

XXII.—*Notes on the Tabanidæ of the Australian Region.*

By GERTRUDE RICARDO.

[Continued from ser. 8, vol. xiv. p. 397.]

THE type of *Tabanus transversus*, Walker, described in the first part of this paper ('Annals,' ser. 8, vol. xiv. 1914, p. 390), came from Auckland, New Zealand.

The species of *Tabanus*, so far recorded from the Celebes, are the following :—

Group V.

Tabanus vanderwulpi, Osten Sacken.

Tabanus flexilis, Walker.

Group VI.

Tabanus speculum, Walker.

Group VII.

Tabanus reduces, Walker.

Group VIII.

Tabanus humillimus, Walker.

Tabanus factiosus, Walker.

Tabanus succurvus, Wlk.

Tabanus spoliatus, Walker.

Group IX.

Tabanus immixtus, Walker.

Of these, *T. vanderwulpi* and *T. factiosus* are also recorded from the Philippines, and *T. humillimus* is also found in Java.

Group VI.

Wings distinctly marked with brown or yellow colouring,
but not in the form of bands.

Tabanus speculum, Walker, Proc. Linn. Soc. v. p. 258 (1861) ;
Ricardo, Records Indian Museum, iv. p. 143 (1911) ;
id. Tyd. v. Entom. liv. p. 348 (1912).

Type (female) from Menado, Celebes, and another from Toli-Toli, N. Celebes.

Type (male) in German Entomological Museum, also from Celebes.

Two males and two females from Toli-Toli, N. Celebes, in Mr. Wainwright's Coll.

This species appears as yet only recorded from Celebes, and the male has not been previously recorded. A handsome fly with very dark brown wings, the discal cell clear. Abdomen black with grey spots. Scutellum grey.

Length, ♂ 21 mm., ♀ 22 mm.

Face covered with brown tomentum, but with a white triangular spot in the centre, with rather thick black pubescence. Beard black. *Palpi* large, ending in an obtuse point, dull reddish yellow with black hairs. *Antennæ* dull reddish yellow but paler, the first two joints with black hairs. *Forehead* very narrow, quite ten times as long as it is broad, and only half as broad anteriorly as it is at the vertex; frontal callus reddish brown, not reaching the eyes, narrow with a long lineal extension. *Thorax* black, with traces of grey tomentum anteriorly, and with black and dull reddish inconspicuous pubescence, and a tuft of white hairs above and below base of wings. *Scutellum* covered with ashy-grey tomentum and with white hairs. *Abdomen* black, the ashy-grey spots are situated on the second and third segments, and sometimes there is a trace of one on the fourth segment, almost semicircular in shape, with some white hairs, pubescence otherwise on dorsum black. *Legs* black, the pulvilli golden brown. *Wings* rich brown in colour with streaks of white in the centre of most of the cells, the discal cell almost entirely clear, and the base of the second submarginal cell pale, the apex on its posterior border quite clear, as far as the sessile ending of the first posterior cell.

Male is similar, the head large, the large facets of eyes occupying not quite two-thirds of the surface. *Palpi* reddish brown, with thick black pubescence.

Group VII.

Species with one or more stripes, usually continuous, on abdomen.

Tabanus concolor, Walker, List Dipt. i. p. 179 (1848).

Type (female) from New Holland (*Hunter*).

A dull-coloured species, not in very good preservation. *Antennæ* blackish. Abdomen hair-brown, with a faint grey tomentose median stripe. Legs brownish, the tibiæ reddish.

Length 12 mm.

Face yellowish white with white hairs. Beard white.

Palpi pale yellow, stout on basal half, the apical half ending in a fine point, with yellow and black hairs. *Antennæ* blackish. *Forehead* about a third narrower anteriorly than at vertex and about six times as long as it is broad anteriorly; frontal callus long and narrow, not reaching the eyes. *Thorax*, *scutellum*, and *abdomen* very much the same colour, all denuded. *Abdomen* narrow, median stripe with traces of white hairs, which are also present at the sides. *Wings* clear, shaded pale brown along the longitudinal veins, stigma and veins yellowish.

Tabanus pseudoardens, Taylor, Austr. Inst. Trop. Med. 1911, p. 66, pl. xiv. fig. 18 (1913); Austen, Ann. & Mag. Nat. Hist. (8) xiii. p. 265 (1914).

This narrow-bodied mummy-brown species, measuring 12–13 mm., comes from Queensland. *Palpi* long and slender. *Forehead* narrow, parallel, frontal callus oblong, raised, with a lineal extension. *Abdomen* with a yellow-haired indistinct median stripe. *Legs* reddish brown.

Group VIII.

Species with median or lateral spots, or both, on abdomen, not usually forming a continuous type.

Tabanus propinquus, Macquart, Dipt. exot. Suppl. v. p. 47 (1854), described as in Mr. Bigot's Coll. from Sydney, is probably lost, as it is not among the types sent me by Mr. Collins from the late Mr. Verrall's Coll. It is described as black with three series of white spots on the abdomen. Legs black, tibiæ testaceous.

Length 18 mm.

Part of the abdomen was wanting when described.

Tabanus leucophilus, Walker, List Dipt. i. p. 154 (1848).

Type (female) from New Holland.

A stout species with pale whitish wings, abdomen blackish with three rows of white spots. *Antennæ* reddish.

Length 19 mm.

A species very easily recognized. Is it possible that it does not belong to this region at all? I have seen nothing like it as yet in collections from Australasia.

Face covered with ashy-grey tomentum and with long pale yellow hairs. *Palpi* canary-coloured, stout, ending in a short point, pubescence apparently black. *Antennæ* broken off, described by Walker as ferruginous, the first two joints

have black hairs. *Forehead* parallel, about five times as long as it is wide anteriorly, same colour as face with whitish hairs; frontal callus reddish yellow, pear-shaped, not reaching eyes, with a short lineal extension. *Thorax* (denuded) reddish, with three narrow grey tomentose stripes. *Scutellum* identical. *Abdomen* broad, short, the spots are triangular, covered with whitish tomentum, commencing from the second segment; underside blackish with grey-haired segmentations. *Legs*: femora reddish brown; tibiæ pale whitish yellow; tarsi a little darker. *Wings* large, no appendix.

