiensis* de Meillon in the general appearance and wing venation. The structures of the apical tarsal segments of the allied species are not known in detail but the wing venations of these 2 species are closely similar in having only a single apical radial cell. A closer examination of the wing, however, shows that they may be distinguished by the following differences: in New Guinean species, wing rather narrower, costa not reaching wing tip, radial cell very narrow and linear, and r-m longer than basal section of Rs.

#### Tribe PALPOMYIINI Meigen

#### Genus *Heteromyia* Say (1825)

This genus is highly characteristic in its possession of a strongly swollen and spinous fore femur and strongly arched tibia corresponding to a swollen femur; other characters are almost similar to those of *Palpomyia*. In the original description of the genus (1825, Amer. Ent. 2: 79), a single *fasciata* was reported from N. America and now there have been known several species and varieties from N. and S. America and Australia. Malloch (1915, Bull. Ill. State Lab. Nat. Hist. 10: 324) included some *Palpomyia* species which have somewhat thickened fore femora into *Heteromyia* and Edwards (1926, Trans. Ent. Soc. Lond. 2: 416, 420) synonymized the genus as *Palpomyia* (group B), as understood by Malloch. However, Johannsen (1943, Ann. Ent. Soc. Amer. 36: 783; 1952, Connecticut Geol. & Nat. Hist. Survey, Bull. 80, part 6, fasc. 5: 163) validated again *Heteromyia* as an independent genus excluding *Palpomyia* species. Lee (1948, Proc. Linn. Soc. N. S. Wales 73: 60) included 2 Australian species, which have hind claws equally developed, into this genus, although he had some doubts about the unguinal characters. The females of 2 New Guinean species are also provided with equal and barbed claws in all legs similarly to Australian species. In this, unguinal diagnosis given by Johannsen (1943) and Lee (1948) should be corrected. The most distinct structure, which is characteristic for the genus and quite different from the members of other allied genera, may be the apical projection of the fore arcuated tibia beyond the articulation to the tarsus.

## KEY TO NEW GUINEA SPECIES OF HETEROMYIA

1. Black species with abdominal tergites dark anteriorly, pale brown posteriorly and with yellow markings ..... 2. **abdominalis**  
 Brown species with abdominal tergites largely ochreous, basal and caudal tergites very slightly fuscous and without distinct markings ..... 3. **pallida**
2. **Heteromyia abdominalis** Tokunaga, n. sp.

Large dark species with wings unmarked, somewhat similar to *tasmanica* Lee from Australia (Eaglehawk Neck) and distinctly different from the American species in the possession of equally developed claws of ♀ hind legs. ♂ unknown.

♀. Body about 3.38 mm long; wing  $2.78 \times 0.85$  mm. General color dark brown, scutum with ochreous faint spots on shoulder parts, scutellum ochreous, halter pale yellow, abdomen with yellow intersegmental spots on dorsal side. Head dark, with eyes separated as wide as 2 facets, mouth parts dark, proboscis slightly longer than 1/2 of head-capsule (20 : 37); palp dark, slender, 5-segmented (9 : 16 : 28 : 19 : 24), III cylindrical, with scattered sensillae on ventral side; mandible with 7 large and 1 small basal tooth; antenna with scape dark, flagella missing. Thorax dark, with scutal faint ochreous spots on shoulder parts, paratergites brown, scutellum ochreous, with 4 large and 5 small setae, scutal anterior tubercle not ascertained. Legs extensively dark to dark brown, but all coxae, basal 1/2 of femora and basitarsi ochreous, middle parts of fore and hind tibiae faintly brownish. Fore femur very strongly thickened, with 15-20 small ventral spines arranged in saw-teeth, tibia strongly arcuate to the shape of femur; other femora without ventral spines; hind tibial comb with 8 apical bristles; mid tibia with 2 apical spines, other tibiae without apical ones; tarsal spur-like spines: fore leg without spines; in mid, I-III each with 2 apical; in hind, I-III each with 1 apical; claws equal, small, each with 1 small basal tooth; TR and RL-L 1.8 and 68 : 50 : 18 : 10 : 5.5 : 5 : 8 in fore, 4.11 and 78 : 69 : 37 : 9 : 5 : 5 : 8 in mid, 2.3 and 91 : 83 : 46 : 20 : 6 : 5 : 7 in hind. Wing with veins dark brown, costal cell pale brown, no macrotrichia, costa ending slightly before tip of  $M_2$ , CR 0.82, RL-V 74 : 75 + 6 : 82 : 35 : 90, radial cell I  $6 \times$  as long as wide (27 : 4.5), II  $2 \times$  as long as I (55 : 27), r-m as long as basal section of  $M_1$  and  $2 \times$  of basal section of Rs (5 : 6 : 10), fMCu under basal section of  $M_1$ ,  $Cu_1$  ending before radial septum, meeting anal margin with 90° angle. Halter yellowish white. Abdomen with tergites dark anteriorly and paler posteriorly, tergite I with large yellow basal spot, 5 intersegmental yellow or very pale spots present on dorsal side of II-VII, tergite IV-VII with gland-rods ending under posterior 1/2 of tergite II and anterior margin of III, sternites yellow, cerci brown as so on caudal segments; spermathecae small, brown, round, equal,  $15 \times 14$  and  $14 \times 13$ , vestigial one invisible.

Holotype ♀ (BISHOP 6682), Kamo Vall., 1530 m, Urapura, Wissel Lakes, NW NG, 11. VIII. 1955, Gressitt.

This is somewhat allied to *tasmanica* Lee, from which it may be distinguished by the presence of ochreous scutal spots on shoulder parts and ochreous scutellum, whitish halters, and equal sized spermathecae. The hind tarsal claws are double, equal, not very long and each with basal small tooth as in Australian species, differing from the genotype.

3. *Heteromyia pallida* Tokunaga, n. sp. Fig. 1D.

Large brown or ochreous species, closely similar to *abdominalis*, except for paler ochreous color.

♀. Body about 3.38 mm long; wing  $2.63 \times 0.82$  mm. Head entirely brown, eyes separated as wide as 2.5 facets, proboscis short, about 1/2 as long as head-capsule (18 : 40). Mandible with 6-7 triangular teeth; palp slender, III cylindrical, with surface sensillae on ventral side, PR about 3.0, RL-P 10 : 18 : 26 : 20 : 25. Antenna entirely brown, segments III-IX subfusiform, about 3× as long as wide, RL-8A 20 : 22 : 24 : 61 : 61.5 : 63 : 76 : ? (W=8-7). Thorax entirely brown; scutum with anterior tubercle, scutellum with 4 large and about 10 minute setae. Legs mainly brown; in fore, trochanter and preapical part of tibia ochreous, basitarsus very pale; in mid, basal part of femur and major part of tibia (except for dark brown both ends) ochreous, tarsal segments I-II yellowish; in hind, trochanter and basal 1/4 of femur ochreous, tibia and tarsus as in mid. Fore femur strongly swollen, with 18 dark spines on ventral side; mid tibia with 2 apical spines; hind tibial comb with 8 apical bristles; tarsal spur-like spines: fore leg without spines; in mid, I-III each with 1 strong apical; in hind, II-III each with 1 slender apical; claws small, equal, each with small basal tooth. TR and RL-L 1.7 and 63 : 49 : 17 : 10 : 6 : 5 : 8 in fore, 4.5 and 75 : 69 : 36 : 8 : 4.8 : 4.5 : 7.2 in mid, 2.57 and 86 : 80 : 45 : 17.5 : 7 : 5.5 : 9 in hind. Wings with veins brown, costa ending just before end of  $M_2$ , CR 0.82 (165 : 202), RL-V 70 : 70+6 : 80 : 30 : 83, radial cell I 5× as long as wide, II 2.8× as long as I (56 : 20), fMCu under basal section of  $M_1$ ,  $Cu_1$  ending slightly beyond midway of radial cell I, r-m as long as basal section of  $M_1$  and shorter than basal section of Rs (5 : 5 : 8). Halter white, but basal swelling brown. Abdomen broadly very pale ochreous, tergite I and 2 caudal segments brownish or fuscous, I with large subtriangular white spot, V-VII with gland-rods ending just before or beyond caudal margin of II; cerci brown; spermathecae 2, small, round, dark, equal,  $15 \times 13$  and  $2+14 \times 13$ , vestigial one tubular,  $5 \times 1.5$ .

♂. Body about 3.32 mm long; wing  $2.11 \times 0.65$  mm. Color generally paler than in ♀ being largely pale ochreous. Head ochreous, eyes separated as wide as 4 facets; palp ochreous, 5-segmented (8 : 13 : 22 : 15 : 22), III with several sensillae on apical 1/2. Antennal segments I and XII-XIV brown, II-XI and plumes pale ochreous, RL of II-XI and XII-XIV combined 215 : 234, RL-8A 16 : 16 : 18 : 23 : 30 : 71 : 77 : 86 (W=8-9). Thorax entirely ochreous. Legs almost entirely ochreous, only base of fore tibia, knee parts and apical ends of mid and hind tibiae, and last 2 tarsal segments of all legs pale brown; fore femur strongly swollen as in ♀, with 17 dark ventral spines; tarsal apical spur-like setae: mid I with 2, II-III each with 1 stiff and 1 slender, hind I-II each with 1, III with 1 stiff and 1 slender; claws rather large, bifid at tips; RL-L 49 : 43 : 17 : 10 : 6 : 4.8 : 7.2 in fore, 59 : 54 : 31 : 9 : 5 : 4.8 : 7.5 in mid, 67 : 62 : 38 : 17 : 6.6 : 5.2 : 8.5 in hind. Wing entirely very pale ochreous, costa not produced beyond end of  $R_{4+5}$ , CR about 0.78, radial cell II about 2.38× as long as I (38 : 16), RL-V 58 : 60 : 67 : 25 : 59, r-m about 1/2 of base of Rs and subequal to base of  $M_1$  (3.5 : 7 : 4). Abdomen pale ochreous; hypopygium (fig 1D) brown, with sternite widely and shallowly concave on caudal margin; coxite conical, style slender, about 2/3 long of coxite (27 : 40); aedeagus triangular, pubescent entirely, with apical part slender; parameres large, median lobes fused on basal 3/5, apical parts round, slightly pubescent at apices.

Holotype ♀ (BISHOP 6683), Nondugl, 1600 m, W. Highlands, NE NG, 9.VII.1955, Gressitt. Allotype ♂ (BISHOP), W. shore of Lake Anggi Giji, 1850 m, Sururai Vill., Vogelkop, NW NG, 25.VII.1957, Hardy.

This is closely related to *abdominalis*, except for the pale color, but may be distinguished by the following points: TR of mid leg is larger than 4.1 being 4.5, tarsal segments I-III of mid leg are provided with single apical spines, radial wing cell II is longer than 2× that of I being about 2.8, and abdominal gland-rods are present only on tergites V-VII differing from the allied species.

#### Genus *Clinohelea* Kieffer (1917)

This genus is highly characteristic in the structure of legs: in fore, tarsal segment IV cordate, V strongly inflated into fusiform, while in 2 posterior pairs, IV strongly bilobate and each lobe ending into 1 large spine-like bristle. In ♀, the claws of the fore leg are equal and simple, but those of 4 posterior legs are single, deeply and more or less unequally bifid at least throughout the New Guinean species. These structures of the claws might easily be overlooked or misunderstood being stated that the paired claws of 4 posterior legs are unequal.

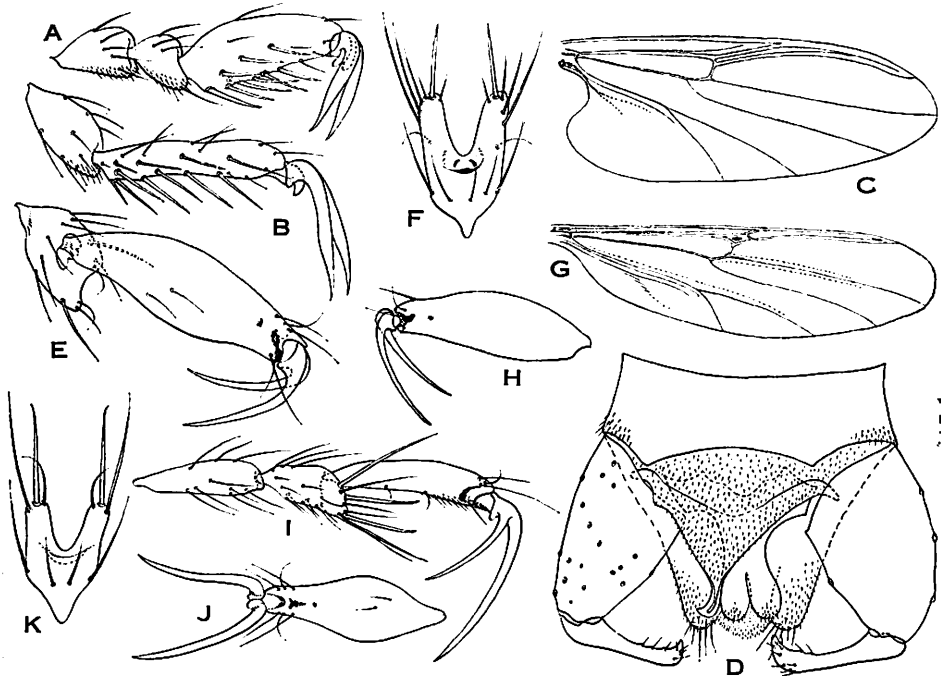


Fig. 1. A-C. *Jenkinshalea papuae* (♀): A, apical 3 tarsal segments of fore leg; B, apical 2 tarsal segments of hind; C, wing. D, *Heteromyia pallida* (♂), hypopygium. E-G. *Clinohelea papuensis* (♀): E, apical 2 tarsal segments of fore leg; F, penultimate tarsal segment of hind leg; G, wing. H-I, *C. tenuipes* (♀): H, apical tarsal segment of fore leg; I, apical 3 tarsal segments of hind leg. J-K. *C. hollandiae* (♀): J, apical tarsal segment of fore leg; K, penultimate tarsal segment of mid leg.



## KEY TO NEW GUINEA SPECIES OF CLINOHELEA

1. All legs with broadly dark knee parts, femora with distinct yellow preapical bands...2  
All legs without broadly dark knee parts, femora without distinct yellow preapical bands..... 3
2. Fore femur brownish on basal 1/2, all tarsal segments II-III brownish differing from pale yellow segment I.....4. *papuensis*  
Fore femur pale yellow except for dark apical end, all tarsal segment I-III white..... 5. *tenuissima*
3. Maxillary palpus with segment IV very short, ring-like; all femora indistinctly brown and ochreous..... 6. *tenuipes*  
Maxillary palpus normal; all femora yellow, with distinctly dark apical parts..... 7. *hollandiae*
4. *Clinohelea papuensis* Tokunaga, n. sp. Figs. 1E-G.

Large, dark and yellow species, all femora and tibiae with broad yellow preapical bands; 4 posterior femora each with single ventral spine on preapical part; tarsal segment IV of 4 posterior legs with 3 strong preapical bristles on each lobe besides black terminal spine-like bristle; wing usually unadorned but rarely with small fuscous spot at center of radial cell I. ♂ unknown.

♀. Body 3.65 (3.38-4.29) mm long. Wing 3.05 (2.85-3.38) × 0.91 (0.86-1.0) mm. Head dark brown, eyes separated as wide as 3-5 facets; proboscis pale brown or yellow, shorter than 1/2 of head (18 : 44). Mandible with 9-10 cutting teeth; palp slender, pale brown but apical 2 segments more brownish, 5-segmented (7.5 : 15.5 : 30 × 8 : 12.5 : 19.5), III elongate, slightly fusiform, with sensillae scattered on ventral side of apical 1/2. Antenna very slender, segment I brown, others pale brown, but gradually more brown on apical segments, III-IX elongate, about 5.5-8 × as long as wide, slightly constricted preapically; RL-A 30 : 98 : 51 : 50 : 49 : 47 : 47 : 45 : 47 : 100 : 100 : ? : ? : ?. Thorax entirely black, scutum with frontal spine-like tubercle, scutellum with 5-7 slender and 4-6 small setae. Legs mainly dark and yellow, coxae dark brown but fore coxae paler or yellow, with base dark, trochanters brown or ochreous; femora mainly dark, with distinct broad yellow preapical bands, bases pale brown or ochreous, but fore femur pale brown or ochreous on basal 1/2 before yellow band; tibiae dark on basal 1/2-1/3, yellow on apical parts, but apices dark, mid tibial end brown, tarsi largely brown or pale brown, but I mainly yellow except for brownish apex; mid and hind femora each with 1 ventral preapical spine; hind tibial comb with 8-10 apical bristles; tarsal spur-like bristles present on mid and hind, mid tarsal segments I-II each with 2 apical, hind segment I with 1 sub-basal and 1 apical, II with 1 apical, fore IV flattened, cordiform, V (fig 1E) fusiform, about 3.2 × as long as wide, mid and hind IV (fig 1F) strongly bilobate; each lobe with 1 strong, 4-5 long and short setae on apical part; claws single, strongly bifid at bases, fore equally bifid, far shorter than segment (35.5 : 35.5 : 70.5), mid and hind unequally bifid, longer one only slightly shorter than segment and shorter one about 1/2 of segment (55 : 30.7 : 62.3 in mid and 59 : 32 : 65 in hind); RL-L 82 : 73.8 : 37.5 : 13.3 : 6.3 : 7.8 : 18.8 in fore, 108 : 92.3 : 48.3 : 21.7 : 9 : 8.3 : 15.3 in mid, 118.5 : 108.5 : 76.5 : 31.3 : 12 : 9 : 17.5 in hind. Wing (fig 1G) with veins dark or brown, without macro- and microtrichia, usually unadorned, rarely with small brown spot at center of radial cell I; costa shortly produced

beyond tip of  $R_{4+5}$ , as long as r-m, ending slightly before tip of  $M_1$  or above tip of  $M_2$ , CR 0.89, varying 0.88-0.91, fMCu under base of  $M_2$  or just before base of Rs, radial cell I about  $4.3\times$  as long as width (20.4 : 4.7), II about  $4\times$  as long as I (80 : 20.4), RL-V 87.4 : 84.6 : 89.6 : 32.2 : 105.4. Halter variable, white, brown or black. Abdominal segments I-II black, other segments very pale brown or ochreous, but in some paratypes I dark brown and other segments gradually paler caudad being almost colorless on 4-5 caudal segments; cerci very pale ochreous or white; spermathecae 2, dark brown, small, round, unequal,  $2.5+27.5 : 27.3$  and  $0.5+23.8\times 22.5$ .

Holotype ♀ (BISHOP 6684), Mt Hagen area, 1650 m, NE NG, 28.VI.1957, Hardy. Paratypes: ♀, Tsigmil, rest house, 1600 m, 24 km E of Minj, NE NG, 25.VI.1957, Hardy; ♀, Bodem, 100 m, 11 km SE of Oeberfaren, NE NG, 7-17.VII.1959, light trap, Maa; 2 ♀♀, Minj, W. Highlands, NE NG, 8-13.IX.1959, Maa; 2 ♀♀, Genjam, 100-200 m, 40 km W of Hollandia, NW NG, 1-10.VIII.1960, Maa.

This is allied to *tenuissima* Kieffer, but may be distinguished by the following points: body larger than 2.5 mm long, being 3.38-4.29 mm long, fore femur brownish on basal 1/2, tarsal segment II-III entirely brownish, and wing with fMCu before origin of  $M_2$ .

5. *Clinohelea tenuissima* Kieffer, 1917, Ann. Mus. Nat. Hist. Hung. 15: 195; 1917, *Ibid.* 15: 316.—Lee, 1948, Proc. Linn. Soc. N. S. Wales 73: 64.

The claws of the ♀ legs are said to be larger, almost 2/3 length of tarsal segment V, they are equal in 4 anterior legs, hind claws slightly unequal. The claws of mid and hind legs are thought to be probably simple and so deeply cleft as superficially showing paired condition.

DISTRIBUTION: New Guinea (Yomba).

6. *Clinohelea tenuipes* Tokunaga, n. sp. Fig. 1H-I.

Small dark brown and yellowish species, legs with color markings faint, fore femur brownish on apical 1/3, tibia with broad fuscous band on middle part, mid and hind femora with broad sub-basal fuscous and preapical yellow bands, mid and hind tibiae entirely yellow except for brown end of hind tibia; wing without color marking. ♂ unknown.

♀. Head with vertex dark brown, frons brown, clypeus and proboscis pale yellow; eyes separated as wide as 3 facets; proboscis about  $0.42\times$  as long as head; mandible with 7 cutting teeth on mesal side and several minute teeth on lateral side; palp very pale brown, small, 5-segmented (4 : 10 :  $12.5\times 5.5 : 3.5 : 7.5$ ), III cylindrical, with only several scattered sensillae on ventral side of apical 1/2, IV very short, ring-like. Antennal segment I dark brown, others brown, cylindrical, with verticils small, sparse; AR about 1.11; RL-13A 46 : 24 : 25 : 25 : 25 : 25 : 26 : 51.5 : 50 : 50 : 47.5 : 55. Thorax entirely dark brown, scutum with anterior tubercle, scutellum with 4 long and 4 small setae. Legs with all coxae dark brown, trochanters and femoral bases pale ochreous, fore femur largely brown, mid and hind largely yellowish ochreous, broadly fuscous on sub-basal area, narrowly brown apically, fore tibia largely ochreous but fuscous on middle part, yellowish on both end parts, mid and hind tibiae yellow, but apical end of hind brown, tarsi fuscous and more brownish on apical segments, but mid basitarsus largely yellow. Hind tibial comb with 6 apical bristles; tarsal spur-like apical bristles present only on mid tarsal seg-

ment II, IV cordiform, not strongly bilobate, fore without spines or strong bristles, mid and hind each with 1 strong and 1 long bristle on either lateral tip, fore tarsal segment V (fig 1H) about  $3.4\times$  as long as width; fore claw equally bifid, far shorter than the segment (22 : 22 : 39), mid and hind (fig 1E) unequally bifid, larger branch longer than the segment (29 : 19 : 27 and 32 : 22 : 30); RL-L 41 : 35 : 14.9 : 5.5 : 4 : 3.8 : 10.3 in fore, 54.5 : 38.5 : 23.8 : 9.5 : 4.3 : 4 : 7 in mid, 59 : 53 : 35 : 12.8 : 6 : 4.5 : 13.2 in hind. Wing with main veins dark brown, without macro- and microtrochia, anal lobe almost absent; costa ending just beyond end of  $M_2$ , not produced beyond apex of Rs, CR about 0.83, radial cell I about  $4.3\times$  as long as width (9.5 : 2.2), II about  $3.6\times$  as long as I (34 : 9.5), RL-V 43 : 45 : 47 : 14 : 48. Halter almost white, with extreme tip brown. Abdomen entirely dark brown; cerci fuscous brown; spermathecae 2, dark brown, equal, oval,  $1+19\times 13$  and  $1+18\times 14$ .

Holotype ♀ (BISHOP 6685), Bomberi, 700-900 m, nr Fak Fak, Vogelkop, SW NG, 9.VI. 1959, Gressitt. Paratopotype: ♀, 4.VI.1959, Gressitt.

