

MELANESIAN-PACIFIC *TABANUS*

(Diptera : Tabanidae)

By I. M. Mackerras¹

Abstract: Seventeen species of *Tabanus* are known from the chain of islands from Manus to the New Hebrides and extending to Fiji and Samoa, representing a faunal infiltration from the west that has probably gone on for more than a million years. The Australian-southern Papuan *T. innotabilis*, previously recorded from the chain, is now excluded. New species described: *subcinnamoneus* (New Britain), *sinewitensis* (Umboi I., New Britain), *choiseulensis* (Solomon Is.), *lenticuloides* (Solomon Is.), *incohaerens* (Umboi I., New Britain, New Hanover, Dyaul, New Ireland), *gressitti* (Solomon Is.), *lyneborgi* (Mussau).

The genus *Tabanus* is the youngest and most typically Oriental element in the Papuan-Pacific tabanid fauna. It had a separate ancestral history from the Diachlorini already discussed (Mackerras 1971b), and it is therefore useful to examine its progression through the islands as a separate problem. This has been facilitated by the new material in the three collections (Bishop Museum, Danish Noona Dan Expedition, Australian National Insect Collection) acknowledged in the paper referred to above, and I would like to record my thanks to the authorities concerned for the opportunity to study it.

Seventeen species of *Tabanus* are now known from the curving chain of islands from Manus to the New Hebrides and extending eastwards to Fiji and Samoa; and the purposes of the present study are to examine their relationships to the Papuan fauna and to seek for evidence of speciation within the chain. The genus is not known from New Caledonia or New Zealand. The records are summarized in the following tabular statement.

MANUS	MUSSAU	NEW IRELAND	SANTA CRUZ Is.
<i>ceylonicus</i>	<i>ceylonicus</i>	<i>ceylonicus</i>	<i>leveri</i>
UMBOI I.	<i>lyneborgi</i>	<i>gilingilensis</i>	<i>rubriventris</i>
<i>sinewitensis</i>	NEW HANOVER	<i>incohaerens</i>	NEW HEBRIDES
<i>incohaerens</i>	<i>ceylonicus</i>	<i>rubriventris</i>	<i>expulsus</i>
<i>vanleeuweni</i> (♂)	<i>gilingilensis</i>	FENI Is.	FIJI
SIASSI Is.	<i>incohaerens</i>	<i>rubriventris</i>	<i>fijianus</i>
<i>siassensis</i>	<i>vanleeuweni</i> var.	SOLOMON Is.	SAMOA
NEW BRITAIN	<i>rubriventris</i>	<i>ceylonicus</i>	<i>samoensis</i>
<i>ceylonicus</i>	DYAUL	<i>choiseulensis</i>	
<i>subcinnamoneus</i>	<i>ceylonicus</i>	<i>lenticuloides</i>	
<i>sinewitensis</i>	<i>incohaerens</i>	<i>gressitti</i>	
sp. nr. <i>selene</i> (♂)	<i>rubriventris</i>	<i>leveri</i>	
<i>incohaerens</i>		<i>rubriventris</i>	

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References in the later notes on the species are to their occurrence in the area; formal taxonomic references may be found in Mackerras & Rageau (1958) and Mackerras (1964).

Relationships

The fauna of New Guinea and immediately adjacent islands includes 39 species of *Tabanus* distributed in 7 species-groups (Mackerras 1964). Of these, 3 species and 1 group may be excluded as being relatively recent extensions from Australia into southern New Guinea, leaving 36 species in 6 groups (*ceylonicus*, *denticulatus*, *recusans*, *exagens*, *cohaerens* and *innotabilis*) for consideration. On the Pacific side, 2 Micronesian species—*palauensis* Tak. from Palau and *striatus* F. from Guam—recorded by Stone (1960) may also be excluded as representing different lines of dispersal from those with which we are concerned. It is worth remembering, too, that the *cohaerens* and *innotabilis* groups are based more on convenience than on evidence of phylogenetic separation, although there are recognizable clones (species-complexes) within each of them. Two of these are relevant to the present discussion and may therefore be defined here.

The *cohaerens* complex: Includes those members of the group that have a narrow, continuous, usually well-defined median pale vitta on abdominal tergites. Eyes green with brown bottom segment in *cohaerens*; similar, but with diffuse brown zone across middle of green in *approximatus*, *subcohaerens*, and probably *divisus*, some specimens giving the impression of having predominantly brown eyes with a wide green band which is sharply defined below and merges into brown above (1964, p. 191); and with the brown zone across center reduced to a narrow, clearly defined, oblique band in *incohaerens*. The shape of sternite 8 and gonapophyses is variable in *cohaerens* and *incohaerens*, and it is possible that the complex consists, at least in part, of nascent rather than fully established species.

The *innotabilis* complex: Smooth-bodied brown species, externally undistinguished in the group, but united by having distinctively long and narrow spermathecal bulbs*. Includes *innotabilis* and *wyndhamensis* in Australia (Mackerras 1971a), *innotabilis* and *rubriventris* in New Guinea, and *rubriventris*, *siassensis* and *lyneborgi* in the Melanesian arc.

All 6 Papuan groups have been found in the Melanesian-Pacific chain, and there are 2 others that are not known from New Guinea. The situation may be presented most simply by grouping the species in descending order of divergence from the Papuan fauna.

The *expulsus* group (not previously named; 2 species, New Hebrides, Fiji): Cannot be related to any other in the subregion. The banded eyes, relatively wide frons, pattern of body and wings, and general habitus suggest that, like the Australian *pallipennis* group, it may have originated from some ancestral Indonesian member of the Oriental *striatus* group that failed to become established in New Guinea.

The *gilingilensis* group (monotypic, New Hanover [Lavongai], New Ireland): May be

* The shape of the spermathecae (termed "spermathecal bulb" because they merge into their ducts—Mackerras 1971a) has proved to be more constant and reliable in *Tabanus* than I had been willing to accept in earlier work.

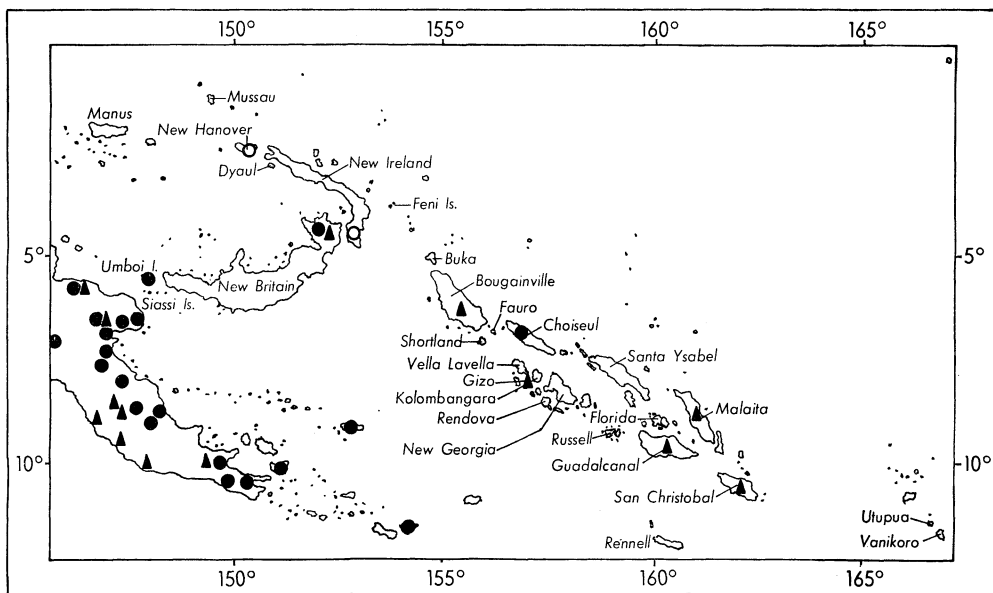


Fig. 1. Local distribution of the *recusans* group (spots), *gilingilensis* group (circles) and *exagens* group (triangles).

a divergent offshoot from the *recusans* group, a suggestion that is supported by the discovery of similarly banded eyes in *choiseulensis*.