Tabanus præpositus, Walker, List Dipt. i. p. 158 (1848).

Type (female) and another female from Port Essington, and a female from locality not specified.

The varieties B. and Y. mentioned by Walker do not appear to be in the Brit. Mus. Coll.

A reddish-yellow species with indistinct black spots on the abdomen, palpi very pale, stout at base, ending in a long point. Antennæ and legs reddish yellow.

Length, type, 18 mm.

Face covered with pale greyish-yellow tomentum, hairs pale yellow. *Palpi* very stout on basal half, the apical part about the same in length as the basal part, pubescence consists of a few black hairs and some yellow ones at base. Beard yellowish. *Antennæ* reddish, the basal joints pale yellow with black pubescence. *Forehead* almost parallel, the same colour as face, about six times as long as it is wide anteriorly; frontal callus dark brown, oblong, not reaching the eyes, with a lineal extension. *Thorax* blackish, covered with grey tomentum, pubescence chiefly black, shoulders pale reddish. *Scutellum* identical. *Abdomen* tawny, a dull black median triangular spot on the second segment, in the two other females there is a similar one on the second segment, and another on the third segment in type and other females, the remaining segments with larger more band-like spots on the anterior borders, pubescence consists of short yellow and black hairs; underside pale reddish yellow with grey tomentum. *Legs* uniformly reddish yellow. *Wings* clear with reddish-yellow stigma and veins, no appendix present.

Tabanus innotabilis, Walker, List Dipt. i. p. 177 (1848).

Tabanus dorsobimaculatus, Macq. Dipt. Exot., Suppl. iv. p. 29 (1850).

Type (of *T. innotabilis*) and another female in Brit. Mus.

Coll., and two females in Mr. French's Coll., both from Endeavour River, Queensland. Walker's type was described from an unknown locality, the other female from New Holland. Both specimens from Endeavour River have been compared with the Macquart type in the Paris Museum by myself and Monsieur Surcouf. I consider them also identical with Walker's type.

A medium-sized brownish species with indistinct median grey spots on the abdomen. Forehead narrow, antennæ and legs reddish.

Length $12\frac{1}{2}$ –15 mm.

Face covered with greyish tomentum, and with some few pale hairs. Beard yellowish. *Palpi* yellow with black pubescence, stout, ending in a fairly fine point. *Antennæ* reddish yellow, dusky at apex, the first two joints with black hairs, the third rather broad at the base with a distinct angle. *Forehead* narrow, about eight times as long as it is broad anteriorly, a third narrower anteriorly than at vertex; the frontal callus chocolate-brown, oblong, taking up nearly the whole space between the eyes, with a narrow lineal extension. Eyes bare. *Thorax* blackish with grey tomentum. *Scutellum* appearing reddish, being denuded. *Abdomen* tawny, with grey tomentose median spots not forming a continuous stripe, on all the segments, commencing from the second one, on which the spot is largest, being triangular, pubescence on dorsum black; underside the same colour with pale segmentations. *Legs* with femora reddish, the tibiæ chamois-leather with black pubescence, tarsi blackish at apex. *Wings* clear, stigma and veins yellow, no appendix.

Walker's type is in poor condition, but appears to be identical with the specimens I compared with type in the Paris Museum.

Tabanus factiosus, Walker, Proc. Linn. Soc. London, iv. p. 102 (1859); Ricardo, Records Indian Museum, iv. no. vi. p. 179 (1911).

Tabanus fastiosus, Kertész, Cat. Tabanidarum, p. 49 (1900).

Tabanus succurvus, Walker, Proc. Linn. Soc. iv. p. 102 (1859).

The female type of *Tabanus succurvus*, Walker, from Macassar, Celebes, the same locality as that of *Tabanus factiosus*, appears to me identical with this latter species, though a dark-coloured specimen, the tibiæ being only dull reddish at base (not yellowish), and the spots on the abdomen not visible, probably owing to denudation; the beard

and hairs on face are brown, not white as in the type of *Tabanus factiosus*. The two males from the Philippines, which I placed under *T. factiosus*, also have the beards brown.

Tabanus spoliatus, ♂, Walker, Proc. Linn. Soc. London, iv. p. 103 (1860).

Type (male) from Macassar, Celebes, and another male from Celebes (Wallace Coll.).

These males are allied to *Tabanus rubicundus*, Macq., from India and Java.

A reddish-yellow species measuring 19–20 mm. *Eyes* with facets all equal. *Antennæ* reddish, the third joint dusky. *Abdomen* tawny, with traces of yellow or whitish-haired median spots, and yellowish hairs on segmentations, apex of abdomen blackish, a black spot on the second segment in the centre; the other male has traces of paler bands on the segmentations, pubescence on dorsum consists of numerous short black hairs. *Thorax* and *scutellum* blackish. *Legs* reddish yellow, the femora black, the tarsi dusky. *Wings* clear, stigma and veins reddish yellow, no appendix present.

Tabanus claripennis, Bigot, Mém. Soc. Zool. de France, v. p. 675 (1892) [*Atylotus*].

The type in fair preservation is a female from Australia.

A small narrow-bodied species with a dull yellow-coloured *abdomen* and traces of round grey spots on sides and of a blackish spot on second segment. It may be at once distinguished by the shining red-brown subcallus united to the same-coloured, nearly square, frontal callus. The *forehead* is brown, narrower anteriorly, barely four times as long as it is broad. *Palpi* pale yellow, short and stout with black and some white hairs. *Antennæ* were incomplete when described by Bigot. *Wings* clear, stigma yellow.

Length 12 mm.

Tabanus victoriensis, ♀, sp. n.

