

VI. A REVISION OF THE SPECIES OF
TABANUS FROM THE ORIENTAL RE-
GION, INCLUDING NOTES ON SPECIES
FROM SURROUNDING COUNTRIES

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The Oriental Region in this paper includes India, Burma, Federated Malay States, Siam, Annam, Sumatra, Borneo, Java, and other islands, the Philippines, Formosa, and the southern part of China, as defined by Wallace and others, but Celebes is not included, following the eastern dividing line adopted by Sclater, so that, as a rule, the species from Celebes are not included here, but relegated to the Austro-Malay Region; judging from the Bigot and Walker types I have seen from Celebes, they certainly (with one or two exceptions included here) appear to have little affinity to the Indo-Malay, Borneo and Java species.

The material on the examination of which this paper is based, includes the British Museum collection, a collection sent me by Dr. Annandale from the Indian Museum for identification, a smaller collection from Mr. F. M. Howlett, from the Pusa Agricultural Research Institute, Bengal; besides species sent by Dr. Kertész from the Budapest Museum. To Dr. A. T. Stanton I am indebted for an interesting series of species collected in the Federated Malay States. From Col. Alcock I have had a small collection to identify belonging to the London School of Tropical Medicine. Through the courtesy of the Director and of M. Jacques Surcouf of the Paris Museum, I have been able to examine most of the Macquart and Bigot types in their possession. Through the courtesy of the authorities of the Natural History Museum at Genoa, I was able to examine Rondani's types in their collection. I am indebted to Mr. G. H. Verrall for his loan of the majority of the Bigot types, which, as a rule, would be very difficult to recognize from the descriptions, based in many cases on single specimens, and now at any rate in a very denuded condition. Bigot labelled many of the specimens in the Indian Museum collections, but most of them are merely MS. names, where he made a new species and published the description, he evidently interchanged the specimens with the Museum and his own collection, so that some of Mr. Verrall's Bigot types have co-types from the same series of specimens in the Indian Museum collection. His specification of localities is very vague,

“India” alone frequently being given for Assam; Dr. Annandale informs me in a letter that M. Bigot destroyed most of the original labels and substituted others in which only “Inde” was written. Owing to denudation it is frequently difficult to identify species of *Tabanus*, and probably with the advent of fresh material much rectification may be necessary, especially as regards the identification of the older species. The synonyms given here are very numerous, but have been chiefly determined from the more important plastic characters, such as breadth of forehead, its greater or less narrowness anteriorly above the eyes, and the shape of the frontal callus; both these characters vary, but to a small extent only; the shape of the palpi is also a valuable character if not relied upon too minutely; the absence or presence of an appendix on the wing is a very variable, uncertain, character; the closed or extremely narrow first posterior cell at border of wing appears fairly reliable, but males and females probably vary in this character. Rondani formed the genus *Bellardia* for species possessing this character (Archiv. Canestr., iii, p. 81, 1863), but it does not appear a good generic character and has not been adopted by other authors. The design and colouring of the abdomen must naturally be largely made use of, though owing to the easy denudation of the tomentose dust which usually forms the spots and stripes, it is often difficult to identify species; the colouring of the hairs on body and legs is useful, but it appears to vary in specimens of the same species to some extent, especially as regards the legs; the shining polished subcallus in some species appears a reliable distinct character, though here again denudation must be borne in mind. The subgenus *Theriopectes*, Zeller, formed for species with pubescent eyes and with an ocelligerous tubercle on vertex of forehead, appears applicable to the species of the Oriental Region, though their number is very small; but it is otherwise with the subgenus *Atylotus*, Osten Sacken, formed for species with pubescent eyes but no ocelligerous tubercle, some species such as the widely distributed *Tabanus taeniatus*, Macq., and other species from this Region have an *Atylotus*-like appearance, that is to say, they resemble the group containing *fulvus*, *rusticus*, and others, of a mealy coloured appearance, Brauer placed black and other species in this group, in his work on European Tabanidae; but the eyes are practically bare in both sexes, so that this subgenus as in the South African fauna is not here applicable. The grouping of the species has been again attempted as in those of the South African Region, but where it is based upon the presence or absence of spots on the abdomen it will probably need correction in the future, the group represented by *Tabanus fumifer*, Walker, being one of the most difficult in this fauna. The table of species has been drawn up for the females, only males are included in a few instances where specified; as is always the case, the males in the collections are very few in number. The measurement of the length of the forehead is based on the width anteriorly above the eyes. In the references

here to Macquart's Dipt. Exot. volumes the original pagination is used, unfortunately in some of the reprints of the work from Mem. Sci. Agri. et Arts de Lille, 1838—1854, in which publication the work first appeared, the original pagination has not been adhered to, and in this incorrect form has been in general use. As the descriptions by Walker and Bigot are, as a rule, too poor for identification of the species, it appears justifiable to delete from the list of species of *Tabanus* any types of either of these authors which are now lost or destroyed. All types, except those of Bigot and Macquart which are either in Mr. Verrall's possession, or in the Paris Museum, or as in the case of Macquart in the Lille Museum, are in the British Museum collection unless otherwise specified.

There were about 119 described species of *Tabanus* from the Oriental Region, now reduced by synonyms, deletion from list or not belonging to the Oriental Region to about 73 species, which with the addition of 40 new species described here (4 were published first in the Annals) brings the total to 117 species, including one species from Celebes, and 3 species from other Regions occurring here. The table for species does not include those species of which I have no knowledge, except in a few instances where the descriptions allow of their being included with some certainty.

The drawings in the two plates have been executed by Miss Grace Edwards.

TABLE FOR GROUPS.

I. Eyes bare	II.
Eyes hairy (<i>Theriopectes</i>)	GROUP XI. 91.
II. Forehead with two separate calli, the first one usually transverse, the second irregular in shape, smaller. Forehead four to six times as long as it is broad. Small species 9—14 mm. in length	III.
III. Thorax and scutellum same colour. Abdomen with no bands	GROUP I. 1.
Scutellum white or yellow-haired. Abdomen with white or yellow-haired bands	GROUP II. 4.
IV. Forehead with two small round spot-like calli, one above the other, never united	GROUP III. 7.
V. Forehead with no callus	GROUP IV. 9.
VI. Forehead with one square, narrow, or oblong callus, which is always prolonged towards the vertex by a more or less narrow line.	VII.
VII. Wings with spots or bands	GROUP V. 10.
Wings distinctly marked with brown or yellow colouring, but not in the form of bands. Large species 18—23 mm. in length	GROUP VI. 13.

Species with one or more stripes usually continuous on abdomen. Forehead five to nine times as long as it is broad	..	GROUP VII.	17.
Species with median or lateral spots or both on abdomen, not usually forming a continuous stripe. Forehead four to ten times as long as it is broad		GROUP VIII.	39.
Species with paler bands and sometimes spots on abdomen. Forehead four to ten times as long as it is broad		GROUP IX.	53.
Species with the abdomen unicolorous or almost so, sometimes darker at apex. Forehead five to ten times as long as it is broad		GROUP X.	65.
VIII. Species with eyes pubescent and an ocelligerous tubercle on forehead at vertex		GROUP XI.	

TABLE FOR SPECIES.

GROUP I.

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|--|------------------------------|----|
| 1. Subcallus shining. Eyes with no cross-bands | | 2. |
| Subcallus not shining. Eyes with cross-bands | | 3. |
| 2. Frontal callus reaching eyes. Abdomen grey, covered with long white pubescence. Tibiae whitish with long fringes of white hairs | <i>rarus</i> , n. sp. | |
| Frontal callus not reaching eyes. Abdomen black, shining. Tibiae whitish, but with no long fringes of white hairs | <i>hirtipalpis</i> , n. sp. | |
| 3. Frontal callus reaching eyes. Black species with three grey stripes on abdomen | <i>bicallosus</i> , Ricardo. | |

GROUP II.

- | | | |
|--|--|----|
| 4. Dark brown or yellowish brown species with yellow-haired scutellum and yellow-haired bands on abdomen | | 5. |
| Black species with white-haired scutellum and white-haired bands on abdomen | | 6. |
| 5. Abdomen reddish brown or yellow with six narrow yellow bands. | | |

- Palpi pale yellow with black and yellow pubescence. Fore tibiae pale on basal two-thirds only *flavicinctus*, n. sp.
- Abdomen dark reddish brown or blackish with two broad yellow bands. Palpi black with grey tomentum and white and black hairs. Fore tibiae pale to apices. *leucocnematus*, Bigot.
6. Abdomen black with two white bands. Frontal callus almost reaching eyes. Fore tibiae pale on basal two-thirds only. Wings tinged brown on fore border *bicinctus*, n. sp.
- Abdomen with six white bands. Frontal callus not reaching eyes. Fore tibiae pale to apices. Wings clear *sexcinctus*, n. sp.

GROUP III.

7. Forehead slightly narrower anteriorly, three and a half to four times as long as it is broad 8.
8. Abdomen blackish covered with golden yellow tomentum and appressed yellow pubescence *fulvus*, Meig.
- Abdomen yellowish with median and lateral blackish or brownish stripes *ditaeniatus*, Macq.

GROUP IV.

9. Abdomen brown, reddish at base, covered with grey tomentum and with two small round greyish spots on the segments. Wings with no appendix. Length $7\frac{1}{2}$ to 11 mm. *virgo*, Wied.
- Abdomen blackish brown with median and lateral greyish tomentose spots. Wings with an appendix. Length 13 mm. *nemocallosus*, Ricardo.
- Abdomen covered with greyish yellow tomentum and with thick short yellow pubescence, ♀: abdomen the same but a black median stripe often appears, ♂ Wings with no appendix. Length $11\frac{1}{2}$ - $12\frac{1}{2}$ mm. *negativus*, n. sp.

GROUP V.

10. Wings with four dark spots. Abdomen reddish brown, with white spots *javanus*, Fabr.

- Wings with one cross-band, the first posterior cell open 11.
- Wings with two cross-bands, the first posterior cell closed or very narrow 12.
11. Forehead narrowest at vertex. Abdomen reddish, darker at apex, with small white median spots . *optatus*, Wlk.
Forehead narrowest anteriorly. Abdomen yellowish, darker at apex, with larger white spots *non-optatus*, n. sp.
12. Abdomen brownish yellow, with broad yellow posterior bands on each segment, under side yellowish. Antennae reddish yellow. ♂ with equal facets to eyes *flexilis*, Wlk.
Abdomen brownish red with narrower yellow bands, under side darker. Antennae reddish yellow, black at apex. ♂ with unequal facets to eyes *vanderwulpi*, O. S.

GROUP VI.

13. Wings dark rich brown, the discal cell clear. Large black species with orange-red pubescence on face and breast. Antennae red *pratti*, n. sp.
Smaller species similar in colouring. Antennae black *fuscicornis*, n. sp.
Wings yellowish or brownish, very distinctly tinged with brown at apex and on posterior border. Scutellum yellow or greyish 14.
14. First posterior cell of wings closed or very narrow 15.
First posterior cell open, not very narrow 16.
15. Abdomen reddish brown, narrow, with grey tomentose bands and median spots. Palpi slender. First posterior cell closed *nephodes*, Bigot.
Abdomen brown with narrow grey tomentose bands but no median spots. Palpi large, broad. The first posterior cell very narrow at border *albofasciatus*, n. sp.
Abdomen black, livid at base. Smaller species. First posterior cell closed *basalis*, Macq.

16. Large yellowish species with blackish bands on the abdomen *auriflamma*, Wlk.

GROUP VII.

17. First posterior cell closed. Yellowish species with indistinct median black stripe on abdomen *annamitus*, ♂, Bigot.
 First posterior cell open 18.
18. Frontal callus oblong or narrow with lineal extension. Forehead at least five times as long as it is broad 19.
 Frontal callus large, somewhat protuberant, almost square, with short lineal extension. Forehead three or four times as long as it is broad 36.
19. Abdomen with a median stripe and lateral stripes or spots 20.
 Abdomen with one median continuous stripe only, no lateral spots, or only isolated ones on the second segment 27.
 Abdomen with lateral stripes only 35.
20. Frontal callus with a spindle-shaped lineal extension 21.
 Frontal callus with the lineal extension not spindle-shaped 22.
21. Abdomen blackish or reddish brown with grey median and lateral stripes, almost all the same length *striatus*, Fabr.
 Abdomen with the grey median stripe beginning only on the third segment, and with lateral stripes ending on the third or fourth segment *hilaris*, Wlk.
22. Abdomen with a median stripe, the side spots small and indistinct 23.
 Abdomen with a median stripe, the side spots large and distinct 24.
23. Smaller species. Abdomen reddish yellow, darker at apex. Thorax blackish. Forehead eight times as long as it is broad *abbreviatus*, Bigot.
24. The median abdominal stripe composed of almost equal sized spots, not very large 25.

- The median abdominal stripe composed of spots of unequal size, those on the third and fourth segments very large and conspicuous 26.
25. Abdomen and thorax lilac or blackish brown, femora blackish. Forehead about five times as long as it is broad *rubidus*, Wied.
- Abdomen and thorax obscurely reddish brown, femora reddish brown. Forehead five to six times as long as it is broad *albimediis*, Wlk.
26. Abdomen and thorax reddish brown, femora blackish. Forehead about seven times as long as it is broad *speciosus*, n. sp.
27. Median stripe of abdomen grey tomentose or white or yellow haired 28.
Median stripe of abdomen black 31.
Median stripe of abdomen golden haired 32.
28. Forehead barely half as wide anteriorly as it is at vertex 29.
Forehead parallel or nearly so 30.
29. Small brown species. Femora brownish. Wings clear, brown on fore border *hirtistriatus*, n. sp.
30. Large black or reddish brown species, medium abdominal stripe narrow. Femora black. Wings tinged brown *monotaeniatus*, Bigot.
Brown species, the median abdominal stripe broad, and two round spots on second segment. Femora reddish. Wings brown on fore border *brunnipennis*, n. sp.
31. Abdomen reddish, black at apex, a narrow grey stripe often apparent on the median black stripe *abscondens*, Wlk.
32. Forehead parallel 33.
Forehead narrower anteriorly 34.
33. Abdomen yellowish brown, darker at apex, the median stripe dull golden haired indistinct *auristriatus*, n. sp.
34. Abdomen yellowish brown or dark brown, the median stripe broad. Fore femora yellowish. Wings brown, especially on fore border *hybridus*, Wied.

- Abdomen covered with yellowish tomentum, median stripe very broad. Fore femora black. Wings clear *aurotestaceus*, Wlk.
35. Black species. Abdomen with ferruginous lateral stripes on the first four segments. Legs blackish brown *tristis*, v. d. Wulp.
36. Forehead narrowest anteriorly 37.
Forehead narrowest at vertex 38.
37. Small black species. Abdomen with a median grey stripe beginning on the third segment only, the lateral stripes terminate on the second segment *jucundus*, Wlk.
38. Small brown species. Abdomen with a median grey stripe *puteus*, n. sp.

GROUP VIII.

