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New species of *Cydistomyia* Taylor with notes and collection records for other Tabanidae (Diptera) from New Guinea

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New species of *Cydistomyia* Taylor with notes and collection records
for other Tabanidae (Diptera) from New Guinea

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New species of *Cydistomyia* Taylor with notes and collection records for other Tabanidae (Diptera) from New Guinea

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Abstract. Four new species of *Cydistomyia* Taylor from New Guinea, *C. missimiensis*, *C. madangiensis*, *C. waigani*, and *C. moresbyensis*, are described and figured. A revised key to the females of New Guinea *Cydistomyia* and New Guinea collection records for 57 additional species of Tabanidae are provided. A table with the approximate longitudes and latitudes of all but one locality listed is provided.

Introduction

As currently treated, the genus *Cydistomyia* Taylor includes species from the Afrotropical Region, the Australasian and Oceanian Region, and the Oriental Region. The species occurring on New Guinea and neighboring islands are the primary focus herein. In his treatment of the Tabanidae of New Guinea, Mackerras (1964) recognized 45 species in the genus *Cydistomyia* and provided New Guinea records for all but one which was then known only from the nearby island of New Britain. He provided a key separating these species into three species groups, the basifasciata group, the lamellata group, and the albithorax group followed by keys to the species of each group. He further subdivided his albithorax group into barretti, albithorax, immigrans, lorentzi, and sylvioides subgroups.

Mackerras (1971) briefly discussed the taxonomic history of his basifasciata group and returned it to generic status as the genus *Chasmia* Enderlein, and he also shifted *C. oudella* Oldroyd to the genus *Japenoides* Oldroyd, thereby removing 15 of the 45 species mentioned above from the *Cydistomyia* of New Guinea. In this same paper, he described five new species of *Cydistomyia*, including one from New Guinea, one from New Britain, and three from the Solomon Islands. In discussing the genus *Cydistomyia*, he retained the lamellata group, elevated the subgroups noted above (barretti, albithorax, immigrans, lorentzi, and sylvioides subgroups) to group status, and established one new group, the nana group, yielding eight groups. The last group mentioned included two species, *C. nana* Mackerras and Rageau and *C. parapacifica* Mackerras and Rageau, neither known from New Guinea, but both known from the nearby island of New Britain. However, *C. nana* proved to be pre-occupied, and the species was renamed *C. chaineyi* (Daniels 1989), so Mackerras' eighth group would now be the chaineyi group.

Goodwin (1999) described *Cydistomyia kamialiensis*, a species in the barretti group, from northeastern New Guinea. Based on all of the foregoing, the genus *Cydistomyia* in New Guinea now includes 31 species representing all of the above groups, except the chaineyi group whose two species are only known from nearby New Britain. Of the 31, *C. papouina* (Walker) is known only from the male.

Below, the descriptions of four additional species, all from New Guinea, are presented. Included are one species each in the albithorax, immigrans, chaineyi, and sylvioides groups. Following the descriptions is a key to the 34 species for which the females are known. This key is largely a combination, with some modification, of keys found in Mackerras (1964). Following the key to species of *Cydistomyia* is an annotated list providing collection data on other species of Tabanidae collected and/or examined in the course of this study.

Materials and Methods

All of the specimens mentioned in the remainder of this report are deposited in one of the collections for which the name, location, and abbreviation (in parentheses) are provided below. In the annotated list, the abbreviation for the collection housing the specimen(s) appears in parentheses at the end, usually just after the collector's name. Complete information on the locations of holotypes and paratypes is provided in

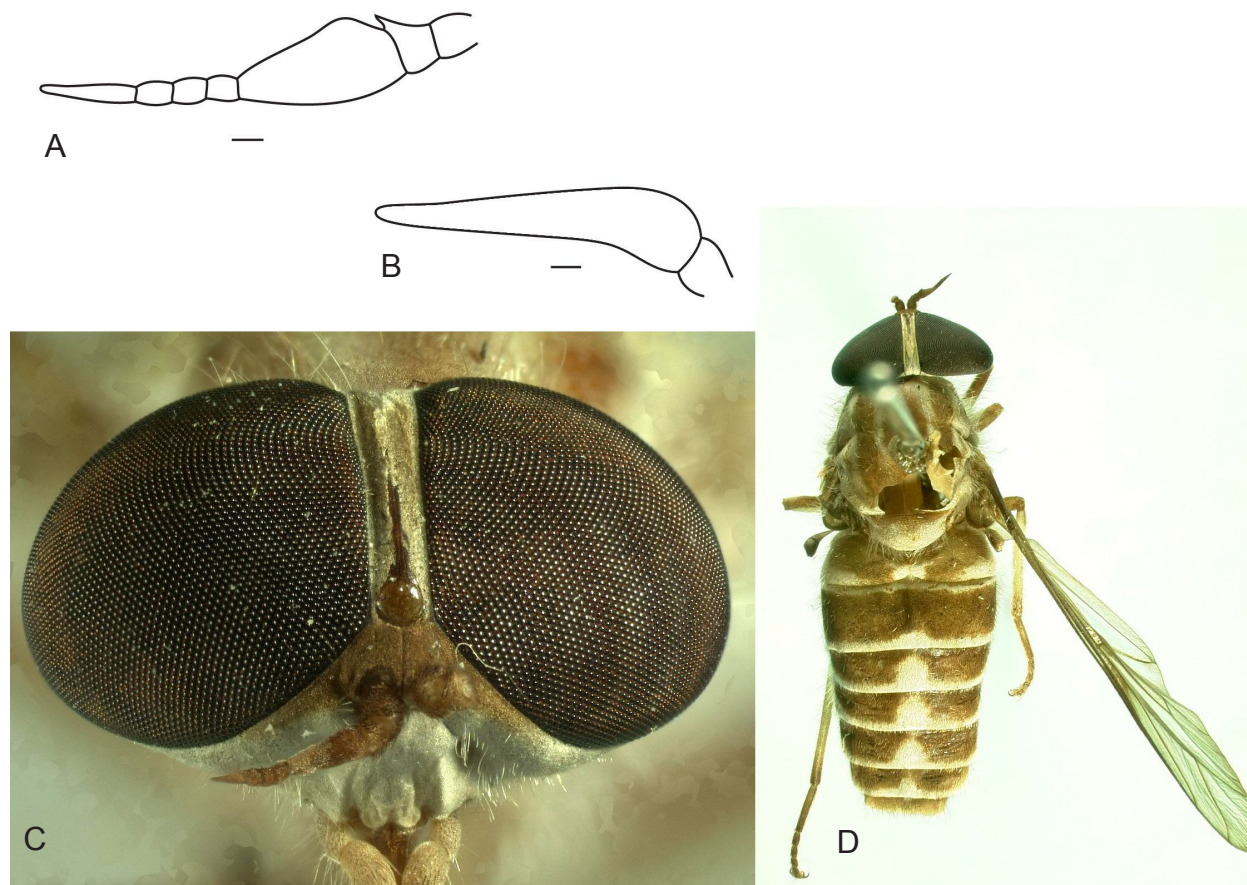


Figure 1. Adult habitus and structures of *Cydistomyia missimiensis* n. sp. **A)** Outline drawing of antenna. **B)** Outline drawing of palp. **C)** Anterior view of head. **D)** Dorsal habitus. Scale line 0.1mm.

the species descriptions. Australia Museum, Sydney, Australia (**AMSA**); Bishop Museum, Honolulu, HI, USA (**BPBM**); Papua New Guinea Forestry Research Institute, Lae, Papua New Guinea (**FRIL**); Florida State Collection of Arthropods, Gainesville, FL, USA (**FSCA**); National Agricultural Insect Collection, Kila Kila, Papua New Guinea (**NAIC**); Papua New Guinea University of Technology (UNITECH), Lae, Papua New Guinea (**UNIT**).

Collecting Localities

A table is provided giving the approximate latitudes and longitudes for most of the collecting localities mentioned herein. Coordinates in some cases were taken from the list of localities found in Mackerras (1964). All others were determined by searching for the localities on several computer based map programs such as Google Earth and numerous others found by seeking Papua New Guinea Maps on the Internet. Specimens not collected by the author, as previously noted, were in several different insect collections. Most were collected more than 30 years ago, some almost 100 years ago, and most of the locality labels from which the information was taken were hand written and often difficult to read. Consequently, only approximate coordinates are given. For localities that are known to be in close proximity to a village, town, or city for which coordinates are provided, no additional coordinates are given, but such localities are listed immediately below the associated village, town, or city. A few localities, as their spelling appeared to this author, are listed as unknown indicating that no such locality could be found on any available map, and one locality, Buna to Sepik, is believed to be a specimen taken aboard a vessel following a common coastal shipping route.

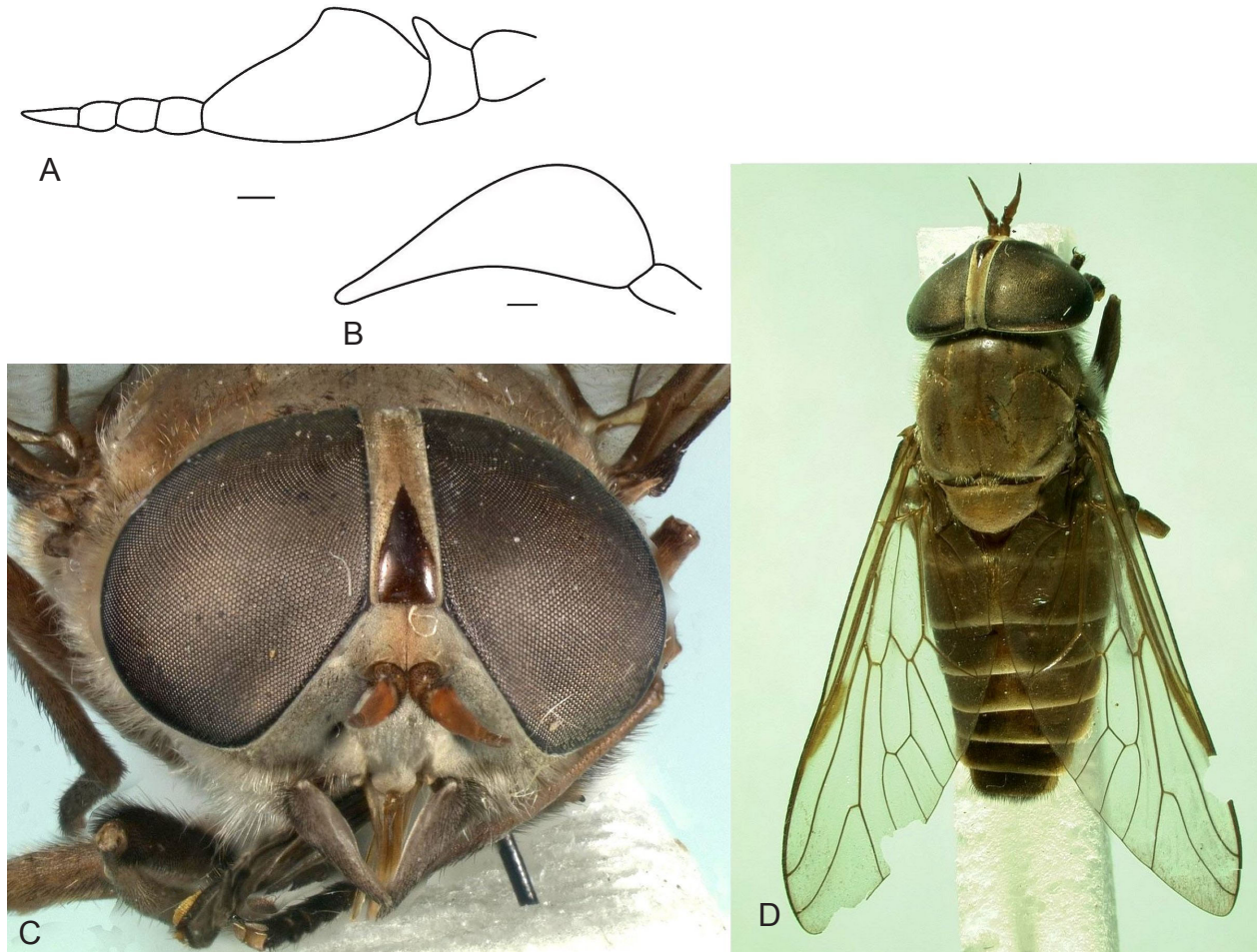


Figure 2. Adult habitus and structures of *Cydistomyia madangi* n. sp. **A)** Outline drawing of antenna. **B)** Outline drawing of palp. **C)** Anterior view of head. **D)** Dorsal habitus. Scale line 0.1mm.