This is somewhat allied to *tasmaniensis* Lee, but may be distinguished by the following points: mid and hind femora with very broad pre-apical pale ochreous bands, fore tibia with wide median fuscous band, TR of fore and hind larger than 2.22 and 2.17 being 2.7 and 2.75 respectively, wing vein  $R_s+R_{4+5}$  far longer than  $2.7\times$  of  $R_1$ , being  $34\times$ , fMCu not beyond origin of  $M_2$  but under it.

#### 7. *Clinohoelea hollandiae* Tokunaga, n. sp. Fig. 1J-K.

Medium-sized, dark and yellow species, all femora generally yellow, with distinct black apical ends, tibiae also yellow, only pale brown on basal and apical ends; apical lobes of mid and hind tarsal segment IV each with terminal 1 strong spine and 1 long bristle; wing unadorned. ♂ unknown.

♀. Body length about 2.73 mm. Wing  $1.85\times 0.52$  mm. Head with vertex and frons dark brown, clypeus and mouth parts yellow. Eyes widely separated as wide as 3.5 facets; mandible with 8-9 cutting teeth; palp mainly yellow, but last segment brown, 5-segmented (7 : 11 :  $14\times 6 : 11 : 12.5$ ), III fusiform, with only few sensillae. Antenna with segment I dark brown, others missing. Thorax entirely shiny dark brown, scutum with anterior tubercle well developed, conical, setae delicate and very sparse, without microtrichia, scutellum with 5 large bristles and 4 small setae. Legs mainly yellow, with distinct dark bands; in fore leg, femur with dark apical part, tibia with pale brown apical end, tarsal segment I pale yellow, with basis pale brown, II-V brown but dark on apical segments; in mid, femur as in fore, tibia with base pale brown, tarsal segments I-II yellow, but apical part pale brown, III-V brown but dark on apical segment; in hind, femur as in others but with faintly brown cloud on middle part, tibia as in fore, tarsal segment, I-III pale ochreous. Hind tibial comb with 6 dark apical bristles, tarsal spine-like bristle present only on sub-basal part of hind tarsal segment I; fore tarsal segment V (fig 1J) about  $2.6\times$  as long as wide, mid segment IV (fig 1K) strongly bifurcate, each lobe with 1 strong bristle, 1 long and 1 small seta at apex; claws single, fore equally bifurcate, shorter than V (34.1 : 34.1 : 49.2), mid unequally bifurcate, larger claw longer than  $2\times$  of smaller and longer than the segment (41.7 : 18.9 : 37.8); RL-L 55 : 48 : 23 : 10 : 4.5 : 5 : 13 in fore, 68 : 55 : 29 : 14 : 5 : 4.8 : 10 in mid, 77.5 : 73 : 48 : 19 : 8 : ? : ? in hind, hind distal 2 segments missing. Wing with veins brown, membrane very pale, costa just

produced beyond tip of Rs, ending above end of  $M_2$ , CR about 0.89, r-m shorter than apical free part of costa (3.5 : 5), RL-V 55 : 55 : 60 : 17 : 63. Halter dark brown. Abdomen dark brown and shiny on dorsal side; cerci brown, spermathecae 2, dark brown, unequal, oval and round, being  $2+28 \times 21$  and  $2+19 \times 19$  respectively.

Holotype ♀ (BISHOP 6686), Genjam, 100-200 m, 40 km W of Hollandia, NW NG, 1-10. III.1960, Maa.

This is somewhat related to Malaysian (Singapore) *pachdactylus* Kieffer in general color and structure of claws, but distinctly differs in the complete absence of the wing marking.

### Genus *Echinohelea* Macfie (1940)

For generic diagnosis, New Guinean species and literature refer to my paper (1963, Pacific Ins. 5 : 231-38).

#### KEY TO NEW GUINEA SPECIES OF ECHINOHELEA

1. Wing adorned with 2 costal dark spots ..... *pictipennis*  
Wing unadorned..... 2
  2. Fore tibia with spines..... *zonata*  
Fore tibia without spines..... 3
  3. Hind tibia entirely yellowish or pale ..... 4  
Hind tibia dark and without preapical yellow bands ..... 5
  4. Femora of all legs with 7 or more spine-like strong bristles..... *flava*  
Fore femur with 5, mid with 1 apical and hind with 2 apical spine-like strong bristles ..... 8. *papuensis*
  5. Caudoscutal area without lateral fuscous stripes; ♀ with claws of mid and hind legs distinctly unequal..... *hardyi*  
Caudoscutal area with faint lateral fuscous stripes; ♀ with all claws of legs equal ..... *laensis*
8. *Echinohelea papuensis* Tokunaga, n. sp. Fig. 2A-E.

Medium-sized, yellowish ochreous species without distinct adornment of wings and legs; closely allied to New Guinea *flava* Tokunaga in general color, but provided with far less number of spine-like bristles on legs than in allied species.

♀. Body about 1.85 mm long; wing  $1.65 \times 0.55$  mm. Head entirely yellowish ochreous; proboscis long, hardly as long as head-capsule (22 : 22.5); eyes just separated; mandible with 8 cutting teeth; palp yellowish ochreous, slender but shorter than proboscis, 5-segmented (5 : 10 : 18 : 11 : 17), I very short, III with 3-4 sensillae on preapical shallow pore. Antennal segment I brownish ochreous, II-IX white on basal 1/2 and brownish on apical 1/2, X-XIV entirely brownish, III-IX elongate fusiform, each with short neck part and only 4 verticils; AR about 0.91, RL-13A 29 : 15 : 17 : 18 : 19 : 19.5 : 20 : 21 : 31 : 31 : 30 : 30 : 29 : 28 (W=5-6.5). Thorax almost entirely yellowish ochreous, but only slightly fuscous on paratergites and posterior marginal area of scutum; scutum with 6-7 supra-alar bristles, scutellum with 6 large and 5 small setae. Legs almost entirely yellowish ochreous, but coxae, trochanters and apical end of fore and hind tibiae somewhat more brown-

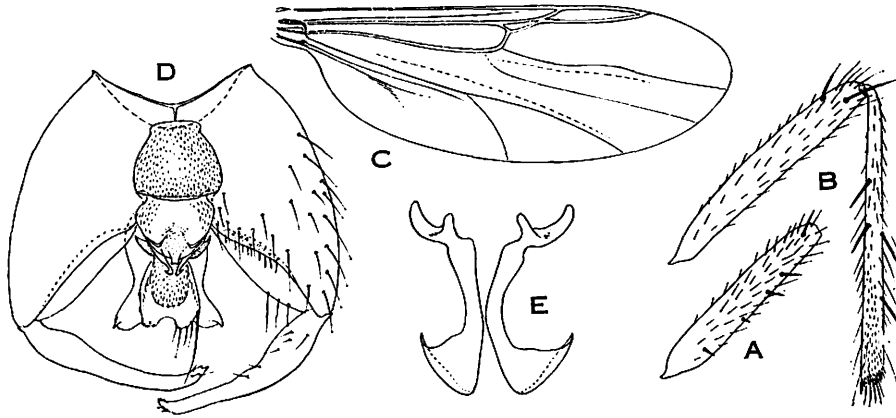


Fig. 2. *Echinohelea papuensis*. A, fore femur of ♀; B, hind femur and tibia of ♀; C, ♀ wing; D, ♂ hypopygium; E, parameres of ♂ hypopygium.

ish; hind tibial comb with 5-6 apical dark bristles; dark spine-like bristles: in fore femur (fig 2A) with 5 ventral, tibia without them, tarsal segment I with 1 sub-basal, III with 1 apical; in mid, femur with 1 apical, tibia with 1 sub-basal and 1 middle, tarsal segment I with 1 middle and 1 apical, II-III each with 1 apical; in hind (fig 2B), femur with 2 apical, tibia with 3-4 middle, tarsal segment I with 1 sub-basal; claws equal or subequal, each with 1 basal tooth; RL-L 39.7 : 36.5 : 18.8 : 8 : 6 : 3.5 : 7 in fore, 47 : 38.5 : 24.8 : 11.5 : 7 : 3 : 7 in mid, 50 : 54 : 30 : 12 : ? : ? : ? in hind; hind apical segments missing. Wing (fig 2C) very pale ochreous, costa hardly produced beyond end of  $R_{4+5}$ , ending just before midway between apices of  $M_2$  and  $M_{3+4}$ , CR about 0.82, radial cell II about  $3.2\times$  long of I, r-m as long as basal section of  $M_1$  and  $2\times$  long of basal section of Rs (4 : 4 : 2.5), fMCu before origin of  $M_2$ ,  $M_1$  slightly undulate, RL-V 54 : 49 : 48 : 18 : 41. Halter with stem yellow, knob fuscous. Abdomen yellowish ochreous, tergites II-V each with slender fuscous band along caudal margin; cerci ochreous; spermatheca single, dark brown, round, with chitinized part of duct,  $5+14\times 14$ .

♂. Body about 1.39 mm long; wing 1.37 : 0.43 mm. Color and structure similar to those of ♀ with usual sexual differences. Eyes separated as wide as 1.5 facets; palp 5-segmented (5 : 10 : 14 : 11 : 12). Antennae missing. Scutellum with 5 large and 3 small setae. Hind tibial comb with 5 brown apical bristles, fore claws as in ♀, dark spine-like bristles arranged as in ♀, but mid tarsal segment I with 1 additional sub-basal and hind tibia with 2 median and 1-2 rather slender preapical; 3 apical segments of mid and hind legs missing; RL-L 34 : 31 : 16 : 7 : 5.5 : 3.2 : 6.8 in fore, 39 : 34 : 23.2 : 11 : ? : ? : ? in mid 41.5 : 48 : 28 : 10.5 : ? : ? : ? in hind. Wing far paler than in ♀, costa ending just before tip of  $M_{3+4}$ , CR about 0.77, radial cell II about  $3.67\times$  long of I (22 : 6), r-m about  $2\times$  of bases of Rs and  $M_1$  (4 : 2 : 2.5), fMCu under base of  $M_2$ , RL-V 43.5 : 41 : 42 : 12 : 31. Hypopygium (fig 2D) large, brown; style shorter than coxite (55 : 67), slightly arcuate; aedeagus semicircular, with 2 apical hook-like small lobes; parameres (fig 2E) separated, with apical parts flattened and triangular.

Holotype ♀ (BISHOP 6687), Mendi, 1660 m, S. Highlands, SE NG, 8.X.1958, Gressitt. Allotype ♂ (BISHOP), Maŕoko, Maŕin Finisterre Range, Saidor Subdist., NE NG, 28.VIII-

## 5.IX.1958, Brandt.

This is closely allied to *flava* Tokunaga, but it is rather paler, anal area of ♀ wing wider and dark spine-like bristles of legs less in number, distinctly differing from the allied species.

Genus *Xenohelea* Kieffer (1917)*Synonym*: *Mixohelea* Kieffer (1917)

The generic diagnosis of the structures of legs is as follows: femora of all legs not much swollen, fore femur usually provided with spine-like rather slender bristles on ventral side, but sometimes these bristles absent or reduced into ordinary bristles; tarsal segment IV far shorter than V and bell-shaped or cordiform at least on fore leg, V cylindrical and slightly arcuated, armed with strong ventral batonnets; all claws of ♀ single, long, and basally barbed.

## KEY TO NEW GUINEA SPECIES OF XENOHELEA

1. Wing with costa extending beyond level of tip of vein  $M_2$  ..... 9. *australiensis*  
Wing with costa not extending beyond level of tip of vein  $M_2$  ..... 2
2. Wing with costa ending at level of tip of vein  $M_2$  ..... 10. *maai*  
Wing with costa ending before level of tip of vein  $M_2$  ..... 3
3. Fore femur with 5 ventral spine-like bristles; wing cross-vein r-m shorter than basal section of  $M_1$  ..... 11. *tonnoiri*  
Fore femur with at most 4 ventral spine-like bristles; wing with cross-vein r-m longer than basal section of  $M_1$  ..... 12. *sarmensis*

9. *Xenohelea australiensis* (Kieffer)

For synonymy and literature refer to Lee, 1948, Proc. Linn Soc. N. S. Wales 73: 66.

Medium-sized, brown species rather variable individually and present specimen somewhat different from Kieffer's original description but may be quite identical. ♂ unknown.

♀. Body about 2.0 mm long; wing  $2.02 \times 0.75$  mm. Head entirely brown; eyes separated as wide as 1 facet at least; mandible with 9-10 sharp cutting teeth; palpal III oval, with only few sensillae on apical part, RL-P 5 : 11 : 12 × 6 : 8 : 10. Antenna entirely ochreous, segments cylindrical, AR about 1.3, RL-13A 23 : 18 : 16.5 : 16 : 16 : 17 : 16 : 35 : 37 : 33 : 36 : 40 (W=6). Thorax entirely ochreous, scutum rather sparsely setigerous with brown setae, densely pubescent with pale brown microtrichia, dorsocentral bristles dark brown only 3, scutal anterior tubercle invisible, scutellum similarly setigerous and pubescent, with 4 dark bristles. Legs with coxae ochreous, trochanters to tarsal segments II yellowish ochreous, III-V fuscous; fore femur without ventral spines, hind tibia with about 10 erect bristles on dorsal side, 4 apical bristles of comb, tarsal segment III slightly flattened apically, IV cordate, V arcuate, clavate, with 10 strong ventral spines on basal part, hind V with 1 additional lateral spine on basal side, claws single, unequally bifid, far shorter than V (30.4+11.4 : 39.9 in fore, 26.6+9.5 : 39.9 in mid, 34.2+15.2 : 53.2 in hind); RL-L 47 : 45 : 20 : 11.5 : 4 : 3 : 10.5 in fore, 55.5 : 46 : 27.5 : 10 : 4 : 3 : 10.5 in mid, 71.5 : 58.5 : 37 : 13 : 4.5 : 3.5 : 14 in hind. Wing entirely yellowish ochreous, rather broad, with

anal lobe obtuse, costa just beyond tip of  $R_{4+5}$  as long  $1/2$  of r-m (4 : 7), ending above midway between ends of  $M_1$  and  $M_2$ ,  $R_{4+5}$  distinctly arcuate, r-m hardly as long as base of Rs (7 : 7.5), base of  $M_1$  very short, only about  $1/3$  of r-m (2 : 7), fMCu before r-m and fork of R, RL-V 51 : 55 : 51 : 25 : 81. Halter with knob dark brown, stem pale ochreous. Abdomen and cerci brown; spermathecae 2, brown, round, equal,  $1+12\times 10$  and  $1+12\times 10$ .

SPECIMENS EXAMINED: ♀, Enarotadi, 1800 m, Wissel Lakes, NW NG, 5. VIII. 1955, light trap, Gressitt.

This specimen differs from the type (collected at Moroka, New Guinea) in the following points besides the slight difference in color: fore femur probably without ventral spines and antennal segments X-XIV each far shorter than  $3\times$  length of IX. The development of the femoral ventral spines is rather variable in the members of this genus as shown in the case of *sarmensis* and the difference of the relative lengths of antennal segments is thought to be due to the difference between the dry and mounted specimen.

10. *Xenohelea maai* Tokunaga, n. sp. Fig. 3A.

Small brown species, scutum with only delicate setae in the position of dorsocentral bristles, fore femur with only 2 spine-like bristles on preapical part, fore tibia only yellowish ochreous on apical  $1/3$ , wing with costa ending at level of tip of  $M_2$ . ♂ unknown.

♀. Body about 2.63 mm long; wing  $1.99\times 0.66$  mm. Head with vertex brown, frons yellow, mouth parts brown; eyes separated as wide as 1 facet; mandible dark, with 7 sharp cutting teeth; palp short, brown, 5-segmented (8 : 13 :  $18\times 8$  : 10 : 12), III with several sensillae on apical  $1/2$ . Antennal basal segment dark brown, other segments, missing. Thorax uniformly brown, scutum with anterior tubercle blunt, very small, scutal setae slender, dense, and uniformly spread, microtrichia very fine, velvet-like, dorsocentral bristles reduced, being represented by delicate setae, scutellum with 4 dark bristles and similarly setigerous and pubescent to scutum. Legs largely brown, but apical  $1/3$  of fore tibia and segments I-II of all tarsi yellowish ochreous; fore femur with 2 preapical spine-like ventral bristles and several strong apical bristles, hind tibia with 8 erect strong bristles on dorsal side, 6-7 apical bristles of comb, last tarsal segment with 6 strong ventral spines or batonnets on basal part, claws (fig 3A) single, unequally cleft, longer part about  $2\times$  length of smaller part and  $2/3$  of tarsal segment V (30.4 : 15.2 : 45.6 in fore, 30.4 : 11.4 : 43.7 in mid, 36.1 : 19 : 47.5 in hind); RL-L 63 : 60 : 27 : 14 : 5.5 : 3.5 : 12 in fore, 73 : 35.5 : 33 : 10 : 4.5 : 4 : 11.5 in mid, 90 : 75 : 52 : 18 : 6 : 4 : 12.5 in hind. Wing with veins brown, membrane pale brown, costa ending at level of tip of  $M_2$ , CR 0.89, r-m as long as base of  $M_1$  and  $1/2$  of base of Rs (6 : 5 : 11), fMCu under fork of R and just before basal end of  $M_2$ , RL-V 55 : 57 : 57 : 28 : 73. Halter entirely brown. Abdomen and cerci brown, spermathecae 2, brown, round, equal,  $1+14\times 14$  and  $1+14\times 13.5$ .

Holotype ♀ (BISHOP 6688), Bodem, (100 m, 11 km SE of Oeberfaren, Sarmi Distr., NW NG, 10-17.VII.1959, Maa.

This is related to *australiensis* Kieffer, but fore tibial apical part is yellowish ochreous (not entirely brown), scutum bears many delicate dorsocentral setae (more than 3 and

not strong), and wing cross-vein r-m is subequal to basal section of  $M_1$  (not  $3\times$  long of base of  $M_1$ ), distinctly differing from the related species.

11. *Xenohelea tonnoiri* Lee, 1948, Proc. Linn. Soc. N. S. Wales 73: 66.

Large black species with AR about 1.5, scutum with small blunt anterior tubercle, femora and tibiae entirely dark brown, fore femur with 5-6 ventral spine-like bristles, wing with costa ending before tip of  $M_2$ , basal section  $M_1$  long, at least as long as r-m. ♂ unknown.

♀. Body about 3.04 mm long; wing  $2.47\times 0.81$  mm. Head entirely dark brown; eyes separated as wide as 3 facets; mandible with 7 dark cutting and 3 yellow minute basal teeth; palp 5-segmented (6 : 13 :  $17\times 7$  : 14 : 13), III with many scattered sensillae on apical 1/2. Antenna with basal segment fuscous yellow, II-IX yellow on bases before verticils, dark brown on apical parts, X-XIV dark brown, ochreous on bases, almost all segments cylindrical, AR about 1.5, RL-13A 30 : 19 : 20 : 21.5 : 22 : 23 : 23 : 28 : 54.5 : 50 : 54 : 56 : 66. Thorax entirely dark brown or black, scutum with small blunt anterior tubercle, densely setigerous with dark stiff setae and thickly pubescent with microtrichia, lateral parts along foveae of caudoscuteal area quite bare, dorsocentral setae 4-6, scutellum with 6 dark long bristles and dense macro- and microtrichia as in scutum. Legs with coxae, trochanters and tibiae dark brown, tarsal segments I-II yellowish ochreous, III-V brown; fore femur with 5 spine-like bristles on ventral side of apical 1/2, many strong setae on apical part, hind tibial comb with 7 apical bristles, last tarsal segment with 6 strong ventral spines or batonnets on basal part, claws single, slender with basal sharp small tooth, RL of claw, basal tooth and V 45.6 : 15.2 : 62.7 in fore, 43.7 : 13.3 : 57 in mid, 49.4 : 19 : 64.6 in hind; RL-L 74 : 69 : 33 : 16.5 : 6 : 5 : 16.5 in fore, 82 : 65.5 : 35 : 12 : 5 : 5 : 15 in mid, 96 : 79 : 55 : 21.2 : 6.5 : 5 : 17 in hind. Wing with veins brown, membrane pale brown, brown cloud along costal margin beyond costal end and along under side of basal 1/2 of  $M_1$ , microtrichia distinct, costa ending distinctly before end of  $M_2$ , CR 0.8, radial cell II about  $3.2\times$  length of I (59 : 18.5), basal section of Rs as long as that of  $M_1$  (9 : 9), longer than r-m (9 : 6.5), fMCu under fork of R and that of  $M_{1+2}$ , far before r-m, RL-V 67 : 66 : 70 : 34 : 81. Halter dark, but base yellowish. Abdomen brown, cerci yellowish; spermathecae 2, brown, subequal, round,  $2+17\times 15$  and  $2+15\times 14$ .

SPECIMEN EXAMINED: ♀, Kiambavi Vill., Finisterre range, Saidor Subdistr., NE NG, 22-29.VII.1958, Brandt.

DISTRIBUTION: Tasmania, Australia and NE New Guinea.

Specimen from New Guinea slightly differs from the Australian type, in its possession of yellow bases of antennal segments II-IX, sensillae of palpal segment III distributed only on apical 1/2, and basal section of  $M_1$  longer than r-m, but these differences are thought to be merely of individual variation.

12. *Xenohelea sarmensis* Tokunaga, n. sp. Fig. 3B.

Large dark brown species closely allied to *tonnoiri* Lee in color and general specific character, but distinctly differs in its very short basal section of wing vein  $M_1$ , pale ochreous tarsal segments I-III, and fore femoral ventral spine-like bristles less than 4 in num-



ber. ♂ unknown.

♀. Body about 2.41 mm long; wing  $2.09 \times 0.65$  mm. Head brown; eyes just contiguous, but separated above; mandible with 11 sharply pointed cutting teeth (apical small, basal minute); palp pale ochreous, 5-segmented (10 : 20 : 20 : 9.5 : 11 : 14), III oval, with scattered sensillae on apical 2/3 of ventral side. Antenna with basal segment ochreous, segment II white, but brown only on apical 1/5, III-IX white on basal parts, brown on apical 1/3-1/2, X-XIV brown and cylindrical; AR 1.71, RL-13A 29 : 18 : 17 : 18 : 19 : 20 : 21 : 25 : 52 : 55 : 60 : 58 : 67. Thorax entirely dark brown, scutum with small blunt anterior tubercle, densely setigerous with slender small setae and pubescent with fine microtrichia, dorsocentral bristles 6 and dark. Legs with coxae and trochanters brown, femora and tibiae mainly dark, but femoral bases and apical parts of fore and mid tibiae brown, tarsal segments I-III pale ochreous, IV-V pale brown; fore femur with 3, rarely 2-4 ventral spine-like bristles on apical 1/3 (very rarely absent), hind femur very rarely with 1 ventral similar bristle, hind tibia with about 8 strong erect dorsal bristles, tarsal segment III slightly flattened apically, IV obcordate, V (fig 3B) with 6 large ventral spines on basal part, hind tibial comb with 7-8 apical bristles, claws single, unequally bifid, 0.7-0.8 as long as V and  $3 \times$  length of smaller parts (45.6 : 64.6 : 15.2 in fore, 53.2 : 60.8 : 19 in mid, 60.8 : 74.1 : 22.8 in hind; RL-L 70 : 68 : 33 : 15 : 6 : 5 : 17 in fore, 75 : 64 : 34 : 12 : 6 : 5 : 16 in mid, 94 : 78 : 55 : 21 : 8 : 5 : 19.5 in hind. Wing brownish, anal lobe almost absent, costa ending before tip of  $M_2$ , CR 0.83, radial cell II about  $3 \times$  as long as I, r-m equal to base of  $R_s$  and  $2 \times$  as long as base of  $M_1$  (5 : 5 : 2.5), fMCu before r-m, RL-V 62 : 63 : 62 : 22 : 64. Halter dark brown, with base paler. Abdomen and cerci dark brown to brown; spermathecae 2, small, short-oval or round, dark brown, subequal,  $2+16 \times 14$  and  $2+15.5 \times 13.5$ .