Type (female) and two other females, all from Dandenong Ranges, Victoria, in Mr. French's Coll. In Mr. Froggatt's Coll. one female from N. S. Wales. In German Ent. Museum two females from N. S. Wales. A stout black species with white-haired spots on the abdomen and veins of wings shaded with brown, the palpi pale yellow, very long and narrow. *Antennæ* and legs black, the tibiæ testaceous.

Length 19 mm.

Face black, covered with grey tomentum, which becomes yellower on the cheeks; two deep pits are present on face below the antennæ and one furrow on the lower part on each side; some black hairs below the antennæ, and on the cheeks some short yellowish hairs, which are longer and white below. *Palpi* yellow with black and some white pubescence, the second joint very long and narrow, almost the same width throughout, in one specimen they appear darker covered with grey tomentum. *Antennæ* large, black, the tooth rather prominent, the first two joints with grey tomentum and black pubescence. *Forehead* narrow, slightly wider anteriorly, black with grey tomentum; the frontal callus brown, shining, triangular, and continued as a fine line for a short distance only, not reaching the eyes, a short deep furrow is present in the centre of the callus; hind part of head with short black pubescence. *Thorax* blackish with shoulders and sides obscurely red, pubescence black with white intermixed on the dorsum, at the sides black anteriorly, white posteriorly; breast black with grey tomentum and white hairs. *Scutellum* black with grey tomentum and black pubescence. *Abdomen* black, sides of first two segments obscurely reddish, segmentations narrowly and faintly reddish, white-haired median spots on each segment small and ill-defined; pubescence of dorsum short, black, sides of segments with white hairs, the last three with black hairs; underside black with mouldy-grey tomentum, narrow pale segmentations, and black short pubescence. *Legs* brown, coxæ blackish with grey tomentum and white hairs; the femora with black pubescence above, white below; tibiæ reddish with black pubescence, tarsi with black pubescence. *Wings* hyaline, the veins broadly shaded with brown; veins brown, stigma dark brown. Halteres brown.

This species is not identical with *Tabanus limbatinevris*, Macq., Dipt. Exot. iv. p. 333, having been compared with the type; it may be at once distinguished by the smaller tooth of antennæ.

Group IX.

Species with paler bands, and sometimes spots on abdomen.

Tabanus limbatinevris, ♀, Macquart, Dipt. Exot., Suppl. ii. p. 33 (1846).

Type (female) in the late Mr. Verrall's Collection labelled "Van Diemen," and stated in the description as from Tasmania.

An easily recognized large reddish-brown species, the first posterior cell of wings closed, and all veins of wing shaded brown.

Length 20 mm.

Palpi yellow with black pubescence, fairly stout throughout their length, ending in an obtuse point. *Antennæ* reddish, black at apex, with a well-defined tooth. *Forehead* about eight times as long as it is broad, parallel; frontal callus oblong, chestnut-red, reaching eyes, with a long lineal extension. Eyes apparently bare. *Thorax* (denuded) reddish with darker stripes. *Abdomen* reddish brown, the dorsal white spots very indistinct owing to denudation. *Legs* described by Macquart as black; the tibiæ yellow, the anterior and posterior pairs black at apices.

Tabanus macquarti, Ricardo.

Tabanus limbatinevis, Macquart, Dipt. Exot., Suppl. iv. p. 333 (1852).

Macquart named two species *limbatinevis*, the one from Tasmania takes priority (1846).

Type (female) in the Paris Museum, from the east coast of New S. Wales, was examined by me in 1911, and a specimen from the Brit. Mus. Coll. compared with it, from Brisbane.

In Brit. Mus. Coll. are females from Moreton Bay, New S. Wales (Vigors's Coll.); from Brisbane (*H. Tryon*), Dec. 1903; from Burpengary and S. Queensland (*Dr. T. L. Bancroft*). In Mr. Froggatt's Coll., females from Queensland and Tweed River, New S. Wales. In Mr. Wainwright's Coll. a long series from Herberton, Kuranda, and Townsville, N. Queensland (*Dodd*), and females in the German Entomological Museum from the same localities and by the same collector.

An easily identified species, but somewhat variable in the colour of abdomen and in the length of the long tooth of third antennal joint. *Abdomen* black, often reddish at the sides, marked with white or yellowish-haired median spots on all segments except the last one, these extend as a very narrow, whitish-haired band to the sides where they expand somewhat; the underside with grey tomentose and white-haired bands. *Wings* clear, tinged brown, leaving the discal cell clear. *Forehead* almost parallel, about six times as long as it is wide; the frontal callus oblong with spindle-shaped extension, the forehead with greyish tomentum. *Palpi* long, fairly stout, ending in an obtuse point covered

with greyish tomentum and with white hairs on basal half. Beard white. *Antennæ* black, the first two joints with black hairs, the third joint with a distinct, very prominent tooth.

Length 15–18 mm.

Macquart's original description is as follows:—Black. Abdomen with segmentations and dorsal spots yellow tomentose, sides with testaceous spots. *Antennæ* and legs black. Wings with veins shaded brown. Length 7 lines (♀). Palpi almost as long as the proboscis, blackish with grey tomentum. Face and forehead pale grey; callus blackish, oblong, with a lineal extension. *Antennæ* with a fairly prominent tooth. Eyes naked. Thorax with some grey tomentum; a testaceous spot, blackish above the wings (?). Abdomen with the second segment obscurely testaceous at sides; underside with white segmentations, a little testaceous on the borders of the first three segments. Wings clear at base, from the apices of the basal cell all the veins are shaded with brown except at their apices, venation normal.

Most of the specimens from N. Queensland have the abdomen almost wholly black, not reddish at the sides of the first two segments, and the wings are somewhat darker on the fore border. The tooth of the third antennal joint is often as long as the first division of the joint, but all the specimens vary in the length of this tooth, which is always very conspicuous.

Tabanus sequens, Walker, List Dipt. i. p. 178 (1848).

Type (female) from Port Essington, N. Australia.