Descriptions of new species

Cydistomyia missimiensis n. sp. (Figure 1A-1D)

Material examined. 3 females, all with some damage. Holotype female: Wau, Morobe Province, PNG, taken at 1600m on Mt Missim, 17-X-1978, Thane Pratt (FSCA; D1456); an auxiliary label is printed light trap, but trap is crossed out and what appears to be 'on' is handwritten above; paratype female: New Guinea, NE Wau, Morobe distr., 6 X 1974/on light/Thane Pratt collector, Wau Ecology Inst. (BISHOP) (FSCA; D1457); paratype female: in *Castanopsis* Bamboo Forest, Manki, L.A. rd., Bulolo, M. Prov., 14 XI 1983, J. Dobunaba (FSCA; D1458).

Description. A medium-sized (body and wing lengths 11.5 mm) brownish species, with distinctive grayish-white thoracic and abdominal pattern similar.

Head. Frons ca. 0.5 mm wide basally, relatively narrow, about 4.5-5.0 times as high as wide basally, diverging slightly over upper one-half, grayish pollinose overall except for callus that is drop-shaped basally, shiny yellow-brown and slightly higher than wide, with a slender more brownish median extension that ends near the midpoint of the frons; callus basally narrowly separated from eyes. Subcallus and upper parafacials adjacent to eyes a rich velvety brown that contrasts with white pollinose surface of the remainder of the parafacials and face. Antennae brown with numerous short black hairs on scape, pedicel,

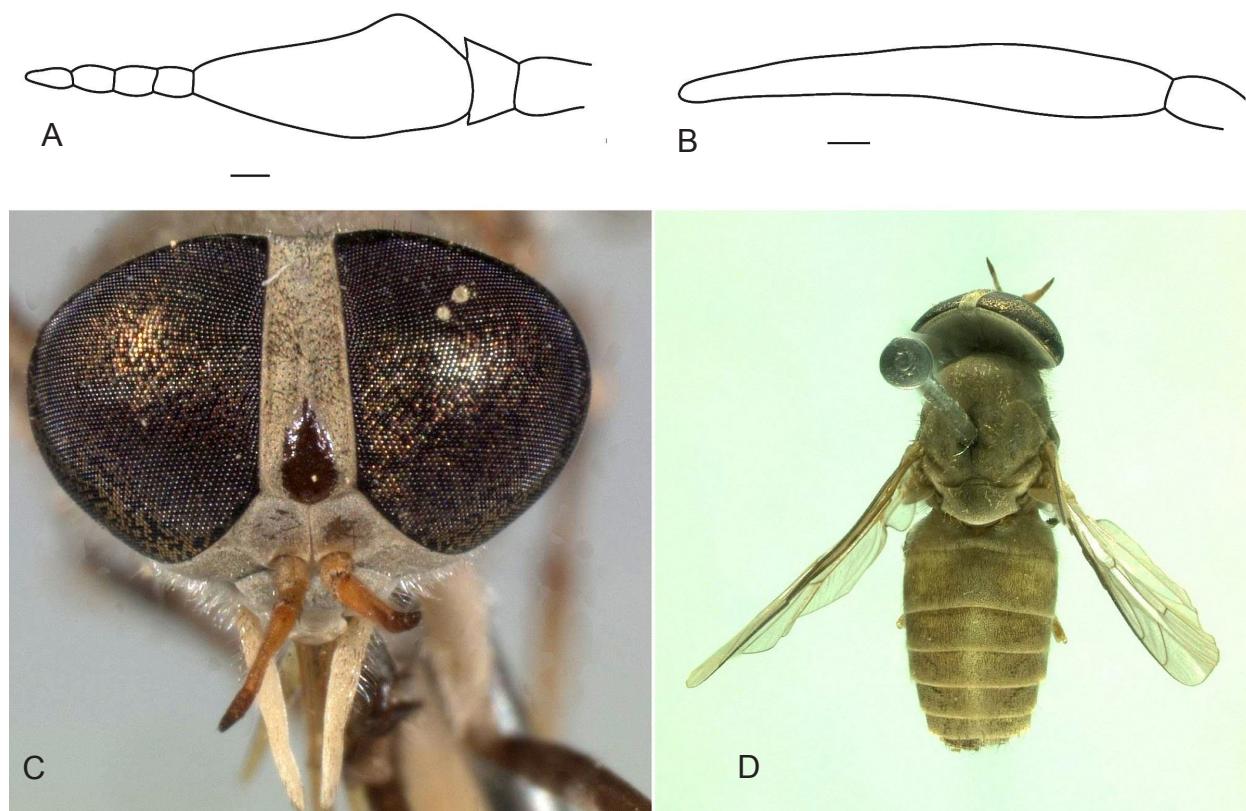


Figure 3. Adult habitus and structures of *Cydistomyia waigani* n. sp. **A)** Outline drawing of antenna. **B)** Outline drawing of palp. **C)** Anterior view of head. **D)** Dorsal habitus. Scale line 0.1mm.

and tooth of basal plate; terminal annuli combined (style) a little longer than basal plate. Palpi yellowish-brown pollinose with mostly black hairs.

Thorax. Dorsum of metanotum with rather broad median and sublateral brown stripes that are enclosed on all sides and behind by predominantly grayish-white pollinose areas; scutellum grayish pollinose, less densely so midbasally allowing brown ground color to show through more clearly. Pleural areas grayish pollinose with white hairs. Legs yellowish brown, all coxae and mid and hind femora grayish pollinose with mostly white hairs. Wings predominantly clear except for very faint brownish along the long veins and crossveins and the basal one-third of the costal cell.

Abdomen. Dorsally, brown with a distinct grayish-white pattern as follows: first tergite with a median and rather large lateral pale areas but no pale posterior border; tergite 2 narrowly pale along entire anterior border; tergites 2-6 each with a large median pale triangle and smaller lateral pale areas united by distinct posterior pale borders; venter brown with pale posterior borders on sternites 2-6.

Etymology. The specific epithet is based on the second part of the name of the mountain on which the holotype was collected.

Discussion. This species would be in the albithorax group as recognized by Mackerras (1964, 1971). It has a ground color (brown) that is lighter than typical for those species with which it might be confused (*C. albidosegmentata* (Schuermans Stekhoven), *C. heydoni* Oldroyd, and *C. perdita* Mackerras). It differs from *C. heydoni* by having a much narrower frons, a much more elongate callus, and median triangles on all visible tergites. It differs from *C. albidosegmentata* in that it is larger, lacks an appendix at the fork of R_{4+5} , paler callus, and narrower frons. It differs from *C. perdita* in color and shape of callus and overall paler ground color.

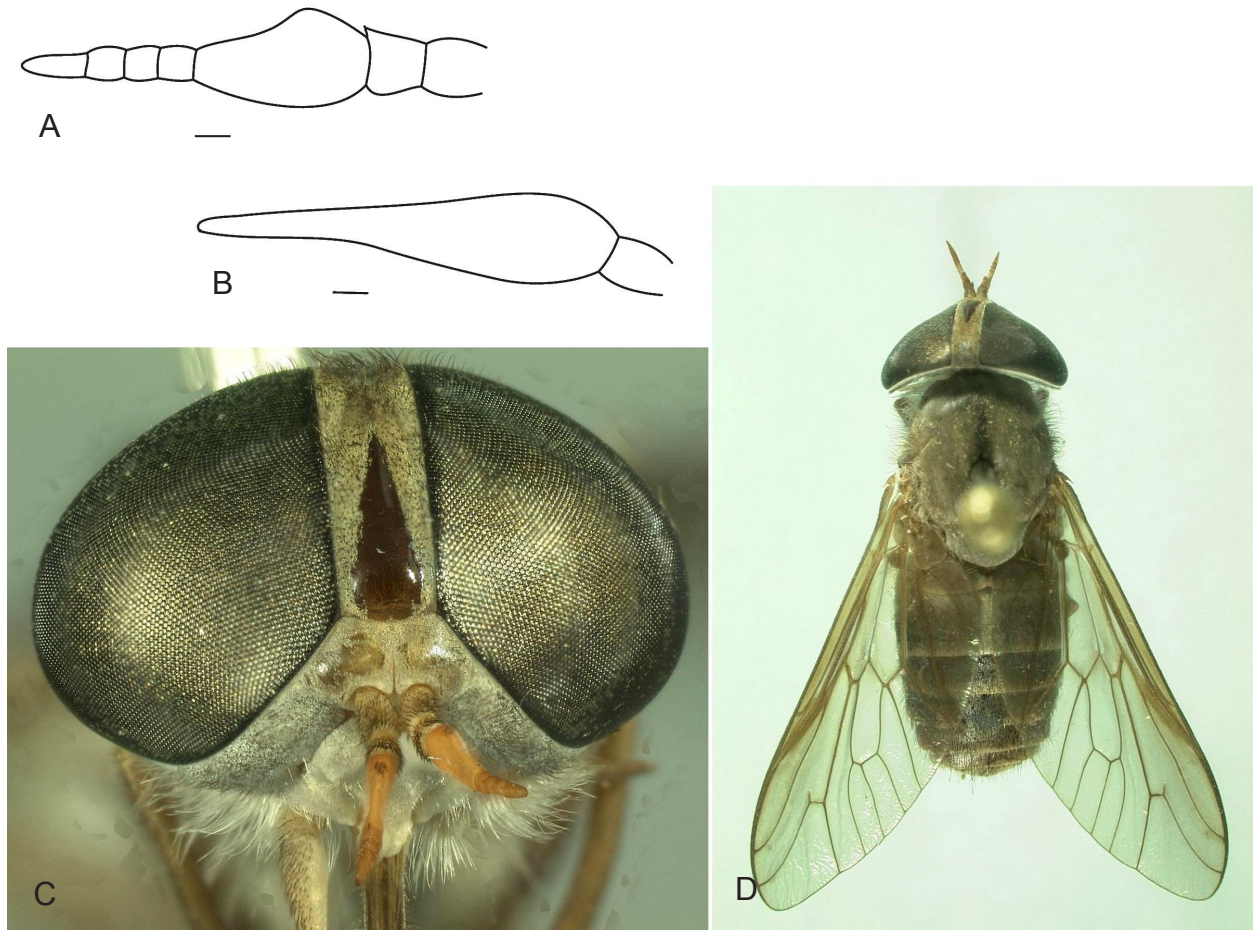


Figure 4. Adult habitus and structures of *Cydistomyia moresbyensis* n. sp. **A)** Outline drawing of antenna. **B)** Outline drawing of palp. **C)** Anterior view of head. **D)** Dorsal habitus. Scale line 0.1mm.