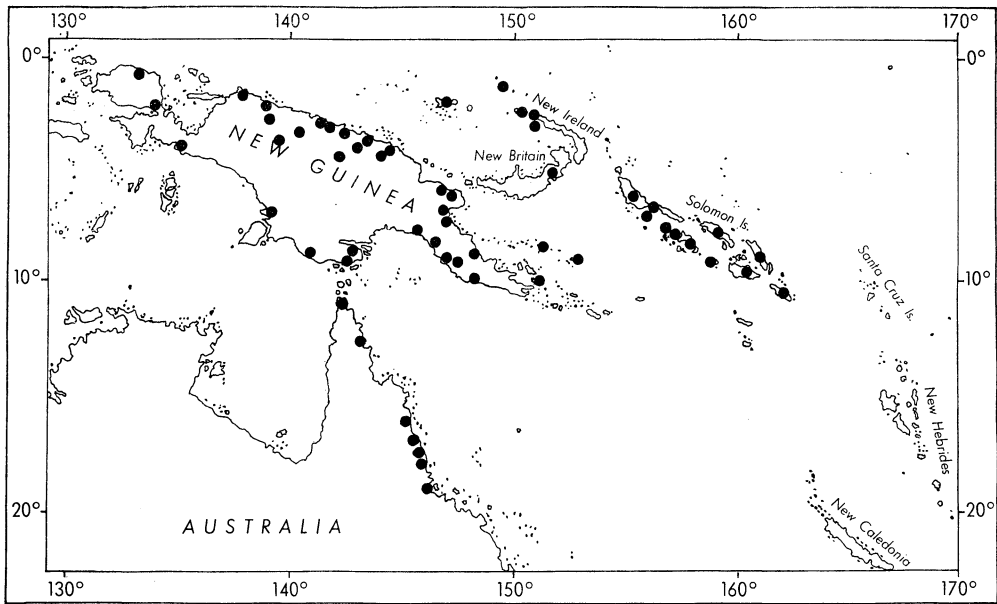
Members of *cohaerens* group (*s. l.*), but cannot be linked to known Papuan species-complexes: *samoensis* (Samoa, the most easterly record of *Tabanus* in the Western Pacific); *gressitti* (Solomon Is.); *leveri* (Santa Cruz and Solomon Is.).

Well defined species-pairs or derivatives of Papuan species-complexes, the Papuan representative being named first: *stuberi-sinewitensis* (Umboi I., New Britain); *papuensis-choiseulensis* (Solomon Is.); *selene*-sp. nr. *selene* (♂, New Britain); *innotabilis* complex-*siassensis* (Siassi Is.) and *lyneborgi* (Mussau).

Species-pairs so closely related that it is doubtful whether subspecific ranking might not have been more appropriate: *cinnamoneus-subcinnamoneus* (New Britain); *lenticulatus-lenticuloides* (Solomon Is.); *cohaerens* complex-*incohaerens* (Umboi I., New Britain, New Hanover, Dyaul, New Ireland).

Species extending into the chain without taxonomically acceptable change: *ceylonicus* (widespread), unchanged; *vanleeuweni* (Umboi I., New Hanover), varying from Papuan form in ♀ terminalia; *rubriventris* (widespread), varying towards *innotabilis* in external characters.

There appear to be minor variations between local populations within the chain (as there are in New Guinea), but only 2 species-pairs have been recognized so far, namely: *expulsus* (New Hebrides) and *fijianus* (Fiji), which are closely related; and *gressitti* (Solomon Is.) and *leveri* (Santa Cruz Is. and Florida I.), the proximate common an-



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Fig. 2. Subregional distribution of *T. ceylonicus*.

cestry of which is not so clear.

Even when allowance is made for possible differences in rates of evolutionary divergence, it is evident from the foregoing and fig. 1, 2, 23, 24 that there has been a fairly free, though by no means completely unimpeded, eastward flow of *Tabanus* through the subregion over a considerable period of time, quite probably from early Pleistocene into the Recent. It may have been intermittent, but only the oldest *expulsus* group suggests that. When the *Diachlorini* are brought into account too, the principal gaps in the chain are seen to lie between the Santa Cruz group and the New Hebrides (Mackerras 1961), between Fiji and Samoa, and, to the south, between the New Hebrides and New Caledonia (where 10 species of *Cydistomyia* are known, but no *Japenoides* and no *Tabanus*). The whole picture provides a good example of the importance of island-arc-trench systems ("sinks" of plate tectonics—e. g. Vine 1970, Dietz and Holden 1970) as palaeogeographic features influencing the distribution of animals.

KEY TO MELANESIAN-PACIFIC SPECIES OF TABANUS - ♀♀

1. Subcallus shining black; slender, 10-12 mm, black species with contrasting yellow antennae and white tibiae; eyes ornately banded in life (*ceylonicus* group)..... **ceylonicus**
 Subcallus not shining black; other characters not as above 2
2. Very large (20 mm), richly coloured reddish species, with strongly toothed orange antennal plate, black style, orange-golden beard, and reddish to yellowish brown venter covered with golden hairs (*denticulatus* group) **subcinnamomeus**
 Not such species 3