Var. B (female) from same locality, and females from S. Queensland (*Dr. T. L. Bancroft*), 1908; from Ching Do, N. Queensland, 26. 1. 1913 (*F. H. Taylor*), 1914.

A small tawny species; abdomen with a median stripe composed of pale-coloured hairs. *Antennæ* reddish yellow. Legs blackish, tibiae yellow.

Length 13 mm.

Face covered with grey tomentum and with white hairs on cheeks and lower part of face. Beard white. *Palpi* chamois-coloured, stout at base, ending in an obtuse point; pubescence black. *Antennæ* tawny, the first two joints pale yellowish, with thick black pubescence on their upper borders, apex of third joint dusky, tooth distinct. *Forehead* rather darker than face, with short black pubescence, parallel, about five times as long as it is wide anteriorly; frontal callus pear-shaped, with short lineal extension, not reaching eyes, reddish brown, shining. *Thorax* blackish brown, covered with some grey tomentum, leaving three indistinct

black stripes visible, also with some yellowish recumbent pubescence and longer black hairs, sides with long dark hairs, paler below base of wings. *Scutellum* identical, bordered with long yellowish hairs. *Abdomen* tawny, becoming darker at apex, the median spots, composed of short yellowish hairs, are short, triangular, forming a more or less continuous stripe from the second to the sixth segment; indistinct brownish marks are often present, even on the basal segments, becoming more distinct on apical segments; the pubescence on dorsum is rather thick, consisting of short black hairs and a few yellow ones intermixed on the second and third segments; hairs at sides are white, forming presumably the white stripes which Walker mentions; segmentations often grey tomentose; underside identical, with broader grey segmentations on the darker apical segments. *Legs* pale yellowish, the femora reddish brown, covered with white pubescence; apical joints of tarsi blackish, pubescence on tibiæ and tarsi black. *Wings* clear, veins brown, stigma yellowish brown; no appendix.

Var. B, described by Walker, has brown spots on the first and second segments.

Tabanus brevior, Walker, List Dipt. i. p. 188 (1848).

Tabanus anellosus, Summers, Ent. Notes London School Tropical Medicine, p. 226 (1912).

Type (female), in poor preservation, from Port Essington, N. Australia, and another female from same locality (*Gould*). This last was described by Walker as var. B of *Tabanus marginatus*, which is a *Silvius* species (see Ann. & Mag. Nat. Hist. (7) viii. p. 296, 1901); in general appearance it certainly bears a strong resemblance to *Sylvius marginatus*, but may be at once distinguished by the absence of ocelli.

A very small reddish-brown species. Palpi yellowish, the same width throughout. Wings slender. Antennæ reddish yellow, with black tips.

Length $8\frac{1}{2}$ mm.

Face covered with ashy-grey tomentum. Beard yellowish. *Antennæ* tawny, the apical joints black, the first two joints and the small tooth with black pubescence. *Palpi* yellowish, with rather thick black and white pubescence. *Forehead* about five times as long as it is broad anteriorly, parallel; frontal callus brown, pear-shaped, not quite reaching eyes, with a rather stout lineal extension. *Thorax* denuded, reddish brown, with grey tomentum. *Abdomen* short and rather broad, tawny-coloured, with darker brown markings,

and the posterior borders of segments grey tomentose, forming narrow bands; pubescence on dorsum blackish. *Legs* reddish yellow, femora and tarsus darker. *Wings* clear, veins and stigma yellow.

Tabanus immixtus, Walker, Proc. Linn. Soc. iv. p. 103 (1860).

Type (female) from Macassar, Celebes.

A species allied to *Tabanus dorsobimaculatus*, Macq., and *Tabanus sequens*, Wlk., but distinguished from both by the very narrow forehead. Reddish yellow, abdomen with well-marked median grey spots and bands. Legs blackish, fore tibiae pale yellow on basal half, other tibiae reddish yellow.

Length 14 mm.

Face covered with ashy-grey tomentum and with a few long white hairs. Beard white. *Palpi* chamois-coloured, with black pubescence, only slightly stouter at base, ending in an obtuse point. *Antennae* reddish brown, the first two joints reddish yellow with black hairs. *Forehead* covered with darker tomentum than the face, very narrow, anteriorly only half the width that it is at the vertex; the frontal callus chestnut-brown, oblong, very narrow, almost reaching the eyes, prolonged as a lineal extension more than half the length of forehead. *Thorax* and *scutellum* blackish, with some grey tomentum; pubescence appears to have been largely pale-coloured; shoulders reddish, with black hairs. *Abdomen* tawny, the last three segments blackish; the triangular median spots appear most distinct on the second to the fifth segments, not forming a continuous stripe; the grey tomentose bands on the segmentations appear on every segment except the first and last one, and are narrow, becoming broader at the sides; pubescence on dorsum black, with longer black hairs on the apical segments; underside tawny, with lighter bands, the last two segments blackish. *Legs*: femora blackish, with grey tomentum and long white hairs; the fore tibiae with the basal half whitish or pale yellow, black at apex, the other tibiae tawny, with black hairs; all the tarsi blackish. *Wings* clear, with yellowish-brown shading, most marked on the first, second, and third longitudinal veins; no appendix present; stigma and veins reddish yellow.

Tabanus parvus, Taylor, Australian Inst. Tropical Medicine Report for 1911, p. 19 (1913); Austen, Ann. & Mag. Nat. Hist. (8) xiii. p. 266 (1914).

This is a small species, 8–10 mm. long.

Forehead almost parallel and about five times as long as it is broad; frontal callus pear-shaped. *Palpi* long and slender, only slightly stouter at the base, yellowish. *Antennæ* reddish. *Abdomen* in the specimen in Brit. Mus. Coll. reddish brown with grey segmentations and median spots. *Wings* with a long appendix.

Type recorded from Darwin, Northern Territory, the same locality as that of *Tabanus anellosus*, Summers (now a synonym of *Tabanus brevior*, Wlk.), which, Mr. Austen remarks, it closely resembles.

Tabanus townsvilli, ♂ ♀, sp. n.