***Cydistomyia madangiensis* n. sp. (Figure 2A-2D)**

Material examined. 3 females. Holotype female: on leaf {of} *Theobroma cacao*, near Sapi Village, Madang Province, PNG, 1-VI-1984, by H. Roberts (FSCA; D1454); paratype female: *Castanopsis* Bamboo Forest/ Manki L.A. rd., Bulolo, M. Prov., 14 XI-1983, J. Dobunaba (FSCA; D1455); paratype female: NEW GUINEA: NE, Wau, 1100-1200m, VI (June) 1968, N. H. L. Krause (BPMB).

Description. A medium-sized (body and wing lengths 12 mm) brown species lacking distinct pattern except for pale hind margins on abdominal segments 2-6.

Head. Frons ca. 0.6 mm wide basally and ca. 5 times as high as wide basally, about same width above and below but distinctly narrowed in middle, yellowish pollinose overall but slightly darker over middle of upper one-half; basal callus pale brown, large, narrowly separated from eyes, about 2.5 times as high as wide basally, narrowing into an elongate median callus that tapers to a pointed apex over upper half of its length. Subcallus, parafacials, and face yellowish-gray pollinose, subcallus a little darker over middle one-third. Antennae orange-brown with abundant black hairs on scape and pedicel and a few on the tooth of the basal plate; basal plate with a shallow dorsal excision, about 1.5 times as long as broad, slightly longer than combined length of annuli (style). Palpi rather stout and short, brown, faintly grayish dusted and covered by abundant black hairs.

Thorax. Mesonotum and scutellum grayish pollinose over brown base color, the scutellum a little lighter in color, lacking pattern. Pleural areas grayish pollinose with white hairs. Legs with coxae gray-



Figure 5. Adult habitus and structures of *Cydistomyia kamialiensis* Goodwin. **A)** Lateral Habitus. **B)** Anterior view of head. **C)** Dorsal habitus.

ish pollinose with white hairs, remainder pale brown with mostly black hairs, the tarsi a little darker. Wings clear except for pale yellowish tint of costal cell.

Abdomen. Pale brown dorsally on tergites 1 and 2, darker brown on remainder; posterior margins of tergites 2-6 with narrow grayish pollinose margins. Venter blackish-brown with pale hind margins on sternites 2-6.

Etymology. The specific epithet is based on the name of the province in which the holotype was collected.

Discussion. This species would be part of the immigrans group (Mackerras, 1964, 1971) recognized by Mackerras (1964, 1971). In Mackerras (1964) it would most likely key to *C. torresi* from which it differs as follows: in *C. madangi* the callus is wedge-shaped, tapering gradually to a pointed apex that ends just below middle of frons, the frons diverges slightly from near its middle to the union with the subcallus, and the subcallus is grayish pollinose as are the parafacials and face; in *C. torresi*, the frons is parallel sided and 5 or more times as high as wide, the callus has an expanded base that is taller than wide and has a slender median dorsal extension that ends distinctly above the middle of the frons, and the subcallus is brown, contrasting with the grayish white parafacials and face.

***Cydistomyia waigani* n. sp. (Figure 3A-3D)**

Material examined. 2 females. Holotype female: UPNG, Waigani, NCD, Papua New Guinea, 26 Feb 1975, Tore Lari (FSCA; D1459); paratype female: light trap, Waigani, Pt. Moresby, 25 Aug 1967, K. Lamb (FSCA; D1460).

Description. A small (body and wing lengths 8 mm) yellowish to grayish species lacking distinct pattern.

Head. Frons ca. 0.6 mm wide basally, converging slightly from subcallus to vertex, about 2.5 times as high as wide basally, with scattered black hairs, yellowish-gray pollinose overall except for orange-brown callus that is widely separated from eyes, egg-shaped except that the narrower dorsal end bears a very short pointed extension, about 1.5 times as high as wide, excluding the short extension. Subcallus, parafacials, and face white pollinose, beard white. Antennae slender, scape and pedicel concolorous with frons and bearing numerous short black hairs, plate of third segment yellow-orange, narrow, about 2 times as long as wide and subequal to combined length of annuli which are slightly darker in color. Palpi yellowish-white pollinose with mostly pale hairs except for a few black ones basally.

Thorax. Dorsally without pattern, grayish pollinose with mostly short pale hairs over a pale brown base color; pleural areas similarly pollinose but overall a little lighter in color; legs with coxae concolorous with pleural areas, remainder yellowish except for apical one-third of fore tibiae and fore tarsi which are brown. Wings clear, veins yellowish, fork of R_{4+5} with a short appendix.

Abdomen. Dorsally yellowish-gray pollinose with numerous short black hairs except for midline and poster margins of tergites which have mostly pale hairs; dorsum patternless in most views, but in some views the midline and posterior borders of the tergites appear paler. Venter concolorous with dorsum but appearing a little paler due to the lack of black hairs.

Etymology. Waigani, the place of the collection of the holotype is the name applied to a part of Port Moresby, and it is used as a noun in apposition.

Discussion. This species appears to be part of the nana group (Mackerras 1971). It is similar in size and coloration to *C. nana* Mackerras and Rageau, one of the species known from New Britain but not known from New Guinea. However the two species differ markedly in shape of frons and callus. In *C. waigani* the frons diverges ventrally, being distinctly wider adjacent to subcallus in comparison to width at vertex. Also, the callus is about 1/2 as wide as frons and 1/3 height of frons, roughly egg-shaped, resting on the larger end and bearing a short pointed extension dorsally. In *C. nana* the frons is parallel sided, about 5 times as high as wide, the callus is almost as wide as the frons basally but tapers rapidly to a slender line that extends above the middle of the frons.

***Cydistomyia moresbyensis* n. sp. (Figure 4A-4D)**

Material examined. 1 female. Holotype female: Papua New Guinea, Central Province, 20 km SE Port Moresby, 6 Jan 1985, W. Ismay (FSCA; D1461); what appears to be 'bushes' is handwritten on the primary label, and a secondary label states 'biting man'.

Description. A small (body and wing 9 mm), brown and gray species without much pattern except for indistinct pale hind margins of abdominal segments.

Head. Frons about 0.6 mm wide basally and about 3.5 times as high as wide basally, parallel-sided, pale yellowish pollinose with black hairs except for large shiny brown callus that is not divided into basal and median parts, is distinctly separated from eyes, just over 2 times as high as wide basally and tapered from near base to pointed apex. Subcallus, parafacials and face grayish pollinose, the subcallus less densely pollinose allowing shiny yellow ground color to show through (in some areas due to wear); parafacials with short black hairs, but beard white. Antennae yellowish, scape and pedicel thinly grayish pollinose with abundant black hairs; third segment with basal plate about 2 times as long as wide, but shorter than combined length of annuli, tooth with a few black hairs. Palpi relatively long, only moderately swollen basally, tapering to a slender, acute apex; predominantly grayish white pollinose with pale hairs.

Thorax. Dorsally without evident pattern, brown in ground color, grayish pollinose, the pollinosity denser anteriorly and laterally; rather densely clothed with a mixture of pale and black hairs, the pale hairs longer and denser above wing bases and anterior to scutellum. Pleural areas grayish pollinose with white hairs. Legs with coxae grayish pollinose and long white hairs, remainder of legs yellowish-brown

TABLE I. Approximate coordinates of the collecting localities listed herein, with latitudes and longitudes in degrees.

BOUGAINVILLE PROVINCE, PNG	Latitude South	Longitude East	GULF PROVINCE, PNG	Latitude South	Longitude East
Numa Numa	5.866667	155.266667	Boolen, Res. Sarni	7.300000	144.183333
			Kikori	7.417000	144.250000
CENTRAL PROVINCE, PNG			Kopi, Res. Sarni	7.483333	144.300000
Aroana Estate	10.300000	149.230000	Sarni	7.300000	144.183333
Doa Estate	8.850000	146.966667			
Garima	8.53333	147.466667	MADANG PROVINCE, PNG		
Kamulai	10.050000	147.750000	Bak	4.083333	144.783333
Mt. Bellamy	8.999000	147.730000	Sapi L. A.		
Mt. Suckling	9.669167	149.010833	Sapi River L. A.		
Mt. Yule	8.216667	146.766667	Bundikara	5.750000	145.166667
Muriva (nr. Port Moresby?)	unknown	unknown	Gogol	5.316667	145.750000
Namai Estate, Tanabada	10.283333	149.500000	Madang	5.216667	145.816667
Otomata Plantation	10.200000	148.200000	Naru Forest (30 k W)	5.250000	145.690000
Port Moresby	9.466667	147.150000	Naru L. A.	5.250000	145.690000
Newtown					
UPNG			MANUS PROVINCE, PNG		
Waigani			Lugos	2.300000	146.840000
Rierner (nr. Port Moresby?)	unknown	unknown	Manus	2.300000	146.840000
Saraga	9.450000	147.200000			
Sogeri Subet	9.42111	147.421111	MILNE BAY PROVINCE, PNG		
Tanobada Village	10.283333	149.500000	Garratin Pass (Dumai Cr)	10.060000	151.060000
Tapin Rd, Angabunga R.	10.310000	149.220000	Guleguleu	10.100000	151.250000
Utuna, nr. Waitape	9.492400	147.348600	Normandy Island	10.060000	151.060000
Vanapa	9.083333	147.300000	Rossel Island	11.333333	154.166667
Waitapa	9.492400	147.348600			
			MOROBE PROVINCE, PNG		
CHIMBU PROVINCE, PNG			Boda, Res. Moppi	9.450000	147.450000
Mt. Yarak Village	6.050000	144.950000	Bubia	6.666667	146.916667
			Bulolo	7.200000	146.650000
EAST NEW BRITAIN PROVINCE, PNG			Taun L. A.		
Keravat	4.210000	152.033333	Busa River @ bridge	6.68333	147.216667
Vudal			Buso	6.666667	147.216667
			Edie Cr	7.350000	146.666667
EAST SEPIK PROVINCE, PNG			Gabensis	6.716667	146.766667
Buna to Sepik	unknown	unknown	Garaina	7.866667	147.133333
Bainyik	3.666667	144.016667	Gumi, Upper Gumi (nr Watut) and Gumi Watut	7.200000	146.333333
Hunstein Mtns	4.050000	143.033333	Kui	7.483333	147.250000
Imbia (nr. Maprik)	3.617000	143.067000	Kovelo (nr Kokoda)	8.916667	147.733333
Okapa	6.533333	145.616667	Lababia	7.300000	147.116667
			Lae	6.716667	147.000000
ENGA PROVINCE, PNG			Mainland Holdings Croc Farm	6.690500	147.150800
Baiyer River Sanctuary	5.516667	144.016667	Mapos	6.900000	146.767000
Mt. Hagen	3.633333	143.050000	Manki L.A	7.183333	146.566667

with mostly black hairs. Wing brown tinted, darker anteriorly, especially the costal cell; vein R_{4+5} with a short appendix.