3. 14-15 mm, rather shining black species, with predominantly black more or less shining frons obscuring the callus, yellowish antennae, and irregularly clouded wings; eyes (relaxed) with a brown band (*gilingilensis* group) **gilingilensis**
 Not such species; callus well defined on a tomentose frons 4
4. Thickset, blackish species, with deep brown to black beards, predominantly black pleural hairs, strongly darkened wings, a strong appendix on vein R_4 , and at most obscure patches or fringes of pale hairs on some abdominal tergites and sternites (*recusans* group) 5
 Not so thickset or dark, with cream to whitish, occasionally brown beards, predominantly pale pleural hairs, less darkened wings, usually no appendix on vein R_4 , and paler bodies or a clearly defined abdominal pattern.....6
5. Antennae entirely black; pleura and some abdominal segments with patches or incomplete fringes of white hairs; eyes unbanded **sinewitensis**
 Antennal plate yellowish brown; pleura and abdomen with entirely dark hairs; eyes with a purple, green-bordered band **choiseulensis**
6. Dark grayish species, with short wide black antennal plate and short plump palpi; wings strongly suffused with brown; abdominal tergites with narrow pale apical bands and low median triangles (*exagens* group) **lenticuloides**
 Not such species 7
7. Bright brown species, with relatively wide frons (index 4.5 to 5), clearly vittate scutum, pattern of brown spots on wings, and conspicuous pattern of orange apical bands and large median triangles on abdominal tergites; eyes with 2 brown bands (*expulsus* group) 8
 Not such species; frons narrower; scutal and abdominal patterns, when present, relatively obscure (*cohaerens* and *innotabilis* groups) 9
8. Scutal vittae conspicuous; frons and callus narrower; antennal plate with strong dorsal tooth; palpi more swollen; terminalia as in fig. 26 (Fiji)..... **fijianus**
 Scutal vittae less conspicuous; frons and callus wider; antennal plate with obtuse dorsal angle; palpi less swollen; terminalia as in fig. 25 (New Hebrides). **expulsus**
9. Abdomen with sharply defined pale median vitta; antennal flagellum black; eyes with a narrow brown band **incohaerens**
 Abdomen without pale median vitta; antennal flagellum usually brown 10
10. 15 mm, dark to blackish brown species, with narrow frons (index 8), long antennae, contrastingly pale pleura, black legs, brownish wings, and narrow pale apical fringes on abdominal tergites (Samoa)..... **samoensis**
 Not such species.....11
11. Antennal flagellum black; 16 mm species, with white beard, grayish brown scutum, yellow-brown femora and tibiae, and bright brown abdomen darkening apically and with inconspicuous pale median apical fringes on tergites **siassensis**
 Antennal flagellum reddish to yellowish brown; other characters not as above..... 12
12. 16-18 mm, dark to reddish brown species, with variable mixture of brown hairs in beard, relatively slender palpi, callus as in fig. 12, brown to blackish fore femora, almost clear wings, and variable grayish white median triangles and apical fringes on abdominal tergites..... **rubriventris**
 Not such species; beard cream to white, palpi stouter, femora brown to yellowish, and wings usually suffused with brown anteriorly 13
13. 15 mm, rather slender, brown species, with strongly converging frons (fig. 8), wings suffused with brown anteriorly and along radial veins, and abdominal tergites with no pale hairs **vanleeuweni**
 Frons not so converging, or wings not suffused with brown; abdomen with at least some pale hairs apically on tergites14

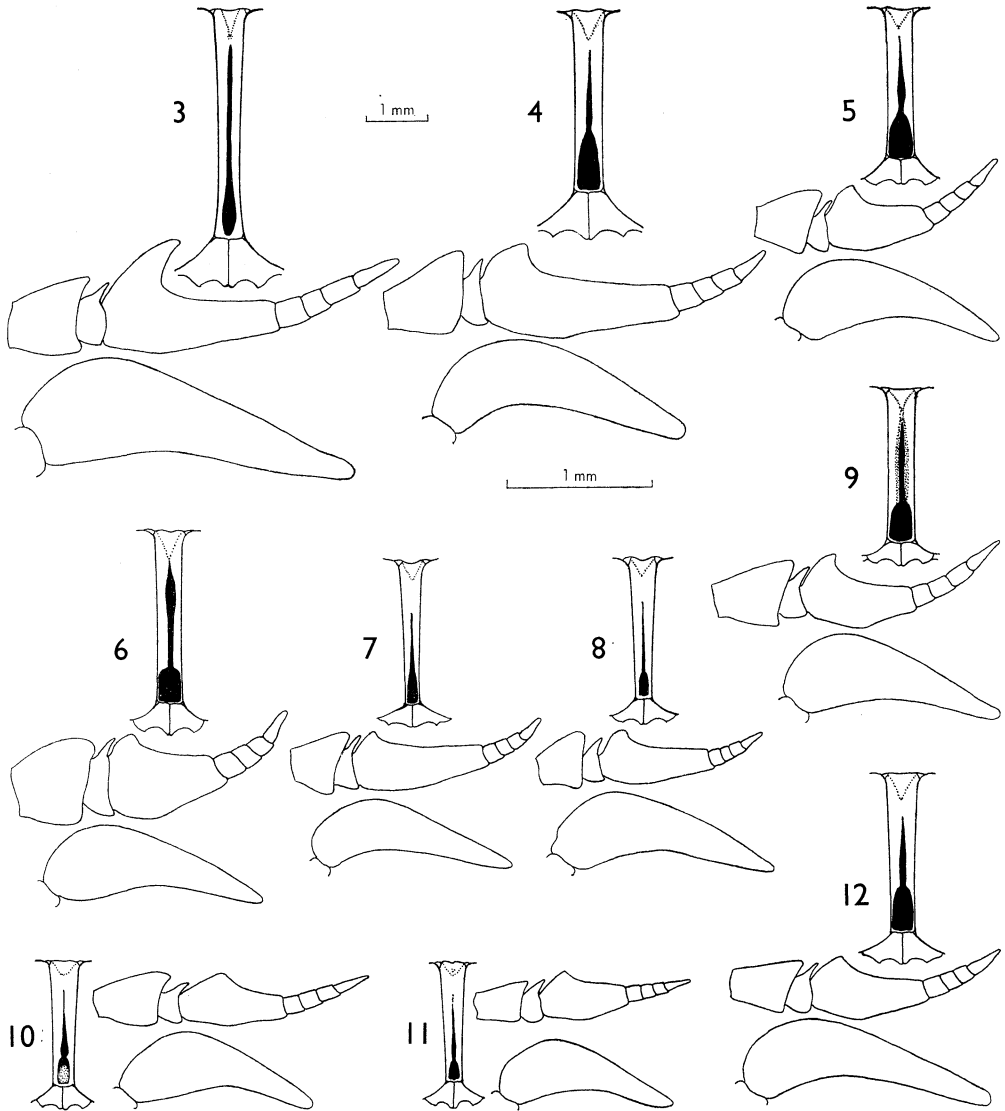


Fig. 3-12. Frons, antenna and palp of ♀♀: 3, *T. subcinnamoneus*; 4, *sinewitensis*; 5, *choiseulensis*; 6, *lenticuloides*; 7, *incohaerens*; 8, *vanleeuweni* var.; 9, *gressitti*; 10, *leveri*; 11, *lyneborgi*; 12, *rubriventris*. Upper scale for frons, lower for antennae and palpi.

- 14. Larger (13-16 mm), more tomentose species, with larger, entirely black callus (fig. 9), strongly toothed antennal plate, and wings only lightly suffused with brown; eyes with a brown band.....**gressitti**
- Smaller (12-14 mm), more shining species, with narrower callus (fig. 10, 11) and antennal plate with obtuse dorsal angle; eyes unbanded
- 15. Basal part of callus light translucent brown; wings suffused with brown anteriorly;

spermathecal bulbs short, rounded **leverii**
 Basal part of callus dark brown to black ; wings almost clear ; spermathecal bulbs long,
 tapering..... **lyneborgi**

***Tabanus ceylonicus* Schiner**

One of the less robust species of the genus, yet it provides a remarkable example of what must have been largely post-Pleistocene, island-hopping dispersal. It has been found in the following islands of the arc (fig. 2) : Manus ; New Britain (Nakanai Mts.) ; Mussau ; New Hanover ; Dyaul ; New Ireland (Kavieng) ; Solomon Is. (Bougainville, Shortland, Fauro, Vella Lavella, Kolombangara, Now Georgia, Santa Ysabel, Russell, Malaita, Guadalcanal, San Christobal). For distribution elsewhere, see Mackerras (1964, p. 170-1).

***Tabanus subcinnamoneus* Mackerras, new species Fig. 3, 13.**

Holotype ♀ (ANIC), from Mt Sinewit, 1,100 m, New Britain. 27.VI-17.IX.1963, W. W. Brandt.

MATERIAL EXAMINED : 7 ♀♀, 1 ♂.