39. Wings with first posterior cell closed or at least very much narrower at border. Forehead six to seven times as long as it is broad 40.
Wings with first posterior cell open, never very narrow at border 41.
40. Abdomen with three series grey spots on abdomen, reddish brown in male, blackish in female *amaenus*, Wlk.
Abdomen with three grey spots on the first two or three segments only, a larger, broader bodied, blackish species *mandarinus*, Schiner.
41. Forehead narrow, six to ten times as long as it is wide anteriorly, with a long narrow frontal callus 42.
Forehead broader, four to five times as long as it is wide anteriorly, with a larger nearly square, or pear-shaped frontal callus 52.
42. Brown, reddish brown, or reddish yellow, medium sized or large species, the triangular greyish or yellowish spots not usually forming a continuous stripe 43.
Large unicolorous reddish species with small median indistinct white spots 49.
Reddish brown or brown species with large prominent median whitish

- spots on the third and fourth segments only .. 50.
 Reddish species with black spots .. 51.
 Small species with a narrow yellow abdomen irregularly marked with black and with three series irregular shaped grey median and lateral spots . *varicolor*, Ricardo.
43. Medium sized species, 17-18 mm. in length. Abdomen reddish yellow with small median white spots. Forehead almost parallel or barely a third narrower anteriorly, six times as long as it is broad. Frontal callus oblong not reaching the eyes. Wings clear, faintly tinged yellowish brown *rubicundus*, Macq.
- Large brown or reddish brown species usually 18-25 mm. in length, with abdominal median spots. Forehead from one-third to half narrower anteriorly, frontal callus long and narrow 44.
44. Forehead eight to nine times as long as it is broad, about one-third narrower anteriorly 45.
 Forehead very narrow, eight to ten times as long as it is broad, only half as wide anteriorly as at vertex .. 46.
45. Abdomen reddish, or reddish yellow, large, broad, with median short triangular yellow spots often indistinct. Fore tibiae reddish yellow on basal half, with black pubescence. Wings large, tinged yellowish brown or almost clear. Forehead almost parallel *stantoni*, n. sp.
- Abdomen reddish brown, long, narrow, with median long triangular, distinct whitish spots, usually joining each other. Fore tibiae white on basal half with white pubescence. Wings long, faintly tinged yellowish brown. Forehead about a third narrower anteriorly *indianus*, n. sp.
- Abdomen blackish brown with almost hemispherical white median

- spots. Fore tibiae blackish. Legs and palpi blackish. Wings clear, tinged brown. Forehead about a third narrower anteriorly *brunneus*, Macq.
46. Forehead eight times longer than it is broad, the frontal callus not reaching eyes 47.
Forehead ten times as long as it is broad, the frontal callus reaching eyes 48.
47. Abdomen dark reddish brown or reddish yellow, with indistinct small greyish or yellow-haired median spots, often absent. Thorax blackish with some yellowish grey tomentum. Fore tibiae pale on basal half. Wings slightly tinged with brown. Male with unequal facets on eyes *fumifer*, Wlk.
- Smaller species. Abdomen reddish brown with distinct bright yellow-haired median spots and similar lateral spots on the 2-5th segments. Thorax blackish with greyish yellow tomentum *malayensis*, n. sp.
- Larger species. Abdomen broad, reddish brown with indistinct median spots and some lighter segmentations. Thorax reddish with some grey tomentum. Wings nearly clear. Fore tibiae pale on basal two-thirds. Male with equal facets to eyes *factiosus*, Wlk.
48. Abdomen reddish brown, median spots indistinct, small, whitish. Thorax reddish, thickly covered with ashy grey tomentum. Wings clear *dissimilis*, n. sp.
49. Abdomen and thorax reddish, shining, nearly devoid of pubescence. Wings clear. Palpi ending in an acute point *ignobilis*, Rondani.
- Abdomen and thorax reddish. Wings tinged yellowish brown. Palpi ending in an obtuse point *nexus*, Wlk.
50. Red-brown species with the large median white spots on third and fourth segments of abdomen, and white spots on the lateral borders

- of the first four segments. Tibiae reddish *signifer*, ♂, Wlk.
 Brown species with the same median spots, but with lateral white spots on the first two segments only. Tibiae white *significans*, n. sp.
 51. Abdomen reddish, the apex dull black with large black median spots on the second and third segments .. *fuscocomaculatus*, n. sp.
 52. Frontal callus square. Small black species with white-haired median abdominal spots. Legs blackish, tibiae yellowish *leucopogon*, Bigot.
 Frontal callus pear-shaped. Large reddish brown species, abdomen with median triangular spots. Legs reddish brown . *discrepans*, n. sp.

GROUP IX.

53. First posterior cell closed .. 54.
 First posterior cell not closed 55.
 54. Large blackish species with narrow fulvous bands on abdomen *servillei*, Macq.
 55. Abdomen blackish brown, the first two segments covered with grey tomentum *crassus*, ♂, Wlk.
 56. Forehead narrow, seven or eight times as long as it is broad. Frontal callus narrow with a lineal extension. Black or brown species 57.
 Forehead broader, four or five times as long as it is broad. Frontal callus large with a stout, broad, or spindle-shaped extension . 62.
 57. Large black or brown species 21 mm. in length, with very narrow pale bands on abdomen 58.
 Smaller blackish species, 15-17 mm. in length, with whitish bands on abdomen 59.
 58. Brown species. Scutellum and sides of thorax with pale tomentum. Legs blackish, tibiae obscurely reddish *alboscutatus*, Bigot.
 Black species. Scutellum and sides with no such pale tomentum. Legs black, tibiae yellowish white *explicatus*, Wlk.
 59. Forehead narrower anteriorly . 60

- Forehead hardly narrower anteriorly, but parallel . 61.
60. Frontal callus large, reaching the eyes. Antennae, legs, and palpi wholly black. Wings clear or tinged smoky brown *nicobarensis*, Schiner.
 Frontal callus narrow. Antennae and legs blackish. Palpi yellow. Wings brownish *justorius*, Rondani.
61. Frontal callus narrow, not reaching eyes. Antennae and legs black. Palpi black, paler on insides. Wings faintly tinged brown *khasiensis*, n. sp.
62. Brown or black species with whitish bands and spots on abdomen 63.
 Reddish yellow species with whitish bands and spots on abdomen . 64.
63. Abdomen reddish brown or blackish brown with broad white bands and large triangular median spots. Palpi short and stout *sanguineus*, Wlk.
 Smaller species. Abdomen black with narrow white-haired segmentations and small triangular spots. Palpi slender *oxycratus*, Bigot.
64. Abdomen reddish yellow, darker at apex, with narrow yellowish white segmentations and median spots. Legs black, tibiae yellowish *orientis*, Wlk.
 Abdomen similar, but the last four segments are black *fulvimedius*, Wlk.
 Smaller species. Abdomen similar to that of *orientis*. Legs wholly yellow .. *consanguineus*, Macq.

GROUP X.

65. Black or brown species. Forehead narrower anteriorly, seven to ten times as long as it is broad 66.
 Large reddish yellow species from 20-24 mm. in length. Forehead six to ten times as long as it is broad 72.
 Dark reddish brown species from 18-22 mm. in length. Forehead seven to ten times as long as it is broad 75.
 Reddish or reddish yellow species

- from 16-19 mm. in length. Forehead six to ten times as long as it is broad 76.
- Small species reddish, yellowish, brownish, or blackish, from 12-16 mm. in length. Forehead five to ten times as long as it is broad 79.
66. Thorax paler than abdomen with yellowish tomentum and pubescence 67.
 Thorax not paler than abdomen 68.
67. Dark brown or blackish species with yellowish brown thorax. Legs black, tibiae white. Wings tinged yellowish brown *birmanicus*, Bigot.
 Reddish brown species with light yellow or greyish thorax. Legs black, tibiae white, middle and posterior femora yellowish. Wings brownish, clear at apex *flavothorax*, n. sp.
68. Wings yellowish brown, yellow on fore border. Black species. Thorax with short red pubescence *tinctothorax*, n. sp.
 Wings brownish or black. Brown or black species 69.
69. First posterior cell of wings closed. Abdomen deep black *nigrotectus*, Bigot.
 First posterior cell not closed 70.
70. Blue-black species. Thorax red at base. Antennae reddish brown. Posterior tibiae red at base *caerulescens*, Macq.
 Forehead almost parallel. Abdomen dull reddish brown with greyish blue tomentum. Antennae reddish yellow, black at apex. Tibiae dull red or blackish. Beard and palpi black *tenebrosus*, Wlk.
 Forehead narrower, not parallel 71.
71. Abdomen blackish. Antennae reddish yellow. Tibiae dull reddish. Beard white and black. Palpi yellowish *perakiensis*, n. sp.
 Abdomen dull blackish, conical. Antennae black. Tibiae black. Beard and palpi black *inobservatus*, n. sp.
72. Forehead parallel, six times as long as it is broad 73.
 Forehead narrower anteriorly, eight to ten times as long as it is broad 74.

73. Broad-bodied reddish-yellow species.
Antennae yellow. Legs reddish brown
fulvissimus, Rondani.
74. Thorax brownish. Antennae reddish, the third joint black. Femora reddish brown
univentris, Wlk.
Thorax yellowish. Antennae, palpi and legs yellow
flavissimus, n. sp.
75. Abdomen reddish brown, covered posteriorly with yellowish brown tomentum, and yellowish pubescence. Forehead seven times as long as it is broad. Beard white.
pauper, Rondani.
Abdomen dull reddish brown with black pubescence. Forehead seven times as long as it is broad. Beard brownish, scanty. Fore coxae with white hairs
leucohirtus, n. sp.
Abdomen dull reddish brown with black pubescence. Forehead ten times as long as it is broad. Beard brown, thick. Fore coxae with black hairs
atrohirtus, n. sp.
76. Forehead ten times as long as it is broad. Frontal callus long and narrow. Abdomen reddish yellow, darker at apex. Legs black, tibiae whitish at base
pallide pectoratus, Bigot.
Forehead six to seven times as long as it is broad 77.
77. Forehead narrowest at the vertex, abdomen reddish. Legs wholly red
nigropictus, Macq. 78.
Forehead narrowest anteriorly
78. Abdomen narrow, reddish brown, under side with bands. Thorax reddish. Legs black, tibiae white at base
joidus, Bigot.
Abdomen conical, reddish yellow, the apex black, under side the same. Thorax blackish. Legs black, fore tibiae dull reddish yellow on basal half, others wholly so . *siamensis*, n. sp.
79. Forehead five times as long as it is broad, narrower anteriorly. Frontal callus club-shaped. Small reddish brown species. Palpi slender, hairy
palpalis, Ricardo.
Forehead five to six times as long as it is broad, parallel or nearly so.

- Frontal callus oblong or club-shaped .. 80.
 Forehead seven to ten times as long as it is broad, narrower anteriorly.
 Frontal callus long and narrow or oblong .. 83.
80. Yellow species. Thorax and scutellum covered with grey tomentum and yellow pubescence. Legs and antennae yellow. Palpi stout, ending in a long fine point. Frontal callus yellowish, often indistinct. . . *flaviventris*, Bigot.
 Reddish brown species. Frontal callus reddish brown, always distinct 81.
81. Thorax and scutellum blackish. Palpi slender, long. Antennae black at tip. Legs black, tibiae reddish yellow *diversifrons*, n. sp.
 Thorax and scutellum usually reddish. Palpi stouter. Antennae not black at tip 82.
82. Abdomen reddish brown, unicolorous. Legs reddish yellow, femora often darker . . . *subcinerascens*, n. sp.
 Abdomen marked with grey tomentum, giving it the appearance of having zigzag indistinct bands. Legs blackish, tibiae yellowish . . . *obconicus*, Wlk.
83. Subcallus not bare, shining or tuberculous 84.
 Subcallus bare, shining, tuberculous .. 88.
84. Palpi stout. Femora black or reddish brown . . . 85.
 Palpi slender. Femora yellowish 87.
85. Forehead two-thirds narrower anteriorly than at vertex. Abdomen yellow, anteriorly rather transparent. Legs yellowish, fore legs darker . . . *borniensis*, Ricardo.
 Forehead one-third narrower anteriorly than at vertex. Reddish brown or reddish yellow species .. 86.
86. Abdomen reddish brown. Thorax blackish. Legs black, tibiae yellowish. Wings clear or slightly tinged . . . *fuscicauda*, Bigot.
 Thorax reddish yellow, almost same colour as abdomen. Legs yellowish,

- fore femora darker. Wings tinged yellow on fore border *uniformis*, n. sp.
87. Abdomen dusky reddish brown or reddish yellow. Forehead about a third narrower anteriorly than at vertex, frontal callus pear-shaped. *subhirtus*, Ricardo.
Abdomen olive-coloured. Forehead about half as narrow anteriorly as it is broad at vertex, frontal callus very narrow. *formosiensis*, n. sp.
88. Medium sized species. Abdomen yellowish with darker apex. Palpi yellow. Legs reddish yellow, the fore tarsi darker. Forehead seven times as long as it is broad. *tuberculatus*, n. sp.
89. Small species. Legs black, tibiae white. Eyes with cross-bands 90.
90. Reddish brown or yellowish species. Beard white or yellow. Palpi usually pale. Forehead ten times as long as it is broad. *simplissimus*, Wlk.
Black, sometimes reddish brown species. Beard black. Palpi blackish. Forehead eight times as long as it is broad. *ceylonicus*, Schiner.

GROUP XI. THERIOPECTES.

91. Forehead with two transverse calli. Subcallus bare and shining. Abdomen black with white-haired bands. *subcallosus*, n. sp.
Forehead with one callus. Subcallus not bare or shining 92.
92. Frontal callus black, club-shaped, with spindle-shaped extension. Abdomen black, reddish yellow at sides of first two or three segments. Palpi stout with short apex. Appendix usually present. Legs black and reddish yellow. *hirtus*, Wlk.
Frontal callus small, indistinct. Abdomen blackish, only reddish on second segment. Palpi slender with long acute apex. No appendix to wing 93.
93. Smaller species. Legs black and reddish yellow. *wyvillei*, n. sp.

Frontal callus broad, yellow. Abdomen black, reddish yellow at sides. Palpi slender. No appendix to wing. Legs yellow . *albilateralis*, Macq.

GROUP I.

Forehead with two callosities, the first one usually transverse, the second one smaller, irregular shaped, separated from each other, forehead broad, four to six times as long as it is broad. Small species 9—14 mm. Scutellum same colour as thorax. Abdomen not banded.

Tabanus rarus, ♀, n. sp.

(Pl. xiii, fig. 1.)

Type ♀ from Kuala Lumpur, Federated Malay States, (H. C. Pratt), from London School of Tropical Medicine.

A small species of unusual appearance, the abdomen being covered with grey tomentum and with long white pubescence. Subcallus shining. Legs black, all tibiae whitish with fringes of long white hairs, which are also present on the femora. Wings clear. Length 12 mm.

Face covered with grey tomentum, and with long white pubescence. Beard white. *Palpi* yellow with white pubescence which is long below and short above. *Antennae* reddish yellow, the first two joints pale yellow with black pubescence, the third narrow at base with only an obtuse angle representing the tooth. Subcallus shining, reddish yellow, furrowed in the middle. *Forehead* five times as long as it is broad, very slightly narrower anteriorly, covered with greyish yellow tomentum; the frontal callus reddish yellow, reaching eyes, transverse, the median one black, irregularly heart-shaped, on the vertex appears another reddish brown small callus; some black hairs on forehead. Hind part of head with long white hairs. *Thorax* and *abdomen* black but appearing grey, being covered with dense grey tomentum, the *thorax* with whitish pubescence, shoulders reddish with grey tomentum and white hairs; breast and sides the same. *Scutellum* identical with thorax, fringed on its outer border with long white hairs. *Abdomen* has the white pubescence thickest on the last five segments; under side the same, but the pubescence slighter. *Legs* black, the coxae and femora with some grey tomentum, the fore tibiae white, black at their extreme apex, the other tibiae straight, slender, yellowish, the long white pubescence is thickest on the fore legs, on the tarsi the pubescence is black and short. *Wings* clear, stigma yellow, veins pale brown.