Abdomen. Dorsum brown to brown-black with grayish-yellow pollinosity and mostly black hairs except hind margins of tergites 2-6 indistinctly paler and with mostly pale hairs just at the hind margins. Venter yellowish brown on sternite 1 and basal part of 2; middle of sternite 2 dark brown, posterior

TABLE I (cont.). Approximate coordinates of the collecting localities listed herein, with latitudes and longitudes in degrees.

MOROBE PROVINCE, PNG - continued	Latitude South	Longitude East	SANDAUN PROVINCE, PNG	Latitude South	Longitude East
Manki, Lower and Upper	7.183333	146.566667	Bolovip	5.333333	141.600000
Markham Ranch	6.583333	142.416667	Imonda	3.366667	141.516667
Mt. Kaindi	7.116667	146.916667	Tabubil	5.266667	141.216667
Mt. Missim	7.216667	146.833333	Vanimo	2.683333	141.316667
Munum Waters	6.566667	146.850000			
Oomsis	6.683333	146.800000	SOUTHERN HIGHLANDS PROVINCE, PNG		
Sambiang (Penig Go R.)	6.633333	147.583333	Rd. Pimaga Oro Kane	6.383333	143.550000
Singowe	unknown	unknown			
Situm L. A.	6.631000	147.271000	WESTERN PROVINCE, PNG		
South Edie Creek	7.366667	146.666667	Aroana Estate	10.816667	147.383333
Sunshine Point, Snake River Valley	7.083333	146.583333	Bokoesa		
Suraurothe Gap	unknown	unknown	Daru	9.083333	143.200000
Wau	7.333333	146.717000	Gulgubip	5.300000	141.516667
Bulldog Road			Kiunga	6.116667	141.300000
Kuper Range			Kui	6.383333	145.133333
Taun L. A.			Lake Murray	7.000000	141.500000
Yaningya			Mabaduam	9.266667	142.733333
			Mabaduam Hill	9.266667	142.733333
NEW IRELAND PROVINCE, PNG			Matkomrae Village 4	5.833333	141.516667
Pire Vill.	3.600000	152.220000	Medini, Fly R.	unknown	unknown
			Tabubil	5.275000	141.226389
NORTHERN PROVINCE, PNG			Wamula (Normandy Is)	10.000000	151.500000
Ajeka	8.916667	147.966667	Wavoi/Guavi	7.600000	143.200000
Awala Estate	8.850000	148.066678			
Buri (nr Sasambata)	8.583333	147.566667	WESTERN HIGHLANDS PROVINCE, PNG		
Kokoda	8.866667	147.733333	Porget L. A.	5.469000	143.705900
Isuava Biaye Valley					
Sangaram			WEST NEW BRITAIN PROVINCE, PNG		
Kanga	8.841000	147.690000	Copa Hoskins	5.461944	150.354722
Mt. Lamington	8.933333	148.166667			
Mt. Livingston	8.910000	147.820000	WEST PAPUA PROVINCE, INDONESIA		
Myola	9.100000	147.700000	Homlikia, Boven Digoel	7.166667	140.000000
Oro Bay	8.883333	148.500000	Jayapura	2.576953	140.516372
Popondetta	8.750000	148.250000	Nabire (S Geelvink Bay)	3.366667	135.466667
Azerita Estate					
Hargate Estate					
Dimark Estate					
Serovi Plantation					
Lewamba Plantation					

margin yellowish-brown; sternites 3-6 dark brown basally but with yellowish brown hind margins that become progressively narrower posteriorly.

Etymology. The specific epithet is based on the second part of the name of the capital of Papua New Guinea (Port Moresby) which is the location where the holotype was collected.

Discussion. This species appears to be in the *sylvioides* group (Mackerras 1964, 1971). In the key (Mackerras 1964, p. 133) it runs to couplet 18 which separates *C. sylvioides* (Walker) and *C. hollandiensis* Mackerras, but it does not match either species. It differs from both in shape of callus as follows: in *C. waigani* the subcallus, parafacials and face are grayish pollinose, the frons is only about 4 times as high as wide, the callus is shiny brown, moderately wide basally and tapered from base to pointed apex, the palpi are pale yellowish gray, whereas the subcallus, parafacials and face are brownish in both of the other species, the frons is either narrower (5 times as high as wide in *C. hollandiensis*) or the callus is yellow and of very different shape (*C. sylvioides*), and the antennae are brown in both.

***Cydistomyia kamialiensis* Goodwin (Figure 5A-5C)**

Discussion. As mentioned earlier, this species was described by Goodwin (1999). The holotype and paratypes were deposited in the Florida State Collection of Arthropods (FSCA), but accession numbers were not mentioned in the manuscript. These numbers are as follows: holotype, D1462; paratypes, D1463 and D1464. The species was illustrated when described, but additional figures of the holotype are provided herein.

Key to species of *Cydistomyia* Enderlein known to occur on New Guinea

The key presented below is a modification of the keys found in Mackerras (1964). It does not include the species now placed in the genus *Chasmia*, but it includes all of the species groups mentioned by Mackerras (1964) plus his nana group (Mackerras 1971). The key has been modified as necessary to include the four species described herein plus *C. kiamialiensis* Goodwin (1999). For those unfamiliar with most published keys to Tabanidae, body length refers to the total length of the body, but not the wings, and index, or frontal index, refers to the height of the frons divided by its width measured just above the subcallus.

1. Subcallus shining yellow; mesonotum covered with dense golden tomentum; wing dark, except for clear marginal zone along wing tip, posterior margin and anal area **2**
- Subcallus normally predominantly pilose (except *C. perdita*); mesonotum not covered by dense golden tomentum; wings clear to diffusely infuscated **3**
- 2(1). Pleura dark brown with at most a few yellow hairs; abdomen dark brown dorsally and ventrally ***C. imitans* Oldroyd**
- Upper half of pleura concolorous with mesonotum, this same color extending rearward to cross the first abdominal sternite laterally; dense tufts of long yellow hairs anteriorly and posteriorly below wing base ***C. kamialiensis* Goodwin**
- 3(1). Body length 10-12 mm, brownish-black except for orange-yellow band on upper pleura extending onto mesonotum and a yellow stripe along in-turned lateral parts of tergites 1 and 2 ***C. bisecta* Oldroyd**
- Without this combination of thoracic and abdominal markings **4**
- 4(3). Body length 14 mm or longer; rather bare, almost uniformly grayish black, with diffusely infuscated wings, no pale pattern on abdominal tergites, and at least antennal plates contrastingly orange **5**
- Body length 15 mm or less (usually less than 13 mm) smaller, patterned or paler, with wings largely clear; if blackish brown and without abdominal pattern (*C. crepuscularis*), body notably hairy **6**
- 5(4). Very large (20-21 mm in body length), with bright orange-yellow antennae, palpi and legs, and no white hairs on pleura ***C. barretti* Mackerras**
- Smaller (14-16 mm in body length), with only antennal plates orange; pleura with anterior and posterior tufts of white hair ***C. macmillani* Mackerras**

- 6(4). Medium sized (9-11 mm in body length), slender, mostly dark body, usually with contrasting pale zone around scutum and scutellum; wing darkened anteriorly; abdomen with pattern of median and lateral triangles or vittae, but inconspicuous or no apical bands on tergites 7
 — Size variable, small to medium large (7-15 mm in body length) more robust body with different thoracic and abdominal patterns; if small and slender, color more drab and ornamentation inconspicuous 11
- 7(6). Orange-brown body with yellow median and lateral vittae on abdominal tergites ***C. latistriata* (Schuermans Stekhoven)**
 — Brown to blackbody, with pale median and lateral triangles on abdominal tergites 8
- 8(7). Distinct yellowish dorsocentral vittae on mesonotum in front of suture ***C. lamellata* (de Meijere)**
 — Mesonotal dorsocentral vittae inconspicuous or absent 9
- 9(8). Callus small, brown; subcallus, parafacials, face and pleura almost uniformly brown; brown body, with narrow yellowish cream thoracic margins ***C. similis* Mackerras**
 — Callus larger, black; subcallus brown, contrasting with cream to white lower parafacials, face and pleura 10
- 10(9). Dark brown body (like *C. lamellata*), with yellowish cream pattern, including wide zone round scutum and scutellum; antennae and palpi shorter ***C. oldroydi* Mackerras**
 — Blackish body, with white pattern, including narrow zone around scutum and scutellum; antennae and palpi longer ***C. laeta* (de Meijere)**
- 11(6). Yellow-brown to blackish body, with clearly defined pattern of pale triangles or bands, or both, on the abdominal tergites 12
 — Usually more reddish to yellowish, occasionally blackish, unadorned body, without clearly defined abdominal pattern, though there may be paler fringes or vague median vitta on tergites .. 28
- 12(11). Ornate body, with brown subcallus and black antennae contrasting with pure white parafacials and face and unusually plump, long-haired, generally whitish palpi 13
 — Not such body; palpi slender, darker, short-haired 16
- 13(12). 11-13 mm in body length, strikingly patterned body, with unusually wide frons (index 2.3-3.0); scutum with conspicuous grayish white dorsocentral vittae and lateral areas grayish broadly merging on each side in front of scutellum; abdomen with large, discrete, grayish white median and lateral triangles on tergites 2-4 or 5 ***C. heydoni* Oldroyd**
 — Less strikingly patterned body, with narrower frons (index 4 or more), less definite scutal pattern, and different abdominal markings 14
- 14(13). Brightly patterned body, usually 8-9 mm I body length, with short callus, moderately narrow frons (index about 4) short antennal style, and grayish white apical bands expanded into median and lateral triangles on abdominal tergites ***C. albidosegmentata* (Schuermans Stekhoven)**
 — Larger body (10 mm or more in body length), with narrower frons (index at least 5) 15
- 15(14). Darker body, 12 mm in body length, callus elongate and tapering from base to apex; dorsum of thorax and abdomen blackish with pale grayish pattern of median and lateral triangles on tergites; wing with strong appendix at fork ***C. perdita* Mackerras**
 — Paler body, 11 mm in body length, callus dorsally rounded with a slender linear dorsal extension; dorsum of thorax and abdomen brown with grayish pattern of median and lateral triangles on tergites; wing without appendix at fork ***C. missimiensis* n. sp.**