♀. A large (20 mm), richly coloured species ; distinguished from *cinnamoneus* Dol. by longer antennae, darker antennal plate, fewer golden hairs on palpi and dorsum of thorax, cell R₅ not narrowed, and venter of abdomen brown with orange hairs on disc rather than black with black hairs. *Head* : Eyes (in life) stated to be green, unbanded (Lyneborg). Frons very narrow (index 11-12), converging, with yellow-brown tomentum, darkening above ; callus dark brown, upper tapering part raised into a keel. Subcallus, parafacials and face rich brownish yellow, with a patch of black hairs lateral to antennae and golden ones on face and lower part of parafacials ; beard orange-gold. Scape and pedicel of antennae light brown, with black hairs ; plate of flagellum orange, with strong dorsal tooth, style black. Palpi brown, with black hairs mixed with a few orange ones laterally towards base. *Thorax* : Scutum and scutellum brown with olive and yellowish tints ; hairs erect black and recumbent golden, more brownish on notopleural lobes, and in bright yellow tufts above and behind wing-root. Pleura yellow-brown, with long dense golden and orange-brown hairs. *Legs* : Coxae darker than lower part of pleura ; remaining segments entirely black, with black hairs. *Wings* : Suffused with brown, darker anteriorly ; R₁ dark brown, stigma and other veins yellowish brown basally, darkening distally ; R₄ strongly curved but without appendix, cell R₅ slightly narrowed distally. *Abdomen* : Rich red-brown, vaguely darkened on more distal tergites ; hairs black on discs, light golden sublaterally at extreme base, and rich golden in a median apical tuft on tergite 1, apical fringes on 2 to 5, and a lateral fringe on all tergites. Venter bright brown with a reddish to yellowish tint and rich golden hairs which are densest at apices of sternites, irregularly darkening and with some black hairs in median zone distally. Terminalia with gonapophyses slightly wider and spermathecal bulbs shorter and stouter than in *cinnamoneus*.

♂. Similar to ♀, but even more brightly and richly colored. Eyes with upper facets only slightly enlarged and not sharply marked off from lower facets ; ocellar tubercle prominent, elongate, reaching level of eyes. Black hairs on parafacials diffusely mixed with the golden ones, not concentrated in a patch ; antennal plate more slender than in ♀ ; palpi stout, bright brown, with black hairs. Terminalia not dissected.

DISTRIBUTION. NEW BRITAIN : Mt Sinewit, 1,100 m, VI-IX, Brandt ; Komgi and Yalom, 1,000 m, V, Noona Dan Expedition.

Tabanus gilingilensis Mackerras

Previously known from the holotype from New Ireland (Mackerras 1962, p. 109), a second ♀ has been seen from Banatam, New Hanover, III, Noona Dan Expedition. The species remains taxonomically isolated.

Tabanus sinewitensis Mackerras, new species Fig. 4, 14.

Holotype ♀ (BISHOP 9500), from Umboi I., nr. Lab Lab, 300 m, in Malaise trap, 8-19.II.1967, G. A. Samuelson.

MATERIAL EXAMINED: 3 ♀♀, 2 ♂♂.

♀. A robust, thickset, 18 mm species of the *recusans* group; close to *stuberi* Oldr., but distinguished by longer antennal plate, darker facial hairs, brown scutum and scutellum, and small patches and partial fringes of pale hairs on some abdominal segments; it is not nearly related to any of the species with similar pale hairs on abdomen (1964, p. 167, couplets 18-20). *Head*: Eyes (relaxed) green, unbanded. Frons of medium width (index 7), slightly converging, brown with fawn tints and short dark brown hairs; callus dark brown, with a long tapering extension towards vertex. Subcallus, parafacials and face dull brownish cream, more grayish below, with dark brown hairs, mixed with a few whitish ones at side of face below; beard dark brown. Antennae black, scape and pedicel with some grayish overlay and black hairs. Palpi grayish brown, with black hairs. *Thorax*: Scutum and scutellum brown with some grayish bloom anteriorly, and with dull cream recumbent and inconspicuous black erect hairs. Pleura brown with a trace of grayish overlay; hairs dark brown, vaguely paler in places, pre-alar, squamal and hypopleural tufts contrasting yellowish cream. *Legs*: Coxae similar to pleura; remaining segments black, except for brown knees and a brownish suffusion in basal third of fore tibiae; hairs black, except for a dull yellowish cream zone ventrally on basal half of hind tibiae. *Wings*: Brown, darker anteriorly and vaguely along veins, slightly paler posteriorly; veins and stigma brown; R₄ with appendix, cell R₅ not narrowed. *Abdomen*: Black, black-haired dorsally and ventrally, except for usual lighter tint at extreme base and tufts of dull cream hairs in median zone of tergites 1-4, in incomplete lateral fringe, and in incomplete apical fringes on sternites 2-4 and a few on 5. Terminalia very similar to those of *stuberi*, but base of furca less incised and spermathecal bulbs slightly shorter and wider.

♂. More like the ♂ of *stuberi*, which also has a brown scutum and scutellum; but the dorsum of the abdomen is entirely velvety black in *stuberi*, whereas in *sinewitensis* it is brown becoming black distally, lacks the velvety appearance, and has patches of pale hairs as in the ♀. Characters of the head are similar in the 2 species. Terminalia not dissected.

DISTRIBUTION. NEW BRITAIN: Umboi I., 300 m, II, Samuelson; Mt Sinewit, 1,100 m, VI-IX, W. W. Brandt; Gaulim, Gazelle Peninsula, 130-140 m, X, J. Sedlacek (♂♂).

Tabanus choiseulensis Mackerras, new species Fig. 5, 15.

Holotype ♀ (BISHOP 9501), from Choiseul, Solomon Is., Kolombangara R., 80 m, in Malaise trap, 20.III.1964, P. Shanahan.

MATERIAL EXAMINED: 1 ♀.

♀. Relatively small (14 mm), deep to blackish brown species, which appears to be closest to *papuensis* Oldr. in terminalia and agrees also in shape of callus and strong appendix on vein

R_4 ; but differs in its bright brown antennal plate, entirely dark beard, and absence of pale hairs on most of pleura and all abdominal segments. *Head*: Eyes (relaxed) brown with an oblique, green-bordered, purple band across middle; it is the only species of the *recusans* group known to have banded eyes. Frons slightly converging, index 6.0, dark brown, with short black hairs; callus black, shining, basal section somewhat swollen. Subcallus and most of parafacials fawn-brown, paler below and on face; hairs black, including beard. Antennal scape and pedicel light brown, with black hairs; plate of flagellum bright orange-brown, with strong dorsal angle, style blackish brown. Palpi dark brown, with black hairs. *Thorax*: Scutum and scutellum dark olive-brown, somewhat lighter at sides behind wing-roots; hairs black erect and dull yellowish cream appressed. Pleura gray, with black hairs except for a dull yellowish cream tuft behind wing-root. *Legs*: Femora black with predominantly black hairs; fore tibiae black on distal half, brown basally, mid and hind brown, all with black hairs; tarsi darkening to black distally. *Wings*: Brown, somewhat lighter in centers of most cells; stigma brown, veins dark brown, R_4 with strong appendix. *Abdomen*: Dorsum deep blackish brown to black; venter brown proximally, darkening to blackish brown distally; hairs entirely black. Terminalia with gonapophyses deeper than in *papuensis*, but otherwise similar.

DISTRIBUTION. SOLOMON ISLANDS: Choiseul, Kolombangara R., 80 m, III, Shanahan.