Tabanus hirtipalpis, ♀, n. sp.

(Pl. xiii, figs. 2, 3.)

Type from Bichiakoh, Nepal; sent in Indian Museum collection.

A small black species allied to *Tabanus ceylonicus*, Schiner, but at once distinguished from it by the wide forehead with two callosities and the hairy palpi, and by the metatarsi being black. Length 9 mm.

Face black covered with ashy grey tomentum and with long white hairs. *Palpi* stout ending in a fine but short point, pale yellowish covered with grey tomentum, and with long white hairs at base and below, some few black hairs visible on dorsum. *Antennae* reddish yellow, black at apex, the first two joints with black hairs, the third joint rather short with small tooth. *Forehead* about four times as long as it is broad, slightly narrower anteriorly. Subcallus shining yellow, convex, divided by a narrow interval from the frontal callus which is black, transverse, not reaching the eyes, furrowed laterally; beyond it appears, separated from it however, a small indistinct black callus; the forehead dark with brownish tomentum. *Thorax* and *abdomen* black, shining, the latter with very narrow yellowish red segmentations, some white hairs at sides and on under side. *Legs* black, the fore tibiae to apex, and the others wholly, yellowish white, fore coxae and all femora with some white hairs. *Wings* hyaline, veins and stigma brownish yellow.

Tabanus bicallosus, ♂ ♀, Ricardo.

(Pl. xiii, fig. 4.)

Ann. Mag. Nat. Hist. (8), iii, p. 489 (1909).

Type (♂) from Pusa, Bengal.

Type (♀) and three other females from the same place.

These specimens were sent to me for identification by Mr. F. M. Howlett from India.

This small species might at first sight be taken for a small specimen of *Tabanus striatus*, Fabr., but is at once distinguished from it by the two separate calli of the forehead. It is very nearly allied to *Tabanus gratus*, Loew, which is distributed over South, Central, and West Africa, reaching up to Egypt, as I had a specimen sent me from the Suez Canal. The wholly yellow legs, narrower median stripe of abdomen the same width throughout (in the African species it is wider on the third and fourth segments), and the prolongation of the thoracic stripes on to the scutellum, seem the only differences between the Indian and the African specimens.

Black, with five grey stripes on the thorax and three on the abdomen. Legs and antennae yellowish. Wings clear. Length 10 mm.

♀ *Face* covered with grey tomentum and with white pubescence. Beard white. *Palpi* greyish, with some white hairs at base, and black hairs elsewhere, but these last are not very numerous.

Antennae: the first joint yellow, the second and third red, tooth at base small. *Forehead* broad, quite a third narrower anteriorly, and four times as long as it is wide, covered with yellowish brown tomentum and with some black pubescence; the frontal callus yellowish brown, nearly square, and almost reaching the eyes; beyond it and sometimes connected by a very fine line is an irregular-shaped black or brownish callus isolated in the middle of the forehead. *Eyes* with three cross-bands. *Thorax*: the median stripe is linear, the other ones broad, sides of thorax greyish, with black pubescence. *Scutellum*: the lateral stripes are continued here, leaving the centre blackish. *Abdomen* narrow, all three stripes reaching from the first to the sixth segment; sides grey, with white pubescence; under side covered with grey tomentum. *Legs* uniformly reddish yellow, only the tarsi a little darker; the femora with grey tomentum and white pubescence. *Wings* clear, the stigma and veins yellow.

♂ The male is identical. *Eyes* with large facets above; the small ones on the lower third of eyes are continued round the head as a very narrow border.

GROUP II.

Forehead with two callosities, the first one usually transverse, the second one smaller, oblong, or irregular shaped, separated from each other; forehead broad, four to six times as long as it is broad. Small species, 9—14 mm. Scutellum white or yellow haired. Abdomen with white or yellow-haired bands. Tibiae white, fore tibiae curved, and sometimes slightly incrassate.

The species as yet described in this group are conferred to India, Assam, Burma and Federated Malay States.

Tabanus flavicinctus, ♀, n. sp.

Type ♀ from Shillong, Assam, in Howlett collection; 2 other females from N. Khasi Hills, Lower Ranges (Chennell collection), in the British Museum collection; and another female from the Nilgiris in Howlett collection.

A species nearly allied to *Tabanus leucocnematus*, Bigot, but distinguished from it by the presence of narrow yellow-haired bands on every segment of abdomen except the first one. The subcallus and palpi are yellowish, the latter with the long-haired pubescence yellow, the tibiae are yellowish, with the apices of the fore pair more widely black, and the white pubescence on them

and the coxae replaced by yellow. The *antennae* are dark at the apices. The *abdomen* is a lighter reddish brown or reddish yellow. The *wings* are clear, with no appendix. The *forehead* is almost the same width throughout, and a little shorter, hardly more than four times as long as it is narrow. Length 9-10 mm.

There is a female in the British Museum collection from N. Kanara, India (Bell), which appears to be the same species, but the middle callus of forehead is much narrower, and the forehead itself slightly narrower and anteriorly narrower. The bands on the third and fourth segments are a little produced in the middle, but this is the case in some of the other specimens.

***Tabanus leucocnematus*, ♀, Bigot.**

Mem. Soc. Zool. de France, vii, p. 656 (1892).

Type (now headless) ♀, from India, is a faded denuded specimen which was evidently described by Bigot in this condition; it would be impossible for anyone to verify the species from his description in which he makes no mention of the pubescence on scutellum and on thorax so characteristic of this species and others in the group. Fortunately fresh specimens from Lushai Hills, Burma, in Dr. Kertesz's collection and from Khasi Hills, Assam, in Mr. Howlett's collection serve to clearly identify the species, and the following description is based on them.

A small species dark brown in colour with two yellow pubescent bands on the abdomen, scutellum entirely covered with yellow pubescence, all tibiae white, wings tinged brown on the fore border. Length 10-11 mm.

Face covered with grey tomentum, a dark brown band is present on each side of the antennae, pubescence white, consisting of long hairs, beard white. *Palpi* stout, ending in a point, pubescent, appearing black but covered with dense grey tomentum, on the inside they are yellowish, the pubescence is white and long on the first joint, on the second short and black, with a few white hairs below and on apex. *Antennae* reddish yellow with a small tooth on third joint, the first two joints with black pubescence. Subcallus shining, brown or reddish brown, convex, furrowed in the middle, produced between the antennae, divided from the frontal callus by a narrow interval. *Forehead* about five times as long as it is narrow, and about a third narrower anteriorly, covered with grey tomentum and with two separate calli, the frontal callus almost square, furrowed in the middle, almost touching the eyes, the middle callus distinct from it in fresh specimens, is narrower and oblong, sometimes with a short linear extension, both blackish brown in colour. *Thorax* dark brown, on the anterior half covered with grey tomentum and with yellow appressed pubescence, on posterior half with black pubescence bordered with a fringe of yellow hairs; sides of thorax with long white hairs; breast covered with grey tomentum, and with long white pubescence. *Scutellum*

chestnut-brown when denuded, but in fresh specimens covered with grey tomentum and with dense golden yellow pubescence of the same shade as that on the posterior border of thorax. *Abdomen* reddish brown, appearing darker with dense short black pubescence, on the third and fourth segments are wide bands of bright golden yellow pubescence, which also appears on the sides of the first two segments, and often as a narrow fringe on the posterior border of the sixth; under side with the yellow bands narrower but present on most of the segments, the second segment with white pubescence. *Legs* black, the knees, fore tibiae except at their apices, and the middle and posterior tibiae wholly, whitish, with white hairs, the fore coxae covered with grey tomentum and with white hairs, the others less distinctly so, the pubescence on femora thick, black; the fore tibiae are curved but hardly incrassate. *Wings* tinged with brown on the fore border as far as the third or fourth longitudinal vein, clearer at the apex, veins, stigma and costal border yellowish, short appendix present.

***Tabanus bicinctus*, ♀, n. sp.**

(Pl. xiii, fig. 5.)

Type ♀ and another from N. Kanara, S. W. India (Bell); others from Pahang, Perak and Kuala Lumpur, Federated Malay States (Pratt, Durham).

A handsome black species with white-haired scutellum, white-haired bands on the third and fourth segments, whitish tibiae, and wings tinged brown on the fore border, distinguished from *Tabanus leucocnematus*, Bigot, by its colouring and by its more heavily fringed black femora. Length: type 18 mm., others 10—18 mm.

Face covered with whitish tomentum and with long white hairs. A dark brown band extends between the eyes and the base of the antennae, with dark pubescence. Beard white; thick. *Palpi* stout, ending in a point, yellowish but appearing grey on the outside, being thickly covered with grey tomentum and with short black pubescence, a few white hairs are visible chiefly at the base, and longer ones below. *Antennae* reddish yellow, the first two joints with black pubescence, the third joint with very small tooth crowned with a few black hairs, apex of joint darker. Subcallus shining, dark brown. *Forehead* about six times as long as it is broad, about one-third narrower anteriorly, covered with grey tomentum, the two calli the same colour as the subcallus, the frontal callus irregularly square, separated from the subcallus by a narrow interval, convex, furrowed in the middle, almost reaching the eyes; the median callus is oblong and narrower, on each side of it and at the vertex the forehead is brownish.

Thorax black, covered with an anterior band of grey tomentum and short whitish pubescence, and with a heavy white fringe of hairs on its posterior border; on the posterior dark part of dorsum the pubescence is black and dense. *Scutellum* covered with whitish

grey tomentum and dense white pubescence. Breast with long white pubescence.

Abdomen black, type with only the two white-haired bands, but on some of the other specimens narrow fringes of white hairs appear on the fifth and sixth segments, the rest of the dorsum with dense black pubescence, sides of first two segments with white hairs, black on the others; under side similar, but the second segment is covered with white pubescence.

Legs black, tibiae white, but black at their apices, fore coxae with some long white hairs, and tibiae with white pubescence, elsewhere black, the femora with thick black fringes on each side. *Wings* tinged brown on the fore border as far as the third vein, less so on some specimens, veins and stigma brown, costal border yellow.

Tabanus sexcinctus, ♀, n. sp.

Type, a female from Lushai Hills, Burma (Capt. E. C. Macleod), sent by Dr. Kertész for identification.

A species nearly allied to *Tabanus bicinctus*, n. sp., but distinguished by white bands on every abdominal segment except the first, and the under side is almost entirely covered with white pubescence. The *wings* are quite clear. The femora with grey tomentum, and some white hairs which are long and numerous on the fore pair, the thick black fringes not present. The *palpi* are more white haired. The *forehead* is almost the same width throughout, and a little broader, the frontal callus not reaching the eyes. The *thorax* appears less black, with no anterior white-haired band, but with some grey tomentum on the dorsum and black pubescence. Length 11 mm.

GROUP III.

Species with the callosities on forehead represented by two small calli separated from each other, both about the same size, usually round, small spots; distinguished by their *Atylotus*-like appearance (*fulvus* group only) though the pubescence on eyes is often practically non-existent. So far the only species in this group from the Oriental Region are also common to the Palaeartic Region, and are represented by the typical *Tabanus ditaeniatus*, Macq., a South African species whose distribution is very wide, and *Tabanus fulvus*, Mg. (*Atylotus*).

The identity of *Tabanus agricola*, Wied., recorded by Schiner as occurring at Hongkong, seems very doubtful; the species is not included in the table.

Tabanus fulvus, ♂ ♀ (*Atylotus*), Meigen.

Syst. Beschreib., ii, 61, 40 (1820) (see Kertész Cat. Dipt. iii, 1908, for authorities).

Atylotus bituberculatus, Bigot, Mem. Soc. Zool. de France, v, 659 (1892).

Bigot gives China with a query as the locality for his type, which is identical with Meigen's species.

In British Museum collection are two females from Chinkiang, Yangtze River, China (B. G. Tours); and another from China is in the Kertesz collection, so that the range of the species to the east coast of China and within the line of the Oriental Region is well established.

The type of *Tabanus hoang*, ♀, Macq., Dipt. exot., Suppl. v, p. 46 (1855), is apparently lost as, though the label is existent among the Bigot types lent me by Mr. Verrall, there are no specimens which answer to the description given by Macquart, in which he says it is related to *Tabanus fulvus*, Mg.; it was possibly identical with this latter, judging from the description. In any event it may now be deleted from the list of *Tabanus*.

***Tabanus ditaeniatus*, ♂ ♀, Macquart.**

Dipt. exot., i (1), p. 130. (1838); Walker, List Dipt., v, pp. 236, 355 (1854); Bezzi, Ann. Mus. Civ. Genova (2), xii (xxxii), p. 184 (1892); Austen, Report Gordon Memorial College (1906), p. 57, fig. 22; *id.*, African Blood-Sucking Flies, p. 118, pl. xi, fig. 82 (1909).

Tabanus pyrrhus, Walker, Dipt. Saund., i, p. 47, pl. ii, figs. 4, 5 (1850).

Tabanus bipunctatus, v. d. Wulp, Notes Leyden Museum, vii, p. 75, pl. v, fig. 5 (1885).

Atylotus nigromaculatus, Ricardo, Ann. Mag. Nat. Hist. (7), vi, p. 165 (1900); Newstead, Ann. Tropical Medicine, 1907, p. 44.

The type was recorded by Macquart from Mauritius; it is a common species in South Africa; Coquillet records it from Japan as *Tabanus pyrrhus*,—see Proc. U. States Mus., xxi, p. 311 (1898); as may be seen from the localities given below, it has a wide distribution ranging from Africa to India, China and Japan.

In Indian Museum coll. and Howlett coll. are specimens from Perso-Baluchistan Frontier; Pusa; Belgatchia; Calcutta, in Bengal; Madras Coast; Umballa, N. W. India; Balighai in Orissa, S. E. Bengal. In Brit. Mus. coll. specimens from Wei Hai Wei, China; "biting cows" (Muat).

A greyish yellow species, the abdomen yellowish with a blackish brown broad median, and narrow lateral stripes, on the median one appear greyish yellow tomentose triangular spots, the lateral stripes do not reach the sides of abdomen and at apex coalesce with the median stripe; the abdomen often varies in appearance,

the yellowish ground colour not always being very apparent. Antennae and legs yellowish. Length 11—14 mm.

***Tabanus agricola*, ♀, Wied.**

Auss. Zweifl. Ins., i, p. 556 (1828); Schiner, *Reise Novara Dipt.*, p. 82 (1868).

Ashy grey: sides and segmentations of abdomen, antennae and legs luteous. Length 6 lines, ♀ From Red Sea.

It is somewhat similar to *Tabanus rusticus*, Fabr. Antennae yellow (the last joint wanting). Palpi very pale yellow. Beard yellowish white. Face and forehead mouldy grey. Thorax appears as if covered with ashy grey tomentum because it has whitish pubescence on the black-grey ground colour. Abdomen clay-yellow on the sides, and more narrowly so on the hind borders of the segments, so that not much remains of the black-grey ground colour on each segment. Under side almost yellow. Dorsum and under side with white pubescence. Wings colourless with yellow veins. Legs clay-yellow; the anterior tibiae at the base inside, all tarsi, but the posterior tarsi only at the apex, brownish black. (Rüppel in the Frankfort Museum.) Wied., Auss. Zweifl. Ins., i, p. 556.