Holotype (BISHOP 6689) ♀, Sarmi, NW NG, 20-23.VII.1959, light trap, Maa. Paratypes: 4♀♀ with type.

This is closely allied to *tonnoiri* Lee, but rather easily separated from the allied species in the following points: AR is larger than 1.5 being about 1.7, palpal segment III is rather shorter being about  $2 \times$  of width, scutum is setigerous with slender setae, fore femoral ventral spine-like bristles are not more than 4, and basal section of wing vein  $M_1$  is far shorter than r-m.

#### Genus *Dicrohelea* Kieffer (1917)

The most distinctive generic characters are the following structures of the legs: femora rather slender, usually hind femur somewhat clavate, rarely is fore femur also more or less clavate, femoral spines quite absent, last tarsal segments elongate-cylindrical, with ventral strong blunt black spines or batonnets, tarsal claws of ♀ basally barbed, equal in fore, very unequal in mid and hind legs. Also, the wing radial cell II is very long, the vein costa is also long extending near to the wing tip, the abdominal gland-rods are completely absent, and the scutal anterior tubercle is more or less developed. The penultimate tarsal segments are often said to be not cordate, however, in some New Guinean species, they are flattened apically forming a bell-shape or cordiform in the mid legs.

## KEY TO NEW GUINEA SPECIES OF DICROHELEA

1. Mid femur almost uniformly dark or dark brown ..... 2  
    Mid femur distinctly bicolored being yellow and dark ..... 3
2. Fore femur uniformly ochreous, hind femur with preapical yellowish spot, hind tibia uniformly dark ..... 13. *novaebrittanica*  
    Fore femur yellowish basally and dark apically, hind femur entirely dark, hind tibia dark basally and yellow apically..... 14. *novaeguineae*
3. Abdomen with at least 1 large oval yellow spot on tergites II-IV ..... 15. *abdominalis*  
    Abdomen without distinct yellow spot ..... 4
4. Wing with costa just produced beyond tip of  $R_{4+5}$  ..... 16. *lalokiensis*  
    Wing with costa far produced beyond tip of  $R_{4+5}$ ..... 17. *maai*

13. *Dicrohelea novaebrittanica* Tokunaga, n. sp.      Fig. 3C.

Small dark and yellowish species with legs distinctly bicolored, but mid and hind femora largely and all tibiae entirely dark, hind femur only fuscous yellow on basal end and preapical clavate part, abdomen entirely dark brown; last tarsal segments with 10 blunt ventral batonnets, scutum with small anterior tubercle; wing with costa just produced beyond end of  $R_{4+5}$ , fMCu under r-m, radial cell II fully 4× length of I, color marking of wing almost absent. ♂ unknown.

♀. Body about 2.65 mm long; wing 1.95×0.59 mm. Head dark, clypeus yellow, mouth parts brown; eyes just contiguous; mandible with 7-8 cutting teeth; palp 5-segmented (8 : 12 : 20×5 : 12 : 16), III subcylindrical, with several sensillae on apical part of ventral side. Antenna with segment I dark brown, flagellum missing. Thorax entirely black, scutum with small anterior tubercle, densely setigerous with small stiff setae, scutellum with 5-6 large bristles and many small stiff setae. Legs dark and yellow: in fore, coxa and trochanter yellowish ochreous, femur and tarsal segments I-II ochreous, tibia dark, III-V brown; in mid, coxa dark brown, trochanter brown, femur and tibia dark, but femoral basal end fuscous yellow, tarsal segment I ochreous, II-V missing; in hind, coxa and trochanter dark brown, femur mainly dark, but basal end and preapical part fuscous yellow, tibia dark, tarsal segments I-II yellow, but apical ends brown, III-V brown; hind tarsal segments I-II each with 1 apical spur-like bristle, IV subcylindrical, V with 10 ventral strong spines, fore claws equal, long, slightly shorter than V (41.8 : 51.3), each with blunt small basal tooth, about 1/4 length of claw (11.4 : 41.8), hind very unequal, longer claw about 0.8 as long as V (45.6 : 55.1), with small basal tooth about 1/4 length of claw (11.4 : 45.6), smaller claw 1/3 of longer (15.2 : 45.6) and with very small basal tooth about 1/2 length of claw (7.6 : 15.2); RL-L 56 : 54 : 25 : 12 : 6 : 4.3 : 13.5 in fore, 89 : 81 : 53 : 17 : 9.5 : 7 : 14.5 in hind. Wing with veins and membrane very pale, microtrichia dot-like, anal lobe very obtuse, costa ending above end of  $M_2$ , just produced beyond tip of  $R_{4+5}$ , CR about 0.88, radial cell II about 4.2× as long as I (55 : 13), r-m (fig 3C) slightly shorter than base of  $M_1$  (3 : 4) and 1/2 as long as base of  $R_{4+5}$ , fMCu under end of r-m, RL-V 51 : 52 : 58 : 19 : 71. Halter with knob dark, stem yellow. Abdomen with tergites dark brown, with cerci white; spermathecae 2, dark brown, subequal, short-oval, 1+21×18 and 1+20×16.

Holotype ♀ (BISHOP 6690), Vunabakan, 180 m, 10 km E of Keravat, New Britain, 16-

20.XI.1959, Maa.

This is somewhat allied to dark specimen of *lalokiensis* Lee (Lee 1948), but distinctly differs in its possession of the entirely dark tibiae and shorter costa not extending beyond the level of apex of wing vein  $M_2$ .

14. *Dicrohelea novaeguineae* Tokunaga, n. sp. Fig. 3D.

Large, dark and yellow species with mid and hind femora entirely dark, hind tarsal segment I at least with 1 sub-basal ventral spine-like seta, last tarsal segments of all legs with 10 ventral batonnets, wing without color marking, forking point of  $M_{1+2}$  at end of cross-vein r-m. ♂ unknown.

♀. Body 3.25-3.45 mm long; wing 2.56-2.57×0.68-0.74 mm. Head with vertex dark brown, frons, clypeus and proboscis yellow; eyes just contiguous; mandible with 7 large cutting teeth; palp dark brown, 5-segmented (10 : 18 : 23.5 : 15.5 : 17.5), PR about 3.4. Antenna filiform, segment I yellowish brown, II-IX yellow but apically brown, X-XIV brown, AR 1.6-1.87, RL-8A 22 : 21 : 22.3 : 75.3 : 73 : 66 : 63 : 77.5 (W=5.5-6). Thorax entirely dark brown, scutum with small anterior spine-like tubercle, dense small setae, scutellum with 4-5 large and many small setae. Legs black and yellow; in fore, coxa yellow, but fuscous on basal corner, trochanter ochreous, femur yellow on basal part, gradually browned and darkened apically, tibia dark but pale ochreous on apical part, tarsal segments I-II yellow, brown at ends, III-V brown; in mid, coxa dark, trochanter brown, femur and tibia dark but femoral base brown and tibial end yellow, tarsus as in fore; in hind, coxa to femur dark, tibia dark on basal 1/2 or more and yellow on apical part, tarsus as in other legs; hind tibial comb with 10 apical bristles, fore and mid tarsal segments IV bell-shaped, hind tarsal segment IV cylindrical, tarsal spur-like apical setae present on mid and hind: mid tarsal segments I-II each with 2, hind I-II each with 1, hind I with additional 1-2 sub-basal spine-like ventral setae, V with 10 strong ventral spines, claws subequal in fore, unequal in mid and hind, RL of segment V to 2 claws with their teeth 64.5 : 50.5+15 : 47.5+13.5 in fore, 62.5 : 48.5+14 : 18+10.5 in mid, 66 : 56+13 : 18+9.5 in hind; RL-L 72 : 70.5 : 28.8 : 12 : 6 : 5 : 17 in fore, 94.3 : 72 : 37 : 10 : 5.5 : 5 : 15.5 in mid, 119.5 : 107 : 66.5 : 21.5 : 10.5 : 7.8 : 17.3 in hind. Wing very pale brown, costa ending slightly beyond tip of  $M_2$ , not produced beyond tip of  $R_{4+5}$ , CR 0.86-0.87,  $R_{4+5}$  extending closely along costa, radial cell II 4.3-4.5× as long as I (66 : 15), fMCu (fig 3D) under r-m, which ends at fork of  $M_{1+2}$  and as long as base of Rs, RL-V 64.5 : 69 : 76 : 25 : 87. Halter with knob dark brown, stem paler. Abdomen slender, brown on anterior segments, gradually paler caudad, or almost all tergites uniformly brown, caudal end and cerci white; spermathecae 2, dark brown, round, unequal, 2.5+24×23 and 2+19.5×18.

Holotype ♀ (BISHOP 6691), Cyclops Mts., 150-250 m, W. Sentani, Hollandia Area, NW NG, 16.VI.1959, Maa. Paratypes: ♀ with type; ♀, Lae, 10 m, NE NG, 10.VII.1957, Hardy; 2♀♀, Genjam, 100-200 m, 40 km W of Hollandia, NW NG, 1-10.III.1960, Maa.

This is very closely allied to the preceding species from New Britain, but is easily distinguished in the following differences: hind femur entirely dark, all tibiae yellow at least on apical ends, wing with costa ending slightly beyond tip of  $M_2$ , and forking point of  $M_{1+2}$  at end of r-m.

15. *Dicrohelea abdominalis* Tokunaga, n. sp. Fig. 3E.

Very large, yellow and dark species, abdomen at least with 1 large oval yellow spot on tergite IV, legs mainly yellow, knee parts dark, mid and hind femora dark on basal 1/2, hind basitarsus very long, last tarsal segment with 13 strong ventral spines, wing with costa distinctly produced beyond tip of  $R_{4+5}$ , fMCu under or just beyond r-m, no wing marking. ♂ unknown.

♀. Body about 4.68 mm long; wing  $3.56-3.81 \times 0.94-1.04$  mm ( $3.66 \times 0.98$  mm in mean). Head with vertex dark brown, frons, clypeus and proboscis yellow; eyes separated as wide as 1 facet; mandible with 7-8 large cutting teeth; palp dark brown, 5-segmented (11 : 20 :  $29 \times 8$  : 15 : 18), III cylindrical. Antenna very slender, with verticils very sparse on segments II-IX, dense and delicate on X-XIV, I dark brown, II-IX yellow, only brown on apical ends, X-XIV brown, only yellow on basal parts; AR about 2.03, RL-13A 42 : 28 : 25 : 23 : 26 : 23 : 24 : 25 : 93 : 88 : 90 : 91 : 92.5. Thorax almost entirely black, only prothorax yellow, scutum with anterior tubercle blunt, scutellum dark brown, with 3-4 large and many small setae. Legs mainly yellow, fore trochanter ochreous, mid and hind coxae and trochanters, basal 1/2 or 1/3 of mid and hind femora, all knee parts, and apical ends of all tibiae dark or dark brown, apical ends of all tarsal segments II and entire length of III-V pale brown; hind tibial comb with 11-12 apical bristles, tarsal apical spur-like setae: mid tarsal segments I-II each with 2, hind tarsal segments I-II each with 1, very fine, fore and mid tarsal segments IV bell-shaped, hind tarsal segment IV very long, about  $0.7 \times$  length of V (57 : 83.6), quite cylindrical, V with 13 ventral spines, fore and mid tarsal segments V missing, hind claw (probably small claw missing) about 0.7 as long as V (60.8 : 83.6), with very short and blunt basal tooth (60.8 : 13.3); in holotype, RL-L 85 : 83 : 38 : 13 : 7 : 6 : ? in fore, 117 : 92 : 57 : 12.5 : 7 : 6 : ? in mid, 157 : 143 : 116 : 34 : ? : ? : ? in hind; in 1 larger paratype, RL-L of hind 150 : 137 : 121 : 38 : 24.5 : 15 : 22. Wing glassy hyaline, with main veins, very pale yellow, without macro- and microtrichia of membrane, costa distinctly produced beyond end of  $R_{4+5}$ , this costal tip about  $2 \times$  length of r-m (13 : 6), ending above midway between ends of  $M_1$  and  $M_2$ , CR  $0.94(0.93-0.94)$ , radial cell II about  $4.85(4.0-5.4) \times$  long of I, r-m (fig 3E) far shorter than base of  $R_s$  (6 : 10), and slightly shorter than base of  $M_1$  (6 : 7.5), fMCu under or just beyond r-m, RL-V 89.7 : 93.3 : 107.3 : 39 : 141. Halter pale ochreous or with knob dark brown and stem yellow. Abdomen dark on anterior tergites and yellow on posterior tergites, II-IV or IV-V each with very large oval yellow spot; cerci yellow, spermathecae 2, dark brown, round, unequal,  $2+33 \times 33$  and  $2+26 \times 24$ .

Holotype ♀ (BISHOP 6692), Kassam, 1350 m, 48 km E of Kainantu, NE NG, 7.XI.1959, Maa. Paratypes: ♀ with type; ♀, at same place, 28. X. 1959, Maa; ♀, Hollandia, NW NG, 13.III.1960, Maa by sweeping.

This is very closely allied to *lalokiensis* Lee in the color of the thorax and legs, but highly differs in the presence of characteristic dark and yellow markings on abdominal tergites.

16. *Dicrohelea lalokiensis* Lee, 1948, Proc. Linn. Soc. N. S. Wales 73 : 69. Fig. 3F-J.

Large shining black and yellow species, wing with costa scarcely produced beyond tip of  $R_{4+5}$ , tarsal segment V with 10-14 ventral spines, hind basitarsus with 2 sub-basal ven-

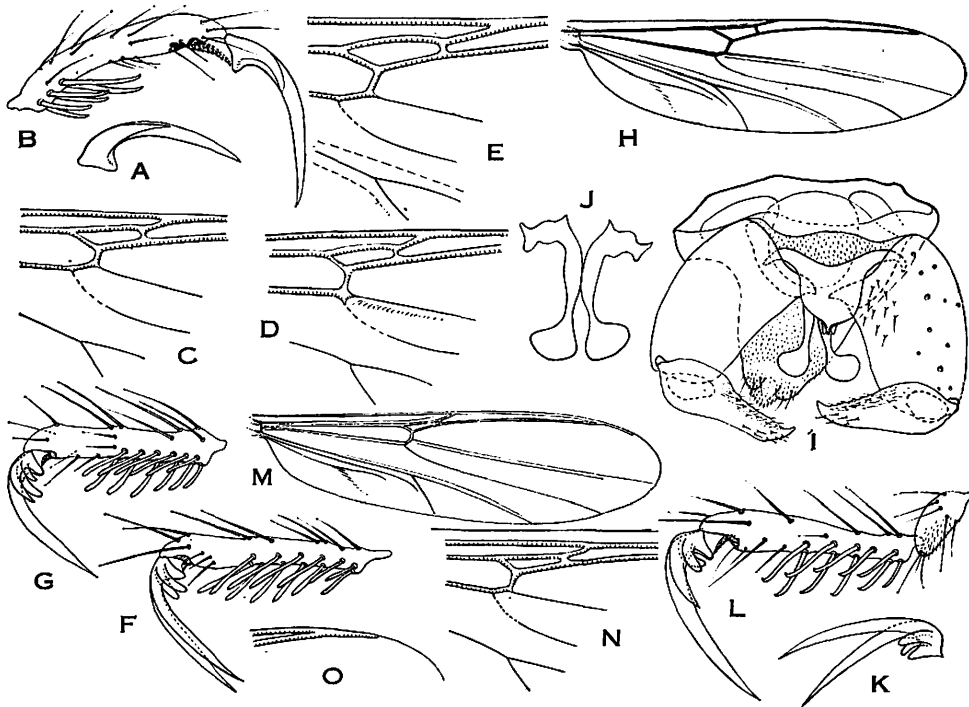


Fig. 3. A, *Xenohoelea maai* (♀), hind tarsal claw; B, *X. sarmensis* (♀), hind apical tarsal segment; C, *Dicrohelea novaebrittanica* (♀), middle part of wing; D, *D. novaeguineae* (♀), middle part of wing; E, *D. abdominalis* (♀), middle part of wing. F-J, *D. lalokiensis*: F, apical tarsal segment of ♀ fore leg; G, apical tarsal segment of ♀ mid leg; H, ♀ wing; I, ♂ hypopygium; J, parameres of ♂ hypopygium. K-O, *D. maai*: K, tarsal claws of ♀ fore leg; L, apical 2 tarsal segments of ♀ mid leg; M, ♀ wing; N, middle part of ♀ wing; O, costal apical part of ♀ wing.

tral spine-like setae, all femora mainly dark or brown, with yellow or ochreous preapical band.

♀. Body 2.73-3.58 mm long; wing 2.24-2.59×0.62-0.78 mm. Head with vertex dark brown, frons and clypeus yellow, mouth parts brown; eyes separated as wide as 1 facet or just contiguous; mandible with 10 large cutting and 2-3 minute basal teeth; palp slender, 5-segmented (10.5 : 16.5 : 22×6.5 : 13.5 : 18.5), III cylindrical. Antenna very slender, with segment I brown, II-IX yellow, but only brown on apical ends, X-XIV brown, AR 2.12-2.31, RL-8A 18.5 : 18 : 18.5 : 80 : 74.5 : 69.5 : 64.5 : 77.5 (W=5). Thorax entirely dark, scutum with small anterior tubercle, densely setigerous with small stiff setae, scutellum with 4-6 strong and many small setae. Legs with fore coxa and trochanter ochreous, mid and hind dark, all femora and tibiae largely dark or dark brown, but femoral bases yellow or yellowish brown, preapical parts of femora and apical tips or 1/2 yellow; in 1♀ specimen, fore femur and tibia largely ochreous, with knee part dark, femoral preapical band and tibial end only slightly paler; in another ♀, hind tibia yellow on apical 1/2 and brown on apical end; tarsal segments I-II or I-III yellow, with apical ends brownish, III-V or IV-V brown; hind tibial comb with 8-11 apical bristles, tarsal apical spur-like

setae: mid tarsal segments I-II each with 2, hind tarsal segment I or I-II each with 1, hind tarsal segment I with 2 similar sub-basal setae, V with 10-14 ventral strong spines, fore tarsal segment IV bell-shaped, other IV cylindrical, fore claw (fig 3F) equal or sub-equal, basally toothed, other claws (fig 3G) quite unequal, but similarly toothed at bases. RL-L in larger specimens about 86.5 : 87 : 41.5 : 18 : 8.3 : 7.2 : 2.0 in fore, 108.5 : 88 : 49.3 : 16.5 : 7 : 6.3 : 16.8 in mid, 136.5 : 124.5 : 96.8 : 28.8 : 16.5 : 10.8 : 20.5 in hind. Wing (fig 3H) with veins yellowish, costa scarcely produced beyond tip of  $R_{4+5}$ , ending above mid-way between ends of  $M_1$  and  $M_2$ , CR 0.9, radial cell II 4-5.3× long of I (72 : 15), r-m nearly ending at fork of  $M_{1+2}$ , RL-V 60.5 : 61 : 69 : 24 : 92. Halter with knob dark, stem yellow. Abdomen dark, but gradually paler towards caudal end and last segment whitish; cerci white, spermathecae 2, brown, short-oval, unequal, 1+26.5×22.5 and 1.5+22×17.5.

♂. Hypopygium (fig 3I) attached to 1♀ as follows: coxite cylindrical, style tapered, arcuate, far shorter than coxite (54 : 70); aedeagus triangular, parameres (fig 3J) separated, stout, shorter than style (37 : 54), with bases round and dilated.

SPECIMENS EXAMINED: 2♀♀, Musgrove Riv., 100 m, near Javarere, Daradae, SE NG, 4.X.1958, Gressitt; 4♀♀, Korn Farm, 1500 m, W. Highlands, NE NG, 19.X.1958, Gressitt.

This is rather variable in color and size in individual specimens. The type specimens collected by Lee along the Laloki River, Papua, also showing color variation of legs in some extent as showed by Lee. The present New Guinea species is only slightly different from the original description having 10 ventral batonnets of mid tarsal segment V and narrower radial cell II.

#### 17. *Dicrohelea maai* Tokunaga, n. sp. Fig. 3K-O.

Large, dark or dark brown species with legs yellow and dark, as in *lalokiensis* Lee, costal wing vein distinctly produced beyond tip of  $R_{4+5}$ , radial cell II narrow, last tarsal segment with 9-10 ventral batonnets. ♂ unknown.

♀. Body 2.8-3.68 mm long; wing 2.34-2.57×0.64-0.69 mm. Head with vertex brown, frons and clypeus ochreous or yellow; eyes narrowly separated or just contiguous; mandible with 7 large and 2-4 small basal teeth; palp dark brown or brown, 5-segmented (8.5 : 16 : 20.5×6 : 13 : 14.5), III cylindrical, with about 4 sensillae on apical part. Antennal segment I brown or ochreous, II-IX pale ochreous or yellow, with apical parts brownish, X-XIV brown, with bases pale brown, AR 1.84-2.0, RL-8A 17.5 : 17.5 : 18 : 71.5 : 69 : 65 : 64.1 : 71 (W=7.5-8). Thorax entirely dark, scutum with anterior spine-like tubercle, scutal surface setigerous with dense stiff small setae, without strong bristles, scutellum probably with 4 large setae and many small stiff setae. Legs dark and yellowish; in fore, coxa and trochanter yellow or ochreous, knee part dark or dark brown, femur largely yellow, with basal end and dorsal side brownish, tibia dark or dark brown on basal 2/3, yellow or ochreous on preapical part, brown on apical end, tarsal segments I-II yellow or pale ochreous, but brown on apical ends, III-V brown; in mid, coxa dark, trochanter dark or ochreous, knee part dark or dark brown, femur dark or dark brown on basal 1/2-2/3, preapical part broad yellow, tibia yellow, but basal 1/3-1/4 dark, tarsus as in fore; in hind, coxa and trochanter dark, femur as in mid, but preapical yellow parts somewhat fuscous in 1 paratype, tibia as in mid, but basal 1/4-1/2 dark, apical end dark in holotype, tarsus as in mid, but segment III far paler; hind tibial comb with

9-10 apical bristles, fore and mid tarsal segments III-IV bell-shaped, hind cylindrical, tarsal apical spur-like setae on mid I-II bearing 1-2, V with 9-10 strong ventral spines, fore claws (fig 3K) equal, mid (fig 3L) and hind distinctly unequal, each claw with basal small tooth, RL of V and claws with basal teeth in holotype 47 : 38+11 : 38+11 in fore, 46 : 40+8 : 15+8 in mid, 60 : 53+11 : 14+8 in hind ; RL-L 58 : 57 : 26 : 9 : 4.5 : 4.5 : 12.5 in fore, 79 : 62 : 38 : 9.3 : 5 : 4.5 : 12 in mid, 103 : 97 : 80 : 23 : 15 : 10 : 15 in hind. Wing (fig 3M) entirely glassy hyaline, veins very pale, costa (fig 30) distinctly produced beyond tip of  $R_{4+5}$ , this free part about  $3\times$  length of r-m (13 : 4.5), ending slightly before tip of  $M_1$ , CR 0.92-0.95,  $R_{4+5}$  extending closely along costa, radial cell II 4.5-4.8 $\times$  length of I (70.5 : 15), fMCu under or just beyond r-m (fig 3N), RL-V 60.8 : 62 : 71.5 : 25 : 88. Halter with knob dark or dark brown, stem and base yellow or white. Abdomen dark or dark brown on anterior segments, gradually paler on caudal segments, apical 2-3 segments yellow or white; cerci very pale; spermathecae 2, dark brown, unequal, round or short-oval, 1.5+25.5 $\times$ 23 and 1+19 $\times$ 17.5.