- 16(12). 10-12 mm in body length, rotund, black body, with white subcallus and black antennae; scutum with golden to cream notopleural lobes, dorsocentral vittae (variable) and crescents in front of black scutellum; abdominal tergites with small median and lateral golden to cream triangles ***C. albithorax* (Ricardo)**
 — Not rotund; scutal pattern otherwise **17**
- 17(16). 9-11 mm in body length, black and white body, with black antennae and palpi, white scutellum, large white spot on upper mesopleural convexity, and white pattern on abdominal tergites limited to conspicuous apical bands on 2 and 3 or 2-4 and lateral triangles on 1-4 ***C. latisegmentata* (Schuermans Stekhoven)**
 — Brown or gray body, with less contrasting pattern, and apical bands on most visible tergites **18**
- 18(17). Frons with indefinite or no callus, though there may be thinly tomentose raised area on its lower part **19**
 — Frons with clearly define callus **21**
- 19(18). Palpi very short and plump; beard and pleural hairs mainly brown; clearly defined, yellow-haired median triangles on abdominal tergites; yellow-brown, 13-15 mm in body length ***C. immatura* Oldroyd**
 — Palpi of more normal shape; beard and pleural hairs mainly white; median pale triangles on abdominal tergites shallow, indefinite **20**
- 20(19). Larger (15 mm in body length), yellow-brown body with narrower frons (index 3.5) ***C. pseudimmatura* Oldroyd**
 — Smaller (11 mm in body length), duller grayish brown body, with wider frons (index 2.8) ***C. quasimmatura* Mackerras**
- 21(18). 12 mm in body length, gray body, with black callus, slender antennae, dark palpi, and whitish apical bands but indefinite median triangles on abdominal tergites ***C. griseiventer* (Schuermans Stekhoven)**
 — Dark to yellowish brown body **22**
- 22(21). 10-12 mm in body length, dark brown body, with black palpi, diffusely paler scutal margin and scutellum, and abdominal tergites with fawn-cream apical bands, but usually an evident median triangle only on tergite 2 **23**
 — Brighter or duller brown body with brown or cream palpi, more evenly colored mesonotum, and different abdominal pattern **24**
- 23(22). Frons diverging slightly from middle to its union with subcallus; callus almost touching eyes basally, wedge-shaped, tapering gradually to a pointed apex that lies just below middle of frons; subcallus grayish pollinose, more or less concolorous with parafacials and face ***C. madangi* n. sp.**
 — Frons parallel sided, slender, more than 5 times as high as wide; callus basally taller than wide with a long slender extension that reaches well above middle of frons; subcallus brown, contrasting with grayish white parafacials and face ***C. torresi* (Ferguson and Hill)**
- 24(22). Normally shaped, brighter brown body, with at most costal cell of wing brown, and clearly defined pattern of apical bands and triangles on abdominal tergites **25**
 — More slender, duller brown body, with wings darkened in radial area, and less definite abdominal pattern **26**
- 25(24). 13 mm in body length, with pale yellow callus, wide, orange antennal plate, only slightly darkened style, whitish, palpi with black-hair ***C. inopinata* Oldroyd**

- 10-12 mm in body length, with brown callus, more slender, brown antennal plate, deep brown style, and fawn palpi *C. immigrans* Oldroyd
- 26(24). 12 mm in body length, with wide yellow callus, and brown subcallus contrasting with white lower parafacials and face; beard white *C. sylvioides* (Walker)
- 8-10 mm in body length, with brown callus, and brown parafacials and face almost concolorous with subcallus or subcallus, parafacials and face grayish white 27
- 27(26). Subcallus, parafacials and face brown; frons about 5 times as high as wide; palpi brown *C. hollandiensis* Mackerras
- Subcallus, parafacials and face grayish; frons about 3.5 times as high as wide; palpi grayish *C. moresbyensis* n. sp.
- 28(11). 12-14 mm in body length, blackish body, with dense covering of dark brown to black hair including beard; legs dark brown to black *C. crepuscularis* Oldroyd
- Brighter red-brown to yellowish or fawn body, less hairy, smoother 29
- 29(28). Robust (mostly 12-15 mm in body length), variable, dark red-brown to orange-yellow, with relatively wide frons and callus, and wings often stained brown *C. lorentzi* (Ricardo)
- Usually less than 12 mm in body length or more slender, paler or duller yellow-brown to golden or grayish, with narrower frons, and wings usually darkened only in costal and radial areas 30
- 30(29). Compact, usually 10-12 mm in body length, light yellow to golden, occasionally grayish body, with moderately narrow, almost parallel frons (index 6), short antennae, and often with median vitta of golden hairs on abdominal tergites *C. sol* (Schuermans Stekhoven)
- More parallel-sided or longer-bodied, yellowish to dull brown body, with longer, more slender antennae 31
- 31(30). Longer-bodied (11-13 mm in body length), yellow-brown body, with very narrow, yellowish frons (index more than 6), and yellow hairs on abdominal tergites usually not tending to form definite pattern 32
- Small to very small (8-10 mm in body length), dull-brown to yellow-brown body with narrower frons (index less than 6), either abdomen with at least indications of pale apical bands on abdominal segments or vein R₄ with a short appendix 33
- 32(31). Frons converging, callus oblong, filling frons below, and with short linear extension *C. nokensis* Oldroyd
- Frons almost parallel, callus usually forming longitudinal ridge on almost its whole length *C. solomensis* (Ricardo)
- 33(31). Small (8-10 mm in body length), dull brown body, with brown, moderately narrow frons (index about 5), brown beard, and usually indications of pale apical bands and median triangles on abdominal tergites *C. hollandiensis* Mackerras
- Very small (8-9 mm in body length), yellowish fawn body, usually without indications of pale apical bands and median triangles on abdominal tergites 34
- 34(33). Frons diverging from vertex to union with subcallus, about 3.5 times as high as wide; callus almost as wide as frons, roughly egg-shaped with larger end toward subcallus, upper end bearing a short pointed extension, entire callus less than half height of frons *C. waigani* n. sp.
- Frons nearly parallel sided, more than 5 times as high as wide; callus almost touching eyes basally, then tapering rapidly to a slender median line that distinctly extends dorsally beyond middle of frons *C. nana* Mackerras and Rageau

Other Materials Examined

While completing the study of *Cydistomyia*, new distributional data were obtained on many species of this and other genera of Tabanidae from New Guinea. These data are summarized below. All collection records are from Papua New Guinea except two, one each for *Chasmia parvicallusa* and *Cydistomyia lorentzi* which are from West Papua Province, the Indonesian part of New Guinea.

SUBFAMILY PANGONIINAE

Tribe Scionini

Scaptia auripilosa Oldroyd

MOROBE PROVINCE: Wau, malaise trap, 14 May 1972, B. S. Cheary (AMSA); Upper Manki, logging area, near Bulolo (5000ft), sticky trap, 29 Dec 1972, 23 Mar 1973, F. R. Wylie & P. Shanahan (AMSA); Suraurothe Gap, 15 June 1927, E. O. Porkley (AMSA).

Scaptia flocosa Oldroyd

CENTRAL PROVINCE: Mt. Yule, 10,800 ft, 28 Aug 1963, Szent-Iveny (NAIC).

MOROBE PROVINCE: Bulldog Rd., S. of Divide, 2400-2800m, 28 Oct 1973, JLG (FRIL); Mt. Missim, near Wau, 2885m, 7 Jun 1977, G. Young (FRIL); Kuper Range, Wau, biting human, 2300m, H. Roberts (FRIL); Kuper Range, fly trap, upper montane forest, 17 Apr 1988, H. Roberts (FRIL); 10 km S Edie Creek, 2600m, 23 Aug 1974, P. Ward (AMSA).

Scaptia leonina Oldroyd

CENTRAL PROVINCE: Utuna, near Woltape, Wharton Range, 18 Oct 1963, D. K. McAlpine (AMSA).

NORTHERN PROVINCE: Kovel, near Kokoda, 6 Jan 1964, D. K. McAlpine (AMSA).

Scaptia taylori Oldroyd

CENTRAL PROVINCE: nr Myola, forest, 1800-2000 m, 22 Jun 1984, J. W. Ismay (NAIC); Mt. Suckling Exp. St., Goeben Ridge, 2500 m, 27 Jul 1972, L. Ferrer (NAIC); NE Garima, 800 m, 6 Jan 1968, J & M Sedlacek (NAIC).

EASTERN HIGHLANDS: Aiyura, 5400 ft, 30 Mar 1959, 4 Apr 1960, 1 & 22 May 1960, J. H. Barrett (NAIC).

MOROBE PROVINCE: Mt. Missim, near Wau, 7 Jan & 16-26 May 1979, B. M. Beehler (FRIL); Mt. Kaindi, 2360m, UV light, 3 Dec 1979, W. C. Gagne (FRIL); Mt. Kaindi, 1700m, 21 Feb 1977, W. C. Gagne (FRIL); Mt. Missim, 1600m, biting human dawn & dusk, collector unknown (FRIL); 10 Mar 1978, collector unknown (FRIL); Mt. Missim, 1600m, primary understory, 23 Mar 1978, Thane Pratt (FRIL); Mt. Missim, 1700m, 23 Nov 1974, A. D. Hart (FRIL); Mt. Missim, 2350m, on *Nothofagus carri*, J. L. Gressitt (BPBM); Kuper Range, 2000m, Wau, attracted to humans, 8 Apr 1988, H. Roberts (FRIL); Kuper Range, 1920m, sweep net, 26 Jan 1988, H. Roberts (FRIL); Gumi, Wafat L. A., Bulolo, 11 Apr 1983, H. Roberts (FRIL); Manki L.A., Bulolo, attracted to man, 29 Mar 1983, H. Roberts (FRIL); Mt. Missim, 6000', in flight, 5 Mar 1968, F. R. Wylie (FRIL).

NORTHERN PROVINCE: Myola 2, 2100 m, 15 Sep 1985, J. W. Ismay (NAIC); Isuava Biaye Valley, 4200-4400 ft, Kokoda, 5 Jun 1956, J. H. Ardley (NAIC).

WESTERN PROVINCE: Gulgubip, 21 Nov 1985, J. W. Ismay (NAIC).

SUBFAMILY CHRYSOPSINAE

Tribe Bouvieromyiini

Liliae (*Aliliae*) *demeijerei* (Ricardo)

CENTRAL PROVINCE: Tanobada Vill. nr Namai Estate, 11 Jan 1964, J. J. H. Szent-Iveny (NAIC); Namai Estate, 20 Feb 1963, J. J. H. Szent-Iveny (NAIC); D. K. McAlpine (AMSA); Aroana Estate, Arpa R., 29 Nov 1963, D. K. McAlpine (AMSA); 20 km SE Pt Moresby, 23 Dec 1984, J. W. Ismay (NAIC).

MOROBE PROVINCE: Mainland Holdings Crocodile Farm, '8' mile, Lae, 14-20, 22-29, 31 Dec 1996, J. T. Goodwin (FSCA).

WESTERN PROVINCE: Lake Murray, 15 Nov 1963, biting crocs, W. Prov., 17 Dec 1977, Louisa Fresca (NAIC); Mabaduam, 29 Nov 1967, T. L. Fermer (NAIC); Mamberan R., Bakoesa, 9 May 1958, E. N. Morhr & J. H. van den Assem (NAIC).

Liliae (Pareucompsa) femoralis (Ricardo)

MOROBE PROVINCE: vegetable gardens, ca. 1.5 km NW of Lababia, 26-28 May 1998, J. T. Goodwin (FSCA).