Wiedemann's description fits a male and two females from Hongkong so well that I am induced to refer them to this species, and add the following particulars to complete the description:—The antennae are pale red-yellow, the first and second joint short, not produced above and with few hairs, the third somewhat deeper in colour, slightly incised above, so that the angle projects but little. The femora have tolerably thick but extremely short whitish pubescence; the fore tibiae brownish black at the apex (Wiedemann says, no doubt by mistake, brownish black at the base, which is contrary to the usual colouring of species of *Tabanus*). Wings quite clear, the first posterior cell wide open, an appendix present. Eyes of male very large and convex; they join completely on the forehead. Everything else as described by Wiedemann; the correctness of the identification is chiefly corroborated by the allusion to the similarity of the species with *Tabanus rusticus*, Fabr. (Schiner, *Reise Novara Dipt.*, p. 82).

From the comparison with *Tabanus rusticus*, L., *nec* Fabr. (*Atylotus*), it is to be presumed this species has two small calli on forehead. *Tabanus rusticus* has not yet been recorded from Asia. It seems probable that the specimens Schiner identified from Hongkong as *Tabanus agricola*, Wied., belonged to *Tabanus ditae-niatus*, Macq.

GROUP IV.

A small group of species, at once distinguished by the absence of callosities on the forehead, which is broad, from four to five times

as long as it is wide. In old or denuded specimens it occasionally appears as if a frontal callus were present. Species from $7\frac{1}{2}$ to 13 mm. in length.

Tabanus erythrocephalus, Wulp, from Halmaheira Island, and *Tabanus leucopterus*, Wulp, from Aru Island, in the Australian Region, appear to belong to this group.

***Tabanus virgo*, ♀ ♂, Wiedemann.**

Anal. Entomol., 22 (1824); *id.*, Auss. Zweifl. Ins., i, p. 184 (1828).

Tabanus albulus, ♀ ♂, Walker, Dipt. Saund., i, p. 46 (1850).

Tabanus puella, ♂, Walker, *l. c.*, p. 53.

Types of *Tabanus albulus*, male and female, from India (Saunders coll.).

Type of *Tabanus puella*, male, from India (Saunders coll.). A male from Mysore (H. K. Slater). In Indian Museum coll. Specimens from Calcutta and Pusa, Bengal. The Wiedemann type came from East India. Slaty grey with red-yellow antennae and a twofold white spotted abdomen. Length 4— $4\frac{1}{2}$ lines, ♂ ♀

Antennae bright rusty yellow; face rather grey haired. Palpi very light yellow. Beard white. Forehead light yellowish green without a callus or line. In the male it is ochre-yellow behind the antennae. Thorax slaty grey, very faintly white striped, the median line extremely narrow. The shoulders and posterior sides of thorax almost chamois-leather colour. Breast sides whitish. Abdomen slaty grey with narrow yellowish white-haired segmentations: on each segment two white-haired roundish spots. Wings very hyaline with ochre-yellow veins and halteres. Legs ochre-yellow with almost chamois-leather coloured femora. In the Royal Museum. Wiedemann, Auss. Zweifl. Ins., i, p. 184.

This small species is easily recognized by the unmarked forehead and very pale wings, yellow antennae and legs and spotted abdomen. The female specimens above mentioned vary from 9—11 mm. One male only measures $7\frac{1}{2}$ mm.

The description given by Wiedemann of the colour of the abdomen only applies to very fresh specimens, the grey colour being caused by the grey tomentum covering the abdomen, viewed best from behind; the ground colour of the abdomen is greyish brown, rusty coloured at the sides of the first three or four segments, the pubescence black, but white on the spots and segmentations; under side lighter with white pubescence, darker at the apex. The thorax is blackish brown covered with grey tomentum and with some appressed fulvous hairs, the stripes hardly visible. The forehead is about five times as long as it is wide, and a third narrower anteriorly, yellowish, showing no callus when fresh, if denuded one is sometimes visible. Antennae reddish yellow, the first two joints pale yellow. Face ashy grey with white

pubescence. Beard white. The *palpi* very pale yellow, stout at base, ending in a point.

The male has the abdomen more reddish in colour, darkening at the apex. Large facets of the eyes very distinctly divided from the small ones, which take up barely a third of the eye and reach the vertex as a very narrow border.

***Tabanus nemocallosus*, ♀, Ricardo.**

(Pl. xiii, fig. 6.)

Ann. Mag. Nat. Hist. (8), iii, p. 490 (1909).

Type ♀ and another female from Pusa, Bengal, in Howlett coll.

A medium-sized species, distinguished by the rather broad forehead, not narrower anteriorly, and with no callus or spots. Abdomen blackish brown marked with greyish yellow median and lateral spots. Length 13 mm.

Face and *forehead* covered with greyish tomentum, the former with white pubescence. Beard scanty, white. *Palpi* yellowish white with white pubescence, stout ending in a short point.

Antennae reddish yellow, the first two joints pale yellow, the third with hardly any tooth. *Forehead* barely three times as long as it is broad. *Thorax*, *scutellum* and *abdomen* blackish brown, the former with five distinct greyish yellow stripes, the dorsum with some grey tomentum and with appressed pale fulvous pubescence; *scutellum* with the same and with grey tomentum. *Abdomen* with an almost continuous median stripe formed of grey tomentose narrow, triangular spots, and with irregular-shaped, roundish, grey tomentose spots on the sides, the pubescence on these, short, pale fulvous, some black pubescence on the dark parts, the sides of the first two or three segments pale reddish, under side lighter, covered with grey tomentum. *Legs* pale yellowish red, the tarsi brown, the pubescence white on femora and tibiae, black on the tarsi. *Wings* hyaline with brown veins and yellow stigma, a long appendix on branch of third vein.

***Tabanus negativus*, ♂ ♀, n. sp.**

Type ♂, type ♀, from Formosa, in Dr. Kertesz's coll.

In Brit. Mus. coll. one female from Hongkong very much mutilated.

A species allied to *Tabanus nemocallosus*, Ricardo, but distinguished from it by the absence of spots on the abdomen and of stripes on the thorax. Wings with no appendix, veins pale yellow. Length of female type 13 mm.; of male specimens 11½-12½ mm.

♀. *Face*, beard, and *antennae* the same as in the above-mentioned species. *Palpi* pale yellow, the same shape, but with

black pubescence. *Forehead* with no callus, almost parallel, about four times as long as it is broad. *Thorax* and *abdomen* uniformly covered with greyish yellow tomentum, through which the dark ground colour hardly appears, and with thick short pale yellow pubescence on the dorsum of abdomen, on the thorax it is less thick and replaced chiefly by black pubescence anteriorly, shoulders the same colour. Breast rather greyer with white pubescence. Under side of abdomen similar but almost devoid of pubescence. *Legs* pale reddish yellow, the apices of fore tibiae and the tarsi blackish, the other tarsi more or less brown, pubescence pale yellow on the coxae and femora, chiefly black elsewhere. *Wings* clear, the veins very pale yellow and stigma hardly noticeable, no appendix.

♂. Similar but in some of the specimens, owing probably to denudation, black median markings or a black median stripe appear. *Abdomen* with very little yellow pubescence, almost bare. Eyes large, convex, the large facets occupying fully two-thirds of the surface of eyes, the small ones reaching to the vertex as a narrow border. *Palpi* pale yellow with yellow pubescence and black pubescence on apex. Frontal triangle and subcallus coloured alike.

GROUP V.

Species with wings spotted or banded. Forehead with one square, narrow, or oblong callus, always prolonged towards the vertex as a more or less narrow line; five to ten times as long as it is broad. Species from 9—21 mm. in length.

Tabanus javanus, ♀, Fabr.

Syst. Antl., 103, 46 (1805); Wied., Dipt. exot., p. 93 (1821); *id.*, Auss. Zweifl. Ins., i, p. 183 (1828).

Thorax striped; abdomen with white triangular dorsal spots, wings spotted. Smaller than the preceding species (*Tabanus vittatus* and *longicornis*). Head white haired. Thorax brown, with white stripes. Abdomen brown, with a large triangular spot on the dorsum of each segment. Body pale, darker at the apex. Wings hyaline, with five black spots. Legs testaceous. From Java, Fabr., Syst. Antl., p. 103.

The species is unknown to me. Wiedemann redescribed it in Auss. Zweifl. Ins., i, p. 183, as follows: Thorax black, white striped, the sides rusty yellow, abdomen brown, ferruginous at the sides, with triangular white median spots; wings spotted with brown, $4\frac{1}{2}$ lines ♀, from Java.

The whole head reddish white. Beard white. Forehead with a chestnut-brown smooth stripe, widening below into a broad callus. Dorsum of thorax with three whitish lines, the sides almost

chamois-leather coloured behind the usual seam, with a small black stripe; breast sides almost chamois-leather coloured; scutellum black. Abdomen on the first segment brown, rusty brown on the sides, the second one at the base with an interrupted whitish band and another more wavy one at the apex; from the middle of it the triangular spot proceeds, the third to the sixth each with the same shaped whitish band at the apex and larger triangular spots; on the seventh the border is hardly whitish; the three last segments are not at all rusty yellowish; under side almost chamois-leather coloured, brownish towards the apex, with whitish segmentations. Wings almost hyaline, stigma and four spots brown. Legs reddish; tarsi gradually brown. The fore legs are wanting in the single specimen in Fabricius's collection. A very denuded specimen in the Leyden Museum is of a deep pure brown colour, with no trace of the stripe and spots of abdomen, only the segmentations are yellowish white.

***Tabanus optatus*, ♀, Walker.**

Proc. Linn. Soc., i, p. III, 33 (1856).

Tabanus alboscutatus, ♀, Rondani, Ann. Mus. Civ. Genova, vii, p. 456 (1875).

Tabanus equestris, ♂ ♀, v. d. Wulp, Notes Leyden Museum, vii, p. 77, 31, pl. v, fig. 6 (1885).

Walker's type, ♀, came from Sarawak, Borneo (Saunders coll.); another female in Brit. Mus. coll. from Kajoe-Tanan, Sumatra (Dr. Hagen), and a male from India (Saunders coll.). In Indian Museum coll. a female from Belgatchia, Bengal.

On comparison of one of the Brit. Mus. coll. specimens with the type of *Tabanus alboscutatus*, the identity of the two species was at once established. Rondani's type also came from Borneo.

From van der Wulp's description and figure of wing there is no doubt he was describing the same species, and his description, as being the best one, is given below.

Reddish, face and palpi pale yellow; eyes naked; antennae with the third joint darker; abdomen with triangular dorsal white spots; the anterior legs and all femora brownish; wings at the base and a median band brownish, ♂, ♀ Length 15.5—17 mm.

Face yellowish white; beard of the same colour; palpi pale ochraceous; front rufous, in the ♀ moderately broad, with a brown cordiform spot extending upwards in a line. Eyes bare, in the ♂ reddish bronze above, with large facets; below for a third part and on the outward borders blackish, with much smaller facets, even after having been moistened no trace of cross-bands is to be seen. Antennae ochraceous; third joint infuscated, rather slender and on its upper side with a triangular tooth. Thorax, scutellum and abdomen rufous, the thoracic dorsum a little infuscated, with indistinct stripes; hind margin of the scutellum

greyish ; last segments of the abdomen darker ; their hind margins yellowish, with small triangular, white, dorsal spots ; on the under surface the pale margins of the segments are broader. Legs and halteres fulvous ; the femora and the whole front legs fuscous. Wings at the base brownish yellow, in the middle with a rather broad brownish cross-band, which issues on the stigma and embraces the discal cell, but does not quite reach the hind margin ; the costal cell is yellow. This species seems to be not uncommon in the Sunda Islands ; it is represented in the Leyden Museum by a ♂ from Sumatra (v. Lansberge), 2 ♀ from Java (Blume and Ludeking) and 4 ♀ from Borneo (Müller) ; it was a long time ago designated in the collection by the late Mr. Snellen van Vollenhoven under the name *equestris*, n. sp., without having been described. The species is related to my species *Tabanus pictipennis* (Tijd. v. Ent., xi, p. 100, 1868), the name of which having been used before, is changed by Osten Sacken into *Tabanus vanderwulpi* (Berlin Ent. Zeit., xxvi, p. 97, 1882) ; it differs, however, by its fulvous posterior legs, its more slender antennae, the third joint of which is darker, and by the pattern of the wings, showing instead of two cross-bands, but a single one which passes over the discal cell. Notes Leyden Museum, vii, p. 77, 31, pl. v, fig. 6, 1885.

Tabanus pictipennis is the same as *Tabanus flexilis*, Walker, a species from Celebes, but *not* the same as *Tabanus vanderwulpi*. The *forehead* against the general rule is slightly wider anteriorly, about a third, and is five and a half times as long as it is wide, the frontal callus small, pear-shaped, with a linear extension. The *legs* have the fore tibiae obscurely reddish yellow on their basal half, the extreme apices of other tibiae and all tarsi blackish. The cross-band of *wing* in the description, said not to reach the hind border of discal cell, does so in the figure and in these specimens.

Tabanus non-optatus, ♀, n. sp.

Type ♂ from Purneah District, in Indian Museum coll.

Type ♀ from unknown locality and two males in Brit. Mus. coll. from unknown locality.

This species is very nearly allied to *Tabanus optatus*, Walker. The female type is so similar to the male type, and the two males identical with latter, that I think it is safe to assume that the specimens with no locality specified came from India or an adjacent region, especially as the species with banded wings are not very numerous in the African or Oriental Region, and probably not in any fauna.

This species is distinguished from the Walker species by the almost wholly yellowish abdomen, only becoming darker on the last two or three segments, and the pale spots are larger, more triangular in shape, the abdomen is longer and more conical in shape, and the forehead in the female is *not* narrower at the

vertex. Length of male type 14 mm., of female type 19 mm., the other males 17—19 mm.

♀ *Face* covered with greyish tomentum, pubescence and beard whitish. *Palpi* yellow with longer slender point, and a few black hairs. *Antennae* reddish yellow, the first two joints with some black hairs, the third broad at base, deeply incised, with a distinct tooth. *Subcallus* and *forehead* same colour as face, the latter with some black pubescence, almost parallel, about five times as long as it is broad; the frontal callus reddish brown, almost square, not reaching the eyes, posteriorly narrower with a short lineal extension. *Thorax* dull chamois-leather coloured, with some greyish tomentum, no stripes visible, a few yellowish and black hairs visible on dorsum, shoulders pale reddish with black pubescence; breast covered with grey tomentum and with greyish white pubescence, tufts of white hairs round base of wing; *scutellum* same colour as thorax, but with whitish grey tomentum on its posterior border. *Abdomen* reddish yellow, black at apex, the spots most distinct in the second, third and fourth segments, pubescence black but very scanty and short, the segmentations somewhat lighter; under side similar with more distinct white segmentations. *Legs* blackish, the tibiae reddish with black pubescence, the pubescence on femora white and on coxae, which latter are covered with grey tomentum, tarsi reddish brown with black pubescence. *Wings* with a dark band across the middle of wing, similar to that of *Tabanus optatus*.

♂ Similar, the *thorax* rather darker in colour. The eyes with large facets on upper part, the small ones attaining the vertex as a narrow border.

Tabanus flexilis, ♂ ♀, Walker.

Proc. Linn. Soc., iv, p. 104 (1860); v, p. 104 (1861).

Tabanus pictipennis, ♀, v. d. Wulp, Tijds. v. Entom., xi, p. 100, pl. iii, figs. 1, 2 (1868); *nec vanderwulpi*, Osten Sacken.

Type ♂ from Celebes.

Type ♀ from Macassar, Celebes (A. R. Wallace), and others from Manado, Celebes, all in Brit. Mus. coll.