Type (female) and two other females from Townsville, N. Queensland (F. P. Dodd, per Janson).

Type (male) from same locality.

A dusky, reddish-brown, medium-sized species, with very small, white-haired, median spots on abdomen. *Forehead* almost parallel. *Antennæ* pale yellow at base, the third joint blackish. Legs reddish yellow and black.

Length, ♂ ♀, 15 mm.

♀. *Face* covered with pale ashy-coloured tomentum and with fairly long white hairs. Beard white. *Palpi* pale yellow, with some short black hairs, very stout at base, ending in a short obtuse point; some white hairs are visible on underside at base. *Antennæ* with the first two joints reddish yellow, the first one largely covered on its outer side with ashy-grey tomentum, and with a few black hairs on its upper border; the second is very small, the third almost wholly blackish, with a small angle as tooth. *Forehead* almost parallel, about six times as long as it is broad, much darker than the face, covered with tawny tomentum and with black hairs; a streak of white hairs is visible on each side; frontal callus chestnut-brown, oblong or pear-shaped, small, not reaching the eyes, with a lineal extension. *Thorax* blackish brown, with three fairly well-marked grey tomentose stripes; dorsum with some grey tomentum and with tawny and black pubescence; tufts of white hairs at base of wings. *Scutellum* same colour, with a few tawny hairs and with long black hairs. *Abdomen* ochraceous tawny, appearing darker by reason of the thick, short, black pubescence on the whole dorsum; the median spots are situated on second to the fifth segments, and consist of grey tomentum covered with a few pale yellow or white hairs; in two specimens the spots are very small, in the third larger and triangular; underside paler, with grey tomentum. *Legs* reddish

yellow, the femora blackish, with long white hairs and grey tomentum; the fore tibiae blackish on their basal halves, the tibiae dusky. *Wings* clear, stigma yellow, veins reddish yellow; no appendix present.

♀. Similar, the median spots of *abdomen* hardly visible. Eyes with the large facets occupying two-thirds of the surface, reaching beyond the apex of the frontal triangle. *Legs* are wanting.

Tabanus germanicus, ♀, sp. n.

Type (female) and a series of females from Cairns and Herberton, N. Queensland, in German Ent. Museum.

A small species, with slender pale yellow palpi, red antennae, and yellowish-brown legs. Forehead narrow. Abdomen reddish brown, with grey bands and spots.

Length 9 mm.

Face covered with greyish tomentum and with a few scattered white hairs. Beard white. *Palpi* pale yellow, slender, a little stouter at base, ending in a long fine point; pubescence white and yellow. *Antennae* bright reddish yellow, the first two joints pale yellow with black pubescence, the third with the basal joint large and broad, the tooth obtuse. Subcallus often partially denuded, when it appears shiny and testaceous in colour. *Forehead* parallel, nearly five times as long as it is broad, covered with yellowish tomentum and with some short black hairs; frontal callus shining reddish brown, pear-shaped, not reaching eyes, with a very short lineal extension. Eyes bare. *Thorax* blackish brown, but in well-preserved specimens appearing grey, being covered with grey tomentum, the pubescence consisting of appressed scattered yellow hairs, with a few longer black hairs; breast grey, with long white hairs. *Scutellum* same as thorax. *Abdomen* reddish brown (when denuded reddish and darker at apex), the grey bands on posterior borders of segments almost half as wide as the segment, narrower on the second one, and altogether absent on the first segment, composed of grey tomentum with yellowish pubescence; there are indications of grey median triangular spots of the same composition; underside reddish at base, darker at apex; pubescence of dorsum on the parts not occupied by the grey bands is black and rather dense, on underside white. *Legs* yellowish, the femora at base blackish, with grey tomentum and white hairs, often prolonged on the outer side; basal half of fore tibiae and apices of others blackish brown, all the tarsi dark; pubescence on tibiae black intermixed with

white hairs, on tarsi black. *Wings* clear, veins brown; a long appendix present.

Tabanus neogermanicus, sp. n.

Type (female) and a series from Palmerston, N. Australia, in German Ent. Museum.

A small species very similar to *Tabanus germanicus*, but apparently a distinct species, the third joint of antennæ with its first division being much narrower at base and the tooth more distinct; the joint rapidly becoming narrower beyond the tooth.

Forehead a little broader, about four times as long as it is broad, also parallel; frontal callus identical, rather narrower. *Thorax* and *scutellum* identical. *Abdomen* very similar, reddish brown, the grey bands not so marked and the white pubescence on them reduced to a few hairs on the segmentations, the black pubescence longer, especially at apex. *Legs* wholly reddish yellow, a little grey tomentum on the fore femora chiefly white, elsewhere black.

Length 9-14 mm.

Tabanus notatus, ♀, sp. n.

Type (female) from Ching Do, N. Queensland, 25.i. 1913 (F. H. Taylor), 1914, 281.

A well-marked black species, with large, triangular, grey median spots and bands on the abdomen. Antennæ black, palpi pale yellow. Legs black and yellow.

Length 14 mm.

Face covered with whitish tomentum and with long white hairs below antennæ and on the cheeks. Beard white. *Palpi* chamois-coloured, stout, ending in a point; pubescence black, with a few white hairs on the upper sides. *Antennæ* black, the third joint stout, with a very small tooth; the four last divisions about a third of the length of the basal first division. *Forehead* and subcallus covered with yellowish-brown tomentum, the forehead nearly a third narrower anteriorly, about seven times as long as it is broad anteriorly; frontal callus oblong, narrow, not reaching the eyes, with a lineal extension. *Thorax* blackish, with grey tomentum; pubescence black, with some white hairs on anterior border and at sides; five narrow blackish stripes discernible. *Scutellum* blackish, with grey tomentum and some tawny hairs on its outer border. *Abdomen* black, with well-marked, narrow, grey tomentose bands on each segment, and the median grey spots on every segment except

the last two; pubescence on the bands and spots white, elsewhere black; underside black, with fine white pubescence covering it. *Legs* black, the fore tibiae on their basal third, and the other tibiae wholly, pale reddish yellow, with white pubescence; femora with white hairs; pubescence elsewhere black. *Wings* clear, stigma reddish brown, veins brown; no appendix.