***Tabanus lenticuloides* Mackerras, new species** Fig. 6.

Holotype ♀ (BISHOP 9502), from Roroni, 35 km E of Honiara, Guadalcanal, Solomon Is., 10 m, in Malaise trap, 17.V.1964, R. Straatman. This is the species of which ♂♂ were recorded as *Tabanus* sp. nr. *lenticulatus* by Mackerras and Rageau (1958, p. 686) and Mackerras (1964, p. 190).

MATERIAL EXAMINED: 10 ♀♀, 13 ♂♂.

♀. Very close to *lenticulatus* Oldr. and possibly should be treated as a subspecies. It is larger than *lenticulatus* (length 15-17 mm as against 14-15 mm), more robustly built, darker in general coloration, with a narrower frons (index 7-7.5 as against 5.5-6), usually more strongly browned wings, vein R_4 more strongly curved, pattern on abdominal tergites reduced to small median yellow-haired apical triangles but only a trace of paler banding and no apical fringes of pale hairs lateral to the triangles. *Head*: Eyes (relaxed) dark green, unbanded. Frons brown with variable gray reflections and blackish brown vertexal triangle; callus black, basal section somewhat swollen, full width of frons below, extension more or less widened in upper section. Subcallus and upper parafacials more definitely brown than in *lenticulatus*. Palpi not so swollen, fawn-brown with predominantly black hairs. *Thorax* and *legs* as in *lenticulatus*. *Wings*: Rather strongly browned (especially anteriorly) in most specimens, and usually with darker spots at fork of R_{4+5} and apices of R_{2+3} and R_4 ; stigma brown, veins dark brown, R_4 strongly curved but without appendix. *Abdomen*: Tergites black, except for inconstant narrow paler apical margins and more definite incipient median triangles on 1-5; hairs entirely black except for dull yellow on the median triangles. Venter dark gray, with paler apical bands and cream fringes on sternites 1-5; hairs grayish white on discs of 1-5, predominantly or entirely black on 6 and 7. Terminalia indistinguishable from those of *lenticulatus*, except possibly for slight differences in the spermathecal bulbs.

♂. More varied in size than ♀ (length 13-17 mm), but of similar robust build. Eyes moderately enlarged, upper large facets brown, lower and posterior small facets greenish black; ocellar tubercle reaching level of eyes. Frontal triangle deep brown, subcallus light brownish yellow; antennae more slender than in ♀; palpi bulbous, light fawn with grayish cream overlay

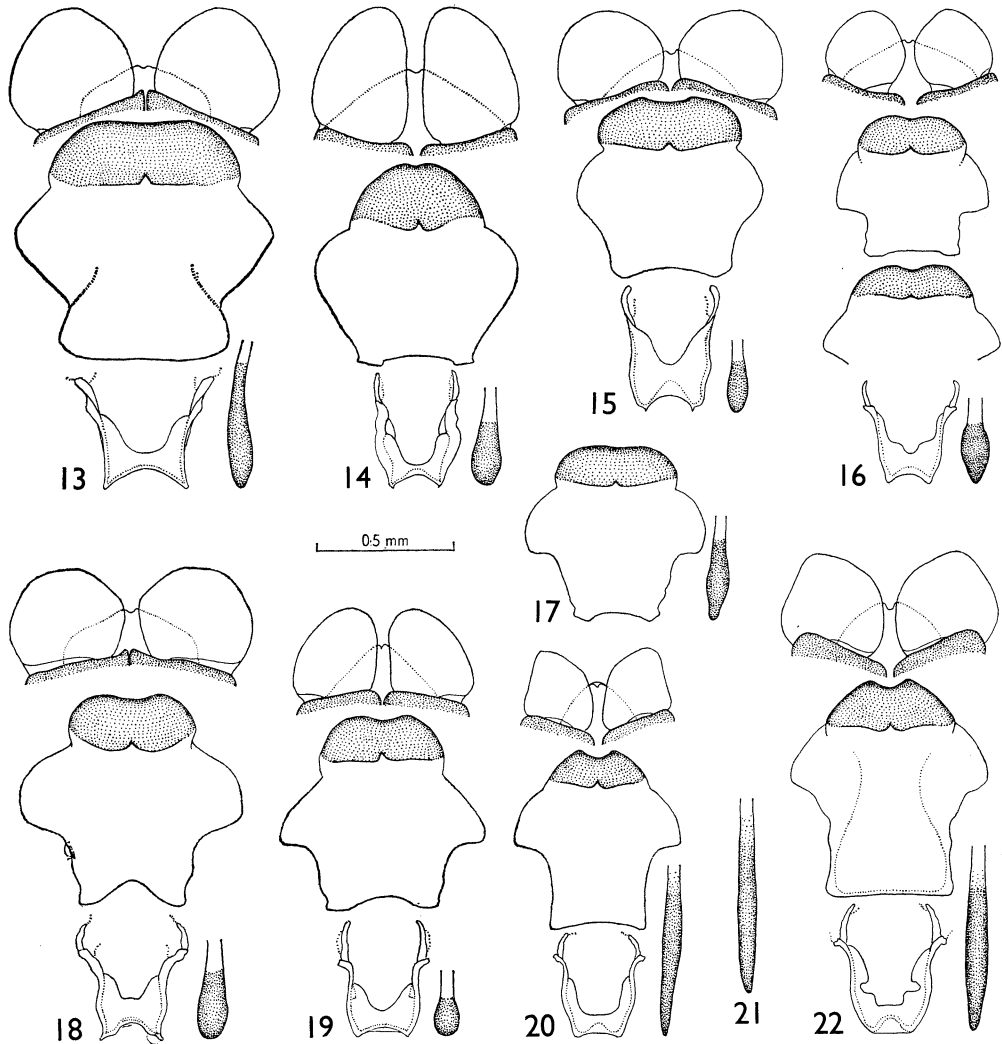


Fig. 13-22. Terminalia of ♀♀: 13, *subcinnamoneus*; 14, *sinewitensis*; 15, *choiseulensis*; 16, *incohaerens*, showing variation in gonapophyses; 17, *vanleeuweni* var. (sternite 8 and spermathecal bulb); 18, *gressitti*; 19, *leveri*; 20, *lyneborgi*; 21, *siassensis* (spermathecal bulb); 22, *rubriventris*.

and mixed black and white hairs. Scutum and scutellum more grayish brown than in ♀. Abdomen with tergites 1-3 bright brown, remainder darker brown, median triangles and hairs as in ♀; venter paler than in ♀, with wider apical pale bands on sternites and a greater proportion of dark hairs on their discs.

DISTRIBUTION. SOLOMON ISLANDS: Bougainville, Torokina, IV, F. N. Ratcliffe, Kiketa, VI, H. A. Standfast (♂♂); Gizo, 30 m, in M. V. light trap, VI, VII, J. & M. Sedlacek (♂♀); Malaita, Auki, 20 m, in M. V. light trap, VI, Sedlacek, Dala, VII, R. Straatman

(♂ ♀); Guadalcanal, nr. Honiara, 10 m, in Malaise trap, V, Straatman (♀); San Christobal, Wairahu R., 100 m, V, Sedlacek (♀).

Tabanus sp.

A single ♂, from Mt Sinewit, New Britain, 1,100 m, VI-IX, Brandt, resembles ♂♂ of *selene* Sch. Stk., but is darker, with shorter antennal plate, darker palpi, blackish brown legs, more conspicuous spots on the wing, and the pale bands on abdominal tergites narrower and less expanded in mid line. It is probably a sister species of *selene*, but unsuitable for description in the absence of females.