Tribe Chrysopsini

***Chrysops albicincta* Wulp**

GULF PROVINCE: Kikori, sea level, Gulf District, 19 Sep 1956, P. Dawson (AMSA).

MOROBE PROVINCE: Mainland Holdings Crocodile Farm, '8' mile, Lae, reared from larva collected 26 Jan 1997, J. T. Goodwin (FSCA).

***Chrysops australis* Ricardo**

EAST SEPIK PROVINCE: Imbia, near Maprik, 15 Dec 1963, D. K. McAlpine (AMSA).

MOROBE PROVINCE: Mainland Holdings Crocodile Farm, '8' mile, Lae, reared from larva collected 26 Jan 1997, J. T. Goodwin (FSCA); Markham Ranch, reared from larva collected 26 Jan 1997, J. T. Goodwin (FSCA).

SUBFAMILY TABANINAE

Tribe Diachlorini

***Chalybosoma luciliaeformis* (Schuurmans Stekhoven)**

MOROBE PROVINCE: Mt. Missim, near Wau, malaise trap, 18-23 Jan 1979, B. M. Beehler (FRIL); Manki L.A., Bulolo, attracted to human, 30 Mar 1983, H. Roberts (FRIL).

***Chalybosoma metallicum* (Ricardo)**

NORTHERN PROVINCE: Kokoda, 6 Jan 1964, D. K. McAlpine (AMSA).

***Chasmia basifasciata* (de Meijere)**

MOROBE PROVINCE: Huon Peninsula, Pening Go River, near Sambiang, 850m, biting on man, 26 Jan 1976, W. C. Gagne (FRIL); Huon Peninsula, Pening Go River, near Sambiang, 550m, biting on man, 25 Jan 1976, W. C. Gagne (FRIL).

SANDAUN PROVINCE: Bolovip, 21 Nov 1985, J. W. Ismay (NAIC).

***Chasmia insularis* (Mackerras)**

MILNE BAY PROVINCE: Garratin Pass: Dumai Cr., 1500m, at light, 26 Feb-5 Mar 1985, collector unknown (FRIL); Rossel Is., 12 Mar 1976, S. Elworthy (NAIC).

***Chasmia lineata* Mackerras**

MOROBE PROVINCE: Mt. Missim, near Wau, 18 Jan, 18-23 Jan, 14-24 Feb, 21-30 Mar, 16-26 May 1979, B. M. Beehler (FRIL).

***Chasmia ochrothorax* (Schuurmans Stekhoven)**

MOROBE PROVINCE: Mountain Rainforest, 50-250m, 1-3 km W of Lababia 12-14 Jun 1997, J. T. Goodwin (FSCA); Huon Peninsula, Pening Go River, near Sambiang, 800m, biting on man, 26 Jan 1976, W. C. Gagne (FSCA); Lowland R. F., Buso, 20 Jun 1984, H. Roberts (FRIL); Melambi R., Lae, Mirilunga Vill., 4500 ft, 29 Dec 1956, J. H. Ardley (NAIC).

SANDAUN PROVINCE: Bolovip, 21 Nov 1985, J. W. Ismay (NAIC).

***Chasmia parva* (Oldroyd)**

MOROBE PROVINCE: Mt. Missim, near Wau, 7, 8 & 18-23 Jan, 14-24 Feb 1979, B. M. Beehler (FSCA); Wau, Mt. Missim, 1400m, malaise trap, 3-6 Jun 1979, Thane Pratt (FSCA); Manki L.A., Bulolo, attracted to human, 29, 30 Mar 1983, H. Roberts (FRIL).

NORTHERN PROVINCE: Buri near Sasambata, Popondetta District, 30 & 31 Oct 1963, D. K. McAlpine (AMSA).

***Chasmia parvicallata* (Oldroyd)**

NORTHERN PROVINCE: Kokoda Valley, 8 Feb 1964, T. V. Bowley (NAIC); Kokoda Station, 880 ft, 9 Jun 1956, Jerome Healey (NAIC).

WEST PAPUA PROVINCE: (near Biak Island, Indonesia): Nabire, S. Geelvink Bay, 1-20m, Sugar-cane, 4 July 1962, J. L. Gressitt (FSCA).

***Chasmia subhastata* (Oldroyd)**

MOROBE PROVINCE: Mountain Rainforest, 50-250m, 1-3 km W of Lababia 20-22 Dec 1997, J. T. Goodwin (FSCA); Sago/Mangrove Swamp, ca. 25m, 0.75 km W of Lababia, 20-22 Dec 1997, J. T. Goodwin (FSCA); Mt. Missim, near Wau, 8 & 18-23 Jan, 16-26 May 1979, B. M. Beehler (FSCA); Upper Manki logging road near Bulolo, sticky trap, 5000', F. R. Wylie & P. Shanahan (AMSA).

***Cydistomyia albidosegmentata* (Schuermans Stekhoven)**

MOROBE PROVINCE: Manki L.A., Bulolo, 25 Jun 1983, H. Roberts (FRIL); Manki L. A., Bulolo, 18 Nov 1983, J. Dobunaba (FRIL); Gumi, 6000', attracted to man, 16 Nov 1984, H. Roberts (FRIL); Upper Gumi, Watut L.A., 10 Oct 1984, H. Roberts (FRIL); Wau, UV light, 1200 m, 4-7 Jan 1963, J. Sedlacek (NAIC); Sunshine Pt., Snake R. Valley, Rouna Castabria (NAIC).

***Cydistomyia albithorax* (Ricardo)**

CENTRAL PROVINCE: Kamulai, 1700 m, 1 Jun 1983, J. W. Ismay (NAIC); 16 km N Angabunga R. on Tapin Rd., 23 Apr 1983, J. W. Ismay (NAIC).

MADANG PROVINCE: Bundikara, 3500 ft, 6 Aug 1959, J. Healey (NAIC).

MOROBE PROVINCE: Mt. Missim, 1400m, 8 April 1974, T. K. Pratt (FSCA); Upper Manki logging area near Bulolo, 16 Feb, 16 Mar, 23 Mar, 30 Mar 1963, F. R. Wylie & P. Shanahan (AMSA); Mt. Missim, 1450m, on Euphorbiaceae *Acalyph* sp, 20 Feb 1974, J. L. Gressitt (FSCA); Bulolo, 900m, biting man, 31 Jan 1981, H. Roberts (FRIL); Manki L.A., Bulolo, *Castanopsis* bamboo forest, 11 May 1983, H. Roberts (FRIL); Manki L.A., Bulolo, attracted to man, 29 & 31 Mar 1983, H. Roberts (FRIL); Story L.A., Bulolo, on *Xanthrophyllum* sp., 25 Jan 1978, H. Roberts (FRIL); Kulolo Cr. L. A., Bulolo, 17 May 1983, H. Roberts (FRIL); Kulolo Cr. L. A., Bulolo, in lowland R.F., 18 & 22 May 1983, H. Roberts (FRIL); Manki L.A., Buylolo, 3 May 1983, H. Roberts (FRIL); Lower Manki L.A., Bulolo, 3 Jun 1983, H. Roberts (FRIL); Mapos, in flight, 21 Jan 1968, F. R. Wylie (FRIL); Wau, 1250 m, 10 Mar 1968, P. Colmer (NAIC).

NORTHERN PROVINCE: Aroana Estate, Aroa R., 7 Dec 1963, D. K. McAlpine (AMSA); Oro Bay, 23 Mar 1951, M. Trenarden (NAIC); nr. Kamalau, 1200-1300 m, 3 Apr 1983, J. W. Ismay (NAIC).

SANDAUN PROVINCE: Vanimu, Denabe Mtns, in undergrowth, W. Sepik, 29 Aug 1983, H. Roberts (FRIL).

WEST SEPIK PROVINCE: Tumolbil, 18 Nov 1985, J. W. Ismay (NAIC).

***Cydistomyia bisecta* Oldroyd**

MILNE BAY PROVINCE: Guleguleu, Normandy Is., 24-25 Dec 1980, R. Dekeys (AMSA); Guleguleu, Guleguleu Village, 24-25 Dec 1980, R. Dekeys (AMSA); Wamula, Normandy Is., 29 Dec 1980, R. Dekeys (AMSA); Tabubil (5°15' S, 141°13' E),

WESTERN PROVINCE: W. Province, 6 Feb 1992, R. B. Lachlan (AMSA).

***Cydistomyia griseiventer* (Schuermans Stekhoven)**

MOROBE PROVINCE: Sago/Mangrove Swamp, 30 m, 0.75 km W of Lababia, 16-19 Feb 1998, J. T. Goodwin (FSCA); Sago Swamp, 10 m, 0.25 km W of Lababia, 16-19 Feb 1998, J. T. Goodwin (FSCA); Hiking Trail just W of Kamiali nr Lababia, 16-19 Feb 1998, J. T. Goodwin (FSCA); Mountain Rainforest,

50-250 m, 1-3 km W of Lababia, 16-19 Feb 1998, J. T. Goodwin (FSCA); Mt. Missim, near Wau, 8 Jan 1979, B. M. Beehler (FRIL).

***Cydistomyia heydoni* Oldroyd**

MOROBE PROVINCE: Kaper Rd., Kuper Range, 1920m, Wau, 26 Jan 1988, H. Roberts (FRIL).

***Cydistomyia immatura* Oldroyd**

MOROBE PROVINCE: Bulolo Cr., Bulolo, in lowland r.f., 13 May 1983, H. Roberts (FRIL); Yaningya, 15 km S Bulldog Rd divide, 1400m, 28 Oct 1973, J. L. (BPBM).

***Cydistomyia immigrans* Oldroyd**

MADANG PROVINCE: on leaf shrub, Naru L.A., Gogol, 29 May 1984, H. Roberts (FRIL); Sapi L.A., Bak, 1 Jun 1984, H. Roberts (FRIL); Sapi River L.A., unlogged area, 11-15 Jul 1983, H. Roberts (FRIL); Naru Forest, near Madang, unlogged lowland r.f., 12 Jul 1983; H. Roberts (FRIL).

MOROBE PROVINCE: Buso, in lowland r.f., 20 Jun 1984, H. Roberts (FRIL); Forest Station L.A., Arboretum Rd., Bulolo, 24 Oct 1983, H. Roberts (FRIL); Lae, biting cattle, Nov 1962, J. Hamilton (NAIC).

NORTHERN PROVINCE: Ajeka, Popondetta district, 4 Nov 1963, D. K. McAlpine (AMSA); Mt Livingston district, Northern Division, Sept 1929, C. T. McNamara (AMSA); Popondetta, 11 Feb 1962, A. Catley (NAIC); Popondetta, 18 Nov, 1961, J. H. Szent-Iveny (NAIC); Popondetta Ag. Sta., Jul 1962, A. Catley (NAIC).

***Cydistomyia laeta* (de Meijere)**

MOROBE PROVINCE: Wau, 1100m, 31 Aug 1964, J. Sedlacek (BPBM).

SANDAUN PROVINCE: Denabe Mtns, Vanim, W. Sepik, on undergrowth, 29 Aug 1983, H. Roberts (FRIL).