This species, though as yet only recorded from Celebes, is included here owing to the great similarity to it of *Tabanus vanderwulpi*, Osten Sacken, from the Philippines.

From the figure and the description of van der Wulp's there is no doubt he was redescribing a specimen identical with Walker's species, both from the same locality. His description is given, as it is sufficient for identification, of the female only however, as he did not know the male.

♀ Ochraceous. Forehead very narrow with a blackish median line; eyes naked; antennae testaceous; the anterior margins of the abdominal segments brown; legs blackish; wings with two

brown bands; costal border testaceous. ♀ $8\frac{3}{4}$ lines. Pl. iii, figs. 1 and 2.

Head ochre-yellow, below with some coloured pubescence; the forehead very narrow, stripe shaped, with a black median line hardly broader below. Eyes naked, bronze coloured, without markings. Antennae cinnamon-brown, the first joint ending in a point, above the second very short, prolonged above in a thorn-like point, the third moderately incised above. Palpi ochre-yellow. Thorax and scutellum blackish with ochre-yellow tomentum and on the breast sides with conspicuous ochre-yellow pubescence. Abdomen black-brown, with thick pale ochre-yellow almost golden yellow tomentum, which leaves the fore borders of the segments tolerably wide, so that cross-bands more or less darker are formed, somewhat broader at the sides. Legs black, the coxae the same colour as the abdomen, and the ground colour of the femora becomes more or less modified owing to the rather thick ochre-yellow pubescence. Halteres yellow. Wings with greyish ground colour and black-brown veins; the base and the marginal cell brown-yellow; a brown shadow lies across the transverse veins, which forms a narrow half zigzag band in the middle of the wing, and on the last third of the wing appears a broad brown cross-band, which stretches from the fore border at the ending of the first vein to the upper branch of the third longitudinal vein; this band, which becomes paler on the posterior border, is rounded on the inside and outside towards the apex of wing notched triangularly, the angle of the third vein has no appendix; the first posterior cell is closed at the border with a short stalk. Celebes (Rosenberg). v. d. Wulp, Tijds. v. Entom., xi, p. 100.

In Walker's type the *abdomen* is brownish black, but the yellow bands are covered with yellow pubescence, besides tomentum; the under side is more yellow with whitish segmentations, blackish at the apex. *Legs* black, the fore tibiae at the base obscurely yellowish, the hind tibiae obscurely reddish yellow, the pubescence on coxae and femora yellow with grey tomentum, black on the tibiae and tarsi, the hind tibiae with black fringes. *Forehead* is barely more than half as wide anteriorly as it is at vertex and about ten times as long as it is broad, the frontal callus very narrow, pear-shaped, with lineal extension. Length of female type 19 mm., the other 16 mm.

♂ Eyes with equal facets. *Face* and subcallus with yellowish grey tomentum and yellowish white hairs. Beard the same. *Palpi* yellow with yellow hairs and a few black ones at the apex. *Antennae* reddish yellow, the first two joints pale yellow, with black hairs, the third long and slender with a small tooth, slightly dusky at tip. *Abdomen* more yellow than in female, the darker bands only beginning on the fifth segment, the segmentations narrowly whitish, the under side identical. *Wings* with the first posterior cell narrowed at opening. Length of type 16 mm., of others 19 mm.

Tabanus vanderwulpi, ♀ ♂, Osten Sacken.

Berlin. Ent. Zeit., xxvi, p. 97 (1882); *nec pictipennis*, V. d. Wulp.

One female in Brit. Mus. coll. from the Philippines.

This species is very nearly related to *Tabanus flexilis*, Wlk. Osten Sacken thought it identical with *Tabanus pictipennis*, v. d. Wulp (which is undoubtedly the same as the Walker species), and renamed it as above, the first name being preoccupied. His reproduction of van der Wulp's description is not given here as he made additions to it to suit his specimens from the Philippines, 1 ♂ and 4 ♀ Judging from the specimen in the Brit. Mus. coll. the female differs from *Tabanus flexilis*, Wlk., in the following particulars:—

Antennae black at apex. *Forehead* about half as wide anteriorly as it is at the vertex and fully ten times longer than it is broad, the frontal callus longer and narrower, very little wider than its lineal extension. *Abdomen* brownish red with the yellow posterior bands narrower, produced in the middle as triangular spots, but the under side is darker with black and yellow bands. *Legs* black or dark brown with black pile as Osten Sacken describes, but in this specimen the femora have some yellow hairs, the fore coxae same colour as breast. Length 21 mm.

♂. According to Osten Sacken's description the eyes have large and small facets very sharply divided.

GROUP VI.

Forehead with one square or narrow or oblong callus, always prolonged towards the vertex as a more or less narrow line, usually nine to ten times as long as it is broad (in *Tabanus curiflamma* Wlk., however, it is much broader). Large species, 18—23 mm. in length, with the wings coloured brown or yellow or both, usually clear at extreme apex and sometimes in the discal cell, never forming regular bands.

Tabanus speculum, Wlk., from Celebes will belong to this group.

Tabanus pratti, ♀, n. sp.

Type ♀ in Brit. Mus. coll. from Kelanton, Malacca (purchased from H. Rolle, 1904); and another female from Sarawak (A. R. Willington, 1908). Presented London School Tropical Medicine coll. In the latter collection is one female from Batu Tiga, Selangor (Pratt). This very handsome black species is distinguished by the bright orange-red pubescence on face and sides of breast; the beard is also the same colour. Abdomen black with white-haired bands at sides. Wings dark brown. Tibiae white at base. Length of type 24 mm., the other female 23 mm.

Face thickly covered with bright orange-red pubescence, the hairs in middle of face and a tuft at sides rather more golden yellow, a few brown hairs are visible on cheeks bordering the eyes, and a tuft-like fringe between the antennae and the eyes. Beard orange-red, thick. *Palpi* dull reddish, appearing black by reason of the thick black pubescence, stout, almost the same width throughout. *Antennae* red, the first two joints covered with black hairs, the third large, broad, the last four divisions forming hardly a fourth of the whole length; the tooth is represented only by a very slight angle indeed. Subcallus blackish, covered with reddish brown tomentum. *Forehead* darker, narrow, about nine times as long as it is broad, and a third narrower anteriorly; frontal callus black, shining, long and narrow, almost reaching the eyes with a long stout linear extension. *Thorax, scutellum* and *abdomen* dull blackish brown, covered with close black pubescence, on the shoulders and sides of thorax it is longer; breast with dense orange-red long pubescence; in the centre it is nearly bare, covered with reddish brown tomentum. *Abdomen* with white-haired segmentations on all the segments but the first, thickest at the sides, hardly ever reaching the centre but usually represented on the median line by a few scattered white hairs; the type itself is denuded and only shows the white bands on the second and third, the segmentations under the white pubescence at sides only, appear golden yellow, sides of abdomen with thick tuft-like black pubescence; under side black with white-haired segmentations. *Legs* black with black pubescence, the tibiae white on the basal half with white pubescence, but black at the extreme base. *Wings* a dark rich brown, a clear streak is visible in the costal cell below stigma, another in the marginal cell, the discal cell is wholly clear, the extreme apex, the basal cells and posterior border much paler if not quite clear, veins and stigma blackish brown, first posterior cell a little narrowed at opening. Squamae brown. Halteres brown, the club at apex yellow. It is named after the gentleman who has enriched the London School of Tropical Medicine and Brit. Mus. coll. with a considerable number of specimens from the Malay Archipelago.

***Tabanus fuscicornis*, ♀, n. sp.**

Type ♀ in Brit. Mus. coll. from Punkio, Formosa (A. E. Wileman, 1909).

This species is nearly allied to *Tabanus pratti*, n. sp., in colouring, but is at once distinguished by the black antennae and black palpi and by the more hyaline wings, quite clear at apex. Length 17 mm.

Face brownish yellow, paler at base, with a few black hairs, the bright orange-red pubescence is here confined to the beard. *Palpi* blackish with black pubescence more pointed than in *T. pratti*. *Antennae* wholly black, the first two joints with black pubescence, the third broad at base with a perceptible

tooth. Subcallus brown. *Forehead* ashy grey, narrow, the same width throughout and about seven times as long as it is broad, the frontal callus black, almost the same width throughout, to within a short distance of the vertex, very similar to that of *T. pratti*. *Thorax* and *scutellum* in this species bluish black, with ashy grey tomentum, devoid of pubescence on dorsum, sides with long black hairs; breast with similar orange-red pubescence to that of *T. pratti*. *Abdomen* black with median white-haired spots, the segmentations white-haired at the sides only, pubescence on dorsum black; under side black with white segmentations. *Legs* black with black pubescence, some yellow hairs on the fore coxae and yellow tomentum on the others. *Wings* marked with dark rich brown colouring, most intense on fore border and across middle of wing, leaving the discal cell however clear, and not extending beyond the base of fork of third vein, so that the apex is wholly clear, posterior border almost wholly clear, veins and stigma blackish, no appendix present. Halteres brown.

***Tabanus nephodes*, ♀, Bigot.**

Mem. Soc. Zool. France, v, p. 656 (1892). [*Atylotus*.]

Type (female) recorded from India; a label is affixed to it with "Naga Hills," which are on the Burma-Assam boundary. There is another female in the Indian Mus. coll. from Sibsagar, Assam, so that the habitat of this species is probably in these regions.

A dark reddish brown species with indistinct grey tomentose bands and median spots on the abdomen. Legs reddish brown. Wings deeply tinged yellowish brown, with the first posterior cell closed.

Antennae yellow. Forehead very narrow. Length of type 21 mm., the other female is 19 mm.

Face red, covered with grey tomentum, above near the antennae and the subcallus with more yellowish brown tomentum, the pubescence brown, on the lower part of the face the pubescence is white. Beard of long white hairs. *Palpi* yellow with black pubescence, long, slender, not much stouter at base, ending in an obtuse point. *Antennae* reddish yellow, the first two joints with black pubescence, the third blackish at its apex with a few hairs, at the base broad, with a small tooth crowned with some black hairs. *Forehead* reddish, covered with grey tomentum, about ten times as long as it is broad, almost reduced to half its width anteriorly, the frontal callus reddish, very narrow, cylindrical, with long, raised lineal extension; the callus is hardly wider than this last. *Thorax* and *abdomen* reddish brown, the former with grey tomentum, sides reddish yellow, shoulders with black hairs; breast blackish, covered with greyish white tomentum, pubescence probably white. *Scutellum* similar to the thorax. *Abdomen* with grey tomentose bands on the first four segments about a third of the width of segment; on the

last three the segmentations are very narrowly lighter, hardly perceptible; there are traces of median white-haired spots with a ground-work of grey tomentum on the second to fifth segments; pubescence otherwise seems black, but on the sides of the first four segments there are white hairs; under side similar with white hairs on the segmentations. All the specimens are more or less denuded. *Legs* reddish brown, the fore tibiae at extreme base and the middle pair appear reddish yellow, fore coxae with grey tomentum and some white hairs, femora also with a few, otherwise the pubescence is black. *Wings* with almost a dark band, the dark brown colouring extending from the upper end of the stigma to the apex on fore border, but not reaching much beyond the branch of third vein, leaving the apex clear, extending across the wing towards posterior border over the upper border of discal cell, shading the veins proceeding from the cell and gradually fading away; costal border and stigma yellow, base of wing with a faint yellow tinge, veins yellow, brown on upper half, the first posterior cell closed, appendix present.

***Tabanus albofasciatus*, ♀, n. sp.**

Type ♀ from Shillong, Assam, sent in Indian Mus. coll.

A large brown species, distinguished by the pale greyish basal band on scutellum, in this respect allied to *Tabanus albocostatus*, Bigot, but with the posterior cell very much narrowed at its opening on border. The abdomen has narrow white tomentose bands. Wings yellowish on basal half, brown on apical half. Legs black. Length 21 mm.

Face covered with yellowish tomentum and with some pale yellowish hairs. Beard yellow. *Palpi* yellow with black pubescence, large, ending in a fairly acute point, antennae bright red, dusky at apex, the first two joints pale yellow with black pubescence, the third wide at the base with a prominent tooth. *Fore-head* with tomentum a little darker than that of the face, about nine times as long as it is broad and barely half as wide anteriorly as it is at vertex. Frontal callus long and narrow with lineal extension. *Thorax* brown, reddish yellow at the sides with golden yellow hairs at base of wings, black hairs on the shoulders, dorsum of thorax with traces of short golden yellow pubescence anteriorly; breast covered with greyish yellow tomentum and with yellow pubescence, some black hairs intermixed. *Scutellum* brown but the basal two-thirds covered with grey tomentum. *Abdomen* blackish brown with greyish white narrow tomentose bands on the first five segments, the first one does not extend beyond the sides, traces of white pubescence on them, otherwise the pubescence on dorsum where present is black; under side identical. *Legs* blackish brown, the femora with some yellowish brown tomentum below, pubescence black. *Wings* yellowish as far as the apex of discal cell, more intensely so on fore border, apex brown extending to

the fourth posterior cell but the second submarginal cell is almost wholly clear. The type is not in very good preservation but is too distinct a species to be confused with others, though it is allied to *Tabanus joidus*, Bigot, in colour of wings and shape of antennae and forehead; the palpi are however larger and broader, and the wings have no appendix, the posterior cell open at border though very narrow.

***Tabanus basalis*, ♀, Macquart.**

Dipt. exot., i (1), p. 130 (1838); Van der Wulp, Notes Leyden Museum, vii, p. 72, 26 (1885).

Black. Scutellum and basal segments of the abdomen ferruginous. Wings yellow at the base, brown at the apex. Length 8 lines. From East India. M. Marc. Museum.

Face and forehead brown, this latter narrow, especially anteriorly, with a raised line and a small anterior callus, blackish. Antennae brownish testaceous, the third joint elongated, with a very short tooth, the last divisions brown. Thorax brown; sides, outer border and scutellum pale ferruginous. Abdomen with the first two segments pale ferruginous, transparent, with light whitish reflections; the others shining black. Legs blackish; tibiae yellowish black at the apex. Wings on anterior half yellowish and posteriorly of a light brown. Macq., Dipt. exot., i (1), p. 130.

Two females from Sumatra (V Lansberge). In the most essential points they agree with the description. There are however some disagreements to be mentioned.

1st. According to the description the third and following segments of abdomen ought to be shining black; in my specimens the colour of these segments is fuscous and rather dull; moreover the livid margins of segments show remains of a white hair-fringe; the under surface is wholly fuscous and there the white fringe is complete, even on the second segment.

2nd. According to Macquart the legs are blackish, the tibiae yellow with black tips; this may be the truth in regard to the front legs; in the posterior ones, however, I find the tibiae brown and not darker at the end.

This species may be easily recognised by the light brownish yellow colour of the first two abdominal segments, on account of which it resembles more or less the N. American *Tabanus cinctus*, Fabr. The eyes are bare, reddish bronze, without cross-bands, even after having been moistened, and with very small facets all over. V. der Wulp, Notes Leyden Museum, vii, p. 72.

Type in Paris Museum seen by me, has the first posterior cell of the wing closed, a fact not mentioned by Macquart or V der Wulp.