Tabanus cyaneus, Wied. Ausszweifl. Ins. i. p. 152 (1828).

Tabanus cyaneoviridis, Macquart, Dipt. Exot., Suppl. iv. p. 334 (1849).

Wiedemann described his type from a specimen caught in unknown locality with the antennae and legs wanting. Macquart's type is in the Paris Museum from Tasmania, and has been examined by me. Specimens are in the Brit. Mus. Coll. from Sydney, N. S. Wales ('Challenger' Expedition); from Brisbane, 1. iii. 1902 (*H. Tryon*), 1912; from South Queensland (*Dr. T. L. Bancroft*); from Stannary Hills, North Queensland, circa 3000 ft. (*Dr. T. L. Bancroft*); also from Burpengary, South Queensland, by the same collector; from Inkerman, near Townsville, N. Queensland (*W. Stalker*), 1908.

This well-known species is easily recognized, being a shining blue-black metallic colour. The *antennae* bright reddish yellow, the two basal joints black. *Palpi*, *face*, and *forehead* black, the latter parallel, narrow, with a pear-shaped shining black frontal callus; the lineal extension stout, reaching the vertex. *Legs* black. *Wings* clear, dark brown at the base; stigma yellow, veins brown.

Length from 13–14 mm.

Group X.

Species with the abdomen unicolorous or almost so, sometimes darker at apex.

Tabanus funebris, Macq. Dipt. Exot., Suppl. i. p. 161, pl. iii. fig. 12 (1845).

A species from New Holland, which I have not been able to identify, the type being apparently lost.

It is described as entirely black, the margins with the veins shaded brown, as shown in the figure.

Length 11 mm.

Tabanus nigrimanus, Walker, List Dipt. i. p. 183 (1848).

Tabanus badius, Summers, Ann. & Mag. Nat. Hist. (8) x. p. 225 (1912).

Type (female) from Port Essington, Northern Territories, S. Australia (*Macgillivray*). Presented by the Earl of Derby, 46. 73.

The specimen of *Tabanus badius* in the Brit. Mus. Coll. is from Port Darwin, Northern Territories (*Dr. C. F. Strangmann*). Presented by London School Tropical Medicine.

A small species with a tawny abdomen. *Palpi* stout at base, ending in a long fine point. *Antennæ* tawny. *Forehead* parallel, about six times as long as it is broad anteriorly; the frontal callus chestnut-brown, oblong, not reaching the eyes, with a lineal extension. *Legs* reddish yellow, tibiæ dusky.

Length 10 mm.

Tabanus diminutus, Walker, List Dipt. i. p. 183 (1848).

Type (female), in poor preservation, from Port Essington, N. Australia.

This type bears a very strong resemblance to *Tabanus avidus*, Bigot, from Australia and Sydney, but is apparently a distinct species, the *palpi* being stouter, the frontal callus a different shape, and the tooth of antennal third joint is smaller. The *palpi* are stout at base for quite half their length, ending in a fine sharp point, pale yellow in colour, with chiefly yellowish pubescence. The *antennæ* are tawny, a little dusky at tip; the tooth is little more than an angle, at the base of the third joint. *Forehead* slightly narrower anteriorly, about six times as long as it is broad anteriorly; frontal callus dark brown, oblong, not reaching eyes, with a lineal extension. *Abdomen* same colour as in *T. avidus*, with the trace of a darker spot on the second segment; apex somewhat darker in colour. *Legs* wholly yellowish; tarsi dusky at tips.

Length 13 mm.

The state of the type precludes a fuller description. It is distinguished from *Tabanus nigrimanus*, Wlk., by the yellow femora.

Tabanus constans, Walker, List Dipt. i. p. 186 (1848).

From N. and N.W. coast, Australia (*Presented by Mr. Bynce, Surgeon, R.N., Haslar Hospital*).

A very small species, in such poor preservation that it is difficult to describe it. *Palpi* appear reddish yellow, stout,

ending in a fine short point. *Antennæ* blackish. *Forehead* very protuberant, parallel, about three-and-a-half times as long as it is broad; the frontal callus chestnut-brown, rather heart-shaped, not reaching the eyes. *Thorax* and *scutellum* blackish, with remains of reddish-orange tomentum. *Abdomen* the same, with same-coloured pubescence. *Legs* reddish, dark at tips. *Wings* (only one is left) apparently brownish, but obscured by dirt.

Length 7 mm.

Tabanus avidus, Bigot, Mém. Soc. Zool. de France, v. p. 673 (1892) [*Atylotus*].

Tabanus fuscipes, Taylor, Report Australian Inst. Tropical Medicine, 1911, p. 14 (1913).

Tabanus taylori, Austen, Ann. & Mag. Nat. Hist. (8) xiii. p. 265 (1914).

Type (female) from Australia and another female from Sydney. The paratype of *Tabanus fuscipes*, given to the Brit. Mus. Coll. by the author, and renamed *Tabanus taylori* by Mr. Austen, the name *fuscipes* being preoccupied, on comparison with Bigot's type is identical, though it is described as from Queensland.

Tabanus posticus, Wied., Ausszweifel. Ins. i. p. 152 (1828), is possibly identical with this species, but it is impossible to speak with certainty without seeing Wiedemann's type.

Tabanus serus, Walker, Proc. Linn. Soc. vi. p. 20 (1862), from New Guinea, is nearly allied, but the forehead is narrower, the palpi stouter.

Forehead in Bigot's type is parallel, about six times as long as it is wide. A reddish-yellow species, the dorsum of thorax darker. *Legs* reddish yellow. *Wings* tinged brown.

Length 14 mm.

For detailed description see Mr. Taylor's account.