***Cydistomyia lamellata* (de Meijere)**

NORTHERN PROVINCE: 30m, NNE Palum R., Kanga, 16 Oct 1974, P. Imlaw (NAIC).

***Cydistomyia latisegmentata* (Schuermans Stekhoven)**

MOROBE PROVINCE: Mt. Missim, near Wau, 21-30 Mar 1979, B. M. Beehler (FRIL).

***Cydistomyia lorentzi* (Ricardo)**

CENTRAL PROVINCE: rainforest, 1000 m, Muriva, 17 Jan 1982, W. Ismay (NAIC); rainforest, Riemer, 5 Dec 1982, W. Ismay (NAIC); Subitana Est., Sogeri Subet, 2000 ft, 20 Apr 1957, J. H. Gressitt (NAIC).

MOROBE PROVINCE: near hoop plant, Kaiseni, Wau, attracted to man, 1 Jun 1983, H. Roberts (FRIL); Waramuri Cr., Bulolo, attracted to man, 9 & 10 Jun 1984, J. Dobunaba (FRIL); Garaina, 800m, 15 Jan 1968, J. Sedlacek (BPBM).

WESTERN PROVINCE: Kiunga, 30 mi NNE, 3 & 15 Oct 1974, P. Imlay (NAIC).

WEST PAPUA PROVINCE: Jayapura, Indonesia: Ipar, Res Hollandia, 18 Oct 1957, R. T. Simon Thomas (AMSA).

***Cydistomyia oldroydi* Mackerras**

WESTERN PROVINCE: Wavoi/Guavi, block 3, 1 Mar 1989, H. Roberts (FRIL).

***Cydistomyia perdita* Mackerras**

MOROBE PROVINCE: Manki L.A., Bulolo, attracted to man, 28, 29 & 30 Mar 1983, H. Roberts (FRIL); Gumi, Watut, Bulolo, 9 May 1983, H. Roberts (FRIL).

***Cydistomyia quasimmatura* Mackerras**

MOROBE PROVINCE: Wau, 1250 m, 6 Feb 1965, J & M Sedlacek (NAIC).

***Cydistomyia sol* (Schuermans Stekhoven)**

MILNE BAY PROVINCE: Rossel Is., 3 Apr 1969, 400-1000 ft, collector unknown (NAIC).

MOROBE PROVINCE: Sago/Mangrove Swamp, 30 m, 0.75 km W of Lababia, 20-28 Feb 1998, J. T. Goodwin (FSCA); Sago Swamp, 10 m, 0.25 km W of Lababia, 16-19 Feb 1998, J. T. Goodwin (FSCA); Lae, UNITECH, Oct 1992, UV light, J. C. Reid (UNIT); Mapos, on log, 21 Jan 1968, F. R. Wylie (FRIL); Kui, Warasweet L.A., in flight, F. R. Wylie & L. Radunz (FRIL); Station L.A., Bulolo, attracted to man, 11 Apr 1984, H. Ivagai (FRIL); Singowe, 22 Jan 1968, F. R. Wylie (FRIL); Wau, 1200 m, 20-23 Mar 1962m 10 Mar 1963, J. Sedlacek (NAIC).

WEST NEW BRITAIN: Copa Hoskins West N. Br. Oct 1965, P. Secula (NAIC).

***Cydistomyia solomensis* (Ricardo)**

CENTRAL PROVINCE: Iawarare Plant., 18 km ESE Sogeri, 18 Nov 1981, D. Black (NAIC).

MOROBE PROVINCE: Sago/Mangrove Swamp, 30 m, 0.75 km W of Lababia, 2-3 Jul 1998, J. T. Goodwin (FSCA); Mt. Livingston District, Northern Division, no date, C. T. McNamara (AMSA); Garaina, 2000', 1 Jun 1967, C. Moiniet (AMSA).

NORTHERN PROVINCE: Awala Estate, Popondetta District, 13 Oct 1963, D. K. McAlpine (AMSA).

***Cydistomyia torresi* (Ferguson and Hill)**

CENTRAL PROVINCE: Brown R., near Pt. Moresby, 22 Oct 1963, D. K. McAlpine (AMSA); 3.2 km S Vanapa, Brown River Rd., malaise trap, 24-26 May 1965, W. A. Steffan (AMSA); 3.2 km S Vanapa, Brown River Rd., malaise trap, 24-26 May 1965, W. A. Steffan & Yiau-Min Huang (AMSA); Doa Estate, 50 mi W of Port Moresby, 2-4 Nov 1962, R. Straatman (AMSA).

EAST SEPIK PROVINCE: Bainyik, T.P.N.G., malaise trap, 21 June 1961, J. L. Gressitt (BPBM).

MOROBE PROVINCE: Sago/Mangrove Swamp, 30 m, 0.75 km W of Lababia, 16-19 Feb 1998, J. T. Goodwin (FSCA); Sago Swamp, 10 m, 0.25 km W of Lababia, 16-19 Feb 1998, J. T. Goodwin (FSCA); Mountain Rainforest, 50-250 m, 1-3 km W of Lababia, 20-22 Dec 1997 1998, J. T. Goodwin (FSCA). Gabensis, PNG F.P.L.A., attracted to human, 19 Dec 1984, H. Ivagai (FRIL); Wau, 1200m, M.V. light, 29-30 Sept 1963, J. Sedlacek (AMSA).

***Dasybasis anomala* Mackerras and Rageau**

CENTRAL PROVINCE: 20 km SE Pt Moresby, 20 Jan 1985, J. W. Ismay (NAIC).

***Dasybasis caesia* (Walker)**

CENTRAL PROVINCE: Biting man, Pt. Moresby (Konedobu), 15 Feb, Hurutius & Igua (NAIC).

WESTERN PROVINCE: Mabaduam Hill, 31 Jun 1972, J. Stibreck (NAIC).

***Dasybasis germanica* (Ricardo)**

CENTRAL PROVINCE: 20 km SE Pt Moresby, 26 Jan 1985, J. W. Ismay (NAIC)

***Neobolbodimyia nigra* Ricardo**

WESTERN PROVINCE: 3 km N of Tabubil (5°15' S, 141°13' E), W.P., 9 Nov 1962, R. B. Lachlan (AMSA).

Tribe Tabanini***Tabanus approximatus* Oldroyd**

MOROBE PROVINCE: 0.75 km W of Lababia, 2-5 July 1998, J. T. Goodwin (FSCA).

***Tabanus aurivittatus* Ricardo**

MOROBE PROVINCE: Mainland Holdings Crocodile Farm, '8' mile, Lae, 22 & 27 Dec 1996, J. T. Goodwin (FSCA); Aguazn(?), Lae, 2 Jan 1996, Tigare Silaual & Tom Dama (FRIL); Situm L.A., in flight, 23 Jan 1990, Tom Dama (FRIL).

WESTERN PROVINCE: 5 km N of Tabubil, 22 Nov 1991, R. B. Lachlan (AMSA); SE slopes of Mt. Akrik, 15 km NW of Tabubil, 17 Oct 1993, R. B. Lachlan (AMSA); Tabubil (5°15' S, 141°13' E), W.

Province, 14 Oct 1963, M. S. Mould & S. Cowan (AMSA); Matkomrae Village (5°49' S, 141°9' E), 60m, ca. 50 km N of Kiunga, M. S. Mould & S. Cowan (AMSA).

***Tabanus ceylonicus* Schiner**

BOUGANVILLE PROVINCE: Numa Numa Pl. 11 May 1958, G. S. Dau (NAIC).

CENTRAL PROVINCE: Dorm (UPNG), 23 Sep 1970, Venere S. (NAIC); Otomata Plant., 1 km E of Pt. Moresby, 23 Nov 1960, J. H. Gressitt (NAIC).

EAST NEW BRITAIN: Vudal, on sheep, 1 Jun 1977, C. H. Perry & M. Hunt (NAIC); 10 m W of Vudal, 12-17 Nov 1974, J. Stibreck (NAIC); Keravat, 2 Jun 1962, D. August (NAIC).

GULF PROVINCE: Kikori Apr 1963, C. Rio (NAIC).

MADANG PROVINCE: Naru L.A., Gogol, Madang P., 27 Mar 1984, H. Roberts (FRIL).

MANUS PROVINCE: Lugos, Manus Is., on leaf of shrub, 22 Apr 1969, B. Gray (FRIL). Manus, 24-28 Nov 1974, J. Pippet (NAIC).

MOROBE PROVINCE: Lae, Nov 1962, J. Hamilton (NAIC). Munum Waters, 2 Aug 1957, J. H. Andler (NAIC); Mainland Holdings Crocodile Farm, '8' mile, Lae, 10, 14, 15, 16, 17, 20, 22, 25, 26, 27, 28, & 29 Dec, 1996 and 7 Jan 1997, J. T. Goodwin (FSCA); Sago/Mangrove Swamp, 30 m, 0.75 km W of Lababia, 16-19 Feb 1998, J. T. Goodwin (FSCA); Buso, in beach vegetation, 20 Jun 1984, H. Roberts (FRIL); Boda, Res. Moppi, 12 Oct 1957, R. T. Simon Thomas (AMSA); Bubia, 10 Feb 1958, J. H. Ardley (NAIC).

NORTHERN PROVINCE: Azerita Pl., 26 Apr 1957, Szent-Iveny (NAIC); Popondetta, 60 m, 26 Sep 1963, P. S. (NAIC).

WESTERN PROVINCE: Daru, 2 Apr 1921, E. O. Pockley (AMSA).

***Tabanus cohaerens* Walker**

CENTRAL PROVINCE: Kikori, sea level, Gulf district, 1956, P. Dawson (AMSA)

GULF PROVINCE: Boolen, Res. Sarni, 19 Jun 1959, R. T. Simon Thomas (AMSA); Kopi, Res. Moppi, 17 Oct 1957, R. T. Simon Thomas (AMSA).

MOROBE PROVINCE: Mainland Holdings Crocodile Farm, '8' mile, Lae, 10 & 16 Dec 1996, J. T. Goodwin (FSCA); Sago Swamp, 10m, 0.25 km W of Lababia, 16-19 Feb 1998, J. T. Goodwin (FSCA); environs of Lababia, 2-7 May 1998, J. T. Goodwin; vegetable gardens, ca. 1.5 km NW of Lababia, 26-28 May 1998, J. T. Goodwin (FSCA); Lae, 20 Dec 1963, D. K. McAlpine (AMSA); Gabensis, attracted to man, 30 Jun, 19 Dec 1984, H. Roberts (FRIL); Plantedar Oomsis, on *Tectona grandis* leaf, 31 Jan 1968, F. R. Wylie (FRIL); Oomsis L.A., 27 Apr 1984, J. Dobunaba (FRIL); Oomsis L.A., lowland r.f., 23 Nov 1983, J. Dobunaba (FRIL).

NORTHERN PROVINCE: Aroana Estate, Aroa Rd, 7 Dec 1963, D. K. McAlpine (AMSA); Mt. Lamington, Northern Division, 23-24 Jul 1927, C. T. McNamara (AMSA); Hargate Pl., Popondetta, 9 Aug 1966, G. Baker (NAIC); Sangaranna, Popondetta, 16 May 1962, A. Catley (NAIC); Dimark Est., 21 Sep 1965, D. L. Cook (NAIC) Serovi Pl., 10 Jun 1974, B. Kaoro (NAIC); Serovi Pl., 16 May 1974, Escs (NAIC); Leiwamba Pl., 21 Apr 1957, J. H. Ardley (NAIC).