The abdomen is elongated, the first two segments livid, the remaining ones brownish black. Scutellum livid. Thorax brown, livid at base. Wings tinged brown, clear at the extreme apex,

yellowish at the base. Only the fore pair of legs are remaining; these are brown, the tibiae pale. Forehead about ten times as long as it is broad, narrowed anteriorly. Frontal callus oblong, no linear extension apparent. Palpi large, broad, ending in a point, reddish, flat. Antennae reddish with hardly any tooth. Length 18 mm. A specimen in Brit. Mus. coll. from Chantabun, Siam, which I believe to belong to this species—though owing to its bad preservation it is not possible to be certain—has the *scutellum* covered with grey tomentum, the *legs* as Schiner describes, and measures 15 mm. The beard is brown.

The female of *Tabanus crassus*, Walker, has not yet been discovered; it is just possible this may prove to be it, though it is a very differently shaped insect. The closing of the first posterior cell is not always present in both sexes.

Tabanus auriflamma, ♀, Walker.

List Dipt. Brit. Mus., i, p. 155 (1848).

Type (female) and two others from Sylhet, Assam, in Brit. Mus. coll.

In Indian Mus. coll. one female from Sibsagar, Assam, another from Naga Hills and another from Cachar, both localities on the border of Burma and Assam.

In Kertesz coll. one female from Sylhet, Assam. A handsome yellow-and-black species with yellowish wings, brown at apex and on posterior border, abdomen yellowish with black bands. Legs yellowish. Antennae yellow. Length of type 22 mm., others from 20—24 mm.

Face, subcallus and *forehead* covered with bright golden yellow tomentum; hairs on face and beard yellow or yellowish brown. *Palpi* reddish yellow with brown pubescence, stout, ending in an obtuse point. Antennae reddish, the first two joints covered with greyish tomentum and with brown hairs, the third joint slender, with no tooth and hardly a perceptible angle. *Forehead* parallel, about four times as long as it is broad, the frontal callus red-brown, shining, almost square, not reaching eyes, with hardly any lineal extension in fresh specimens; in denuded ones it appears. *Thorax* and *abdomen* yellowish, the former with some greyish brown tomentum and browner on the dorsum; pubescence scanty, consisting of short yellow hairs, shoulders with longer soft yellowish brown hairs. Breast the same colour. Scutellum yellow. *Abdomen* with broad blackish brown bands on the second, third and fourth segments, and a very narrow one on the fifth, all situated on the anterior half of segments, taking up half the width of segment on the second, rather narrower on the third and fourth, and on the fifth hardly noticeable; in some specimens the bands are reddish brown, the pubescence on the yellow parts golden yellow, thick, on the bands black; under side similar. *Legs* wholly reddish yellow, in the type the fore tarsi and tibiae are darker, owing to discoloration, pubescence reddish yellow. *Wings* large, deeply tinged with

yellow, brown on the apex, beginning from the base of the fork of third vein and extending along the posterior border, gradually becoming narrower as it approaches the base of wing, the coloration very distinct and the two colours sharply divided, veins yellow, brown on the brown part, stigma yellow, no appendix, all posterior cells widely open.

GROUP VII.

Forehead with one square or narrow or oblong callus always prolonged towards the vertex as a more or less narrow line, from five to nine times as long as it is broad.

Species of medium size or small, with one or more stripes on abdomen, usually continuous, the median stripe always so.

Tabanus striatus, Fabr., is the typical species of this group. *Tabanus auristriatus*, n sp., *hybridus*, Wied., and *aurotestaceus*, Wlk., form almost a subgroup. *Tabanus immanis*, Wied., is not known to me and is not included in the table; neither is *Tabanus bubali*, Doleschall, which will prove hard to identify from its very meagre description.

Tabanus annamitus, ♂, Bigot.

Mem. Soc. Zool. France, v, p. 630 (1892) (*Bellardia*).

Type, male, from Saigon, Cochin China.

A species with a fulvous abdomen on which appears an indistinct blackish median stripe, the apex blackish. Wings clear. Legs yellowish. Length 15 mm.

Eyes large, with the large facets very distinct, taking up fully two-thirds of the eye, the small facets on lower part continued to vertex as a narrow border, no appearance of hairs on eyes. Frontal triangle chestnut-brown. Subcallus and face covered greyish tomentum and a few white hairs. *Antennae* now incomplete, described as yellow, black at apex; the first two joints with black pubescence. *Palpi* yellow, with paler pubescence. *Thorax* blackish with grey tomentum. *Abdomen* reddish yellow, with some grey tomentum, especially visible on the black narrow median stripe which becomes broader towards apex; under side reddish yellow, apex blackish. *Legs* yellowish, the fore femora darker, covered with grey tomentum and with black pubescence, the posterior pair with chiefly white pubescence, elsewhere it is mostly black. *Wings* quite clear, veins and stigma yellow, the first posterior cell closed at border.

I have seen no specimens identical with this species.

Tabanus striatus, ♂ ♀, Fabr.

(Pl. xiii, fig. 7.)

Ent. Syst., iv, p. 371 (1794); *id.*, Syst. Antl., p. 103 (1805); Wied., Dipt. exot., p. 79 (1821); *id.*, Auss. Zweifl. Ins., i, p. 155

(1828); V d. Wulp, Sumatra Exped. Dipt., p. 16 (1881); *id.*, Notes Leyden Museum, vii, p. 71 (1885).

Tabanus dorsilinea, ♂, Wied., Anal. Entom., p. 22 (1824); *id.*, Auss. Zweifl. Ins., i, p. 184 (1828).

Tabanus sinicus, ♂, Wlk., List Dipt., i, p. 163 (1848).

Tabanus tenens, ♀, Wlk., Ins. Saund. Dipt., i, p. 49 (1850).

Tabanus megalops, ♂, Wlk., List Dipt., v, Suppl. i, pp. 247, 407 (1854).

Tabanus partitus, ♀, Wlk., Proc. Linn. Soc. London, i, p. 9 (1856).

? *Tabanus manilensis*, ♀, Schiner, Reise Novara Dipt., p. 84 (1868).

Atylotus macer, ♂, Bigot, Mem. Soc. Zool. France, v, p. 649 (1892).

Tabanus rufocallosus, ♀, Bigot, *l. c.*, p. 679.

Reddish brown; thorax with white stripes, abdomen with three wide white stripes. Length 5-6 lines, ♂ ♀. From China and Java. Fabr., Ent. Syst., iv, 371, 39 (1794).

Ashy grey, abdomen brown with three abbreviated white lines. Fabr., Syst. Antl., 103, 47 (1805).

Antennae rusty yellow. Face grey-haired. Beard whitish. Forehead yellowish with a smooth band widened above and below into a square callus. Thorax in certain lights appearing white, with four broad whitish stripes and a line in the middle always apparent. Sides of breast white-haired. Abdomen in unrubbed specimens with three broad white unabbreviated stripes; the side borders also white so that really five stripes are present. Wings hyaline. Halteres brownish with white knob. Femora reddish rusty brown, tibiae paler. Tarsi blackish brown. Wied., Auss. Zweifl. Ins., i, 155, 69 (1828).

Van der Wulp records a male from Soerian Sumatra, in Sumatra Exped. Dipt., 16, 3 (1881), and gives the following details:—

“ ♂ Eyes are naked, flatter above than in other species, with a coarse network and a purple transverse band, below which the network becomes very fine. The white stripes on the thorax are indistinct, as are the two side stripes on the dorsum of abdomen, which latter ends in a point. The wings are quite clear, but have a pale grey tinge, the costal cell is yellow, the stripe-like stigma yellow-brown.”

In Notes Leyden Museum, vii, 71, 24 (1885), he records ♂ and ♀ from Java and Sumatra and adds—

“ Eyes bare, in ♂ reddish bronze above with large facets, the lower third and the borders blackish with small facets; the two parts distinctly separated; in the ♀ the eyes are uniform bronze with small facets.”

This species has a wide distribution, being found from India to Sumatra.

In the Brit. Mus. coll. are ♂ ♀ specimens from N. India, Pusa Bengal, Bassein Bombay, Calcutta; Trincomalee, Tanglegam, Kandy and other places in Ceylon; Upper Burma; Kuala Lumpur, Federated Malay States; Cavité, Philippines; and from Kajoe-Tanan, Sumatra (Hagen).

In Indian Mus. coll. from Bunkutwa, Gonda District, U. P.; Calcutta; Murshidabad, Purneah District; Port Canning; Bengal; Madras Coast; and Balighai, near Port Orissa E. India.

In Howlett coll. from Belgatchia and Pusa, Bengal; others identified from Sylhet, Assam; and Manipur, Burma.

The only species likely to be confused with this species are *Tabanus albimediis*, Walker, and *Tabanus rubidus*, Wied., from both of which it may be distinguished by the *spindle-shaped continuation of the frontal callus*, by the almost straight median stripe, narrow almost continuous lateral stripes and by the slender more or less pointed abdomen. Length from 12—20 mm. A female specimen in the Paris Museum placed under this species and supposed to be the original type is a specimen of *Tabanus albimediis*, Walker, from Java, but as the original description very clearly states there are three stripes, the type has probably been lost or confused; there is a specimen side by side with this supposed type, determined by Macquart as *Tabanus striatus*, with the usual striped narrow abdomen.

Some small specimens, females, from Mohmand Pass, N. W. Frontier, in the Howlett coll., which I took at first to be a new species, only measure 11 mm. but I can find no other specific character to divide them from *Tabanus striatus*.

♀ *Face* greyish, with white pubescence. Beard white. *Palpi* very pale yellow with white pubescence and some black hairs, curved on upper side, with a rather long apex. *Antennae* reddish yellow, darker at apex. *Forehead* rather narrow, slightly narrower anteriorly, about six times as long as it is wide, covered with yellowish grey tomentum, some short white pubescence is visible, on the vertex are some black hairs. Frontal callus shining reddish brown, oblong, hardly reaching the eyes anteriorly, posteriorly receding from them and continued in a fine line for a very short distance, then becoming broad, at least half as wide as the callus itself, often starting direct from the callus as a broad stripe. Pubescence on hind part of head short and white. *Thorax* reddish brown, or brown with four fairly distinct greyish white tomentose stripes with white pubescence, elsewhere on the dorsum the pubescence is black, sides of thorax with black hairs, breast grey with white pubescence. *Scutellum* same colour as thorax, with black pubescence and white hairs round the posterior border.

Abdomen usually long and slender, ranging from reddish brown to blackish brown, the median stripe continuous, reaching the sixth segment, composed of oblong grey tomentose spots slightly narrower at their apices on the second and third segment, the side stripes

usually prolonged very distinctly to the fourth segment, appearing on the fifth as an indistinct spot, the sides of abdomen white with white hairs, the pubescence on dorsum black, white on the stripes. Under side reddish yellow or darker, covered with grey tomentum.

Legs reddish yellow, the femora more rusty reddish, often appearing darker owing to the black hairs situated chiefly on the upper sides, in some specimens the middle and posterior pair are blackish covered with grey tomentum, the pubescence is always predominantly whitish; on the coxae it is white and on the tibiae with black hairs on the upper sides, the tarsi reddish brown with black pubescence. *Wings* hyaline, stigma yellow, veins reddish. *Halteres* yellow or brown with lighter knob.

In a specimen from Malacca the fore coxae and femora are shining black with grey tomentum and wholly white pubescence.

♂ These are all reddish brown in colour of abdomen; in *Tabanus sinicus* ♂ type and another specimen from Calcutta, the femora and the greater part of the fore tibiae are blackish. The eyes are as Van der Wulp describes them, but the large facets are yellowish green in colour with a large brown band across the centre, only in the type of *Tabanus sinicus*, is this not apparent. The males vary from 12—20 mm. in size.

Tabanus dorsilinea, ♂, said to be nearly related to *Tabanus striatus* in the description but much smaller and different, has been long placed as a synonym and apparently correctly, though I have never seen a specimen of *Tabanus striatus* with "segmentations of abdomen widely ochre-yellow," as Wiedemann describes. His type came from E. India.

Tabanus sinicus, ♂, from Hongkong, has rather darker legs than usual, measuring 20 mm. length.

Tabanus tenens, ♀, from India, has legs rather paler than usual.

Tabanus megalops, ♂, from Java, is more reddish in colour than usual.

Tabanus partitus, ♀, from Singapore, has the femora rather darker than usual.

Atylotus macer, ♂, from India is labelled as *Atylotus microloma*, but from the description it is evidently the type of *A. macer*; it is a small specimen in very bad condition, as remarked by Bigot in his description; it appears to be a small specimen of *Tabanus striatus*, the three stripes clearly visible though Bigot speaks of two only. The type of *Tabanus rufocallosus* is from Java, nearly all the legs were wanting when described, the abdomen is partly destroyed which accounts for Bigot describing the median stripe as ending on the third segment; in reality it appears to end on the fourth segment, as the fifth is incomplete; the fore femora are rather darker than is usual.

Tabanus manilensis, ♀, is apparently from the description a specimen of *Tabanus striatus*, with the side stripes indistinct and the legs rather darker than usual; it is described as from Manila. Length 13 mm. one specimen only. *Tabanus chinensis*, Thunberg

(N. Acta. Reg. Soc. Upsaliensis, ix, 53—62, 1827), recorded as from China and Cape of Good Hope, was probably a specimen of *Tabanus striatus*, or of *Tabanus taeniola*, P. B., from the Cape, or Thunberg may have had specimens of both species before him, the African and Indian species being very nearly related, but distinct; the frontal callus alone would divide them, but his description is not full enough to make it possible to decide; the species may well be deleted from the list of *Tabanus* species. See Bezzi, "Nomenklatorisches über Dipteren" in Wien. Ent. Zeit., xxvii, vol. ii and iii (Feb. 1908).

Tabanus costalis, Lichtenstein, Catalogus, p. 213, Hamburg (1796); Austen, Ann. Mag. Nat. Hist. (8), i, p. 346 (1908); from Coromandel. This species, described in under a dozen words and absolutely indeterminate but apparently thought by the author to be near *Tabanus striatus*, should be deleted from the list of species of *Tabanus*.

***Tabanus hilaris*, ♂ ♀, Walker.**

Ins. Saund. Dipt., p. 49, pl. ii, fig. 3 (1850).

In Brit. Mus. coll.; the type ♂ from India, others from the Punjab and N. W. India.

In Indian Museum coll. ♂ and ♀ specimens from Bhogaon, Purneah district, N. Bengal, "resting in numbers on tree trunks during the day, common in the evening on the stomachs of cows" (C. A. Paiva). In Howlett coll. ♂ and ♀ specimens from Belgatchia and Pusa, Bengal, others sent for determination came from Sylhet, Assam.

A species distinguished from *T. striatus*, F., by the short median stripe of abdomen which does not begin till the *third* segment and by the shorter lateral stripes which usually terminate on the third or fourth segment. The frontal callus is very similar in shape, shining red-brown, rather protuberant with a spindle-shaped extension, the forehead almost the same width throughout. The *palpi* shorter and stouter. *Legs* darker, the femora being all blackish or reddish brown. In colouring the abdomen is blackish brown with the stripes grey. The *thorax* with two stripes which fade away on the anterior border. The males are similar, in the type the abdomen is more reddish brown than black. Eyes in males with a broad band of very large facets, leaving the lower half of eyes and a narrow border continued to the vertex composed of small facets; across the yellowish large facets is a well-marked broad brown band.

Length of male specimens 11½ mm., of females 14 mm.

***Tabanus abbreviatus*, ♀, Bigot.**

Mem. Soc. Zool. France, v, p. 670 (1892). [*Atylotus*.] ? *Atylotus conicus*, ♂, Bigot, *l. c.*, p. 650.