Holotype (BISHOP 6693) ♀, Cyclops Mts, W. Sentani, Hollandia Area, NW NG, 16.VI. 1959, Maa. Paratype: ♀, Vunabakan, 180 m, 10 km E of Keravat, New Britain, 16-20. XI.1959, Maa (BISHOP).

This is very closely allied to *lalokiensis* Lee in general color and structure, but very distinctly different from the allied species in strongly produced apical part of costa beyond end of  $R_{4+5}$ , costal tip being far longer than r-m and slightly shorter than radial cell I.

#### Genus *Homohoelea* Kieffer (1917)

This genus is only known from Malaysia and S. America and closely allied to *Dicrohoelea*, but it is highly characteristic differing from the allied genus as follows: all tarsal claws of ♀ equally well developed and simple, lacking basal barbs or teeth.

#### 18. *Homohoelea hollandiensis* Tokunaga, n. sp. Fig. 4A-B.

Large, yellow and dark species, scutum with dark brown clouds on orange yellow ground color, anterior tubercle present, mid and hind femora each with broad dark preapical band followed by narrow yellow band and dark apical band of knee, last tarsal segment with 10 rather slender ventral batonnets, and wing vein costa extending near to wing tip. ♂ unknown.

♀. Body about 6.11 mm long; wing 4.32 $\times$ 1.22 mm. Head entirely dark brown; eyes widely contiguous, proboscis about 1/2 as long as head; mandible with 7 cutting teeth. Palp cylindrical, small, 5-segmented (14 : 30 : 36 $\times$ 12 : 17 : 19). Antennal segment I brown, other segments missing. Thorax orange yellow and dark brown; pronotum yellow, scutum with blunt anterior tubercle, dark irregular spots on lateral sides, caudoscuteal area and paratergites dark brown, scutellum setigerous, dark brown, with 2 obscure fuscous yellow spots; postscutellum also dark brown, with median fuscous yellow spot; pleural and sternal sides mainly yellow, with irregular brown clouds. Legs mainly yellowish ochreous, but basal parts of coxae and knee parts dark or dark brown, femur with broad preapical brown band, apical ends of tarsal segments and entire length of penultimate segment brownish; hind tibial comb with 10 apical bristles, hind tarsal segment I with 1, II-II each with 2 slender apical spur-like bristles, IV subcylindrical, V (fig 4A) with 10 ventral

spine-like bristles on basal 1/2, claws equal, simple, long, just shorter than segment (24 : 25.5); RL-L of hind 175 : 137 : 84 : 36 : 16 : 11 : 25.5; fore and mid missing. Wing (fig 4B) with anterior veins ochreous, microtrichia dot-like, macrotrichia absent; costa long, ending slightly before wing apex, CR about 0.98, septum of apical radial cells very faint, Rs+R<sub>4+5</sub> very long, extending closely along costa, radial cell I about 11× as long as wide, II very narrow and long, about 4.5× length of I (148 : 34), fMCu under middle of radial cell I, RL-V 110 : 117 : 143 : 75 : 193. Halter very pale. Abdomen mainly brown, with long yellowish mid dorsal stripe, tergite I largely yellow; cerci brown; spermathecae 2, dark, elongate-oval, unequal 50×31 and 63×40.

Holotype ♀ (BISHOP 6694), Cyclops Mts, 50-100 m, W. Sentani, Hollandia Area, NW NG, 22-24.VI.1959, Maa.

This is characteristic in the tergal markings of thorax and distinctly different from *inermithorax* Kieffer from Singapore in the presence of a scutal anterior tubercle.

#### Genus *Johannsenomyia* Malloch (1915)

This genus is often discussed by the following revisers: Edwards (1926, Trans. Ent. Soc. Lond. 74 : 413), Johannsen (1943, Ann. Ent. Soc. Amer. 36 : 784), Lee (1948, Proc. Linn. Soc. N. S. Wales 73 : 67), and Wirth (1952, Univ. Calif. Publ. Ent. 9 : 210). I intend to adopt chiefly from Wirth's generic diagnosis as follows: femora slender and unarmed, lacking ventral spines, tarsal segments IV apically flattened and more or less cordiform or bell-shaped; in ♀, all tarsal segment V with strong black ventral batonnets and all claws well developed, fully 1/2 as long as segments, equally paired for each leg and each with large basal tooth on lateral side, abdominal gland-rods quite absent.

#### 19. *Johannsenomyia nigra* Tokunaga, n. sp. Fig. 4C-E.

Large, black species with dark or dark brown legs and halter, anterior wing veins dark brown; wing with basal section of vein M<sub>1</sub> longer than r-m, tarsal segments V at least with 9 ventral batonnets. ♂ unknown.

♀: Body about 3.51 mm long; wing 3.24×0.92 mm. Head and mouth-parts black; eyes separated as wide as 2 facets; mandible with 7 large cutting teeth; palp 5-segmented (11 : 20 : 22×9 : 14 : 16), III quite cylindrical. Antennae missing. Thorax entirely black, scutal anterior tubercle not visible, probably absent, scutellum with 6 large bristles and densely setigerous with short stiff setae as in scutum. Legs mainly black, but bases of coxae and femora, all trochanters and tarsal segments I-IV dark brown; hind tibial comb with 6 apical bristles, tarsal apical spur-like setae absent on fore, present on mid tarsal segments I-III, I-II each bearing 2, III with 1, fore and mid IV bell-shaped, fore V with 9 and mid V with 10 ventral strong spines, claws unequal, fore claws (fig 4C) about 4/5 of V (41 : 55), each with basal tooth about 1/4 length of claw, mid claws (fig 4D) similar to fore, but basal tooth not so sharply pointed, hind tarsal segments III-V missing; RL-L 75 : 69 : 36 : 15.7 : 9 : 6 : 14.5 in fore, 98 : 76 : 51 : 18 : 9.8 : 6.5 : 15 in mid, 110 : 97 : 64 : 24 : ? : ? : ? in hind. Wing with anterior veins dark brown, costal and radial cells fuscous, costa not produced beyond tip of R<sub>4+5</sub>, ending just before end of M<sub>2</sub>, CR about 0.83, radial cell I about 5× as long as wide, II about 2.4× of I (69 : 25), fMCu before base of R<sub>1</sub> and far before r-m, base of M<sub>1</sub> longer than r-m and shorter than base of Rs (fig 4E), RL-V 88 : 94 : 89 : 44 : 102. Halter black. Abdomen with tergites and



cerci dark brown, subgenital plate Y-shaped, with broad arms, setigerous with long setae on caudal margin; spermathecae 2, dark, short-oval, unequal 26×19 and 17×15.

Holotype ♀ (BISHOP 6695), Kassam, 1350 m, 48 km E. of Kainantu, NE NG, 7.XI.1959, Maa.

This is very closely allied to *australiensis* Lee, but from which it can easily be distinguished by the difference of the wing venation: stem of fMCu far shorter than M, fMCu being located far before basis of M<sub>2</sub>.

#### Genus *Palpomyia* Meigen (1818)

For synonym, literature and diagnosis refer to Wirth, 1952, Univ. Calif. Publ. Ent. 9: 216.

#### KEY TO NEW GUINEA SPECIES OF PALPOMYIA

1. Mid and hind femora and tibiae uniformly dark brown or brown ..... 2  
Mid and hind femora and tibiae not uniformly dark brown or brown..... 4
- 2 (1). All femora with ventral spines..... 20 *jimmensis*  
Mid and hind femora without ventral spines ..... 3
- 3 (2). Wing with forking point of vein M<sub>1+2</sub> at end of r-m..... 21. *atypipennis* (♂)  
Wing with forking point of vein M<sub>1+2</sub> located distinctly before r-m .....  
..... 22. *serraticauda*
- 4 (1). Hind femur with several ventral spines ..... 23. *ancorifera*  
Hind femur usually without ventral spines or rarely with 1 spine at most..... 5
- 5 (4). Fore leg with knee part distinctly dark ..... 6  
Fore leg without distinctly darkened knee part..... 9
- 6 (5). Wing with forking point of M<sub>1+2</sub> at end of r-m ..... 24. *novaebritainica*  
Wing with forking point of M<sub>1+2</sub> before r-m ..... 7
- 7 (6). Mid and hind femora not dark on basal 1/2, but largely yellow ..... 25. *magna*  
Mid and hind femora dark on basal 1/2 ..... 8
- 8 (7). Fore femur distinctly inflated; ♀ without abdominal gland rods.....  
..... 26. *inflatifemoralis*  
Fore femur not distinctly inflated; ♀ with abdominal gland rods ..... 27. *maai*
- 9 (5). Thoracic tergites with lanceolate setae; fore femur distinctly inflated.....  
..... 28. *lanceolifera*  
Thoracic tergites with only normal setae; fore femur not distinctly inflated..... 10
- 10 (9). Hind leg with clearly demarcated dark knee part from yellow parts of femur  
and tibia..... 11  
Hind leg without clearly demarcated dark knee part ..... 12
- 11 (10). Fore femur with 6-8 ventral spines..... 29. *laensis*  
Fore femur with 4-5 ventral spines..... 30. *novaequineae*
- 12 (10). Mid and hind femora yellow and dark, clearly demarcated ..... 13  
Mid and hind femora not clearly demarcated into yellow and dark parts..... 14
- 13 (12). Hind femur with apical yellow part shorter than 1/2, apical end slightly  
brownish ..... 31. *novaeirelandensis*  
Hind femur with apical yellow part longer than 1/2, without fuscous or brown-  
ish apical end..... 32. sp. near *novaeirelandensis*

- 14 (12). Wing with costa produced beyond tip of  $R_{4+5}$  at least as long as r-m... 33. *stella*  
 Wing with costa not or just produced beyond tip of  $R_{4+5}$ ..... 15  
 15 (14). Mid and hind femora uniformly pale ochreous ..... 34. *brandti*  
 Mid and hind femora largely brown or dark brown..... 22. *serraticauda* (♀)

20. *Palpomyia jimensis* Tokunaga, n. sp. Fig. 4F.

Large, dark brown species, legs dark brown to brown, all femora with ventral spines, wing with basal section of  $M_1$  very short, costa extending rather long, CR being about 0.9, abdomen with 1 strong and 1 slender gland-rods. ♂ unknown.

♀. Body about 3.38 mm long; wing  $2.34 \times 0.78$  mm. Head entirely dark brown; eyes linearly separated; mandible with 10-11 large cutting teeth; palp brown, 5-segmented (9 : 14 :  $26 \times 11$  : 19 : 18), III elongate oval, with several sensillae on apical 1/2. Antennal segment I brown, other segments missing. Thorax entirely dark brown, scutum with conical anterior tubercle, scutellum with 6 large bristles and dense small setae. Legs with coxae to femora dark brown, tibiae brown, tarsal segments I-II pale brown, III-V brown; fore femur with 9 ventral spines on apical 1/2, mid with 2-4 on apical 1/4, hind with 3-4 on apical 1/4, tarsal apical spur-like bristles: fore tarsal segments II-III each with 1 slender, mid tarsal segment I with 3, hind tibial comb with 8-9 apical bristles, claws simple, equal, about 1/2 as long as segment V (20 : 40 in fore, 24 : 45 in hind), angulate preapically on both sides (fig 4F). RL-L 63 : 59 : 25.5 : 10 : 5 : 6 : 10 in fore, 78 : 62.5 : 38.5 : 9 : ? : ? : ? in mid, 86 : 78 : 48 : 16.5 : 5.5 : 5.2 : 11 in hind. Wing with main veins brown, brown clouds along anterior veins, costa rather long, CR about 0.9, radial cell II about  $2.7 \times$  length of I (60 : 22), basal section of  $M_1$  very short, shorter than r-m, fMCu under r-m, RL-V 58 : 64 : 71 : 37 : 90. Halter brown. Abdomen and cerci brown; tergite VI with gland

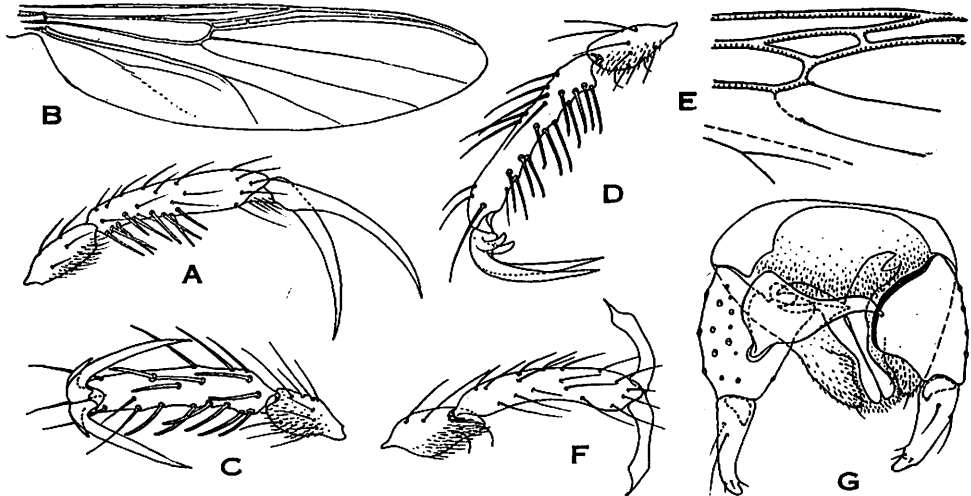


Fig. 4. A-B. *Homohelea hollandensis* (♀): A, apical 2 tarsal segments of hind leg; B, wing. C-E. *Johannsenomyia nigra* (♀): C, apical 2 tarsal segments of fore leg; D, apical 2 tarsal segments of hind leg; E, middle part of wing. F, *Palpomyia jimensis* (♀), apical 2 tarsal segments of hind leg; G, *P. atypipennis* (♂), hypopygium.

rods very slender, pale, ending under anterior part of III, VII with well developed, ending under anterior part of IV; spermathecae 2, brown, unequal, short oval,  $3+21 \times 17$  and  $2+16 \times 13$ .

Holotype ♀ (BISHOP 6696), Tsenga 1200 m, Upper Jimmi Vall., NE NG, 13.VII.1955, Gressitt.

This is specific in the entirely dark color, presence of ventral spines on all femora and absence of basal barbs of all claws; quite different from all known species of New Guinea and somewhat allied to North American *linsleyi* Wirth in general color and structure of femora, but distinctly differing from the latter as follows: TR of hind leg larger than 2.8 being 2.91, claws far shorter than segment V being about 0.9, and knob of halter not white being brown.

21. *Palpomyia atypipennis* Tokunaga, n. sp. Fig. 4G.

Small brownish species. In ♂, legs almost entirely brown, all femora without ventral spines, forking point of wing vein  $M_{1+2}$  at end of r-m, parameres of hypopygium with long paired median lobes extending side by side. ♀ more ochreous than ♂, hind femur and tibia largely dark brown, but ochreous on basal part of femur and middle part of tibia (fore and mid legs missing), wings normal, abdomen brownish ochreous, with well developed 5 pairs of gland rods.

♂. Body about 1.76 mm long; wing  $1.27 \times 0.4$  mm. Head and mouth parts entirely brown; eyes separated as wide as 1.5 facets; palp small, stout, 5-segmented ( $5 : 8 : 11 \times 6 : 7.5 : 7$ ), III with 2-3 sensillae beyond middle. Antennal segment I brown, other segments missing. Thorax entirely brown, scutum uniformly setigerous with small setae, anterior tubercle minute, indistinct, scutellum with 4 large and many small setae. Legs almost uniformly brown, but tarsal segments I-II very pale, only brown at apical ends; III subcylindrical, IV bell-shaped, V elongate, femoral spines quite absent, hind tibial comb with 4-5 brown apical bristles, tarsal segments I-III with apical spur-like bristles, claws cleft at tips somewhat unequally; RL-L  $37 : 35 : 16 : 7 : 3.5 : 3 : 6.3$  in fore,  $44 : 34 : 19 : 6 : 3.5 : 3 : 6$  in mid,  $49.5 : 43 : 26 : 10 : 4.5 : 3.5 : 7$  in hind. Wing very pale brown, veins obscure, costa ending slightly before tip of  $M_2$ , CR 0.84,  $M_{1+2}$  forking at end of r-m, radial cell II  $2.56 \times$  length of I ( $23 : 9$ ), r-m as long as basal section of Rs ( $3.5 : 3.5$ ), RL-V  $35 : 38 : 40 : 13 : 37$ . Halter brown. Abdomen brown or pale brown; hypopygium (fig 4G) brown, sternite widely concave on caudal margin, coxite tapered, short, style small, tapered, about  $4/5$  long of coxite ( $20 : 25$ ), with apex round, aedeagus bell-shaped, with basal arms strong, basal membrane pubescent on caudal part, parameres almost separated, caudal lobe clavate, long, as long as style ( $19 : 20$ ).

♀. Body about 2.67 mm long; wing  $1.99 \times 0.57$  mm. General color as in ♂, but color of legs not ascertained since almost all segments are missing, and only coxae, trochanters, hind femur and tibia remain. Head mainly brown, frons and clypeus yellowish ochreous; eyes separated as wide as 3 facets; mandible with 6 cutting teeth; palp pale ochreous. Antennal segment I yellow, other segments missing. Thorax entirely brownish ochreous, scutum rather sparsely setigerous, with anterior tubercle, scutellum with 4 large bristles. Fore coxa and trochanter yellowish ochreous, other coxae brownish ochreous, trochanters ochreous, hind femur yellowish ochreous on basal  $1/2$ , dark brown on apical  $1/2$ , tibia brown on basal  $2/5$ , yellow on middle  $2/5$ , dark on apical  $1/5$ ; hind tibial comb with 7

ochreous bristles. Wing very pale, anterior veins pale brown, costa ending before apex of  $M_2$ , hardly produced beyond tip of  $R_{4+5}$ , CR about 0.83, radial cell II  $2.78 \times$  length of I, r-m about 0.55 of base of Rs and 0.67 of base of  $M_1$  (3 : 5.5 : 4.5), fMCu under origins of Rs and  $M_2$ , RL-V 55 : 55 : 60 : 20 : 59. Abdomen and cerci brownish ochreous, with yellow intersegmental bands, tergites more or less concave between bases of gland rods; gland rods well developed on III-VII, extending under tergite II; spermathecae 2, dark brown, round, subequal,  $3+14 \times 13$  and  $2.5+13 \times 12.5$ .

Holotype ♂ (BISHOP 6697), NE of air strip, 46 m, Kampong Landbouw, 30 km from Biak, NW NG, 16.VII.1957, Hardy. Allotype ♀ (BISHOP), Kerema, SE NG, 3-9.V.1959, Michener.

This ♂ is quite characteristic in its possession of quite unarmed femora and in its absence of basal section of  $M_1$ ,  $M_2$  arising at end of r-m, and the ♀ is also characteristic in bearing 5 pairs of very well developed gland rods all of which extend into abdominal segment II. S. African *cinnae* de Meillon may be allied to the present species in the almost absent femoral ventral spines and in the structure of the ♂ hypopygium, besides the similarity of the general color, but its ♂ has quite sessile median fork of wing and the ♀ has a single pair of gland rods, distinctly differing from *atypipennis*.

## 22. *Palpomyia serraticauda* Tokunaga, n. sp. Fig. 5A.

Brown or dark brown species. ♂ small, fore legs largely very pale ochreous, other legs more brownish, fore femur with 4-5 ventral spines, claws basally toothed, lateral margins of aedeagus serrated, median lobes of parameres united and with large hook-like projection. ♀ far larger and darker than ♂, legs largely dark brown, 4 pairs of abdominal gland rods well developed, extending into segment II.

♂. Body about 1.89 mm long. Wing  $1.52 \times 0.4$  mm. Head brown, mouth parts very pale; eyes separated as wide as 1.5 facets; palp 5-segmented (5 : 13 : 16 : 7 : 15), III with several sensillae on middle swollen part. Antenna entirely brown, RL-A 30 : 15 : 15...13 : 13 : 13 : 13 : 15 : 16.5 : 72 : 100 : 101 (W=7-8.5). Thorax entirely brown, scutum rather densely setigerous with brown small setae, anterior scutal tubercle conical, scutellum with 4 large and 12 small setae. Fore leg very pale ochreous, 2 posterior pairs brown, but all coxae brown, bases of mid and hind femora very pale ochreous, fore tarsal segments III-V ochreous; fore femur with 4-5 ventral spines, hind tibial comb with 6 apical bristles, tarsal apical spur-like setae present on mid tarsal segments I-III, each with 2; RL-L 35 : 31 : 15 : 6 : 3.7 : 3.2 : 4.2 in fore, 43 : 40.5 : 26 : 5.5 : 3.5 : 3 : 4.8 in mid, 51.5 : 48 : 29.7 : 11.5 : 4 : 3.2 : 5.1 in hind. Wing very pale brown, CR about 0.79, costa slightly produced beyond tip of  $R_{4+5}$ , this free part shorter than r-m, radial cell II about  $2.63 \times$  length of I, r-m about as long as bases of Rs and  $M_1$  (4 : 3.5 : 4.8), fMCu under origin of  $M_2$ , RL-V 48 : 46 : 47.5 : 14 : 32. Halter brown. Abdomen brown or pale brown, hypopygium (fig 5A) dark or dark brown, closely similar to that of *stella*, but aedeagus with large median lobe which is fully as long as style (29 : 28) and strongly barbed.

♀. Body about 4.03 mm long; wing  $3.06 \times 0.9$  mm. Head dark brown, clypeus ochreous eyes separated as wide as 2 facets; mandible with 6 cutting teeth; palp dark brown, 5-segmented (10 : 18 : 29 : 8 : 20 : 29), III subcylindrical, with several sensillae on basal 1/2; antennal segment I brownish ochreous, other segments missing. Thorax entirely dark brown rather sparsely setigerous with small setae on dorsal side, scutal anterior tubercle conical,

pointed, scutellum with 5 long bristles. Legs almost entirely dark brown, only paler on tarsal segments I-II; hind tibial comb with 10-11 brown apical bristles; RL-L 101 : 93 : 54 : 22 : 7 : 6 : 9 in hind; fore legs and mid tarsi missing. Wing very pale brown, anterior veins brown, costa ending above midway between apices of  $M_2$  and  $M_{3+4}$ , CR about 0.83, radial cell II about  $2\times$  length of I, r-m  $3/5$  of base of Rs and about  $1/2$  of base of  $M_1$  (4.5 : 7.5 : 8), fMCu under r-m, RL-V 82 : 83 : 93 : 38 : 94. Halter white. Abdomen dark brown, cerci pale; gland rods present on tergites IV-VII, ending under tergite II; spermathecae 2, dark brown, small, round, unequal,  $4+18\times16$  and  $?+14\times13$ .