Tabanus incohaerens Mackerras, new species Fig. 7, 16.

Holotype ♀ (BISHOP 9503), from Umboi I., nr. Lab Lab, 300 m, in Malaise trap, 8-19. II.1967, G. A. & S. L. Samuelson.

MATERIAL EXAMINED: 7 ♀♀, 6 ♂♂.

♀. A variable, 12-16 mm, species of the *cohaerens* complex; distinguished in the Melanesian arc by having a sharply defined median pale vitta on the abdomen, and from its Papuan relatives by darker general color, entirely black antennal flagellum, and black, gray-dusted femora. In general appearance it resembles *subcohaerens* Mack., but its antennae and terminalia suggest closer relationship with *cohaerens* Walk. *Head*: Eyes (relaxed) green, brown at bottom, and with a narrow oblique purple-brown central band which does not reach lateral margin. Frons converging, index 7.5-8, brown, with short black hairs; callus raised, shining black. Subcallus fawn-brown, with a narrow deep brown band at top; parafacials with a narrow, dark brown, dark-haired, transverse zone at top, remainder and face grayish white with white hairs, including beard. Antennal scape with dark gray dusting and black hairs; pedicel light brown with black hairs; flagellum with a more acute dorsal angle than in *cohaerens*, entirely black. Palpi light fawn, with black hairs. *Thorax*: Scutum and scutellum dark olive-brown, lightly gray-dusted anteriorly and at sides, but without trace of pattern; hairs black and dull yellow on disc, black on notopleural lobes, dull yellowish above and behind wing-root. Pleura light fawn-gray, with white to dull cream hairs and some black ones on upper part of mesopleural convexity. *Legs*: Femora black, gray-dusted, with black and grayish white hairs; fore tibiae light brown basally, black distally, with dull yellow hairs on the paler part, black elsewhere; mid and hind tibiae brown, darkening at apex, with black and dull cream hairs; tarsi black with black hairs. *Wings*: Grayish, more or less suffused with brown anteriorly; stigma brown, veins dark brown, R₄ strongly curved but without appendix. *Abdomen*: Tergites deep to blackish brown with black hairs, except for the sharply defined, yellowish, golden-haired median vitta, and similar, almost equally conspicuous, yellow-haired lateral margins on tergites 2-6, 7 entirely dark. Venter grayish brown, with cream and some black hairs on discs, and with yellowish, yellowish-cream-haired apical bands on sternites 1-6, 7 entirely dark. Terminalia of most specimens like those of *cohaerens*, except that base of furca wider; but one ♀ from Umboi I. and one from New Britain have wider, shallower gonapophyses like those of *divisus* Walk. (1964, fig. 192).

♂. Similar to ♀ but somewhat lighter in general coloration, and tergites 2-3 of abdomen bright brown rather than black. Eyes moderately swollen, upper large facets brown, lower small facets black; ocellar tubercle reaching level of eyes. Subcallus and top of parafacials brownish cream, contrasting with the very dark antennae; palpi fusiform, light fawn, with cream and black hairs.

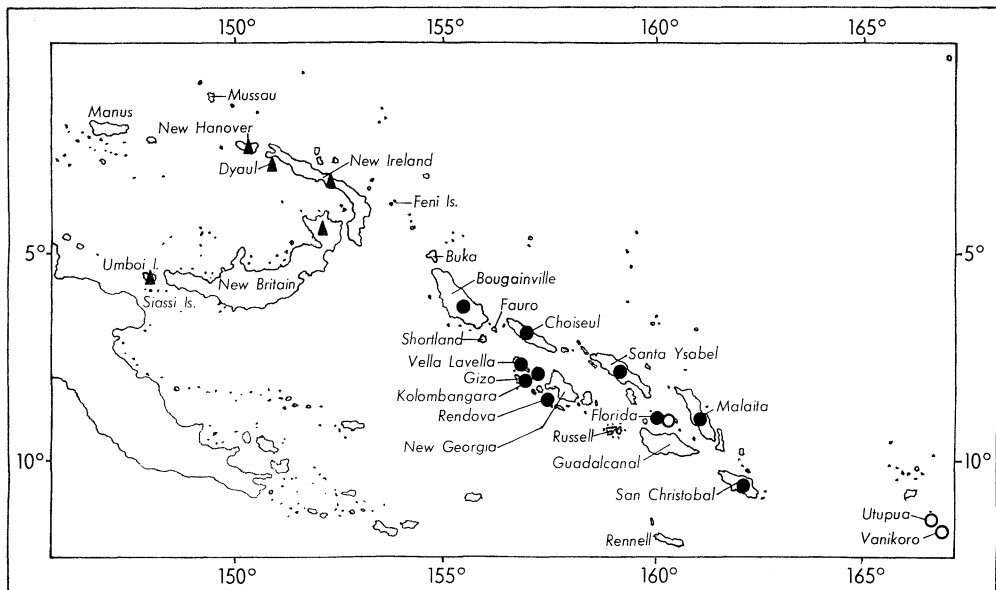
In addition to the variation in ♀ terminalia noted above, a ♂ from Dyaul and ♀ from New Hanover are not as dark as the other specimens, more like *cohaerens* in coloration; but they

also have the typical black antennae and legs, and the terminalia of the ♀ are similar to those of the type.

DISTRIBUTION (fig. 23). **NEW BRITAIN**: Umboi I., 300 m, in Malaise trap, II, Samuelson (♀♀); Mt Sinewit, 900 m, XI, Sedlacek (♀), 1,100 m, VI-IX, Brandt (♂♂); Yalom, 1,000 m, V, Noona Dan Expedition (♀). **NEW IRELAND** group: New Hanover, Banatam, III, Noona Dan Expedition (♀); Dyaul, III, Noona Dan Expedition (♂); New Ireland, Danu, IV, Noona Dan Expedition (♀).

Tabanus vanleeuweni Oldroyd, var. Fig. 8, 17.

A ♀ from New Hanover, Banatam, III, Noona Dan Expedition, and 2 ♂♂ from Umboi I., 300 m, II, Samuelson and Colman, all collected in Malaise trap, agree with this species very well in external characters, but the ♀ has wider, shallower gonapophyses and base of furca more concave than the only dissected Papuan ♀ now available. It is difficult to evaluate these differences, but they suggest that there may have been some segregation of populations.



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Fig. 23. Distribution of *T. inchoaerens* (triangles), *T. gressitti* (spots) and *T. leverii* (circles).

Tabanus gressitti Mackerras, new species Fig. 9, 18.

Holotype ♀ (BISHOP 9504), from Vella Lavella, Solomon Is., Ulo Crater, 10 m, in Malaise trap, 17.XII.1963, P. Shanahan.

MATERIAL EXAMINED: 64 ♀♀, 5 ♂♂.