Type ♀ and another from Java, in bad preservation. In Brit. Mus. coll. a female from Singapore (Falshaw), "Biting horses and cattle, more frequently seen in the last six months than in former years;" a female from Selangor (Butler), "Common, bites men and horses." In Howlett coll. females from Calcutta and from Belgatchia, Bengal.

In Kertesz coll. four females from Formosa. The type had the antennae incomplete when described and is now in a dirty denuded condition; the description given below is based largely on the modern specimens.

A reddish yellow species with the thorax blackish, abdomen with a narrow grey median, and fainter lateral stripes. Antennae and legs reddish brown. Length type 16 mm., other specimens from 14—17 mm.

This species is distinguished from *Tabanus albimediis*, Wlk., by its smaller size, narrower forehead especially above antennae, more slender palpi, covered with black pubescence, darker legs and thorax, abdomen reddish yellow, blackish at apex. *Face* covered with grey tomentum and with silvery white pubescence. Beard the same colour. *Palpi* pale yellow thickly beset on their outer side with black hairs, long and slender, the apical part as long as the stouter basal part. *Antennae* red-brown, blackish on the last half of the third joint which is broad at its base with a prominent tooth, the first two joints with black hairs. *Forehead* narrower anteriorly, covered with yellowish brown tomentum and with black hairs about eight times as long as it is wide anteriorly, the frontal callus oblong, not reaching the eyes, diminishing to a long narrow line, reddish brown or brown in colour. *Thorax* blackish covered with yellow brown and grey tomentum and with white and black hairs on dorsum, the grey stripes indistinct, sides with black hairs, but tufts of whitish or yellowish hairs round base of wings; breast grey with white pubescence. *Scutellum* as thorax. *Abdomen* reddish yellow, on each side of the median stripe it is usually brown, the last three segments largely black, the median stripe is narrow, usually continuous, covered with grey tomentum and with black hairs, some yellow hairs are often present, the side stripes are faint, indicated by grey tomentum and by yellow hairs, the pubescence on the dorsum is otherwise black, thicker at the apex: under side lighter. *Legs* reddish, femora darker, especially the anterior pair, with grey tomentum and largely yellowish pubescence, fore tibiae at apex and fore tarsi blackish, other tarsi brown. *Wings* clear, costal border yellow, veins brown, stigma yellow.

In one of the specimens from Formosa the median stripe is broken up into narrow triangular spots which however join; in fresh specimens the side stripes appear more distinct as oblong narrow spots forming more or less continuous stripes.

Atylotus conicus ♂, Bigot, from India is probably the ♂ of this species. Type is in fair condition; eyes with large facets above.

***Tabanus rubidus*, ♀, Wied.**

Dipt. exot., 69, 14 (1821).

♀. Lilac brownish. Thorax with whitish stripes. Abdomen with three whitish stripes composed of spots. 8 lines. From Bengal, Wied., Dipt. exot., 69, 14 (1821).

Related to *Tabanus autumnalis*. Antennae rather reddish, the end joint almost wholly blackish. Face and beard white. Palpi very pale yellowish. Forehead grey. Frontal stripe narrow ending below in a narrow egg-shaped reddish callus. Thorax lilac reddish brown, with grey tomentum and five whitish, in certain lights, grey-haired stripes; breast sides rather hoary white with white tomentum. Abdomen lilac reddish brown, median stripe composed of narrow triangular side stripes of nearly square spots: side borders yellowish white, in certain lights the abdomen appears a little grey haired. Wings in the middle rather yellowish; halteres rather reddish. Femora very light lilac reddish, above with a blackish stripe, tibiae more yellowish, both with white pubescence, tarsi brown. Wied., Auss. Zweifl. Ins., i, 127, 25 (1828).

Van der Wulp in Notes Leyden Museum, vii, 71, 23 (1885), records females from Java and Sumatra. Eyes with no cross-bands.

In Brit. Mus. coll. ♀ specimens from Moulmein, Burma; Bombay; Kuala Lumpur and Singapore, Federated Malay States; Siam (Woolley). On the female from Singapore is the following note: "Biting horses and cattle, more frequently seen during the past six months than in former years." (Falshaw.)

In Howlett coll. from Pusa and Belgatchia. In Indian Mus. coll. from Sibsagar, Assam; Bhogaon and Purneah District, N. Bengal: "Resting in numbers on tree-trunks during the day, common in the evening on the stomach of cows;" from Khasi Hills, Assam; from Partabgarh, U. P.

This species is distinguished from *Tabanus striatus*, Fabr., in general by its broader, larger *abdomen*; the frontal callus is not prolonged in a spindle-shaped thick line but as a narrow short line; the median stripe of *abdomen* is not so straight, the sides are serrated, the spots composing it being more triangular in shape, the side stripes do not appear so regular and continuous, being composed of very similar spots, but their apices as a rule are turned inwards so that the stripe appears irregular. The *legs* as a rule are darker, especially the femora, and the apices of the fore tibiae, which are blackish, their basal part yellowish white. The *palpi* are pale yellow or whitish with mostly black pubescence, stout and large. The *face* is covered with grey tomentum and with white hairs. *Forehead* slightly narrower anteriorly, about five times as long as it is broad. In the specimen from Assam the wings are tinged with brown. Length of specimens 17—20 mm. The males of this species if they do not retain the dark colour of the females will be difficult to distinguish from those of *Tabanus albimediis*, Wlk., only the darker femora serving to divide them.

I have not yet seen any males which appear to belong to this species.

Tabanus albimedius, ♀ ♂, Walker.

(Pl. xiii, fig. 8.)

Dipt. Saund., p. 48 (1850).

Tabanus vagus, ♀, Walker, Dipt. Saund., p. 50.

Tabanus umbrosus, ♀, Walker, Dipt. Saund., p. 52.

Tabanus priscus, ♀, Walker, List Dipt., i, p. 176 (1848).

? *Tabanus calidus*, ♀, Walker, Dipt. Saund., p. 57.

Atylotus lachrymans, ♀, Bigot, Mem. Soc. Zool. France, v, p. 669 (1892).

In Brit. Mus. coll. the type (♀) of *albimedi*us from E. India (Saunders coll.), other specimens from Nepal; India; and a long series of males and females from Ceylon (Verbury coll.); these latter are said to be common on the road from Trincomalee to Kanthalla.

In Howlett coll. females from Umballa, 900 ft., "lying close on tree trunk;" males from Calcutta; and males and females from Pusa, Bengal.

This species is very nearly allied to *Tabanus rubidus*, Wied., being chiefly distinguished from it by the lighter colour of *abdomen* which is not uniformly blackish brown or lilac-brown, as is the case in typical specimens of the Wiedemann species, but is reddish brown, usually darker brown each side of the median stripe, which latter varies from narrow to wider triangular spots forming a more or less continuous stripe. Under side reddish yellow. *Thorax* reddish brown with grey tomentum and indistinct grey stripes. *Legs* are lighter in colour, the femora reddish brown, the tibiae yellowish but the apices of the fore tibiae blackish, the tarsi reddish brown. ♀ *Forehead* five to six times as long as it is broad, slightly narrower anteriorly, frontal callus reddish brown, not quite reaching the eyes, with a narrow linear extension, which at once distinguishes it from *Tabanus striatus*. *Palpi*, very pale yellow with few or no black hairs. *Antennae* red, darker at the apex. Length 13½—18½ mm. The male is difficult to distinguish from the males of *Tabanus striatus*, but the shape of median stripe is different, being not so straight or continuous. The males of the three species *striatus*, *albimedi*us and *rubidus* are all somewhat difficult to distinguish from each other.

The species is very nearly allied to *Tabanus rubidus*, Wied., and may perhaps eventually be regarded as only a form of the above, as many of the specimens of both species are variable in the colouring of the abdomen and of the legs and therefore difficult to divide from each other.

The series from Ceylon have the forehead rather narrower anteriorly and the abdomen is rather more reddish yellow.

Tabanus vagus, type, ♀, is from E. India (Saunders coll.), another female from same locality and one from Java were identified by Walker as this species, but I find no difference in the specimens from those of *Tabanus albimediis*.

Tabanus umbrosus, type, ♀, from E. India (Saunders coll.), has the legs somewhat darker than usual, and the median stripe is straighter and narrow.

Tabanus priscus, type, ♀, from an unknown locality, appears to be identical with *T. albimediis*, but priority is not given to it owing to the doubt as to locality.

? *Tabanus calidus*, type, ♀, from Asia, but in the description a query accompanies the locality; this is presumably a specimen of *Tabanus albimediis*, very similar to the series of specimens from Ceylon.

Atylotus lachrymans, ♀; Bigot, from Java, appears identical with the Walker species.

***Tabanus speciosus*, ♀, n. sp.**

Type ♂ from Travancore.

Type ♀ from India (Wroughton), and another female from Tamblegum, Ceylon (Yerbury), in Brit. Mus. coll. In Indian Museum coll. female from Travancore, S. India.

A distinctly marked conspicuous species with a superficial resemblance to *Tabanus reducens*, Wlk., from Celebes, but distinguished from it by the presence of side spots. It is allied to *Tabanus rubidus*, Wied., but the conspicuous spots on the third and fourth segments of abdomen with wide bases will distinguish it; on the second segment the spot is very narrow so that the stripe has a much more unequal appearance; and it is larger in size.

A black species, with three series of white spots on abdomen, legs blackish with yellow tibiae, antennae red, wings almost clear. Length 19 mm.

♀ *Face* covered with greyish white tomentum, with silvery white pubescence and beard. *Palpi* pale yellow with some black pubescence, stout, ending in a short acute point. *Antennae* red, dusker at the apices, the first two joints pale yellow with black pubescence, tooth of third joint small but distinct. *Subcallus* same colour as face. *Forehead* with rather darker tomentum and with some white pubescence, about seven times as long as it is wide, only slightly narrower anteriorly, the frontal callus reddish brown, large, oblong, not reaching the eyes, the short linear extension not always visible. *Thorax* reddish brown in type, probably blackish brown when not denuded, with five distinct grey tomentose stripes, with yellowish white pubescence on them, sides with black hairs, round the base of the wings with white ones; breast covered with grey tomentum and with white pubescence. *Scutellum* same colour as thorax, with white pubescence at sides and on posterior border. *Abdomen* blackish brown, the median stripe

composed of four whitish tomentose spots, the one on the second segment narrow triangular, on the two following segments broad triangular, on the fifth the same but a little narrower, all with their apices reaching the border of the next segment, the spots on the sides distinct and large but less defined in shape and only present on the second, third, and fourth segments, oblique, inclining inwards from the outer border, the one on the fourth segment smaller; all these spots are white haired, pubescence otherwise on dorsum short, thick, black, sides yellowish with white pubescence; under side reddish brown with an indistinct median black stripe, pubescence white. *Legs* blackish, the coxae and femora covered with dense grey tomentum and with white pubescence, tibiae reddish yellow, the fore pair only so on their basal half, with white pubescence, which is also present but less thick on the other tibiae; pubescence on apices of fore tibiae, the extreme apices of the others and on the tarsi black. *Wings* hyaline, a hardly noticeable brownish tinge on the fore border, veins brown, stigma reddish yellow. Male identical with female, more reddish in colour. Eyes very large, the large facets occupy fully two-thirds of the eyes, the lower third composed of small facets which reach to the vertex as a narrow border, a dark brown band crosses the coppery coloured large facets.

***Tabanus hirtistriatus*, ♀, n. sp.**

Type (♀) and five other females, the type from Perak, the others from Durien Tipus, Negui Sembilan, Federated Malay States, in collection sent me by Dr. Stanton. A small brownish species, with a very narrow forehead, anteriorly barely half as wide as it is at the base, the abdomen with a grey tomentose median stripe clothed with yellowish or whitish hairs, this stripe often seems almost obsolete in rubbed specimens. Wings tinged with brown on the fore border. Length of type $11\frac{1}{2}$ mm., others from 12—14 mm.

Face covered with grey tomentum and some white hairs, sides of cheeks and subcallus with yellowish brown tomentum. Beard white. *Palpi* small, a little stout at base, ending in a point, pale yellowish with black pubescence. *Antennae* slender with an acute but very short tooth at base of third joint, bright red, black at apex, the first two joints with black pubescence. *Forehead* covered with same coloured tomentum as subcallus, the frontal callus very narrow, oblong or cylindrical with a fine linear extension, not reaching the eyes, brown in colour, about nine times as long as it is wide. *Thorax* blackish brown with fine greyish yellow short pubescence, at sides with black pubescence. *Scutellum* is similar.

Abdomen blackish brown, more yellow-brown on the first two segments, sometimes reddish brown and black at apex, the pubescent stripe continuous with straight sides; under side yellowish brown covered with grey tomentum, and with white-haired segmentations. *Legs* brownish, the tibiae yellow, black at apices. *Wings* hyaline, tinged with brown on the fore border reaching the apex, a short appendix usually present.

There are a series of males in the Indian Museum coll. from the base of the Dawna Hills, Lower Burma (*Annandale*), which may possibly prove to be the male of this species; the abdomen and legs are yellower; all the facets of the eyes almost the same in size. A note is attached to them, *viz.*, "Hovering over cart track in the bright sun."

Tabanus monotaeniatus, ♀, Bigot.

Mem. Soc. Zool. France, v, p. 655 (1892). [*Atylotus*.]

Type (♀) and four others from India (only three specimens are mentioned by Bigot in his description) and one other (♀) from N. Khasi which was placed under his species *Tabanus monilifer*.

In Indian Museum coll. three para-types from India, one of them from Sibsagar, and another from N. Khasi, Assam. In Howlett coll. seven ♀ from Nangpoh, Assam, "caught on animal." In Brit. Mus. coll. ♀ specimens from Dibia and Sadia, Khasi Hills District; and N. Khasi Hills, lower ranges (Chennell); and Nangpoh, Assam. A blackish brown or reddish brown species, the abdomen with a narrow distinct grey tomentose median stripe reaching to the sixth segment, the sides straight: the thorax blackish with indistinct stripes. Legs blackish, with red tibiae, antennae and palpi.

Length of the type 18 mm., other specimens range from 14—19½ mm.

Face covered with greyish tomentum and with white pubescence, a few black hairs on cheeks. *Palpi* large, reddish or yellow, covered with black hairs, the inside bare, ending in rather an obtuse point. Beard white. *Antennae* reddish, the third joint dusky, and blackish at apex, only red at base, the tooth obtuse, the first joint with grey tomentum and with black pubescence, the second with black pubescence on its outer border. *Forehead* covered with yellowish tomentum, with some short black pubescence, very nearly the same width throughout, very slightly narrower anteriorly, quite six times as long as it is wide, the frontal callus club-shaped, the line proceeding from it being thick; the callus does not reach the eyes and is dark brown in colour. Hind part of head with short white pubescence, some black hairs at vertex. *Thorax* black with yellowish brown tomentum and with traces of four indistinct grey stripes, the shoulders and sides of thorax in some of the specimens reddish brown, the pubescence of dorsum short, black, hairs at sides black. *Scutellum* black with grey tomentum and black pubescence; breast and sides covered with greyish tomentum and with white hairs. *Abdomen* blackish brown, or reddish brown, with some yellowish brown or greyish tomentum which in some specimens appears as indistinct roundish spots, the dorsum rather thickly covered with short black pubescence, with the exception of the median stripe on which a few white hairs are visible, the hairs on sides of first three segments are black, afterwards white, the segmentations very narrowly lighter; under side blackish brown or reddish brown

covered with grey tomentum, the segmentations yellowish, the pubescence chiefly black. *Legs*: the coxae and femora black with grey tomentum and with white pubescence, the tibiae reddish, darker at extreme apex, with chiefly black pubescence, the tarsi the same colour but appearing darker on account of the thicker black pubescence. *Wings* grey, tinged with brown on fore border, and round veins. Halteres reddish brown, knobs pale yellowish red.