Holotype ♂ (BISHOP 6698), Brown Riv., near Port Moresby, SE NG, 17.VI.1957, Hardy. Allotype ♀ (BISHOP), Nondugl, 1600 m, NE NG, 9.VIII.1955, Gressitt.

This ♂ is very closely related to that of New Guinean *stella* Tokunaga in possession of characteristic style and parameres, but differs in the structure of lateral margins of aedeagus from the related species. The ♀ is closely similar to *atypipennis* in general color, but hind tibiae are uniformly dark brown, lacking paler median part and radial cell II short being only  $2\times$  length of I.

### 23. *Palpomyia ancorifera* Tokunaga, n. sp. Fig. 5B-C.

Large dark brown species, legs with clear yellow markings, hind femur with 8 ventral spines on apical  $1/4$ , ♀ without abdominal gland rods, ♂ hypopygium with styles small, pointed, parameres with caudal lobes separated, far longer than style, apical parts strongly curved and pointed.

♀. Body about 4.33 mm long; wing  $3.06\times0.8$  mm. Head with vertex dark brown, clypeus and mouth parts ochreous; eyes just contiguous; mandible with 7 cutting teeth; palp slender, 5-segmented (12 : 24 :  $30\times10$  : 15 : 17), III with many sensillae on ventral side. Antennal segment I brown, other segments missing. Thorax almost entirely setigerous with dense small setae, anterior tubercle sharply pointed, scutellum ochreous, with 4 large and many small setae. Legs with all coxae and trochanters dark brown, hind leg with knee part broadly dark, femur dark on basal  $1/2$ , yellow on following  $1/4$ , with 6 dark ventral spines on apical  $1/4$ , tibia dark on basal  $1/3$ , yellow on apical  $2/3$ , hind tibial comb with 10 yellow apical bristles; other segments missing. Wing with veins brown, stripe along under side of  $M_1$  fuscous, costa ending above apical  $1/3$  between ends of  $M_2$  and  $Cu_1$ , radial cell II about  $3.9\times$  length of I, CR 0.8, r-m about  $1/2$  of base of Rs or of  $M_1$  (5 : 11 : 10), RL-V 83 : 85 : 93 : 30 : 88. Halter dark brown. Abdomen entirely brown; cerci pale brown; gland rods absent; spermathecae 2, brown, oval, unequal,  $1+39\times30$  and  $1+32\times26$ .

♂. Hypopygium (fig 5B) attached to ♀ type dark brown, sternite widely but shallowly concave; coxite subcylindrical, slightly tapered, style small, about  $1/2$  as long as coxite (24 : 50), oval, with pointed tip; aedeagus broad, subtriangular, basal membrane entirely pubescent; parameres (fig 5C) rather slender, with paired caudal lobes, somewhat swollen on preapical parts, sharply pointed and strongly curved on apical  $1/3$ , basal arms fused and forming M-shaped sclerite.

Holotype ♀ with ♂ hypopygium (BISHOP 6699), Musgrove Riv., 100 m, near Javarere, Daradae, SE NG, 4.X.1958, Gressitt.

This is highly specific in the structure of the ♂ hypopygium and the presence of ventral spines on the banded hind femur. The ♂ hypopygium is somewhat similar to that of Tas-

manian *decima* Lee, but the ♀ is quite different in the development of hind femoral ventral spines. Another allied species may be European *fulva* Macquart but it has only 3-4 ventral spines of hind femur, pale white halteres, dark tibial apex, and pale basal 2/3 of hind femur distinctly differing from *ancorifera* n. sp.

24. *Palpomyia novaebritainica* Tokunaga, n. sp. Fig. 5D.

Small brown species, fore femur with 5 spines widely arranged on ventral side, all knee parts brown, wing with forking point of  $M_{1+2}$  at end of r-m, ♂ hypopygium with parameres quite separated. ♀ unknown.

♂. Body about 2.02 mm long; wing  $1.38 \times 0.4$  mm. Head brown, but clypeus and mouth parts very pale; eyes separated as wide as 3.5 facets; palp short, stout, 5-segmented (7 : 9 :  $14 \times 8$  : 11 : 11). Antennal segment I brown, other segments missing. Thorax entirely brown, scutum setigerous with many small setae, scutal anterior tubercle distinct, scutellum with 4 large and many small setae. Legs with all coxae, knee parts, apical ends of tibiae and tarsal III-V brown, tibial preapical 1/2 and tarsal segments I-II very pale ochreous, femora somewhat different in color from each other: fore mainly very pale ochreous, with pale brownish sub-basal cloud, mid largely pale brown, with base and preapical band very pale ochreous; fore femur with 5 spines distributed on ventral side, hind tibial comb with 5-6 apical bristles, tarsal apical spur-like bristles present on mid tarsal segments I-II single and rather slender, claws unequally bifid; RL-L 41 : 37 : 17 : 8 : 3.7 : 3 : 7 in fore, 45 : 37 : 22 : 8.5 : 4 : 3 : 6.2 in mid, 53 : 45 : 30 : 12 : 5 : 3.4 : 8.5 in hind. Wing entirely very pale, costa ending above midway between ends of  $M_2$  and  $Cu_1$ , CR 0.8, radial cell II about  $2.44 \times$  length of I (22 : 9), r-m ending at forking point of  $M_{1+2}$ , subequal to base of Rs (3 : 4), fMCu just before r-m, RL-V 40 : 44 : 44 : 10 : 35. Halter brown. Abdomen entirely brown; hypopygium (fig 5D) broad, with sternite shallowly concave on caudal margin; coxite short, tapered, style arcuate, slightly shorter than coxite (23 : 27), pointed at tip; aedeagus broad, bell-shaped, with basal roots rather slender, basal membrane pubescent; parameres separated, but closely applied together, slightly clavate, longer than coxite (29 : 27).

Holotype ♂ (BISHOP 6700), Lindenhafen, 2 m, S. Coast, New Britain, 24.V.1956, Gressitt.

This is allied to *flavipes* Meigen and *nemorivaga* Goetghebuer known from the Northern Hemisphere, but the hind femur with a yellowish or pale ochreous preapical band and the wing with the median fork located just at end of r-m, distinctly differs from the allied species.

25. *Palpomyia magna* Tokunaga, n. sp. Fig. 5E.

Large brown species, fore femur with 8-10 ventral spines, legs largely yellow, femora without dark bands except for dark brown knee parts, abdomen ochreous, with very pale median stripe on anterior dorsal side throughout tergites I-IV, gland rods 4 pairs, rather short. ♂ unknown.

♀. Body 4.62-4.81 mm long; wing  $3.76-3.87 \times 1.01-1.07$  mm. Head dark brown, but frons and mouth parts pale ochreous; eyes separated as wide as 1 facet; mandible with 6 large cutting and 5-6 minute ventral teeth; palp 5-segmented (9.5 : 19 :  $32.5 \times 9$  : 21.5 : 27),

I-III yellow, IV-V dark, III flask-like, with several sensillae on basal swollen part. Antennal segment I yellowish pale brown, with apical part brown, II-VI also pale but apically brown, VII-XIV dark brown; AR 1.46, RL-8A 41.5 : 43 : 50 : 96 : 100 : 110 : 110 : 136 (W=8-10). Thorax mainly brown, caudal scutal area, scutellum, pleural and sternal areas ochreous, scutal anterior tubercle sharply pointed, scutellum with 4 large and many minute setae. Legs with coxae, knee parts, and tibial ends brown or dark brown, tarsal segments II-IV brown or pale brown, other parts and segments entirely yellow; fore femur (fig 5E) slightly inflated, with 8-10 ventral spines on entire length, hind tibial comb with 6-8 dark brown apical bristles, claws small, equal, simple; RL-L 78 : 70.5 : 31 : 11.5 : 6 : 5.5 : 9 in fore, 102 : 90 : 54.5 : 9.1 : 5.3 : 4.8 : 8 in mid, 127 : 109.5 : 22.5 : 5.8 : 4.8 : 8 in hind. Wing pale brown, apical part more brownish, veins brown, costa ending before tip of  $M_2$ , CR 0.84-0.85, radial cell II about  $2.57 \times$  length of I (72 : 28), r-m shorter than 1/2 of base of Rs and of  $M_1$  (6.5 : 16 : 15), fMCu under basal end of  $M_2$ , RL-V 111.5 : 113.5 : 117.5 : 47.5 : 113. Halter with knob dark brown, stem yellow. Abdomen ochreous, more brownish on caudal segments and cerci, with very pale median dorsal stripe throughout I-IV, tergites IV-VII with gland rods rather small, those of IV as long as 1/2 of III, of V equal to IV, of VI slightly longer than V, of VII equal to V+VI; spermathecae 2, oval, brown, subequal,  $2.5+70 \times 54.5$  and  $2+56 \times 46.5$ .

Holotype ♀ (BISHOP 6705), Mt Otto, 2200 m, NE NG, 24.VI.1955, Gressitt. Paratype: ♀, Aiyura, 1620 m, NE NG, 19-24.X.1959, sweeping, Maa.

This is very closely allied to Japanese *montana* Tokunaga in general color and main specific characters, but it may be distinguished from the allied species by the following points: fore femur with 8-10 ventral spines on entire length instead of 6 spines on apical 1/2, hind tibia not broadly dark, but narrowly, and hind TR larger than 2.37 being 2.83-2.95.

26. *Palpomyia inflatifemoralis* Tokunaga, n. sp. Fig. 5F.

Large dark brown species with yellow legs bearing distinct dark bands, fore femur strongly swollen on middle part, with 8-9 ventral spines. ♂ unknown.

♀. Body about 3.77 mm long; wing  $3.13 \times 0.94$  mm. Head dark brown, clypeus and mouth parts ochreous; eyes separated as wide as 1.5 facets; palp ochreous, 5-segmented (11 : 16 : 27 × 9 : 18 : 25). Antennal segment I orange, II-IV pale ochreous, following segments gradually more brownish to dark brown, AR about 1.42, RL-8A 35 : 34 : 35 : 80 : 81 : 90 : 92 : 100. Thorax dark brown, scutal anterior tubercle conical, scutellum somewhat yellowish, with 4 large and many small setae. Legs mainly yellow, all coxae, knee parts, basal 1/2-1/3 of mid and hind femora (excepting basal ends), and hind tibial end dark brown, tarsal III-V brown; fore femur (fig 5F) strongly inflated, with width about 0.22 of length, hind tibial comb with 7 apical bristles, tarsal apical spur-like bristles: fore I-III each with 2, hind III with 1; RL-L 67 : 61 : 26.5 : 10 : 5 : 5 : 6 in fore, 88 : 81 : 53 : 9 : 5.2 : 5.2 : 8 in mid, 107 : 96 : 54 : 21 : 5.5 : 5 : 9 in hind. Wing pale brown, anterior veins brownish, costa ending before end of  $M_2$ , radial cell II about  $2.36 \times$  long of I (59 : 25), r-m shorter than 1/2 of base of Rs and of  $M_1$  (5 : 12 : 11), fMCu under basal end of  $M_2$ , RL-V 87 : 88 : 91 : 39 : 94. Halter dark brown. Abdomen and cerci brown; gland rods invisible, probably absent; spermathecae 2, dark brown, small, round, unequal,  $0.7+24 \times 22$  and  $0.7+18 \times 15$ .

Holotype ♀ (BISHOP 6706) Matoko, Finisterre Range, Saidor Subdistr., NE NG, 29.VIII-

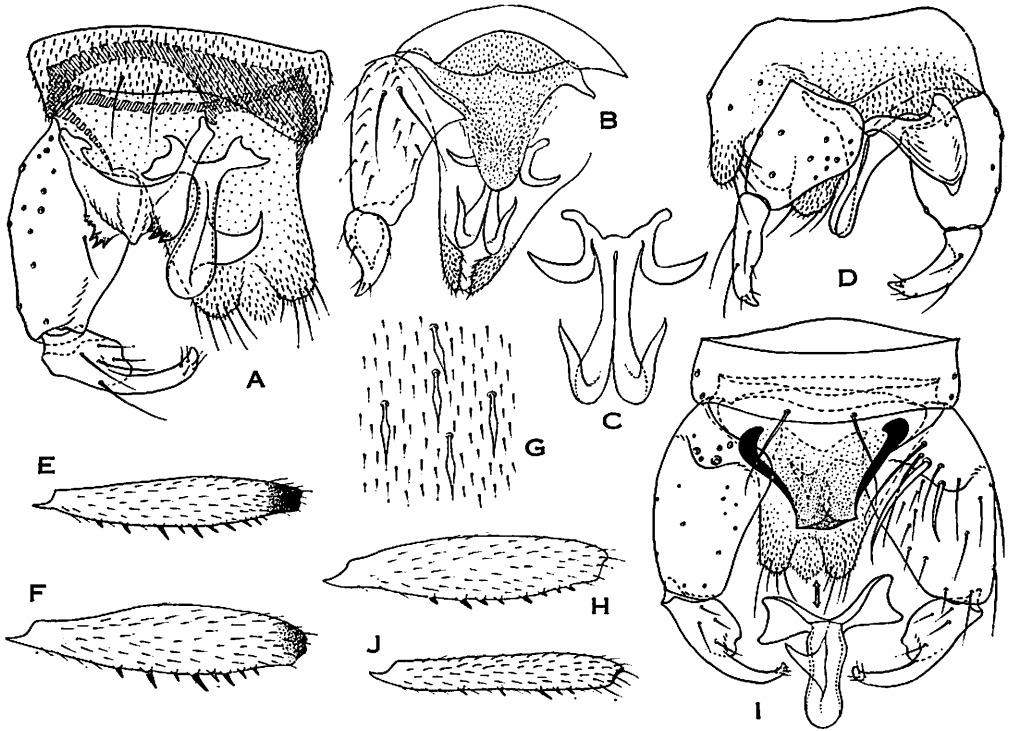


Fig. 5. *Palpomyia* spp. A, *P. serraticauda* (♂), hypopygium. B-C. *P. ancorifera* (♂); B, hypopygium; C, parameres. D, *P. novaebritainica* (♂), hypopygium; E, *P. magna* (♀), fore femur; F, *P. inflatifemorialis* (♀), fore femur. G-H. *P. lanceolifera* (♀): G, macro- and microtrichia of caudoscutal area; H, fore femur. I, *P. stella* (♂), hypopygium and enlarged parameres; J, *P. brandti* (♀), fore femur.

5.IX.1958, Brandt. Paratype: ♀, Daradae Plantation, 500 m, 30 km N of Port Moresby, SE NG, 5.IX.1959, Maa.

This is very closely related to *divisa* Kieffer known from Taiwan, but from which can be distinguished by the dark basal 1/2 of mid and hind femora, smaller AR than 2.0, and shorter  $R_{4+5}$  than  $3 \times$  long of  $R_1$ .

#### 27. *Palpomyia maai* Tokunaga, n. sp.

Large dark species, legs mainly golden yellow, with distinct dark bands, fore femur moderately swollen, with 10 ventral spines, wing with basal section of  $R_s$  and of  $M_1$  long,  $2 \times$  length of r-m or more, abdomen with pale dorsal median stripe on anterior tergites, gland rods well developed. ♂ unknown.

♀. Body about 4.29 mm long; wing  $3.86 \times 0.92$  mm. Head dark, clypeus fuscous yellow, mouth parts pale ochreous; eyes separated as wide as 1.3 facets; mandible with 6 large and 6 minute basal cutting teeth; palp 5-segmented (9 : 19 : 27 : 19 : ?), I-III very pale ochreous. Antennal segment I orange yellow, II-V pale ochreous to brown, following dark brown to dark, AR about 1.17, RL-8A 46 : 46 : 48 : 88 : 90 : 97 : 103 : 115 (W=8-10).



Thorax entirely black, with scutal anterior tubercle, scutellum slightly ochreous or brownish, with 4 large and many small setae. Legs mainly golden yellow, but all coxae, knee parts, tibial ends, basal 1/2 of mid and hind femora dark, tarsal segments III-V, apical ends of fore tarsal segment II, mid tarsal segments II-III, entire length of hind II brown; fore femur moderately swollen, with 10 ventral spines, hind tibial comb with 8 apical bristles, tarsal apical spur-like bristles: present only on mid tarsal segments I-III, each with 2; RL-L 78 : 70 : 30 : 11 : 6 : 6 : 9 in fore, 103 : 92 : 57 : 9.5 : 5 : 6 : 8 in mid, 127 : 110 : 61 : 22 : 5.5 : 6 : 10 in hind. Wing pale brown, main veins brown, costa ending before end of  $M_2$ , CR about 0.83, radial cell II about  $2.26\times$  long of I, r-m about 1/3 of base of Rs and of  $M_1$  (5 : 18 : 15), fMCu just before origin of  $M_2$ , RL-V 107 : 114 : 110 : 47 : 110. Halter with knob dark, stem brown. Abdomen and cerci dark brown, with pale median dorsal stripe on anterior segments I-IV throughout; gland rods well developed, those of VI longer than IV+V, of VII longer than V+VI; spermathecae 2, dark brown, large, oval, unequal,  $83.6\times 57$  and  $72.2\times 38$ .

Holotype ♀ (BISHOP 6707), Arau, 1400 m, 40 km E of Kainantu, NE NG, 15.X.1959, Maa.

This is very closely allied to the preceding *inflatifemoralis* n. sp. in coloration, but fore femur is not so strongly inflated, abdomen is provided with pale dorsal median stripe on anterior tergites and well developed 4 paired gland rods, spermathecae are very large and oval, distinctly differing from the allied species.

28. *Palpomyia lanceolifera* Tokunaga, n. sp. Fig. 5G-H.

Medium-sized dark brown species, scutum and scutellum with dense small lanceolate setae instead of ordinary setae, legs mainly yellow to pale yellow, fore femur rather strongly inflated, with 8 ventral spines. Abdomen missing. ♂ unknown.

♀. Wing about  $2.5\times 0.78$  mm. Head dark brown, mouth parts brown; eyes separated as wide as 2 facets; mandible with 6 large cutting and 5 small ventral teeth; palp pale brown, 5-segmented (7 : 14 : 21 : 17 : 20), III with several sensillae on slightly swollen ventral side. Antennal segment I yellow, II-IX very pale ochreous to brown, X-XIV brown, II-XIV cylindrical; AR about 1.52, RL-8A 28 : 29 : 30 : 63 : 71 : 71 : 76 : 94 (W=7-9). Thorax entirely dark brown, scutum with distinct anterior tubercle, scutal surface densely setigerous with small lanceolate setae (fig 5G) instead of normal macrotrichia, scutellum with 5 large and many lanceolate setae. Legs mainly yellowish, but coxae dark brown, basal 2/3 of mid femur except for basal end dark brown, basal part of fore tibia and mid knee part slightly brownish, tarsal III-V brown; fore femur (fig 5H) rather strongly swollen with 8 ventral spines, tarsal spur-like apical setae present on mid tarsal segments I-III, each with 2; hind legs missing; RL-L 55 : 48 : 20 : 6.8 : 4 : ? : ? in fore, 66.5 : 63 : 37 : 6 : 4 : 4 : 5.5 in mid. Wing with veins brown, costa ending slightly before end of  $M_2$ , CR about 0.83, radial cell II  $2.61\times$  long of I, r-m short, about 1/2 of base of Rs (4 : 8) and 1/3 of base of  $M_1$  (4 : 11), fMCu just beyond basal end of  $M_2$ , RL-V 74 : 71 : 77 : 30 : 72. Halter with stem yellow, knob dark. Abdomen missing.

Holotype ♀ (BISHOP 6708) Kiambavi Vill., Finisterre Range, Saidor Subdistr., NE NG, 1-28.VIII.1958, Brandt.

This is quite specific in its possession of dense small lanceolate setae instead of ordinary

macrotrichia on scutum and scutellum; in this case 3 or 4 ordinary setae are present only at the position of supra-alar and 5 large setae on the scutellum, distinctly differing from other New Guinean species. Although the abdomen and hind legs of the present ♀ are missing, this special character may be enough for the erection of a new species.

29. *Palpomyia laensis* Tokunaga, n. sp.

Medium-sized brown species, legs mainly yellowish, with dark broad bands on 4 posterior femora and knee parts, fore femur rather slender, with 6-8 ventral spines, abdominal gland rods present on tergites IV-VII or V-VII. ♂ unknown.

♀. Body about 2.82-3.33 mm long; wing  $2.26-2.37 \times 0.61-0.65$  mm. Head dark brown, mouth parts brown or pale brown; eyes separated as wide as 1 facet; mandible with 6 cutting teeth; palp 5-segmented (8 : 16 : 21.5 : 12 : 18.5), III fusiform, with several sensillae just before midway. Antenna filiform, I ochreous, other segments brown, with basal parts pale; AR about 1.42, RL-8A 33 : 35 : 37 : 68 : 75 : 79 : 85 : 99 (W=6-7). Thorax almost entirely dark brown, prosternum paler, scutum with pointed anterior tubercle, scutellum with 3-4 large and many small slender setae. Legs mainly yellow, fore coxae brown excepting yellow apical 1/3, other coxae brown, but apical ends yellowish, mid and hind legs broadly dark brown or brown on knee parts and basal 1/2-2/3 of femora excepting yellow basal ends, hind tibial end more or less brownish or dark, fore and mid tarsal segments III-V and hind tarsal segments I-V pale brown or brown, dark or brown parts of mid legs of some specimens often paler than those of hind, knee parts of mid and hind legs of 1♀ very pale and almost yellowish ochreous; fore femur rather slender, with 6-8 rather slender ventral spines, hind tibial comb with 5-7 dark or brown apical bristles; tarsal spur-like apical setae: fore tarsal segment III with 0-1, mid tarsal segment I-III each with 2, hind tarsal segment II-III each with 0-2, I rarely with 1 sub-basal spine-like seta; RL-L 48.5 : 42.5 : 19.8 : 7 : 4 : 3.8 : 6 in fore, 63.3 : 54 : 36 : 5.5 : 4 : 3.9 : 5.5 in mid, 77.5 : 66.3 : 39.5 : 14.3 : 4.7 : 4.4 : 6 in hind. Wing very pale, anterior veins pale fuscous brown, costa ending slightly before tip of  $M_2$ , CR 0.84-0.85, radial cell II  $3.54-4.1 \times$  length of I (45.5 : 12), r-m about 1/2 of base of  $R_s$  and of  $M_1$  (4 : 8.8 : 7.5), fMCu more or less before origin of  $M_2$ , RL-V 73.5 : 71.5 : 64.5 : 21.5 : 63. Halter with knob brown, stem white. Abdomen and cerci brown, tergites I-III very pale on median parts forming median pale stripe; gland rods present on tergites IV-VII, ending under anterior part of tergite III (when 4 pairs) or of IV (when 3 pairs); spermathecae 2, brown, elongate oval, unequal,  $2+36 \times 22$  and  $2+30 \times 20$ .

Holotype ♀ (BISHOP 6709), Lae, 10 m, NE NG, 10.VII.1957, Hardy. Paratypes: ♀, same place as type, 6.VII.1957, Hardy; ♀, Cyclops Mts, 150-250 m, W. Sentani, Hollandia Area, NW NG, 16.VI.1959, Maa; ♀, Genjam, 100-200 m, 40 km W of Hollandia, NW NG, 1-10. III.1960, Maa.