♀. Apparently related to *leverii*, but larger (13-16 mm), darker, more grayish tomentose, and

further distinguished by having banded eyes, basal section of callus entirely black and somewhat bulbous, antennal plate strongly toothed, often a short appendix on vein R_4 , and minor differences in terminalia. *Head*: Eyes (relaxed) green with brown reflections above and below and a broad purple-brown band across middle. Frons almost parallel, index 5-5.5 light brown, darker adjacent to callus, with short dark brown hairs; callus swollen below and raised into a keel above, entirely shining black. Subcallus and upper parafacials bright brown, lower parafacials and face ashy white; hairs black on upper parafacials, white below and on face; beard white. Antennal scape and pedicel bright brown, with black hairs; flagellum reddish to orange-brown, darkening on style, basal plate variable in shape but with strongly developed tooth. Palpi light fawn-brown, with black hairs. *Thorax*: Scutum and scutellum olive-brown with some paler dusting at sides anteriorly and a trace in dorsocentral lines; hairs dark brown erect and inconspicuous dull yellowish cream appressed; marginal hairs mainly black on notopleural lobes, dull cream behind wing-root. Pleura pale gray, with white hairs except for some black ones on upper part of mesopleural convexity. *Legs*: Femora brown, hind pair gray-dusted, all with mixed black and creamy white hairs; tibiae brown, fore pair darkening distally, hairs black and cream; tarsi blackish brown, with black hairs. *Wings*: Lightly suffused with brown anteriorly, costal cell brown; stigma brown, inconspicuous, veins dark brown, R_4 with inconstant short appendix. *Abdomen*: Tergites black, 1-6 with brown apical margins; hairs on disc black mixed with scattered dull yellowish cream ones; apical fringes on tergites 1-5 yellowish cream, inconstantly on 6, 7 entirely dark-haired; lateral margins narrowly bright brown, with predominantly dull yellowish cream hairs. Venter gray, irregularly marked with brown on basal sternites, and with dull cream apical fringes on 2-6. Terminalia with cerci shorter and gonapophyses narrower than in *leverii*, base of furca more definitely concave, and spermathecal bulbs longer.

♂. Similar to ♀, but more brown in general coloration, especially on abdomen, and with lighter brown antennae and legs. Eyes moderately swollen, enlarged upper facets reddish brown, small lower ones greenish black; ocellar tubercle small. Frontal triangle brown; subcallus and upper parafacials more yellowish than in ♀, lower parafacials and face more grayish; palpi light brown, with dull cream and black hairs.

DISTRIBUTION (fig. 23). SOLOMON ISLANDS: Bougainville, Torpanos, 200 m, in Malaise trap, II, Straatman (♀); Choiseul, Kolombangara R., 80 m, in Malaise trap, III, Shanahan (♀); Vella Lavella, Ulo Crater (10 m), Kunderumbangara (80 m), Pusiama, in Malaise trap, XI, XII, Shanahan (♂ ♀); Gizo, 30 m, in M. V. light trap, VI, VII, J. & M. Sedlacek (♂ ♀); Kolombangara, Pepele, 30 m, II, Shanahan (♀); Rendova, VII, J.L. Gressitt (♂); Santa Ysabel, Tatamba, 0-50 m, in Malaise trap, IX, Straatman (♀); Florida, Nggela I., 200 m, X, Straatman (♀); Malaita, Tangtalau, 200 m, IX, Gressitt (♀); San Christobal, Kira-Kira, 0-50 m, in Malaise trap, XI, Straatman (♀).

***Tabanus leverii* Mackerras and Rageau** Fig. 10, 19.

A small, smooth-bodied, inornate, brown species, so far known only from Utupua and Vanikoro in the Santa Cruz Is. and Florida (Tulagi) in the Solomon Is. It thus seems to be almost allopatric with *gressitti* (fig. 23), and the two might be regarded as sister species that had been separated originally by the gap between the island groups. However, the resemblances between them are largely due to a lack of distinctive features in both, so the hypothesis must be treated with caution.

Tabanus lyneborghi Mackerras, new species Fig. 11, 20.

Holotype ♀ (ZMA), from Mussau, Schadel Bay, at mercury light, 14.II.1962, Noona Dan Expedition.

MATERIAL EXAMINED: 1 ♀.

♀. A small (12 mm), inornate species; superficially like *leverii*, but basal section of callus entirely black, wings not suffused with brown, abdomen more darkened in median zone, and terminalia characteristic of the *innotabilis* complex. *Head*: Eyes (relaxed) green, unbanded. Frons converging, index 6.1, fawn-brown, with short black hairs; basal section of callus blackish brown, extension black. Subcallus and top of parafacials fawn-brown, remainder of parafacials and face grayish white; hairs brown on upper parafacials, white elsewhere; beard white. Antennae short; scape and pedicel brown, with black hairs; plate of flagellum somewhat darker, but yellowish brown dorsally, style brownish black. Palpi fawn, with black hairs and a few white ones below. *Thorax*: Scutum and scutellum dark brown with an olive tint, gray-dusted anteriorly and on notopleural lobes; hairs on disc inconspicuous erect black and dull yellowish appressed, black and cream on notopleural lobes, cream above and behind wings. Pleura gray, with grayish white hairs and some brown ones on upper part of mesopleural convexity. *Legs*: Femora brown, gray-dusted, with predominantly grayish white hairs; tibiae yellowish brown, fore pair darkening distally, with yellowish hairs basally, black ones distally on fore tibiae, cream and black on mid and hind; tarsi dark to blackish brown with black hairs. *Wings*: Almost clear, cell R₁ not darkened; stigma light brown, veins darker brown, R₄ without appendix. *Abdomen*: Tergite 1 dark brown with apical bright brown band, 2 bright brown, darkened in median zone, and with yellowish brown apical band, 3-5 darker, more extensively darkened in median zone, with narrow yellowish brown apical bands which are slightly widened and paler in mid line, 6-7 entirely dark, almost blackish brown; hairs (rubbed) mostly black, but yellowish cream in an apical fringe on tergite 1 and on lateral margins of 2-5. Venter yellowish brown, darkening in median zone, and more extensively on distal sternites. Terminalia like those of *rubriventris*, but with somewhat shallower gonapophyses.

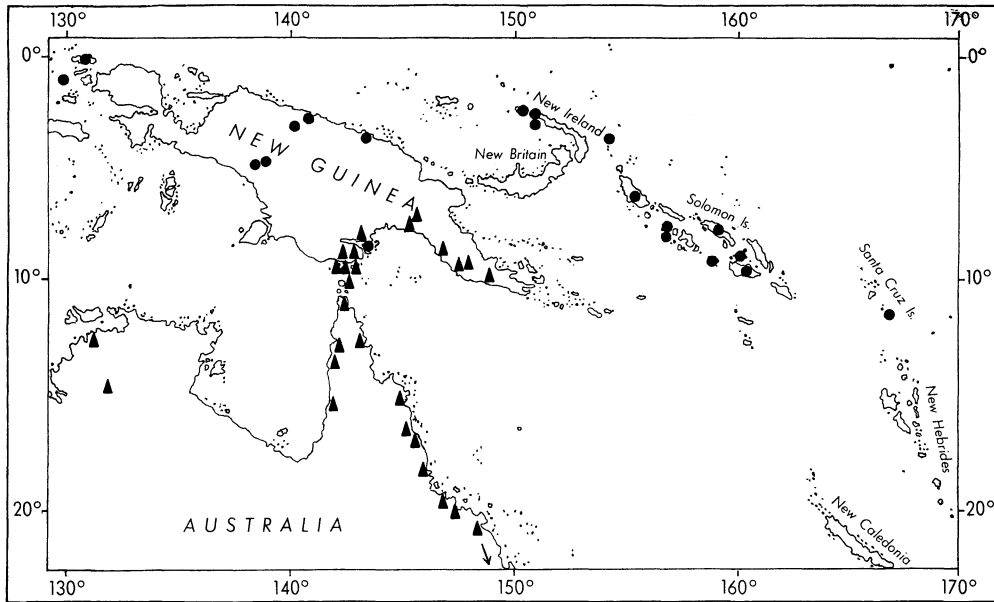
DISTRIBUTION. NEW IRELAND group: Mussau, II, Noona Dan Expedition.