Tabanus hyperythreus, Bigot, Mém. Soc. Zool. de France, v. p. 674 (1892) [*Atylotus*].

Tabanus lorentzi, Ricardo, Résultats Expéd. Sci. Néerlandaise, Nouv. Guinée, ix. (3) p. 400 (1913).

Type (female), in fair preservation, from Australia, and a long series of females from Townsville and Kuranda, N.E. Queensland, in Mr. Wainwright's Coll.

Having examined Bigot's type, I find my species is identical, only differing in the colour of the legs, which is sometimes darker, the apical joints of tarsi often blackish, and the apex of antennæ is sometimes darker.

A medium-sized uniformly reddish-yellow species, with narrow hairy palpi, reddish legs, yellow antennæ, and clear wings.

Length 14 mm.

Tabanus sanguinarius, Bigot, Mém. Soc. Zool. de France, v. p. 675 (1892) [*Atylotus*].

In Brit. Mus. Coll. females from S. Queensland (*Dr. T. L. Bancroft*), 1908, and from Brisbane (*H. Tryon*), 1907.

In Mr. Wainwright's Coll. a female from S. Queensland. In Mr. Froggatt's Coll. three females from Richmond River, N. S. Wales, and from Tweed River.

In German Ent. Museum two females from New South Wales.

I have not seen the type, but the species is easily recognized by its large size and by its uniform reddish-brown abdomen. Legs red. Antennæ and palpi reddish yellow.

Length 18-19 mm.

Face covered with yellowish tomentum, and with some brown hairs in centre of face and on cheeks. Beard white. *Palpi* long, moderately stout, ending in an obtuse point, yellow, with black pubescence. *Antennæ* red, the first two joints with black hairs, the third slender, with a small but distinct tooth. *Subcallus* and *forehead* same colour as face, the latter almost parallel or slightly narrower at the vertex, about six times as long as it is broad; the frontal callus reddish brown, large, oblong, not reaching the eyes, with a stout lineal extension. *Thorax* reddish brown, when denuded four black stripes appear; some grey tomentum on dorsum, and the pubescence consists of scattered pale yellow recumbent hairs and some black hairs. *Scutellum* reddish brown, fringed with yellowish hairs. *Abdomen* reddish brown, slightly darker at the apex; pubescence on dorsum and at sides black; underside paler red, with grey tomentum and traces of yellow pubescence on the posterior borders of segments. *Legs* uniformly red, the apices of tarsi darker, the pubescence on coxæ white with grey tomentum, on femora yellow below, elsewhere black. *Wings* clouded more or less with brown, fore border and stigma yellow, veins yellowish.

This species must be very nearly allied to, if not identical with, *Tabanus nigropictus*, Macquart, the type of which was recorded from India; but as yet I have seen no specimens of it from the Oriental Region or elsewhere (see Ricardo, 'Records Indian Museum,' iv. no. vi. p. 210, 1911).

Mr. Froggatt records *Tabanus sanguinarius* under *T. nigropictus* in "March Flies" (Science Bull. New South Wales, No. 3, p. 8, 1911), as found near Richmond River, New South Wales.

Tabanus nigratarsis, Taylor, Report Austr. Inst. Tropical Medicine, 1911, p. 18 (1913).

This reddish-yellow species from Queensland, measuring 15–17 mm., may be distinguished from *Tabanus avidus*, Bigot [*Tabanus fuscipes*, Taylor, *Tabanus taylori*, Austen], by the *palpi*, which are swollen and stout at the base, ending in a rather long obtuse point; the frontal callus is narrower and the femora are blackish, not cinnamon-coloured.

Tabanus spatiosus, ♀, sp. n.

Type (female) and a long series from Stannary Hills, N. Queensland, circa 3000 ft. (Dr. T. L. Bancroft), 1901, in Brit. Mus. Coll.

A small yellowish-brown species, smaller than *Tabanus hyperythreus*, Bigot, from which it is distinguished by the wider forehead; this character also serves to distinguish it from *Tabanus nigrimanus*, Wlk. From *Tabanus nigratarsis*, Taylor, it may be distinguished by the colour of the legs.

Antennæ reddish yellow. *Palpi* pale yellow. *Legs* yellowish. *Wings* clear, with an appendix present.

Length $11\frac{1}{2}$ mm.

Face chamois-coloured, covered with grey tomentum on the cheeks; the sparse pubescence consists of short white or yellow hairs. Beard white. *Palpi* the same colour or a shade brighter, with short white and black hairs, slender, nearly the same width throughout, ending in a short point. *Antennæ* Mars-yellow, the first two joints paler, the third with its basal joint broad, and a small tooth. *Forehead* same colour as face, parallel, broad, about four times as long as it is broad anteriorly; the frontal callus dark brown, pear-shaped, not reaching the eyes, and with hardly any lineal extension. *Thorax* olive-coloured, with recumbent white pubescence and a few longer black hairs. *Scutellum* identical. *Abdomen* ochraceous tawny, the three last segments darker, with obscure brown markings, all segments covered with fairly numerous short whitish hairs, thickest on segmentations, and in the middle in the form of a faint stripe; underside identical. *Legs* ochraceous tawny, the femora sometimes with a dark streak; apical joints of tarsi

brownish; pubescence on femora white and on apical two-thirds of tibiæ, elsewhere black. *Wings* with yellowish stigma and veins.

Tabanus solomensis, ♂ ♀, sp. n.

Type (female) and type (male) from Solomon Islands, July–August, 1909 (*W. W. Froggatt*).

These specimens from Mr. Froggatt's Coll. are placed by him under *Tabanus ardens*, Wied., which was described from Java. He states this species is very common in the open forest-country of the Solomon Islands, and suggests it has a wide range over the Malay Archipelago (see "March Flies," by W. W. Froggatt, in *Science Bulletin*, No. 3, Sept. 1911, p. 6). Wiedemann's species is not known to me, but I do not think these are specimens of it, judging from Wiedemann's description (see translation of the original in 'Indian Records,' iv. no. vi. p. 224, 1911). The thorax in these is not mouldy grey, the palpi are not light brown, nor are the breast-sides mouldy grey. On the abdomen there is no trace of a golden-yellow spot, and it cannot be described as waxy yellow at sides; the golden-yellow pubescence on it is not mentioned by Wiedemann. Wings are not yellowish, but brownish. Halteres are black, not golden yellow.