This is related to European *nemorivaga* Goetghebuer, but lacks the smoky cloud of the wing and bears broad dark basal band at least on the hind femur, differing from the related species. An un-named species from Java, reported by Johannsen (1931, Arch. Hydrobiol. Suppl. 9 : 438) is also related to the present midge but also differs in its possession of the brown tinge along the anterior marginal area of the wing.

30. *Palpomyia novaeguineae* Tokunaga n. sp.

Medium-sized dark brown or brown species, legs mainly yellowish, with distinct dark brown marking, fore femur slender, with 4-5 rather slender ventral spines on apical 1/2, abdominal gland rods present on IV-VII or V-VII. ♂ unknown.

♀. Body 2.86-3.58 mm long; wing 2.76-2.9×0.74-0.85 mm. Head dark brown or brown, mouth parts paler or yellowish; eyes separated as wide as 1.3-1.5 facets; mandible with 6 large cutting and 4-7 minute ventral teeth; palp slender, 5-segmented (9 : 16 : 23.5 : 15 : 21), III with several sensillae on middle part. Antennal segment I ochreous or yellow, II-IX brown or pale brown, with basal parts far paler, X-XIV brownish; AR 1.68-1.74, RL-8A 26.5 : 28 : 30.5 : 75 : 80 : 82 : 90.5 : 75-102 (W=8-9.5). Thorax entirely dark brown or brown, scutum with conical anterior tubercle, scutellum with 4 large and many small setae. Legs mainly yellow or very pale ochreous, coxae dark brown or brown, basal 1/2 -2/3 of mid and hind femora (excepting pale bases) dark brown, knee parts of mid and hind legs distinctly dark brown, but those of mid of some specimens brownish, apical end of fore tibia, fore tarsus, mid and hind tarsal segments III-V brown or pale brown, apical end of hind tibia more brownish; fore femur not thickened, with 4-5 rather slender ventral spines on apical 1/2, hind tibial comb with 6-7 apical bristles, tarsal apical spur-like setae present only on mid, I-III each with 2; RL-L 58.8 : 51.5 : 23.5 : 9.9 : 5 : 5 : 7.3 in fore, 74 : 71 : 45 : 8.3 : 4.7 : 4.7 : 7.3 in mid, 95 : 84 : 47 : 18.5 : 5.5 : 5.5 : 8.2 in hind. Wing pale brown or brown, main veins brown, costa ending before end of M<sub>2</sub> or above midway between ends of M<sub>2</sub> and Cu<sub>1</sub>, CR 0.81-0.84. Radial cell II 2.7-2.8× length of I, r-m about 1/2 as long as base of Rs and of M<sub>1</sub> (4.5 : 11 : 11.3), fMCu just before or beyond origin of M<sub>2</sub>, RL-V 82 : 82 : 80-88 : 31 : 80. Halter brown or pale brown. Abdomen and cerci brown or pale ochreous, anterior part of abdomen with median large yellow or very pale stripe on tergites I-IV; gland rods present on tergites IV-VII or V-VII, those of IV ending under anterior part of tergite III, of V at middle of III, of VI under posterior part of III, of VII under anterior part of IV; spermathecae 2, brown, elongate oval, unequal, 52×34 and 43.3×30; in 1 pale specimen which may be one of varieties, gland rods not visible and probably absent.

Holotype ♀ (BISHOP 6710), Wum, 840 m, Upper Jimmi Vall., NE NG, 16-18.VII.1955, Gressitt. Paratypes: 3♀♀ with type; ♀, Wahgi Vall., 1500 m, Banz, NE NG, 10.VII.1955, Gressitt; ♀, Mt Hagen Area, 1650 m, NE NG, 28.VI.1957, Hardy; ♀, Minj, W. Highlands, NE NG, 8-13.IX.1959, Maa; ♀, Baiyer Riv., 1150 m, W. Highlands, NE NG, 18.X.1958, Gressitt; ♀, Waris, 450-550 m, S of Hollandia, NW NG, 1-7.VII.1959, at light, Maa; ♀, Hollandia, NW NG, 13.III.1960, sweeping, Maa; ♀, Arau, 1400 m, 40 km, E of Kainantu, NE NG, 15.X.1959, Maa; ♀, Kokoda-Pitoki, 400 m, SE NG, 23.III.1956, Gressitt; ♀, Laloki, near Port Moresby, SE NG, 30.VII-2.IX.1959, Maa; ♀, St. Paul's, 350 m, Bainings, Gazelle Pen., New Britain, 8.IX.1955, Gressitt.

This is very closely allied to *laensis* n. sp., but the fore femur is provided with only 4-5 ventral spines, the AR is larger than 1.42 being 1.68-1.74, the spermathecae are far larger, and the radial cell II is relatively short being shorter than 3× long of I, distinctly differing from the allied species.

31. *Palpomyia novaeirelandensis* Tokunaga, n. sp.

Small dark brown species, legs mainly yellow, 4 posterior femora dark on basal 2/3, fore

femur slender, with 3 ventral spines on apical 1/2, hind femur with 1 ventral spine on preapical part. ♂ unknown.

♀. Wing about  $1.81 \times 0.6$  mm. Head brown, proboscis ochreous; eyes separated as wide as 1 facet; palp almost white, 5-segmented (7 : 12 : 20 : 12 : 14), V fuscous. Antennal segment I yellow, II-IV very pale brown, V-XIV brown; AR 1.6, RL-8A 22.5 : 23 : 25 : 54 : 57 : 60 : 64 : 69 (W=5.5-7). Thorax uniformly dark brown, scutum with small anterior tubercle, scutellum with 4 large and several small setae. Legs mainly yellow, all coxae dark brown, hind trochanter ochreous, basal 2/3 of 4 posterior femora (excepting ochreous basal ends) dark, apical ends of fore tibia and hind femur, and tarsal segments III-V of all legs pale brown, tarsal segments I-II of all legs pale ochreous; fore femur with 3 ventral spines on apical 1/2, hind with 1 ventral spine on preapical part, hind tibial comb with 5 apical bristles, tarsal apical spur-like setae present on mid tarsal segments I-III, each with 2; RL-L 40 : 34 : 17 : 6 : 4 : 3.4 : 5.8 in fore, 51.5 : 48 : 32 : 6 : 3.2 : 3.3 : 5 in mid, 67 : 58 : 31 : 11 : 4 : 3.5 : 5 in hind. Wings very pale, but costal and radial cells slightly brownish, main veins dark brown, costa ending above midway between ends of  $M_2$  and  $Cu_1$ , CR 0.8, radial cell I about  $2.2 \times$  length of I (33 : 15), r-m 1/2 length of base of Rs and 1/3 of base of  $M_1$  (3 : 6 : 9), fMCu under origin of Rs, RL-V 58 : 57 : 62 : 22 : 54. Halter dark. Abdomen missing.

Holotype ♀ (BISHOP 6711), Gilingil Plantation, 2 m, SW New Ireland, 5.VII.1956, Gressitt.

This is closely allied to *novaequinae* n. sp., but smaller, with only 3 femoral ventral spines, not distinctly dark brown on knee parts of mid and hind legs, being rather easily distinguished from the allied species.

### 32. *Palpomyia* sp. near *novaeirelandensis*

Very closely allied to *novaeirelandensis* n. sp. especially in color. Fore femur with 5-6 dark ventral spines. ♂ unknown.

♀. Wing about  $1.99 \times 0.59$  mm. Color very closely similar to allied species; main differences as follows: Palp almost entirely white including last segment, fore tibia and hind femur without apical pale brownish clouds, apical yellow part of hind femur longer than basal dark part, hind femoral ventral spine absent, wing paler, CR about 0.82, radial cell II about  $2.7 \times$  length of I (35 : 13), r-m about 1/2 of basal section of Rs and of  $M_1$  (4 : 7 : 8.5). Abdomen dark brown, gland rods present on V-VII, extending about anterior margin of tergite IV.

SPECIMEN EXAMINED: ♀, Cyclops Mts, 150-250 m, W. Sentani, Hollandia Area, NW NG, 23.VI.1959, Maa.

This is very closely allied to *novaeirelandensis* and probably one of local varieties or forms of the species.

### 33. *Palpomyia stella* Tokunaga, n. sp. Fig. 5 I.

Medium-sized or rather small brownish or ochreous species without distinct color marking of legs, fore femur slender, with 3-4 ventral spines, costa produced longer than r-m beyond tip of  $R_{4+5}$ ; ♂ with styles of hypopygium basally flattened, broad, apically slender, arcuate, parameres completely fused, rather small, with barb-like hook of median lobe;

♀ without abdominal gland rods.

♂. Body small, generally brown, about 2.15 mm long. Wing  $1.61 \times 0.43$  m. Head brown, mouth parts pale brown; eyes separated as wide as 1 facet; palp very pale ochreous, 5-segmented (7 : 15 : 18 : 9 : 17), III with several sensillae on basal swollen part. Antennal segment I brown, II-X pale brown, XI-XIV gradually browned towards apex, plumose hairs pale brown and brown, CRL of II-XI and XII-XIV 140 : 293, RL-A 30 : 13 : 12 : 12.5 : 12 : 11 : 10 : 10 : 10 : 12 : 15 : 85 : 94 : 114 ( $W=7-8.5$ , except for I-II). Thorax entirely brown, scutum setigerous with slender small setae, anterior tubercle conical, scutellum with 4 long and about 15 small setae. Legs mainly very pale brown, without distinct color marking, coxae, trochanters and tarsal segments III-V more brownish, mid femur pale brown, but both end parts far paler, hind femur and tibia also pale brown, but femoral both ends and tibial middle part indistinctly paler; fore femur slender, with 3 ventral spines on middle 1/3, hind tibial comb with 5 apical bristles, tarsal apical spur-like setae only present on mid tarsal I-III, each with 2; RL-L 37 : 32.4 : 15 : 6.8 : 3.9 : 3.5 : 5.5 in fore, 43 : 43 : 29.5 : 6.5 : 3.5 : 3 : 5.5 in mid, 56.5 : 51 : 31 : 11.5 : 4 : 3.5 : 6.2 in hind. Wing entirely very pale, slender, costa ending beyond level of tip of  $M_{3+4}$ , produced beyond tip of  $R_{4+5}$ , costal free tip longer than r-m (5 : 3), CR about 0.76, radial cell II  $2.3 \times$  long of I (10 : 23), r-m about 1/2 of base of Rs and of  $M_1$  (3 : 5 : 6), fMCu under origin of  $M_2$ , RL-V 48 : 46 : 47 : 16 : 34. Halter brown. Abdomen almost entirely pale brown, setigerous with delicate setae, hypopygium (fig 5 I) brown; coxite rather slender, tapered, with several long simple and 2 blade-like strong bristles on basal swelling; style about 3/4 length of coxite (46 : 62), with basal 1/2 flattened, broad, apical 1/2 slender, arcuate; aedeagus very broad, trapezoid, with thick lateral sclerite; parameres slightly shorter than aedeagus (23 : 30), star-like, median lobe only slightly longer than basal arms, round at tip, with barb-like median hook, basal arm subtriangular.

♀. Body larger than in ♂, about 3.43 mm long. Wing  $2.43 \times 0.65$  mm. Color generally as in ♂, but legs mainly yellowish ochreous, with brownish indistinct marking. Eyes separated as wide as 1.5 facets; mandible with 6 large and 6 small cutting teeth; RL-P 10 : 15 : 22 : 14 : 19. Antennal segment I brown, other segments partly missing. Thorax setigerous with small dark brown setae, scutellum with 4 large and many small setae. Legs mainly yellowish ochreous, with obscure marking, coxae brown, both ends of fore tibia, knee parts of 4 posterior legs, basal 1/2 of middle and basal 3/4 of hind femora, apical end of hind tibia, and all tarsal segments III-V indistinctly brownish ochreous; fore femur with 4 ventral spines on apical 1/2, hind tibial comb with 6 brown apical bristles; RL-L 53 : 45 : 20 : 8.8 : 4.5 : 3.5 : ? in fore, 67 : 62 : 39 : 7.5 : 4 : 3.8 : 6.2 in middle, 85 : 73.2 : 40 : 14.7 : 4.5 : 4 : 7 in hind. Wing pale brown, slender, costa ending before tip of  $M_2$ , produced beyond tip of  $R_{4+5}$ , costal free tip far longer than r-m (9 : 5), CR about 0.84, radial cell II,  $2.8 \times$  length of I (46 : 16.5), r-m about 1/2 of bases of Rs and of  $M_1$  (5 : 9 : 10), fMCu just before origin of  $M_2$ , RL-V 77 : 75 : 74 : 25 : 71. Abdomen pale brown or ochreous, but caudal segment and cerci brown, tergites I-II with very pale median stripe; spermathecae 2, brown, unequal, oval,  $46 \times 34$  and  $39 \times 33$ .

Holotype ♂ (BISHOP 6712), Waris, 450-500 m, S of Hollandia, NW NG, 1-7. VIII. 1959, at light, Maa. Allotype ♀ (BISHOP), Alula Reg., Nipa swamp, E of Lindenhafen, New Britain, 22. IV. 1956, Gressitt. Paratypes: 6♂♂, with holotype; ♀, Waris, 450-500 m, S of Hollandia, NW NG, 27-30. VII. 1959, at light, Maa.

The ♀ is closely allied to the paler specimens of *novaeguineae* n. sp., but may be distinguished by the more slender wings and brownish ends of fore tibiae. The 2 sexes are rather distinctly unlike but were coupled together by the structure of the ♂ hypopygium which was attached to the abdominal end of the allotype ♀. The color of the ♂ is rather more brownish than the yellowish of the ♀ and with the general color similar to that of New Guinean *serraticauda* n. sp. and New Zealand *nelsoni* Macfie, but the ♂ of this species may be easily distinguished from the former by the serrated lateral sides of the aedeagus and from the latter by the far less number of the ventral spines of the fore femur than 13.

34. *Palpomyia brandti* Tokunaga, n. sp. Fig. 5J.

Medium-sized, dark brown species, but legs mainly pale yellowish ochreous and without distinct color marking, maxillary palpus almost white, but last segment brown, fore femur with 5-6 ventral spines, abdominal gland rods present. ♂ unknown.

♀. Body about 2.63 mm long; wing  $2.17 \times 0.62$  mm. Head dark, clypeus slightly fuscous, proboscis very pale; eyes almost contiguous; mandible with 6 cutting teeth; palp almost white, but V brown, RL-P 8 : 13 : 20 : 12 : 15, III with only about 2 sensillae on sub-basal part. Antennal segment I dark brown, other segments missing. Thorax entirely dark brown, scutum setigerous with rather sparse stiff small setae, anterior tubercle blunt, scutellum with 4 large and many small setae. Legs mainly pale yellowish ochreous, but coxae dark brown, bases of tibiae, apex of hind tibia, tarsal segments III-V slightly more brownish, sub-basal part of hind femur, hind tarsal segments I-II obscurely more ochreous; fore femur (fig 5J) with 5-6 ventral spines, hind tibial comb with 4-6 dark brown apical bristles, tarsal apical spur-like setae present on mid tarsal segments I-III, each with 2; RL-L 44 : 38.5 : 17 : 6.7 : 3.5 : 4 : 5.2 in fore, 60 : 52 : 33.5 : 5 : 3.5 : 3.7 : 5 in mid, 73.5 : 63 : 37 : 14 : 4 : 3.8 : 6 in hind. Wing slender, very pale brown, costa ending before level of tip of  $M_2$ , CR about 0.84, radial cell II about  $2.56 \times$  length of I, r-m  $1/2$  length of base of Rs and  $1/3$  of base of  $M_1$  (3 : 6 : 9.5), fMCu just before origin of  $M_2$ , RL-V 70 : 66 : 67 : 22 : 62. Abdomen and cerci dark brown, but with very pale median stripe on anterior tergites; gland rods present but their accurate number not ascertained; spermathecae 2, brown, rather large, oval, unequal,  $28 \times 22$  and  $21 \times 19$ .

Holotype ♀ (BISHOP 6713), Matoko, Finisterre Range, Saidor Subdistr., NE NG, 29.VIII-5.IX.1958, Brandt.

This is allied to *stella* n. sp., but from which may be separated by the following points: legs far paler, hind femur without preapical yellowish band, last palpal segment distinctly brown differing from white basal segments, and abdominal gland rods present. The color of legs of the present species is similar to that of New Zealand *rastellifer* Macfie, but the fore femur is somewhat different bearing only 5 ventral spines instead of 10 of the allied species.

## Tribe BEZZIINI Kieffer

Genus *Nilobezzia* Kieffer (1921)

The generic characters of the wing are similar to those of *Bezzia* Kieffer (1899). However, the structure of the legs is characteristic in the following points: at least mid and hind femora provided with spine-like ventral bristles which are often developed only at apical ends and might easily be overlooked, since there is only a slight difference between these bristles and other setae uniformly covering the femora and tibiae; tarsal segment IV of all legs subcylindrical or cylindrical and never cordiform, V armed with strong ventral spines or batonnets which are usually sharply pointed, claws of ♀ large, longer than 1/2 of segment V, equal and basally barbed.

## KEY TO NEW GUINEA SPECIES OF NILOBEZZIA

- Tarsal segment V with about 10 ventral batonnets (Port Moresby, SE NG; Lee 1947)  
 ..... whartoni  
 Tarsal segment V with 13-14 ventral batonnets ..... 2  
 Claws of legs with basal tooth stout and blunt ..... 35. hardyi  
 Claws of legs with basal tooth slender and sharply pointed ..... 36. maai

35. *Nilobezzia hardyi* Tokunaga, n. sp. Fig. 6A-B.

Large black species with hind TR about 3.0, tarsal segments IV cylindrical, V with 14 ventral sharp spines, claws large, with basal tooth blunt, without strong femoral ventral spines; wing with anterior veins brown, costal and anterior apical radial cell brownish smoky, fMCu just before cross-vein r-m; ultimate sternite fringed with 10-12 long setae on each caudal lobe. ♂ unknown.

♀. Body about 4.21 mm long; wing  $3.47 \times 1.17$  mm. Head dark, eyes separated as wide as 2 facets; mandible with 7 cutting teeth; palp dark brown, RL-P 12 : 20 : 26 × 9 : ? : ?, III cylindrical, with several sensillae on preapical part. Antenna with scape dark, flagellum missing. Thorax dark, scutum without anterior tubercle, moderately setigerous with small delicate setae, supra-alar setae 6-8. Legs mainly dark, tarsi dark brown; femoral spines absent, hind tibial comb with 6 apical bristles, penultimate segments cylindrical, tarsal apical spur-like setae present on mid and hind: mid tarsal segment I with 1, II-III each with 2, hind tarsal segments I-II each with 1, all V (fig 6A) with 14 ventral sharp spines, claws equal, large, distinctly shorter than segments V (55 : 74 in fore, 60 : 78 in hind), each equally with basal blunt tooth, which is slightly shorter than 1/3 of claw (17 : 55 in fore, 17 : 60 in mid, 18 : 60 in hind); RL-L 81 : 71 : 35 : 15 : 10.5 : 7.5 : 20 in fore, 111 : 88 : 46 : 19 : 11 : 8 : 19.5 in mid, 129 : 106 : 77 : 26 : 16 : 10 : 21 in hind. Wing with main veins, costal and apical radial cell brown, anal lobe obtuse, costa ending above end of  $M_2$ , CR about 0.89, Rs arcuate, r-m as long as base of Rs (8 : 8), longer than base of  $M_1$  (8 : 6), fMCu just before r-m, RL-V 88 : 90 : 94 : 57 : 136. Halter dark. Abdomen entirely dark brown, sternite VIII (fig 6B) dark brown, with about 10-12 long marginal setae on each caudal lobe; spermathecae 2, unequal, dark, short-oval, 2+ 25 × 19 and 2+ 18 × 15.

Holotype ♀ (BISHOP 6714), Maprik, 160 m, Sepik Distr., NE NG, 28. VIII. 1957, Hardy.

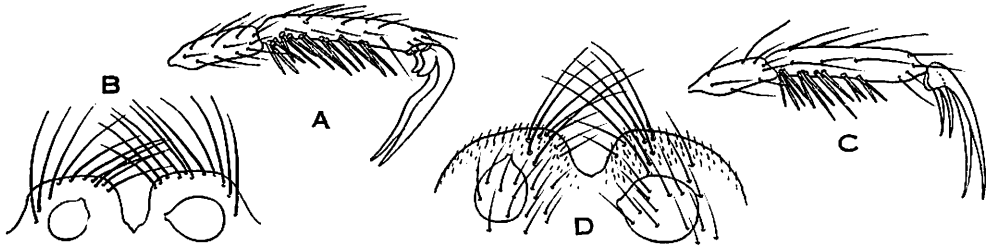


Fig. 6. *Nilobezzia* spp. (♀). A-B. *N. hardyi*: A, ultimate 2 tarsal segments of hind leg; B, ultimate abdominal sternite and spermathecae. C-D. *N. maai*: C, ultimate 2 tarsal segments of hind leg; D, ultimate abdominal sternite and spermathecae.

This is allied to *formosana* (Kieffer) in general color, but may be distinguished by the following points: tarsal segment I of hind far longer than following 3 segments together being longer than II-V combined (77 : 73), tarsal segment V with more ventral batonnets than 6, wings and halteres far more brownish or darkish than in the allied species.

36. *Nilobezzia maai* Tokunaga, n. sp. Fig. 6C-D.

Medium-sized dark species very closely allied to *hardyi* n. sp., but tarsal claws slender, with basal tooth slender and pointed sharply, ultimate abdominal sternite with long bristles arranged in oblique line on each caudal lobe, differing from allied species. ♂ unknown.

♀. Body about 3.16 mm long; wing  $2.46 \times 0.73$  mm. Head entirely dark; eyes widely contiguous; mandible with 7 cutting teeth; palp dark brown, RL-P 4 : 10.5 : 14 : 5.5 : 7 : 5.5, III elongate-oval, with several sensillae on preapical part of ventral side. Antenna entirely dark, segments III-IV subcylindrical, V-VIII elongate-oval to fusiform, IX with short neck part, X-XIV elongate, cylindrical, AR about 0.61, RL-13A 24 : 13 : 13...13.5 : 14.5 : 18 : 34 : 39 : 38 : 39 : 52. Thorax entirely dark brown, scutum with 3 supra-alar setae, rather densely setigerous with delicate setae, without anterior tubercle, scutellum with 5 slender setae and dense small delicate setae. Legs dark brown, but fore and mid tarsi and hind tarsal segments II-V brown; femoral spines absent, hind tibial comb with 5 apical bristles, all tarsal segments IV cylindrical, V (fig 6C) with 13-14 sharp ventral spines on basal 2/3, tarsal apical spur-like setae present only on mid tarsal segments I-III, each with 2, claws long, slender, slightly shorter than V (40 : 48 in hind), each with sharply pointed basal tooth; RL-L 65 : 60.5 : 31 : 14 : 9.5 : 5.8 : 12 in fore, 7.5 : 59 : 40 : 14 : 5.2 : 5.7 : 12 in mid, 81 : 72 : 54 : 16 : 11.6 : 7 : 12.5 in hind. Wing very pale brown, but with costal, basal and apical radial cell more brownish, main veins brown, costa ending just before or above apex of  $M_2$ , CR about 0.88, fMCu under r-m, base of Rs longer than r-m (5.5 : 4), base of  $M_1$  very short, 1/2 as long as r-m (2 : 4), RL-V 65 : 66 : 73 : 37 : 92. Halter dark. Abdomen and cerci entirely brown, sternite VIII (fig 6D) with about 5-6 strong and 2 slender setae on apical part of each lateral lobe of caudal part; spermathecae 2, dark brown, unequal, almost round, 1+20×19 and 1+15.