Tabanus siassensis Mackerras

This species remains known only from the holotype (1964, p. 198) from the Siassi Is. which are close to Umboi I. Further study of the terminalia (fig. 21) has confirmed its close relationship to *rubriventris*, from which it can be distinguished by its paler general coloration and entirely black antennal plate.

Tabanus rubriventris Macquart Fig. 12, 22.

A review of all the material now available, including 18 additional ♀♀ from the Melanesian arc, has supported the view that *rubriventris* and *innotabilis* are distinct, closely related species with overlapping phenotypes, and has also led to transfer to *rubriventris* of the specimens from the Solomon and Santa Cruz Is. recorded as *innotabilis* by Mackerras & Rageau (1958, p. 684) and Mackerras (1964, p. 196). These conclusions are supported by dissections of 7 *rubriventris* and 8 *innotabilis* (4 from Australia, 4 from southern New Guinea), which have shown that the "minor" differences in terminalia illustrated in figs. 205 and 206 of the 1964 paper are more constant than I had expected them to be. Both are moderately large (mostly 16-18 mm), dark to grayish brown spe-



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Fig. 24. Distribution of *T. rubriventris* (spots) and *T. innotabilis* (triangles). The ♀ from the Fly R. delta indicated by a question mark has the attributes of *rubriventris*, but is in the midst of an *innotabilis* population.

cies, and they can generally be distinguished by using the following comparative statements. I have seen too few males to attempt to identify them other than by association with females.

innotabilis Walk.: Brighter in general coloration; with less converging frons (about 1.2 above to 1.0 below), basal part of callus pyriform and less raised, relatively long antennae (1964, fig. 197), slender palpi, and white beard (but occasionally with small patch of brown laterally). Fore femora bright brown, often gray-dusted, occasionally dark. Abdominal tergites generally with rather inconspicuous paler median triangles, apical fringes and sublateral patches, sometimes with median triangles and fringes only, rarely almost concolorous. Terminalia with sternite 8 narrower and gonapophyses deeper (except in ♀ from Fly R. delta), base of furca concave, spermathecal bulbs usually longer and more tapering.

rubriventris Macq.: Darker and duller in general coloration; with more converging frons (about 1.5 to 1.0), basal part of callus more oblong and bulging, shorter antennae (fig. 12), less slender palpi, and brown to yellowish beard (but often with more or less extensive admixture of white). Fore femora generally black, but varying to brown. Abdominal tergites darker, sometimes with indications of black median patches, and with at most incipient pale median triangles and apical fringes, but no sublateral pale patches. Terminalia with sternite 8 wider and gonapophyses shallower, base of furca not concave, and spermathecal bulbs (fig. 22) generally

shorter and less tapering.

The corrected distributions of the species are shown in fig. 24, the following being the present records of *rubriventris* in the Melanesian arc: New Hanover; Dyaul; New Ireland (Kavieng); Feni Is. (Anir); Solomon Is. (Bougainville, Vella Lavella, Gizo, Santa Ysabel, Russell, Florida, Guadalcanal); Santa Cruz Is. (Vanikoro); collected in all months except February, May and December. The specimens from the New Ireland group are more typical; those from the Solomon and Santa Cruz Is. vary towards *innotabilis* in external characters, but the terminalia remain typical.

Tabanus expulsus Walker Fig. 25.

An isolated species, the possible relationships of which have been discussed on an earlier page; still known only from the New Hebrides (Aneityum).

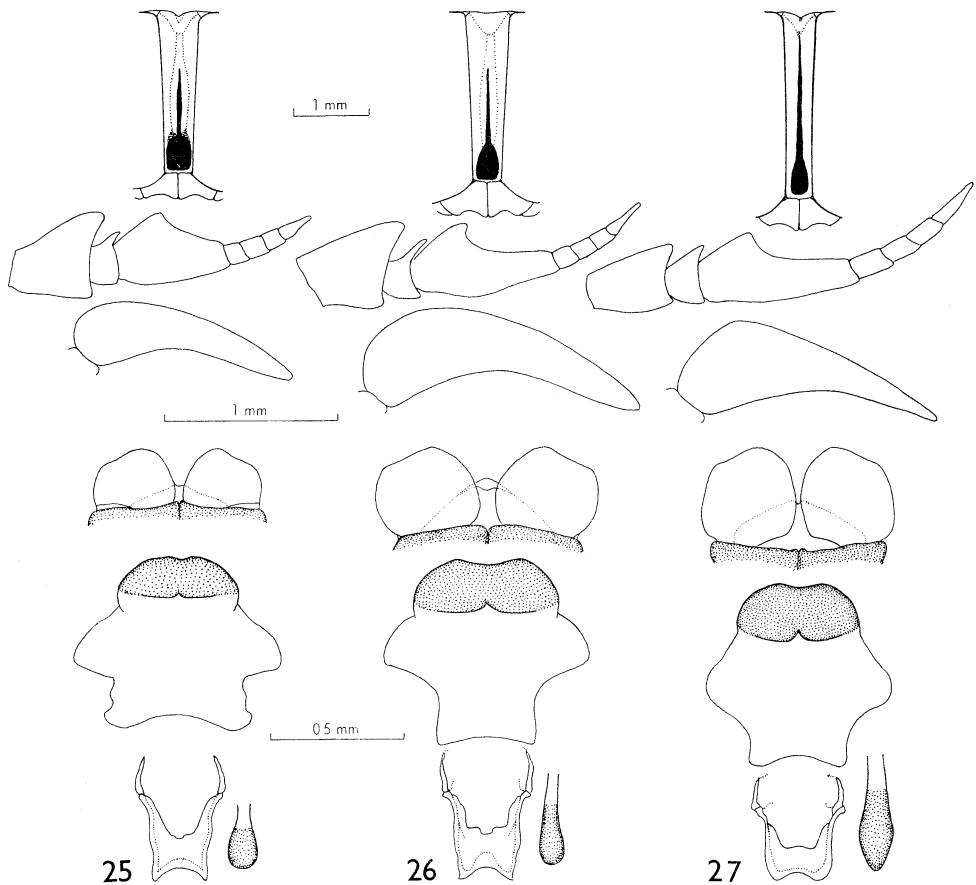


Fig. 25-27. New Hebridean-Pacific species, ♀♀: 25, *expulsus*; 26, *fijianus*; 27, *samoensis*. Top scale for frons, middle for antennae and palpi, bottom for terminalia.

Tabanus fijianus Ricardo Fig. 26.

Mackerras & Rageau (1958, pp. 687, 730) treated *fijianus* as a subspecies of *expulsus*, but re-examination of the differences between them against the wider background now available suggests that they would more properly be regarded as separate species, at least in the context of the present paper. This would imply that the ancestors of *fijianus* had colonized Fiji (i. e. became separated from ancestral *expulsus*) before, for example, the ancestors of *subcinnamoneus*, *lenticuloides*, or *incohaerens* had reached their respective territories, which seems a reasonable hypothesis on present morphological evidence.

Tabanus samoensis Ferguson Fig. 27.

A distinctive species, which was redescribed by Mackerras & Rageau (1958, p. 739). It is the only tabanid known from Samoa. In external characters it seems like a member of the *innotabilis* group, but its terminalia (not previously illustrated) would relate it rather to the *cohaerens* group.

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