No species of *Tabanus* has been described from these islands, and these specimens do not appear to be identical with any species hitherto described from New Guinea or adjacent islands—hence the decision to make it a new species.

A species to be recognized by the uniform ochraceous tawny colouring of thorax and abdomen, and the almost similar colouring of the antennæ, palpi, and legs. The extremely narrow forehead and frontal callus is characteristic, also the slender antennæ.

Length, ♀ 13 mm., ♂ 12 mm.

♀. *Face* and *forehead* ochraceous tawny. Beard scanty, reddish yellow. Palpi a shade lighter in colouring, almost the same width throughout, ending in a short point, with a few black hairs at tip, otherwise pubescence is yellow. *Antennæ* long and slender, the first two joints the same colour as palpi, the third dusky, the first division not very broad, with a very small tooth, the last four divisions together longer than the first one. *Forehead* parallel, very narrow, about ten times as long as it is broad; the frontal callus small and narrow, with a stout lineal extension, chestnut-brown in colour. *Thorax* has the ground-colour

obscured by brown indistinct stripes; dorsum shows little trace of any pubescence; sides with a few yellow hairs. *Scutellum* the same as thorax. *Abdomen* narrow, a little obscured by darker colouring, the last two segments brownish, golden-yellow short hairs appear on the segmentations, with the exception of the last two segments, where the pubescence is black; underside similar, with more golden-yellow hairs. *Legs* same colour as palpi or a shade darker and redder, rather shining; the tarsi dusky; pubescence on coxæ and femora yellow, elsewhere black. *Wings* dusky, on fore border and at base yellowish; stigma yellowish; veins reddish yellow; a small appendix present.

Male is similar. *Eyes* with the large facets reaching the apex of frontal triangle, but they are very little larger than the small facets below; the third joint of *antennæ* is only dusky on apical half. *Wings* are rather paler in colouring and the appendix is non-existent.

Tabanus aurihirtus, ♂ ♀, sp. n.

Type (female) and another from Townsville, Queensland (*F. P. Dodd*), 1904, 284.

Type (male) and another from same locality, 1902, 284, and 1903, 319, and another male from Kuranda, N. Queensland (*F. P. Dodd, per Janson*).

A medium-sized species with short golden-yellow pubescence on the thorax and on the abdomen, this latter with a reddish-yellow ground-colour. *Antennæ*, palpi, and legs reddish yellow. Frontal callus heart-shaped, reddish brown, very indistinct.

Length, female type 16 mm., the other female 14 mm.; male type 14 mm., others 14–15 mm.

Face reddish brown, but covered with ashy-grey tomentum and with pale yellow short hairs. Beard pale yellow. *Palpi* yellow, only slightly stout at base, ending in a long slender point; pubescence pale yellow or white, consisting of fairly long hairs on the basal part. *Antennæ* Mars-yellow, the first two joints paler, with a few black hairs, the third broad at its base; the tooth represented by an obtuse angle. *Forehead* narrow, parallel, about six times as long as it is broad, covered with much the same coloured tomentum as the face, but the pubescence is brighter-coloured, more orange-yellow, with some black hairs intermixed; the frontal callus is only indicated by a heart-shaped reddish-brown spot, reaching the eyes, but with no lineal extension, it is partially obscured by the pubescence which overlaps it, and

may possibly cover it in very fresh specimens. *Thorax* and *scutellum* blackish, covered with superincumbent golden-yellow pubescence, and longer hairs of the same colour at the sides, on the posterior border of thorax, and on the scutellum; breast covered with tawny tomentum and with some long white hairs. *Abdomen* reddish yellow, with some tawny tomentum and covered with appressed golden-yellow pubescence, with which is intermixed black pubescence of the same nature, apex of abdomen becomes somewhat darker; underside paler-coloured with white pubescence. *Legs* reddish yellow; the tibiæ paler yellow; the tarsi dusky; pubescence chiefly black with some white hairs on coxæ and on the femora. *Wings* clear; stigma yellowish; veins reddish yellow; appendix very long and curved in the type, but not so long in the other female.

Male is altogether paler in appearance. *Eyes* with the large facets taking up two-thirds of the surface, reaching beyond the apex of the frontal triangle, but not quite reaching the vertex, so that a narrow border of the small facets extends to the vertex. *Thorax* with the pubescence a dirty white colour and much longer; this applies also to the scutellum. *Abdomen* with the same-coloured pubescence on a paler ground-colour. *Legs* rather paler in colour.

A female from S. Queensland (*Dr. T. L. Bancroft*), 1908, 72, has the legs wholly reddish yellow, and the pubescence on thorax and abdomen paler in colour.

XXIII.—*Notes on Degeneration in the Teeth of Oxen and Sheep.* By J. WILFRID JACKSON, F.G.S. (Assistant-Keeper, Manchester Museum).

IN a Report on the Animal Remains discovered at Corstopitum (Corbridge-on-Tyne) * Messrs. A. Meek and R. A. H. Gray call attention to the absence of the first lower premolar tooth in several jaws of oxen found on the site. This form they considered distinct from the domesticated cattle (*Bos taurus*, var. *longifrons*) of Roman and earlier times, and it was accordingly described by them as a new wild species, viz. *Bos sylvestris*. They further state that this species is represented to-day by the Chillingham herd, in which there is apparently a similar absence of the first lower premolar.

* 'Archæol. Æliana,' 3 ser. vii. 1911, pp. 99 *et seq.*



Ricardo, Gertrude. 1915. "Notes on the Tabanidae of the Australian Region [part]." *The Annals and magazine of natural history; zoology, botany, and geology* 15, 270–291.

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