Holotype ♀ (BISHOP 6715), Waris, 450-500 m, S of Hollandia, NW NG, 11-23.VIII.1959, at light, Maa. Paratype: ♀ at same place, 24-31.VIII.1959, at light, Maa.

This is very closely allied to *hardyi* n. sp. in general color and structure, but may be



distinguished by the details of tarsal and genital structures from the allied species: ventral batonnets of tarsal segment V more densely developed on basal part of the segment, basal teeth of tarsal claws very slender and more sharply pointed, longer bristles of ultimate abdominal sternite not developed along caudal margin. Another allied species may be *raphaelis* Salm. from Java and Sumatra, but this allied species is provided with dusky yellow legs which are partly infuscated, CR of wing is only about 0.8 at most, fMCu is located beyond the level of r-m, knobs of halteres are white. Javanese *Parrotia nigriventris* Kieffer seems to be related to the present species in some respects but its systematic position must be revised in detail.

#### Genus *Bezzia* Kieffer (1899)

*Pseudobezzia* Malloch (1915), *Allobezzia* Kieffer (1917) and probably some member of *Lasiobezzia* Kieffer (1925) are included in this genus.

#### KEY TO NEW GUINEA SPECIES OF BEZZIA

1. Hind femur entirely dark brown..... 2  
Hind femur distinctly bicolored ..... 3
- 2 (1). Fore femur distinctly inflated; hind tibia largely yellow..... 37. *inflatifemora*  
Fore femur slender; hind tibia entirely dark or brown..... 38. *crassistyla*
- 3 (1). Hind tibia with dark or brown median band on yellow ground color ..... 4  
Hind tibia largely yellow, except for both dark ends ..... 6
- 4 (3). Wing with fork of  $M_{1+2}$  at end of r-m ..... 39. *excavata*  
Wing with fork of  $M_{1+2}$  before r-m ..... 5
- 5 (4). Scutum almost uniformly dark brown or with indistinct fuscous vittae on brown ground color..... 40. *zonatipes*  
Scutum with distinct brown vittae on yellow ground color ..... 41. *vittata*
- 6 (3). Fore femur with dark or brown preapical band or spot..... 7  
Fore femur without dark or brown band or spot, fore tibia without dark or brown middle band..... 9
- 7 (6). Fore tibia without dark or brown middle band on yellow ground color (Hollandia, NW New Guinea)..... *longiforceps*  
Fore tibia with dark or brown middle band on yellow ground color..... 8
- 8 (7). Mid and hind femora brown on basal 1/2, yellow on apical 1/2... 42. *conjunctivena*  
Mid femur largely dark brown, only yellowish on apical 1/4, hind femur largely yellowish, only dark brown on basal 1/3 ..... 43. *dividua*
- 9 (6). Fore and mid femora and tibiae entirely yellow ..... 44. *maai*  
Fore and mid legs with knee parts dark or brown..... 10
- 10 (9). Hind TR 2.59; wing with  $R_s$  2.48 $\times$  of  $R_1$ ; abdominal gland rods almost entirely reduced ..... 45. *gressitti*  
Hind TR 2.32-2.35; wing with  $R_s$  2.77 $\times$  of  $R_1$ ; abdominal gland rods of tergite VII well developed ..... 46. *papuae*

37. *Bezzia inflatifemora* Tokunaga, n. sp. Fig. 7A-E.

Small black species with fore femur strongly swollen, bearing many ventral spines, dark

preapical ring, mid and hind femora dark, tibiae and tarsi largely yellow; wing with forking point of  $M_{1+2}$  at end of r-m, fMCu just beyond r-m,  $R_s$  about  $3\times$  in ♀ and  $2\times$  in ♂ as long as  $R_1$ ; spermathecae with long chitinized part of duct; aedeagus with granule-like impression on caudal broad lobe.

♀. Body about 2.64 mm long; wing  $2.0\times 0.65$  mm. Head and appendages black to dark brown; eyes separated as wide as 1 facet; mandible with 8 cutting teeth; palp slender, RL-P 7 : 13 : 21  $\times$  4.5 : 14 : 13. Antenna largely dark brown, but basal parts of segments brown, III-IX elongate fusiform, about  $3\times$  as long as wide, AR about 1.45, RL-8A 17.4 : 18 : 19 : 45 : 42 : 38 : 47 : 53 (W=6.5-7.8). Thorax entirely black, scutum with dense small setae, supra-alar setae 3, without anterior tubercle, scutellum with about 4 strong and many small setae. Legs with all coxae and trochanters, mid and hind femora dark, other parts largely yellow and with dark marking; fore knee part, femoral base and preapical ring, both ends of tibia black, ends of tarsal I-III and entire part of IV-V pale brown, mid and hind tibiae similar to those of fore; fore femur (fig 7A) strongly swollen, about  $3.8\times$  as long as wide, with 13-14 ventral spines, hind tibia with strong bristles on dorsal side, 4-5 apical bristles of comb, tarsal spur-like apical bristles: 2 on mid tarsal segments I-III, 1 on hind tarsal segment I, claws equal, each with 1 short basal tooth; RL-L 48 : 39 : 16.5 : 9 : 5 : 4 : 8 in fore, 57 : 48 : 27 : 10.7 : 5.5 : 3.5 : 7 in mid, 66 : 61.5 : 37 : 15 : 7 : 4 : 8.2 in hind. Wing white, with main veins pale brown, costa ending above apical 2/5 of anal margin between tips of  $M_2$  and  $M_{3+4}$ , CR about 0.81,  $R_1$  ending slightly beyond end of  $Cu_1$ , fMCu just beyond r-m, fork of  $M_{1+2}$  (fig 7B) at end of r-m, r-m as long as base of  $R_s$ , RL-V 47 : 48 : 57 : 21 : 65. Halter dark. Abdomen dark brown, tergal gland rods developed only on VII, ending under III; cerci brown; spermathecae (fig 7) 3, oval, subequal, 7+14 $\times$ 10, 6+14 $\times$ 10 and 7+13 $\times$ 9.5, each with long chitinized part of duct; paratype with spermathecae (fig 7D) 2, round.

♂. Body about 2.37 mm long. Wing  $1.7\times 0.45$  mm. General color and structure as in ♀. Eyes separated as wide as 2 facets; RL-P 6.5 : 11 : 19 : 11 : 12. Antenna entirely dark brown including plumes, segments III-VIII oval to elongate-oval, other apical sub-cylindrical, CRL of II-X to XI-XIV 51 : 43.5, RL-8A 16 : 19 : 22 : 31 : 28.5 : 33 : 47 : 57. Fore femur about  $4.3\times$  as long as width, claws equal, unequally bifid at apical 1/3; hind legs missing; RL-L 43 : 36 : 16 : 9.8 : 5.3 : 3.8 : 7 in fore, 54 : 44.5 : 27.5 : 13 : 6 : 4 : 6.8 in mid. Wing with main veins very pale, costa ending above end of  $M_{3+4}$ , CR about 0.76,  $R_1$  ending above tip of  $Cu_1$ , fMCu just before middle point of  $R_1$ , RL-V 44 : 46 : 57 : 21 : 45. Hypopygium (fig 7E) dark; style rather small, shorter than coxite (19 : 24), aedeagus almost as long as paramere (25 : 29), median lobe round at tip as in paramere, with about 8 dots, basal membrane bare.

Holotype ♀ (BISHOP 6716), Mendi, 1600 m, S. Highlands, SE NG, 6.X.1958, Gressitt. Allotype ♂, Eliptamin Vall., 1200-1350 m, NE NG, 1-15.IX.1959, Brandt. Paratype: ♀ with allotype.

This midge is quite characteristic in color of the femora and tibiae, structure of fore femur and venation of wing, especially related to r-m and forking point of  $M_{1+2}$ . But this is somewhat allied to *micronyx* Kieffer, known from Taiwan, bearing with different color of fore femur and tibia and more ventral spines of fore femur than the allied species.

38. *Bezzia crassistyla* Tokunaga, n. sp. Fig. 7F-I.

Small dark brown species with hind femur and tibia entirely dark brown, other femora and tibiae dark to pale ochreous, fore femur with single pale preapical ring and 3 slender ventral spines, fore tibia with 2 pale ochreous rings, wing vein  $M_2$  arising from end of r-m; aedeagus and parameres elongate, coxite very strong, style stout, spermathecae with very slender chitinized part of duct.

♀. Body 1.69-1.82 mm long; wing 1.12-1.17×0.38-0.4 mm. Head with vertex dark brown, frons, clypeus and mouth parts brown; eyes slightly separated less than 1 facet; mandible with 8 cutting teeth; RL-P 5.5 : 9 : 12.5×5 : 9.8 : 11, III elongate-oval, with only 2-3 sensillae on ventral side. Antenna dark brown, but bases of flagellar segments very pale, III-IX oval to subcylindrical, AR 1.36, RL-8A 11 : 12.3 : 12.8 : 21.5 : 22.7 : 24.5 : 26 : 31 (W=5-6). Thorax entirely dark, scutum rather sparsely setigerous with several strong setae, without anterior tubercle, scutellum with 5 long and many small setae. Legs with coxae, trochanters, mid and hind femora and hind tibia black; in fore leg, femur and tibia mainly dark brown, with pale ochreous rings before and beyond dark knee part, preapical ochreous cloud before dark tibial end, tarsal segments I-IV very pale ochreous, with apices pale brown, V brown; in mid leg, femoral part somewhat brownish, tibia largely brown, with pale brown sub-basal and apical part, tarsus as in fore and hind; fore femur with 3 preapical ventral spines, tarsal apical spur-like bristles present only on mid: I-III each with 2, hind tibial comb with 4-5 apical bristles, claws simple, small, equal; RL-L 30 : 25.9 : 12.5 : 6 : 3.8 : 2.9 : 5.5 in fore, 37 : 29.3 : 18 : 7.5 : 4.3 : 3 : 5.9 in mid, 42 : 34.5 : 20.3 : 9.3 : 5.6 : 3.3 : 6.5 in hind. Wing with anterior veins fuscous, costa ending slightly beyond apex of  $M_{3+4}$ , CR 0.73-0.75, fork of  $M_{1+2}$  (fig 7F) at end of r-m, fMCu beyond r-m, RL-V 26.5 : 27.5 : 34 : 11 : 32.5. Halter dark. Abdomen entirely dark brown, without gland rods, spermathecae (fig 7G-H) 2, oval or short-oval, subequal, 15+28×16 and 15+24×13 or 12+24×19 and 12+21×18.

♂. Body 1.76-1.82 mm long. Wing 1.25×0.34 mm. Generally similar to ♀. Eyes separated as wide as 2 facets. CRL of antennal segments II-X to XI-XIV 38.8 : 34, RL-8A 13 : 13.3 : 16.8 : 22.3 : 36.5 : 22.5 : 31 : 38.5 (W=5.5-7.8). Scutellum with 4-5 strong and many small setae. Legs with mid tibia paler than in ♀, RL-L 32.5 : 27.8 : 13.3 : 6.8 : 4 : 3.3 : 6.3 in fore, 39.3 : 32.5 : 21.3 : 9.2 : 4.9 : 3.5 : 6 in mid, 43.8 : 37.5 : 22 : 10.1 : 6 : 3 : 7 in hind. Wing white, all veins pale, costa ending at apical 1/3 between tips of  $M_{3+4}$  and  $Cu_1$ , CR 0.66-0.67, fMCu under middle point of  $R_1$ , RL-V 31.8 : 32.5 : 42 : 13 : 24. Hypopygium (fig 7I) with coxite very large, each with blunt setigerous lobe on mesal side of apex, style strong, pointed at tip, about 1/2 as long as coxite (32 : 67); aedeagus with small basal plate and paired lanceolate median lobes, basal membrane bare, parameres large, with median lobe broad, flattened, truncated, with additional inner lobe slender, slightly clavate and pubescent.

Holotype ♀ (BISHOP 6717), Kampong Landbouw, 40 m, 30 km NE of air strip, Biak, NW NG, 17.VII.1957, Hardy. Allotype ♂ (BISHOP) with type. Paratypes: ♀ and ♂ with types.

This is similar to Australian *tasmaniensis* Lee, but easily distinguished by the following differences: ♂ antennal segment XI almost as long as XIV and longer than following 2, fore femur with 3 ventral spines, costa of ♂ wing shorter, CR being only about 0.66-0.67,

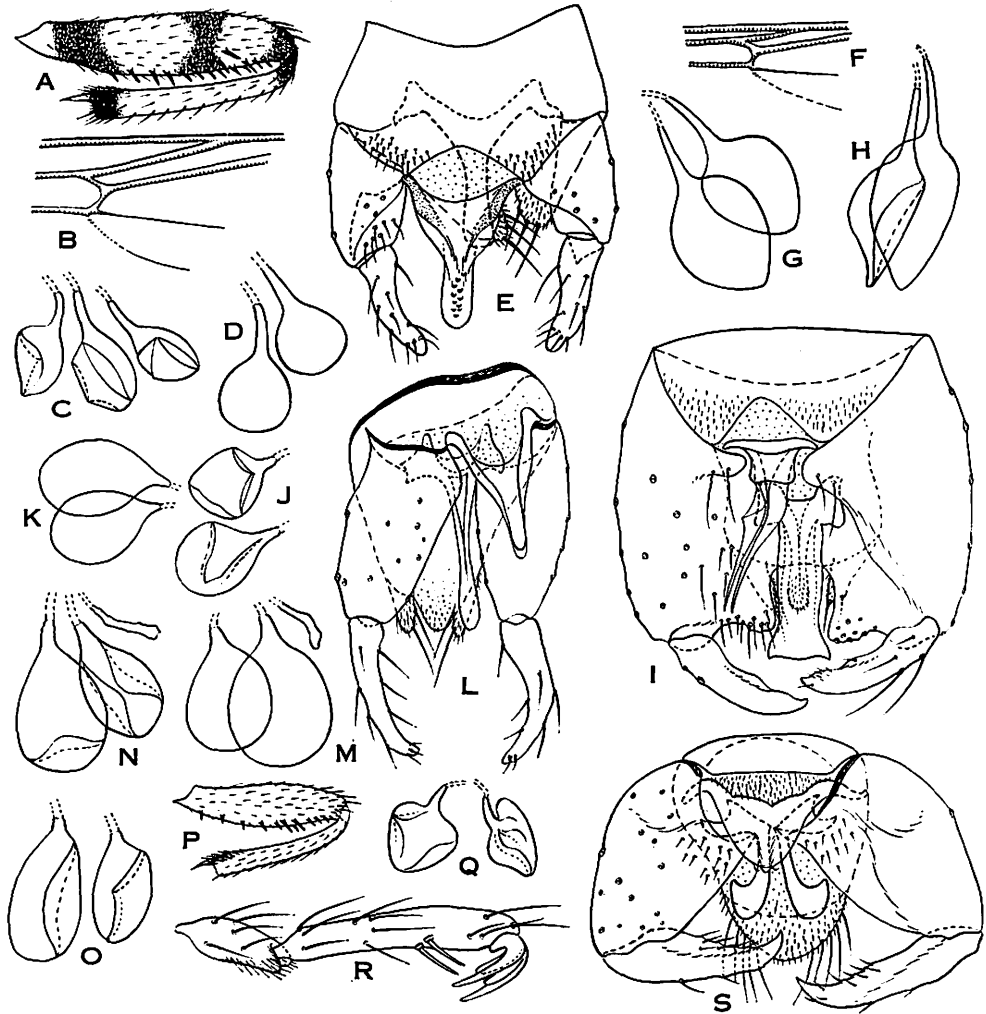


Fig. 7. A-E. *Bezzia inflatifemorata*: A, ♀ fore femur and tibia; B, middle part of ♀ wing; C, spermathecae of holotype; D, spermathecae of paratype; E, ♂ hypopygium. F-I. *B. crassistyla*: F, middle part of ♀ wing; G, spermathecae of holotype; H, spermathecae of paratype; I, ♂ hypopygium. J-L. *B. excavata*: J, spermathecae of holotype; K, spermathecae of paratype; L, ♂ hypopygium. M, *B. zonata* (♀), spermathecae of paratype; N, *B. vittata* (♀), spermathecae; O, *B. conjunctivena* (♀), spermathecae. P-Q. *B. maai* (♀): P, fore femur and tibia; Q, spermathecae. R-S. *Probezzia petersi* (♂): R, apical 2 tarsal segments of hind leg; S, hypopygium.

aedeagus almost as long as parameres, coxite with blunt apical lobe on mesal side, differing from *tasmaniensis*. *B. murina* Kieffer known from Taiwan is more closely related to this species, than the Australian but ♀ wing vein Rs is rather shorter being only 2.5× as long as R<sub>1</sub> and ♀ hind basitarsus is rather longer being as long as following 4 segments put together, differing from *crassistyla* n. sp.

39. *Bezzia excavata* Tokunaga, n. sp. Fig. 7J-L.

Small or medium-sized dark brown or brown species with legs mainly yellow or white and bearing distinct brown bands: all femora each with dark preapical ring or spot, all tibiae each with dark both ends and middle ring; median fork of wing vein just sessile or at end of r-m; spermathecae with short chitinized part of duct; style and parameres of ♂ hypopygium slender.

♀. Body about 2.98 mm long; wing  $1.81 \times 0.69$  mm. Head dark brown, mouth parts brown, eyes separated as wide as 1 facet, mandible with 8-9 cutting teeth, palp stout, segment III short-oval, with several sensillae on ventral side, RL-P 6 : 11 : 11 : 6 : 9 : 12. Antennal segment I pale ochreous, other segments with basal swollen parts white and apical elongated parts brown; AR about 1.26, RL-8A 14.2 : 15.5 : 16.5 : 29 : 31.5 : 32 : 32 : 39 (W = 5.5-6). Thorax entirely dark brown, scutum densely setigerous with small setae, anterior tubercle small, scutellum with 4 large and many small setae. Legs with all coxae brown, trochanters ochreous, other segments largely yellow, knee joints dark, femora with 1 dark preapical spot or band, tibiae with middle and apical dark bands, tarsal segments I-IV with brown apical ends; fore femur with 2 preapical ventral spines, hind tibial comb with 6-7 apical bristles, tarsal spur-like bristles absent, claws simple, equal; RL-L 35.8 : 29.5 : 15.5 : 8 : 4.5 : 4 : 6 in fore, 48 : 38.5 : 25 : 10 : 4.5 : 3.7 : 5 in mid, 57.5 : 54.5 : 31.5 : 12.5 : 5.5 : 4 : 6 in hind. Wing entirely very pale, costa ending above end of  $M_2$ , CR 0.86, fork of  $M_{1+2}$  at end of r-m, fMCu under end of r-m, RL-V 43 : 47 : 52 : 30 : 68. Halter white. Abdomen dark brown, tergites I and III-VI each with distinct window-like pale spot on anterior part, gland rods present only on VII, very long, reaching posterior margin of postscutellum; cerci brown, spermathecae (fig 7J-K) 2, dark brown, round or pyriform,  $6 + 16 \times 13$  and  $4 + 14 \times 12$ .

♂. Body about 1.98 mm long; wing  $1.29 \times 0.43$  mm. General structure as in ♀, but color somewhat paler, generally being brown and white. Palp small, segment III oval, with only 1-2 sensillae, RL-P 6 : 8 : 8 : 5.5 : 7.5 : 11.5. Antennal segment I dark brown, II-X and plumes pale brown, XI-XIV with basal parts pale brown, elongated apical parts brown, II-X elongate-oval, 4 apical cylindrical, CRL of II-X to XI-XIV 25 : 32, RL-8A 12 : 12.5 : 13 : 14.5 : 21 : 28 : 30 : 40.5 (W = 8-7). Thorax entirely brown, scutum sparsely setigerous, anterior tubercle rudimental, supra-alar setae 2, scutellum with 4 large and several small setae. Legs white in ground color, with coxae, trochanters and all bands brown or pale brown; fore femur with 2 spines, claws equal, each unequally cleft at tip; RL-L 29 : 25 : 12.5 : 7 : 4 : 2.5 : 5 in fore, 36 : 30 : 17.5 : 8 : 4.5 : 3.5 : 5 in mid, 41 : 38 : 22 : 10 : 5 : 4.8 : 5.5 in hind. Wing entirely white, costa ending slightly before end of  $M_2$ , CR about 0.85, fMCu just beyond r-m, RL-V 30 : 34 : 41 : 18 : 45. Halter very pale brown. Abdomen pale brown, but hypopygium (fig 7L) brown, coxite and style slender, aedeagus triangular, with lateral sclerite, parameres elongate, fully as long as coxite (36 : 34) and longer than style (36 : 30), with apex of median lobe slightly clavate.

Holotype ♀ (BISHOP 6718), Maprik, Sepik Distr., NE NG, I.1959, W. Peters. Allotype ♂ (BISHOP) with type.

This is very closely allied to Javanese *serrena* Johannsen, but the Javanese species is different from the new species in the following points: in ♀, AR larger being 1.67, fore femoral spine single, tarsal claws each with basal minute tooth, CR smaller being 0.8, and Rs relatively shorter being about  $1.5 \times$  length of  $R_1$ .

40. *Bezzia zonatipes* Tokunaga, n. sp. Fig. 7M.

Medium-sized dark brown species with legs yellow in ground color and bearing distinct dark bands and knee joints, fore femur with 1 ventral spine, tarsal claws each with basal tooth, wing with median fork widely sessile, abdominal gland rods well developed only on tergite VII. ♂ unknown.

♀. Body about 3.51 mm long; wing  $2.39 \times 0.86$  mm. Head and mouth parts entirely dark brown, eyes separated as wide as 2 facets; mandible with 7-8 or 8-9 large cutting teeth; palp stout, but III elongate, subcylindrical, with many sensillae on apical 1/2 of ventral side, RL-P 7 : 19.5 : 25.5  $\times$  8 : 13.5 : 11. Antennal basal segment brown, flagellum missing. Thorax entirely dark brown, but in paratype, brown in ground color and scutum with obscure fuscous vittae along foveae, scutum entirely covered with dense small setae, anterior tubercle present, scutellum with 6 large and many small setae. Legs mainly yellow, with coxae, trochanters, knee parts, femoral bases and preapical bands, tibial median bands, dark, apical ends of tarsal segments I-IV pale brown; fore femur with 1-2 bristle-like ventral spines on preapical part, hind tibial comb with 7-8 or 9-10 apical bristles, tarsal spur-like apical bristles present only on mid leg: I-II or I-III each with 2, claws large, equal, each with basal tooth; RL-L 55 : 48 : 23 : 11 : 6 : 5.3 : 12 in fore, 69 : 56 : 36 : 14 : 6.5 : 6 : 12 in mid, 80 : 80 : 52 : 17 : 6.6 : 6 : 12.5 in hind. Wing rather broad, with veins pale brown, costa ending slightly before end of  $M_2$ , CR about 0.82, r-m subequal to base of  $R_s$  (6 : 5) and longer than base of  $M_1$  (6 : 4), fMCu just beyond base of r-m or under it, RL-V 53 : 53 : 69 : 34 : 84. Halter brown or pale brown. Abdomen with tergites entirely dark brown, III-VI each with shallow concavity on anterior margin between rudimental gland rods, VII with long rods, extending under II; cerci brown, spermathecae (fig 7M) 2, short-oval, dark brown, unequal,  $7+21 \times 18$  and  $5+19 \times 16$  in paratype.