***Tabanus denticulatus* Ricardo**

CENTRAL PROVINCE: Mt. Bellamy, Kokoda Trail, 7 Nov 1996, Mark Johnson (FSCA); Waitapa, Central Prov., in flight, 19 Oct 1977, N. Howcroft (FRIL).

CHIMBU PROVINCE: Mt. Yarak Village, Simbu Prov, 1 Jun 1983, Tacrae (FRIL).

EAST HIGHLANDS PROVINCE: Mageh, N slopes of Wahgi Divide, W. Highlands, 4300', Aug 1954, E. LeG. Troughton (AMSA); Okapa E.H.D., Station Area, 20 Aug 1967, F. R. Wylie (FRIL).

MOROBE PROVINCE: Mt. Kaindi, near Wau, 2362m, 24 Oct 1985, collector unknown (FSCA); Mt. Kaindi, near Wau, 2300m, 17 Feb 1977, collector unknown (FSCA); Kuper Range, near Wau, 200m, 3 & 5 Feb, 8 Apr 1988, J. Dobunaba (FRIL); Biarai, Kuper Range, 24 Feb 1988, J. Dobunaba (FRIL); 10 km S of Edie Cr., 2500m, 23 Aug 1974, P. Ward (AMSA); Gumi Watut, 2200m, in flight, 1 Feb 1986, H. Roberts (FRIL); Melambi R., Lae, Zitara Vill., 6000 ft, 25 Dec 1956, J. H. Ardley (NAIC); Mt. Missim, Mar 1975, J. T. Mengier (NAIC).

NORTHERN PROVINCE: montane forest, 2200m, Myola 2, north Prov, 2 Nov 1984, H. Roberts (FRIL); Myola 2, 20 Apr 1984, J. W. Ismay (NAIC); Porget logging area, below Wabal & Kombien, 8500 ft, July 1950, J. S. Wismersley (NAIC).

***Tabanus exagens* Walker**

SOUTHERN HIGHLANDS PROVINCE: Rd. Pimaga Orokane, on leaf of shrub, S.H. Pro, 26 Nov 1969, B. Gray (FRIL).

***Tabanus flammeus* Schuurmans Stekhoven**

MOROBE PROVINCE: Kuper Range, near Wau, 2000m, 8 Jun 1988, J. Dobunaba (FRIL).

***Tabanus indistinctus* Bigot**

MOROBE PROVINCE: Sago/Mangrove Swamp, ca. 25 m., 0.75 km W of Lababia, 12-14 Jun 1997, J. T. Goodwin (FSCA); 50-250 m, 1-3 km W of Lababia, 20-22 Oct 1997, J. T. Goodwin (FSCA); UNITECH, Lae, 25 mar 1998, J. T. Goodwin (FSCA); UNITECH, Lae, Aug 1994, T. Hoa (UNIT); UNITECH Farm, Lae, rabbit house, 5 Sep 1996, collector unknown (UNIT); in lowland rainforest, Bulolo, 20 Jun 1984, H. Roberts (FRIL); in lowland r.f., Bulolo; 20 Jun 1984, H. Roberts (FRIL).

***Tabanus innotabilis* Walker**

CENTRAL PROVINCE: Motupore Is., NCD, nr Pt. Moresby, 26 Aug 1997, J. T. Goodwin (FSCA).

MADANG PROVINCE: CRI Nagada Bay, Madang, at light in net trap, 6-8 PM, 14 Mar 1990, collector unknown (UNIT).

WESTERN PROVINCE: Medini, Fly R., 12 Dec, 16-20 Dec 1922, A. R. McCulloch (AMSA).

***Tabanus lenticulatus* Oldroyd**

MOROBE PROVINCE: Mainland Holdings Crocodile Farm, '8' mile, Lae, 26 Dec 1996, J. T. Goodwin (FSCA); Mainland Holdings Crocodile Farm, '8' mile, Lae, reared from larva collected 26 Jan 1997, J. T. Goodwin (FSCA).

WESTERN PROVINCE: Medini, Fly R., 13 Jul 1988, A. R. McCulloch (AMSA).

***Tabanus muruensis* Mackerras**

MOROBE PROVINCE: Kui, M. Distr., Warasweet L. A., in flight, 10 Nov 1970, F. R. Wylie & L. Radunz (FRIL).

***Tabanus obtusipalpis* Schuurmans Stekhoven**

MOROBE PROVINCE: Wau, 1200m, 22 Jul 1979, W. C. Gagne (FRIL).

***Tabanus opalescens* Schuurmans Stekhoven**

MOROBE PROVINCE: Sago/Mangrove Swamp, ca. 25 m., 0.75 km W of Lababia, 12-14 Jun 1997; J. T. Goodwin (FSCA); Mt. Missim, near Wau, 18-23 Jan 1979, B. M. Beehler (AMSA); Wau, 1200m, UV light, 15 Mar 1974, J. J. H. & M. L. Szent-Iveny (AMSA); Upper Manki logging area, near Bulolo, 5000', 29 Dec 1972, 30 Mar 1973, F. R. Wylie & P. Shanahan (AMSA).

***Tabanus papuensis* Oldroyd**

MOROBE PROVINCE: Markham Ranch, N. side of Highlands Hwy., 10-13 & 13-15 Sep 1997; J. T. Goodwin (FSCA); Mainland Holdings Crocodile Farm, '8' mile, Lae, reared from larva collected 26 Jan 1997, J. T. Goodwin (FSCA); Waramuri Cr., Bulolo, 9 Jan 1984, J. Dobunaba (FRIL); Bulolo, Forestry Station, attracted to man, 30 mar, 29 Sep 1983, H. Roberts (FRIL); Bulolo, Forestry Station, in house, 27 mar 1983, H. Ivagai (FRIL); Bulolo, Forestry Station, on house, 25 Mar 1983, H. Roberts (FRIL).

***Tabanus pollinosus* Ricardo**

MOROBE PROVINCE: Munum Waters, 15 km W of Lae, 15 Jaan 1971, A. & G. Daniels (AMSA); Buso, in lowland r.f., attracted to man, 20 Jun 1984, H. Roberts (FRIL); Aguazn(?), Lae, 2 Jan 1995, Tagosi Silauel & Tom Dama (FRIL); Lae, Oct 1960, T. L. Rothurnby; Bubia, 11 & 31 Oct 1956, 26 Jan &

25 Sep 1957, J. H. Ardley (NAIC); Bubia, 30 May 1958, E. N. Marks (NAIC); Busu R., 400 ft @ bridge, 20 Apr 1957, Ardley (NAIC).

NEW IRELAND PROVINCE: Pire Vill., 21 Sep 1971, E. S. C. Smith (NAIC).

NORTHERN PROVINCE: Kokoda, 8 Oct 1944, A. Blomberg (AMSA); Mt. Lamington district, Northern Division, Jan-Feb 1929, C. T. McNamara (AMSA).

***Tabanus recusans* Walker**

CENTRAL PROVINCE: UPNG, Waigani, NCD, 11 Mar 1976, B. Gabir (FRIL);

MADANG PROVINCE: on leaf shrub, Naru L. S. Gogol, Madang Prov, 28 May 1984, H. Roberts (FRIL).

***Tabanus semicircularis* Ricardo**

CENTRAL PROVINCE: UPNG, 28 May 1976, Miloto (NAIC).

ENGA PROVINCE: Baiyer R. Sanct., 40 km N Mt. Hagen, 22 Dec 1981, D. Black (NAIC).

MOROBE PROVINCE: Wau, 1200m, malaise trap, 14 Dec 1996, W. Gagne (FSCA); Garaina, 2000', 1 Jun 1967, G. Moiniet (AMSA).

WESTERN PROVINCE: Kiunga, 30 m NNE Palmer R., 16 Oct 1974, P. Imlay (NAIC).

***Tabanus sepikensis* Oldroyd**

WEST PAPUA PROVINCE, INDONESIA: Homlikia, Res. Boveu Dicapel, 12 Oct 1957, R. T. Simon Thomas (AMSA).

***Tabanus serus* Walker**

EAST NEW BRITAIN: 'Bisi' Pl., Sangara, 29 Nov 1988, G. Bula (NAIC).

EAST SEPIK PROVINCE: Buna to Sepik, 5 Jun 1921, E. O. Pockley (AMSA).

MOROBE PROVINCE: Mainland Holdings Crocodile Farm, '8' mile, Lae, 9, 10, 11, 12, 13, 14, 16, 20, 25 Dec 1996, J. T. Goodwin (FSCA); Bubia, 13 Feb 1971, K. Gorea (NAIC).

GULF PROVINCE: Sarni, Res. Sarni, 14 Mar 1988, R. T. Simon Thomas (AMSA).

SANDAUN PROVINCE: 20 km S Vanimo, in flatland lowland r.f., W Sepik Prov, 1 Sep 1983, H. Roberts (FRIL).

***Tabanus stuberi* Oldroyd**

MOROBE PROVINCE: compound, attracted to light, 2 Oct 1972, M. Gamea (FRIL); Manki L.A., Bulolo, attracted to man, 28 Mar 1983, H. Roberts (FRIL).

***Tabanus subrecusans* Mackerras**

GULF PROVINCE: Kikori, Apr 1968, G. Rio (NAIC).

MADANG PROVINCE: Gogol, on *Anthocephalus chinensis*, Madang Prov, 7 Mar 1972, J. Simpson (FRIL).

MOROBE PROVINCE: Boda, Res. Sarni, 19 Jun 1959, R. T. Simon Thomas (AMSA).

SANDAUN PROVINCE: 20 km S of Vanimo, in flatland lowland r.f. W. Sepik Prov, 1 Sep 1983, H. Roberts (FRIL).

WEST SEPIK PROVINCE: Imonda, 14 Nov 1985, J. W. Ismay (NAIC).

***Tabanus vanleeuweni* Oldroyd**

EAST SEPIK PROVINCE: Hunstein Mtns, Camp 4, ca 1000m, 26 Sep-5 Oct 1989, A. Allison et al. (BPBM).

MOROBE PROVINCE: Sago/Mangrove Swamp, ca. 25 m., 0.75 km W of Lababia, 12-14 Jun 1997 & 2-5 July 1998; J. T. Goodwin (FSCA); Mountain Rainforest, 50-250m, 1-3 km W of Lababia, 12-14 Jun, 20-22 Oct 1997, J. T. Goodwin (FSCA).

WEST NEW BRITAIN PROVINCE: Kercvak (?), New Britain, on leaf of *Ochroma lagopus*, 7 May 1968, F. R. Wylie (FRIL).

***Tabanus yulensis* von Röder**

MOROBE PROVINCE: Manki L.A., Bulolo, attracted to man, 30 Mar 1983, H. Roberts (FRIL); Forestry Station, Bulolo, in flight, 30 Mar 1972, Nime (FRIL); Taun L.A., Bulolo, in flight, 9 Nov 1971, F. R. Wylie (FRIL).

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