Holotype ♀ (BISHOP 6719), Goldie River, near Port Moresby, SE NG, 25.IX.1959, light trap, Ardley. Paratype ♀, Wamena, 1700 m, Baliem Vall., NW NG, 10-25. II. 1960, Maa.

The general color of this species is very similar to *excavata* n. sp., *serena* Johannsen and *kyotoensis* Tokunaga, but these allied species are all different from the present species in the following points: In *excavata*, median dark band of hind tibia placed before the middle, fore femur with 2 ventral spines, tarsal claws simple, and median fork of wing veins not widely sessile; in *serena*, scutellum yellow, abdomen yellowish white, halter yellow, and wing with median fork not widely sessile; in *kyotoensis*, apical 2 tarsal segments brown, hind femur largely yellowish brown and with both ends yellow, fore femur with 2-3 ventral spines, claws simple, wing with brownish costal and radial areas, and abdomen with 3 pairs of gland rods.

41. *Bezzia vittata* Tokunaga, n. sp. Fig. 7N.

Large brown and ochreous species; scutum with brown vittae on yellowish ground color, legs yellowish, with fuscous bands, but these bands not so distinct as shown in *excavata* and *zonatipes*, fore femur with 2 ventral spines, median fork of wing distinctly sessile, abdomen with only 1 pair of long gland rods, spermathecae with short chitinized part of duct. ♂ unknown.

♀. Body about 4.16 mm long; wing  $3.34 \times 1.08$  mm. Head ochreous, mouth parts brown; eyes separated as wide as 2.5 facets; mandible with 8 cutting teeth; palp slender, RL-P

9 : 19 : 25 × 8 : 15 : 11, III fusiform, with several sensillae on apical 1/2 of ventral side. Antennal basal segment brown, flagellum missing. Thorax mainly brown, prothorax and mesosternal side yellow, scutum largely ochreous, densely setigerous with small setae, caudoscuteal area yellow, 2 lateral and 2 subconfluent median vittae brown, anterior tubercle present, scutellum pale ochreous, with 6 large and many small setae. Legs with coxae and trochanters brown, other segments largely yellow, femora pale ochreous, with knee parts, preapical bands fuscous, ventral side of fore femur before preapical band fuscous, preapical area of hind femur between dark knee and band fuscous yellow, tibiae as in preceding species bearing 3 dark and 2 yellow bands, tarsal segments III-V or IV-V brown; fore femur with 2 ventral spines on preapical part, hind tibial comb with 8-9 apical bristles, tarsal spur-like apical bristles: fore tarsal segments I-II each with 1, mid tarsal segments I-III each with 2, hind tarsal segments II-III each with 1, fore and mid claws unequal, simple, larger one far longer than 1/2 of V (9 : 13) and smaller shorter than 1/2 (7 : 13); RL-L 65 : 56 : 26 : 14 : 8.5 : 8 : 12 in fore, 86 : 72 : 45 : 17.5 : 9 : 7 : 12 in mid, 97.5 : 101 : 58 : 22 : 9 : 7.5 : 13 in hind. Wing with anterior veins brown, costa ending slightly before end of  $M_2$ , CR about 0.79, r-m as long as base of  $R_s$  (7 : 7) and shorter than base of  $M_2$ , fMCu under end of r-m, RL-V 70 : 77 : 86 : 57 : 122. Halter brown. Abdomen pale brown, with long gland rods of tergite VII extending into segment III; cerci dark brown, spermathecae (fig 7N) unequal, brown, oval, 13+22 × 16 and 7+20 × 14.

Holotype ♀ (BISHOP 6720), Wamena, 1700 m, Baliem Vall., NW NG, 10-25.II.1960, Maa.

This midge is allied to the common European *solstitialis* Winnertz, however, the allied species is distinctly different from the new species in the presence of 4 pairs of abdominal gland rods. Another allied species may be Japanese *kyotoensis* Tokunaga, but this is easily distinguished from the new species by smaller hind TR than 2.64 being 2.14, more brownish anterior marginal area of wing, and more well developed abdominal gland rods which are 3 pairs.

42. *Bezzia conjunctivena* Tokunaga, n. sp. Fig. 70.

Small brown species with banded yellowish legs and pale ochreous abdomen; fore femur with brown preapical band, but other femora yellow on apical 1/2 and without brown or dark preapical bands, fore tibia with median brown band, but hind without it, fore femoral ventral spines 5, claws barbed, wing vein  $M_{1+2}$  forked at end of r-m, abdominal gland rods only 1 pair. ♂ unknown.

♀. Body about 2.5 mm long. Wing 1.91 × 0.7 mm. Head and mouth parts entirely brown, eyes just contiguous; mandible with 8 cutting teeth; palp rather slender, III somewhat fusiform, with only 1-2 sensillae on middle part of ventral side, RL-P 5 : 10 : 15 × 5.5 : 9.5 : 9. Antennal segment I dark brown, flagellum missing. Thorax entirely brown, scutum rather sparsely setigerous with small setae, without anterior tubercle, scutellum with 4 large and about 14 small setae. Legs with coxae and trochanters dark brown or brown, fore femur ochreous on basal 1/2, with broad brown preapical band before yellow apical part, tibia mainly yellow, with both ends dark, median band brown, tarsus largely pale yellow, distal ends of segments I-III and entire length of IV-V brown, mid femur brown on basal 1/2, yellow on apical 1/2, other segments missing, hind femur as in mid, but extreme tip dark, tibia and tarsal segments I-III generally yellow to pale yellow, but both tibial ends dark, distal ends of I-II brown, IV-V missing; fore femur with 5 ventral spines, hind

tibial comb with 5 apical bristles, tarsal apical spur-like bristles: fore tarsal segments I-II and hind I-II each with 1, fore claws equal, each with basal tooth; RL-L 41 : 36.5 : 14 : 7.5 : 4.7 : 4 : 8 in fore, 60 : 57 : 30.5 : 8 : 5 : ? : ? in hind. Wing almost entirely white, costa ending above or just before end of  $M_2$ , CR about 0.88, r-m fully as long as base of Rs (5 : 4), fork of  $M_{1+2}$  at end of r-m, fMCu under end of r-m, RL-V 44 : 45 : 52 : 25 : 73. Halter yellowish pale ochreous. Abdomen yellowish ochreous, with gland rods of tergite VII pale brown, long, ending at posterior part of tergite II; cerci pale brown, spermathecae (fig 7 O) 2, dark brown, elongate oval, unequal, 2+24×14 and 1+18.5×11.

Holotype ♀ (BISHOP 6721), N of Mendi, 1800 m, S. Highlands, SE NG, 8.X.1958, Gressitt.

This is rather distinctly characteristic in color of legs and somewhat allied to European *bicolor* Meigen, but may be easily separated from the allied species by the presence of the ventral spines of fore femur, longer gland rods of the abdomen than 3 segments, broader brownish basal part of hind femur, and relative position of median fork to r-m.

#### 43. *Bezzia dividua* Tokunaga, n. sp.

Medium-sized dark brown species; legs yellowish and with dark bands, fore femur largely yellow, with dark preapical spot and 3 ventral spines, mid femur extensively dark brown and only narrowly yellowish ochreous apically, hind femur largely yellowish ochreous and dark brown on basal 1/4; wing with median fork at end of r-m; abdominal tergites I and II fused, III-IV deeply constricted, V-VI separated into paired hemitergites, abdominal gland rods 1 pair, very long. ♂ unknown.

♀. Body about 3.32 mm long; wing 2.52×0.85 mm. Head dark brown, eyes separated as wide as 1.5 facets; mandible with 9-10 cutting teeth, palp rather short, brown, III with many sensillae on apical 2/3 of ventral side, RL-P 5 : 10 : 19×6.5 : 10 : 11.7. Antenna largely brown, flagellar segments with basal swollen parts white, verticils highly reduced, only present on II-IX, II with 7, III-IX each with 1-3 verticils; AR about 1.1, RL-8A 20 : 20.5 : 23 : 36 : 39 : 38 : 37 : 45 (W=8). Thorax entirely dark, scutum rather densely setigerous with small slender setae, finely pubescent with very minute hyaline microtrichia, anterior tubercle very small, scutellum with 7 large and many small setae. Legs with coxae and trochanters dark brown; fore femur and tibia largely yellow, knee part, base of femur, apex of tibia, femoral preapical incomplete band and tibial median band dark, tarsal segments I-III with basal 1/2 or more pale ochreous, apical parts dark brown, IV and V entirely dark brown; mid femur dark brown, but extreme apex dark and preapical part yellowish ochreous, tibia yellowish ochreous, with both ends dark, tarsus as in fore in color; hind femur and tibia yellowish ochreous, femoral basal 1/3, knee part and tibial apical end dark, tarsus as in fore in color; fore femur with 2-3 ventral spines on apical 1/2, tarsal apical spur-like bristles invisible, claws equal, each with strong basal tooth; RL-L 44 : 40.5 : 19 : 9 : 5.2 : 4.5 : 7 in fore, 66 : 51 : 30.8 : 12 : 5.9 : 4.9 : 7 in mid, 84 : 72.5 : 40 : 16.5 : ? : ? : ? (III-V missing) in hind. Wing pale brown, costal area and apical radial cell more brownish, anterior veins brown, costa slightly produced beyond tip of Rs as long as r-m, ending just beyond tip of  $M_2$ , CR about 0.91, Rs very long, arcuate, r-m short, about 1/2 of base of Rs (5 : 9), fork of  $M_{1+2}$  at end of r-m, fMCu under r-m, RL-V 59 : 66 : 73 : 48 : 92. Halter with stem white, knob dark. Abdomen with tergites dark, but VII-IX brownish, I-II fused, III-IV strongly constricted, deeply anteriorly and shallowly



posteriorly, V-VI completely divided into paired hemitergites, gland rods of VII very long, extending into thorax; cerci brown, spermathecae 2, dark, unequal, somewhat pyriform,  $20 \times 4$  and  $13 \times 12$ .

Holotype ♀ (BISHOP 6722), Waris, 350-500 m, S of Hollandia, NW NG, 16-23.VIII.1959, at light, Maa.

This midge is very closely related to *conjunctivena* n. sp., but distinctly differs in the color of mid and hind femora, less number of fore femoral ventral spines, and special structure of abdominal tergites.

44. *Bezzia maai* Tokunaga, n. sp. Fig. 7P-Q.

Small brown and yellow species, scutum without anterior tubercle, legs largely yellowish, fore femur somewhat thickened, with many (10-12) ventral spines, hind femur without brown preapical band, wing with Rs very long, fully  $3 \times$  as long as  $R_1$ , median fork just before end of r-m, abdominal gland rods absent, spermathecae with long chitinized part of duct. ♂ unknown.

♀. Body about 1.57 mm long; wing  $1.22 \times 0.43$  mm. Head and mouth parts brown; mandible with 9 large cutting and 3-4 small basal teeth, palp longer than proboscis, segment III with many sensillae on ventral side, RL-P 6 : 11 :  $14 \times 5$  : 10 : 11.5. Antenna brown and white, basal swollen parts of segments white and apical parts brown, III-IX each with 4 pale brown short verticils, AR about 1.77, RL-8A 12.5 : 12 : 12.7 : 38 : 34 : 31.5 : 36.5 : 44 (W=5.5). Thorax entirely brown, scutum rather densely setigerous with small brown setae, microtrichia almost absent, anterior tubercle absent, scutellum with 4 large and about 10 small setae. Legs with coxae yellowish ochreous, trochanters pale ochreous, other segments largely yellow, hind femur with brown apical band just before yellow extreme tip, hind tibia with both ends brown, tarsal segments IV-V ochreous; fore femur (fig 7P) thickened as in hind, with 10-12 ventral spines, hind tibial comb with 6-7 apical bristles, tarsal apical spur-like bristles: fore tarsal segments II-III each with 1, mid tarsal segment I with 2, hind tarsal segments I-II each with 2, claws equal, small, each with basal tooth; RL-L 30 : 27.4 : 12 : 6 : 3 : 3 : 5.5 in fore, 38.7 : 33 : 19.5 : 8 : 3.8 : 3 : 5 in mid, 47 : 44 : 29 : 11.5 : 4.5 : 3 : 6.5 in hind. Wing entirely very pale, costa ending far before tip of  $M_2$ , CR about 0.81,  $R_1$  ending above tip of  $M_{3+4}$ , r-m as long as base of Rs, median fork just before end of r-m, base of  $M_1$  being about  $1/3$  of r-m (1 : 3), RL-V 30 : 33 : 40 : 11 : 37. Halter with knob dark brown, stem brown. Abdominal tergites brown, spermathecae (fig 7Q) subequal, brown,  $8+11 \times 11$  and  $7.5+? \times 11$ .

Holotype ♀ (BISHOP 6723), Sarmi, W to Hollandia, NW NG, 20-23.VII.1959, light trap, Maa.

This is somewhat related to European *affinis* Steager, but fore and mid femora and tibiae entirely yellow differing from the related species. Another allied species may be N. American *pruinosa* Coquillett, but it bears simple tarsal claws as one of the distinct differences from the present new species.

45. *Bezzia gressitti* Tokunaga, n. sp.

Rather large dark brown species, legs largely yellow, with knee parts, apical ends of tibiae and of tarsal segments I-II, entire segments of III-V dark, mid and hind femora with sub-basal dark spot or band, fore femur with 2 ventral spines, claws barbed, spermathecae

small, round, gland rods only 1 pair, vestigial. ♂ unknown.

♀. Body about 4.16 mm long; wing  $3.56 \times 0.98$  mm. Head with vertex dark brown, clypeus and mouth parts pale brown or ochreous; eyes separated as wide as 2 facets; mandible with 7 cutting teeth, palp pale brown, but distal 2 segments brown, III with several sensillae on middle part of ventral side, RL-P 10 : 18 :  $26 \times 9$  : 19 : 22. Antennal segment I brown, other segments missing. Thorax entirely dark brown, scutum densely setigerous with small erect setae, supra-alar setae 2, anterior tubercle slender, scutellum with 6 large and many small setae. Legs mainly yellow, but fore coxa brown, with only apex yellow, other coxae brown, all knee parts rather broadly dark, tibial ends, ends of tarsal segments I-II or I-III, apical 2 or 3 segments dark or dark brown, mid femur with rather large dark cloud on dorsal side of sub-basal part, hind femur with large sub-basal dark band; fore femur with 2 ventral spines on preapical part, hind tibial comb with 9 apical bristles, claws equal, each with small basal tooth; RL-L 72 : 68 : 32 : 12 : 7 : 6 : 10 in fore, 93 : 82 : 44 : 13.2 : 7 : 5.5 : 10 in mid, 115 : 108 : 57 : 22 : 7.5 : 6 : 10 in hind. Wing with main veins brown, membrane very pale but with brown clouds or stripes along main veins, costa ending slightly before tip of  $M_2$ , CR about 0.87, r-m hardly as long as base of Rs (7 : 8), base of  $M_2$  about 1/2 as long as r-m (4 : 7), fMCu just before origin of r-m, RL-V 90 : 93 : 108 : 52 : 129. Halter dark brown. Abdominal tergites and cerci brown, but IV-VI somewhat paler, rudimental gland rods present only on VII; spermathecae 2, unequal, small, dark brown, round,  $5+20 \times 17$  and  $5+16 \times 16$ .

Holotype ♀ (BISHOP 6724), Goroka-Kabebe, 1800 m, E. Highland, NE NG, 24. IV. 1955, Gressitt.

This is allied to *nigriclava* Kieffer, but the allied Taiwan species is different from the New Guinea midge in the following points:  $M_{1+2}$  forked at end of r-m and femora of mid and hind legs each with faint fuscous preapical band.

#### 46. *Bezzia papuae* Tokunaga, n. sp.

Large dark brown species closely similar to *gressitti* n. sp. in color and wing venation; legs largely yellow, with knee joints, apical ends of tibiae and tarsal segment I dark, hind femur with large sub-basal dark band, abdominal gland rods 5 pairs, but anterior 4 pairs very small. ♂ unknown.

♀. Body 3.98-4.49 mm long; wing  $3.41-3.47 \times 0.91-0.96$  mm. Head with vertex dark brown, clypeus yellow, mouth parts brown, eyes separated as wide as 2 facets; mandible with 7 cutting teeth; palp slender, III with several sensillae on ventral side, RL-P 11 : 17 :  $30 \times 8$  : 18 : 22. Antennal segment I brown, other segments missing. Thorax entirely dark brown, scutum setigerous with dense small erect setae, supra-alar setae 2, anterior tubercle present, scutellum with 6 large and many small setae. Legs with fore and mid coxae basally brown, apically yellow, hind coxa entirely brown, femora, tibiae and tarsal 2 basal segments mainly yellow, femoral basal ends, both ends of tibiae, apical end of basitarsi, and apical 2/3 of tarsal segment II dark, III-V entirely dark, mid and hind knee parts dark, hind femur with large sub-basal dark band; fore femur with 2 ventral spines beyond middle, hind tibial comb with 8-9 apical bristles, tarsal apical spur-like bristles: mid I-II each with 2, claws equal, each with basal tooth; RL-L 72.5 : 67.5 : 31.3 : 16.3 : 7.5 : 5.8 : 11 in fore, 96.5 : 81 : 45.5 : 16 : 7 : 5.8 : 10 in mid, 118 : 116 : 59.5 : 25.5 : 9 : 6.2 : 11.5 in hind. Wing pale brown, main veins brown, area along main veins distinctly brownish,

costa ending just before or above tip of  $M_2$ , CR 0.86-0.87, r-m as long as base of Rs (6.8 : 7) and far longer than base of  $M_1$  (6.8 : 3.5), RL-V 88 : 91.5 : 100 : 44 : 122. Halter dark brown. Abdomen with tergites and cerci entirely brown, gland rods of III-VI short, not extending beyond preceding tergites respectively, those of VII very long, reaching anterior part of tergite II; spermathecae 2, round, small, dark brown, unequal, 5.5+20.5×19 and 3.5+18×16.

Holotype ♀ (BISHOP 6725), Okaitadi, 1800 m, Wissel Lakes, NW NG, 7.VIII.1955, Gressitt. Paratype: ♀, Enarotadi, 1800 m, Wissel Lakes, NW NG, 5. VIII. 1955, Gressitt.

This is very closely allied to the preceding species with only following slight differences: mid femur without sub-basal dark spot, abdominal gland rods present, rather well developed, and wing vein Rs about 2.7-2.8× length of  $R_1$ .

#### Genus *Probezzia* Kieffer (1906)

This genus has been regarded as a subgenus of *Bezzia* Kieffer by Kieffer (1917), Edward (1926), Johannsen (1931), Goetghebuer (1934), and Tokunaga (1939), however, this paper, succeeding the system of Malloch (1915), Kieffer (1919) and Wirth (1952), treats *Probezzia* as an independent genus with following generic characters: all femora slender and without ventral spines or apical spine-like bristles, ♀ tarsal segments V provided with strong black spine-like bristles or batonnets below, claws of ♀ rather large, equal, distinctly bifid or barbed basally. Other characters are closely similar to those of *Bezzia*.

#### 47. *Probezzia petersi* Tokunaga, n. sp. Fig. 7R-S.

Medium-sized dark species with frontal scutal tubercle; fore femur pale yellow on basal 3/5 and black on apical part, other femora and all tibiae entirely black, last tarsal segments with ventral batonnets (2 in ♂). Parameres of ♂ hypopygium separated, each with flattened apex. ♀ unknown.

♂. Body about 2.2 mm long. Wing 1.44 mm long. Head with vertex dark, clypeus and mouth parts brown; eyes separated as wide as 1 facet; palp slender, III cylindrical, with few sensillae on preapical part, RL-P 5 : 9 : 14×5.5 : 11 : 12. Antenna entirely dark brown, segments III-IX elongate oval, XI-XIV cylindrical, CRL of II-X to XI-XIV 42 : 57, of II-XI to XII-XIV 49 : 49.4, RL-8A 13 : 13 : 15 : 18 : 28 : 57 : 64 : 63 (W=5-8). Thorax entirely dark, scutum setigerous with small stout setae densely on middle part and sparsely on lateral sides, supra-alar setae 2, anterior tubercle present, scutellum with 4 large and 10 small stout setae. Legs largely brown, but fore coxa and all trochanters pale yellow, fore femur yellowish white on basal 1/2, all tarsi almost white on basitarsi and pale brown on other segments; femoral spines absent, hind tibial comb with 5 apical bristles, tarsal apical spur-like setae weakly developed only on mid tarsal segments I-III, each bearing 2, hind tarsal segment V (fig 7R) clavate, with 2 ventral strong spines just beyond middle, but fore and mid V elongate oval, without spines, claws small, equal, each with blunt basal tooth; RL-L 43 : 41 : 21 : 9.5 : 4.2 : 3.5 : 6.5 in fore, 55 : 40 : 26 : 9 : 4 : 3.5 : 6.5 in mid, 64 : 58.5 : 42 : 14.7 : 8 : 5 : 10 in hind. Wing with main vein pale brown, costa ending above midway between ends of  $M_2$  and  $M_{3+4}$ , CR about 0.8, radial septum quite absent or very rudimentary, when present radial cell I about 0.38× long of II (9 : 24), r-m as long as base of Rs (3 : 3) and of  $M_1$  (3 : 2.5), fMCu under r-m, RL-V 43 : 43 : 48 : 12 : 37.

Halter dark brown. Abdomen pale brown; hypopygium (fig 7S) darker; coxite conical, style strong, pointed, slightly shorter than coxite (40 : 46); aedeagus bell-shaped, with distinct basal roots, basal membrane pubescent; parameres separated, curved, apically flattened and without pointed tips.

Holotype ♂ (BISHOP 6726), Baingil, SE NG, III.1959, W. Peters.

This midge is allied to N. American *albiventris* Loew, S. African *vacunae* de Meillon, dark form of *conspersa* Johannsen reported from Sumatra by Macfie, and European *nigritula* Zetterstedt in some different points, but rather easily distinguished from these species: in *albiventris*, all femora are entirely dark and abdomen white; in *vacunae*, frontal tubercle of scutum and ventral batonnets of ♂ tarsal V are almost absent; in darker form of *conspersa*, hind TR is smaller being only about 2.3, hind tibia is dusky yellow and apically dark, and fMCu is beyond level of r-m; in *nigritula*, Rs is short being only 2× length of R<sub>1</sub>, and claws of both sexes are simple.

## SOME NEW ICHNEUMONIDAE (Hymenoptera) FROM NEW GUINEA AND ADJACENT AREAS<sup>1</sup>

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*Abstract:* Thirteen new species of Ichneumonidae representing the subfamilies Ephialtinae and Banchinae are described from New Guinea and adjacent areas. A new genus, which belongs in the subfamily Ephialtinae, is also described.

This article presents 13 new species of Ephialtinae and Banchinae and a new genus of Ephialtinae from New Guinea, Borneo and New Ireland. It is based on material from the collection of Bishop Museum, Honolulu, and all the holotype of the species described herein will be preserved there.

Taking this opportunity I would like to express my sincere thanks to Dr J. L. Gressitt and Dr C. M. Yoshimoto of Bishop Museum for the loan of material. I am also greatly indebted to Drs Henry and Marjorie Townes of the American Entomological Institute for their kindness in reading the manuscript.

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