The two females from N. Khasi are rather paler in colouring, the abdomen more reddish, the thorax with sides and shoulders reddish, the legs slightly redder, the wings clear with stigma and veins yellow.

The type and the majority of the specimens have a blackish brown abdomen, but some are reddish brown.

***Tabanus brunnipennis*, ♀, n. sp.**

(Pl. xiii, fig. 9.)

Type (♀) and two other females from Basi, N. Kanara, S. W. India (T. R. Bell), 1908; one ♀ from Bangkok, Siam (S. S. Flower), 1908.

In Howlett coll. one ♀ from Gorakhpur, U. P., India.

A well-marked brown species with a rather broad very distinct grey median stripe on abdomen, and two grey spots on the second segment. *Legs* and antennae reddish. *Wings* grey, tinged brown on fore border as far as the second longitudinal vein. Length of type 16 mm., other specimens from 13—15 mm. It is distinguished from *T. monotaeniatus*, Bigot, by its smaller size, and the wings have not the cross-veins shaded, but the tinged fore border sharply defined.

Face covered with whitish grey tomentum and a few scattered white hairs. Beard white. *Palpi* yellow with rather numerous black hairs, stout at base ending in a long obtuse apex. *Antennae* reddish, the first joint appearing paler with whitish tomentum and some very fine black pubescence, the third slender with a very slight tooth, brown at apex. *Forehead* covered with yellowish brown tomentum and with a few black hairs, the same width throughout, about six times as long as it is wide, the frontal callus shining reddish brown, not reaching the eyes, club-shaped, the linear extension thick ending in a point beyond the middle of the forehead, in some of the specimens the callus appears larger, apparently owing to denudation, a slight furrow appears each side of the apex of callus converging towards the vertex. *Thorax* blackish (when denuded reddish), covered with greyish tomentum and black pubescence, two indistinct grey stripes apparent, with traces of yellowish pubescence anteriorly, sides grey with white hairs, shoulders reddish with black hairs, breast covered with grey tomentum and white pubescence. *Scutellum* reddish with grey tomentum and black hairs, white hairs on borders. *Abdomen* dark reddish brown, usually redder on the anterior

segments, covered with dense but short black pubescence, on the stripe and spots with short white hairs; the spots are situated one on each side of the second segment, small and round, indications of one on the third segment are present, the stripe measuring nearly 1 mm. at its broadest from the first to sixth segment, sides straight; under side paler, reddish, with white and yellowish pubescence. *Legs* reddish, apices of fore tibiae and tarsi darker, femora with grey tomentum and chiefly white pubescence, tibiae and tarsi with chiefly black pubescence. *Wings* with the dark colouring very noticeable reaching to the apex, veins and stigma brown.

***Tabanus abscondens*, ♀, Walker.**

Trans. Entom. Soc. London, v, p. 275 (1860).

Type ♀ from Burma; one ♀ from N. Chin Hills, Burma (Watson); one ♀ from Dawna Range, Tenasserim, Lower Burma, 500—1,500 feet (Bingham); one ♀ from China in Dr. Kertesz's collection.

Type and specimens are all in a denuded faded condition, so that the redescription given below is imperfect. The species appears to be nearly related to *Tabanus glaber*, Bigot, but is distinguished from it by the frontal callus. Abdomen reddish, with a broad black median stripe. Length 16 mm., one specimen 17 mm.

Face greyish with thick short white pubescence. Beard white. *Palpi* reddish yellow with black pubescence, long with a not very pointed apex.

Antennae gone in type. Walker describes them as small, with the tooth very small; in the specimens from Tenasserim and China they are long and slender, the tooth prominent, reddish, the third joint darker. *Forehead* considerably narrower anteriorly, about six times as long as it is wide, the frontal callus oblong, narrow, nearly reaching the eyes with a short linear extension. *Thorax* blackish, red at sides, *scutellum* blackish, red on its outer border. *Abdomen* appears to be reddish with a broad black stripe on which appear traces of a narrow grey stripe, the sides of segments black and the three last segments wholly blackish. *Legs* reddish, the fore femora, apices of fore tibiae, and tarsi blackish. *Wings* clear, stigma yellowish, veins brown.

***Tabanus auristriatus*, ♀, n. sp.**

Type ♀ and three others from Gersoppa, N. Kanara, S. W. India (Bell), 1908.

A dark brown species with golden hairs on thorax and abdomen, forming a stripe on the latter. Antennae yellowish. Legs brownish. Wings pale brown, deeper brown on the fore border. Length of type 14 mm., other specimens from 11—13½ mm.

Face covered with pale greyish white tomentum on lower part; a narrow band stretching across just below the antennae, subcallus and the forehead covered with rich yellowish brown tomentum, pubescence on face scanty, black. Beard sparse, white. *Palpi* long, narrow, yellowish brown with black pubescence. *Antennae* long, slender, the first two joints pale yellow with black hairs, the third red, black at apex, with a small tooth. *Forehead* narrow, the same width throughout, about six times as long as it is wide anteriorly, the frontal callus long, narrow, not reaching the eyes, prolonged in a thick line just beyond the middle of forehead. *Thorax* and *scutellum* thickly covered with very short yellow pubescence, sides with black hairs, breast grey with white hairs. *Abdomen* yellowish brown anteriorly, darker at apex, with black pubescence, the median stripe is indistinct, chiefly marked by the golden yellow hairs which also border the segmentations; under side brown with white-haired segmentations.

Legs brown or yellowish brown, fore tibiae a little paler at base. *Wings* tinged brown, paler on the posterior border, stigma dark brown, veins brown.

This species is distinguished from *Tabanus hybridus*, Wied., by the forehead not becoming narrower anteriorly, by the ~~darker~~ legs and indistinct narrower median stripe.

***Tabanus hybridus*, ♀ ♂, Wied.**

Auss. Zweifl. Ins., i, p. 557, 31 (1828); Walker, Proc. Linn. Soc., i, p. 110 (1857) (recording the species from Macao).

Oak-brownish with a brown-yellow striped abdomen. Wings brownish on the fore border, $5\frac{1}{2}$ lines, ♀ from Macao.

Of a slender form. Antennae rusty yellowish, the last joint with a hardly perceptible tooth at base; palpi brownish; face yellow; beard whitish; forehead yellow with a linear like callus gradually somewhat thicker below. Thorax oak-brown with two hardly perceptible lighter stripes; breast sides greyish. Abdomen brown with a broad yellow stripe and quite narrow yellow side borders, the last segment black-brown; on the under side the three last segments are blackish with yellow side borders. Wings on the fore border brownish. Legs brownish yellow with black-brown tarsi. In my collection. Wied., Auss. Zweifl. Ins., i, p. 557.

Van der Wulp in his Cat. Dipt. S. Asia also gives Borneo, the type being recorded from Macao, S. China.

In Brit. Mus. coll. are ♀ specimens from Kuala Lumpur and Sunghai, S. Perak, Federated Malay States; also specimens sent to me by Dr. Kertesz for identification from Perak, and from Sylhet, Assam, others from Batu Tisa, Federated Malay States, Stanton coll. A very pale faded specimen determined by Walker as this species from Sarawak, Borneo, is probably correctly identified.

♀ An easily recognised species with the median yellow stripe on the yellowish brown sometimes darker brown *abdomen*,

the stripe in well-preserved specimens is covered with golden yellow hairs and is continuous and straight at sides; the *thorax* is covered with short golden yellow pubescence and some black hairs intermixed. The *forehead* is narrow, quite seven times as long as it is wide anteriorly, where it is almost a third narrower than at vertex. The frontal callus is very narrow with a fine linear extension. The *palpi* are yellowish covered with black pubescence, rather stout, ending in an obtuse point. The *legs* are brownish yellow, but the anterior and middle pair paler yellow, the fore tibiae often appearing white owing to white pubescence; in some specimens however the pubescence is black. The *wings* have the costal border shaded brown extending to the apex, in some specimens it reaches to the hind border, stigma yellow.

♂ Similar, the large facets of eyes occupy the greater portion of eye; the small facets on the lower part occupying about a third of the surface of eye, continued as a narrow border to the vertex.

Length of specimens from 11½ to 15 mm.

Tabanus aurotestaceus, ♂, Walker.

List Dipt., v, Suppl. i, pp. 214, 253 (1854).

Type from Shanghai, and a ♀ from China (Walker coll.).

A species near *Tabanus hybridus*, Wied., but distinguished by the wholly clear wing and black fore femora.

The ♂ has a very large head, *Atylotus*-like, flat above, the small facets occupying the lower third of the eyes and continued as a narrow border to vertex. *Thorax* and *abdomen* covered with yellowish tomentum and with black and some yellow hairs. *Legs* pale yellow, fore femora black, tarsi blackish. The yellow stripe on abdomen is very broad, about a third of the width of abdomen. Length 17 mm.

♀ A poor specimen. The forehead very narrow anteriorly, about nine times as wide as it is broad, with a long narrow frontal callus. Length 16½ mm.

Tabanus tristis, Van der Wulp.

Sumatra Exped. Dipt., 17, 5, pl. i, fig. 9 (1881).

One female from Datar, Sumatra, in May.

Black. Abdomen with lateral stripes and antennae ferruginous, the lateral borders of thorax and posterior border of scutellum pale haired. Wings ashy grey, the costa darkened. ♀ Length 11 mm.

Eyes naked, divided by a narrow, posteriorly somewhat enlarged, frontal band, on which a stripe-shaped, below a little enlarged, black line appears; the remaining triangular forehead, besides the face and the cheeks, with grey-brown tomentum; the beard pale grey. Antennae rust-coloured; the first joint triangular, the second projecting above spine-like; the third above at the base

with a small tooth and at the apex darkened (see plate). Abdomen black; the borders of the thorax and the posterior border of the scutellum with pale pubescence: on the fore breast and the fore coxae a very long dirty white pubescence; breast sides with ashy grey tomentum; the first four segments of abdomen with a rusty coloured stripe on each side, which is broadest at the base, but posteriorly narrower, a pale pubescence is visible on them; on the dorsum are some traces of reddish segmentation; on the under side they are distinct and light grey. Legs black-brown, somewhat shining; the femora by their pubescence greyish. Halteres brown. Wings with a grey-brown tinge, darkest on the fore border; stigma dark brown; veins black-brown, neuration normal. V d. Wulp, Sumatra Exped. Dipt., p. 17.

This species is unknown to me.

***Tabanus jucundus*, ♂ ♀, Walker.**

(Pl. xiii, fig. 10.)

List Dipt., i, p. 187 (1848).

Type ♂ and another specimen with no head, from Hongkong; male and female from Pundaluoya, Ceylon (Green); females from Kohat, Punjab, and India; all in Brit. Mus. coll.

In Howlett coll. females from Igatpuri, W. Ghats, Bombay Presidency; from Mussoorie, N. India, about 7,000 ft. high.

Walker described the male only.

A well-marked small black species with two very distinct lateral grey stripes on the thorax and with a grey median stripe on the abdomen, starting from the third segment and continued to the sixth segment, two lateral stripes commence on the first segment but terminate abruptly on the second segment. Wings clear. Legs reddish yellow. Antennae red. The large protuberant frontal callus with the short linear extension distinguishes this species. It differs from *Tabanus hilaris*, Wlk., by the presence of the lateral stripes confined to the first two segments, by the more distinctly striped thorax, and by the shorter linear extension of the frontal callus which is darker and larger, and by the narrower forehead anteriorly.

Length males 13 mm., females 10-11 mm.

♀ *Face* covered with whitish tomentum and with white pubescence. Beard white. *Palpi* stout, ending in a short apex, pale yellow in colour covered with white hairs, a few black hairs are also visible. *Antennae*: the first joint pale with white pubescence, black at the upper edge, the second very small, pale red, the third red with very obtuse tooth, apex reddish brown. *Forehead* broad, narrower anteriorly, about four times as long as it is broad at narrowest end, covered with greyish tomentum and with some patches of black pubescence; the frontal callus is large, almost square, entirely filling up the space between eyes, tuberculous, rising above the plane of the head, dark blackish brown, shining,

with a short fine line proceeding from it. Eyes with three cross-bands.

Thorax with dark pubescence except on the broad grey stripes where it is whitish, sides grey, so that the thorax might be called four-striped, pubescence below black, breast covered with long white hairs. *Scutellum*: the two grey stripes are continued and end on its posterior border.

Abdomen blackish, reddish brown anteriorly, the pubescence black, white on the stripes; sides grey, covered with white pubescence; under side with white-haired segmentations. *Legs* reddish yellow, the fore femora darker, all with grey tomentum, the fore pair with black, the others with white pubescence, the fore tibiae with thick white pubescence on basal half, elsewhere black, apices of fore tibiae and tarsi black. In the specimen from Bombay all the femora are darker.

Wings clear with small yellow stigma, veins dark.

♂ Identical. The eyes with large facets, the lower third consisting of small ones continued as a very narrow border to back of head; the cross-bands are visible in the type.

***Tabanus puteus*, ♂ ♀, n. sp.**

(Pl. xiii, fig. 11.)

Type ♂ from Velverry, Ceylon, and another from Trincomalee.

Type ♀ and another from Hot Wells, Trincomalee, one ♀ from Colombo, all from Yerbury coll.; "not uncommon" [note by donor].

A small brown species with a dusky mahogany-brown abdomen which has a straight median grey stripe. Antennae yellow. Legs brownish. Wings tinged with brown on the fore border reaching the third longitudinal vein. *Forehead of ♀ narrowest on the vertex.* Length 11 mm.

♀ *Face* covered with yellow-brown tomentum and with a few dusky hairs. Beard scanty, brown. *Palpi* small, stout, the same colour as face, with black pubescence. *Antennae*: the first two joints pale yellow with some black hairs, the third bright yellowish red, narrow, with no tooth, only a small angle marking its usual position, the second joint half as long as the first one. *Forehead* broad, *narrower at the vertex*, about three times as long as it is broad anteriorly, the same colour as the face, frontal callus large, almost square, reaching the eyes with a thick short line proceeding from it, in all the specimens there is a deep depression on the posterior part of the rather prominent callus which is yellowish brown in colour. *Thorax* blackish brown with the sides reddish, dorsum with thick short pale yellow hairs (in type rubbed off), on sides with yellowish brown pubescence. *Scutellum* appears rather lighter in colour, with the same very short pubescence. *Abdomen* narrow, no spots, the anterior segments more yellow-brown, the apex darker, the short yellowish hairs appear on the grey

stripe and on sides, but short black pubescence covers the dorsum. *Legs* dull brown or yellowish brown.

Wings grey, the yellowish brown shading extending in a fainter shade along the veins but most intense on the fore border, stigma brown, veins yellowish.

♂ Similar, the eyes with large facets, only the lower part bordering cheeks with small facets which do *not* extend to the vertex. The figure of head is taken from a badly preserved specimen, two ♀ specimens lately added to Brit. Mus. coll. have the whole forehead shining brown.

Tabanus immanis, ♀, Wiedemann.

Auss. Zweifl. Ins., i, p. 123, 17 (1828); V. d. Wulp, Sumatra Exped. Dipt., 16, 1 (1881); *id.*, Notes Leyden Museum, vii, p. 71, 22 (1885).

Olive-green. Abdomen rusty brown with an indistinct paler stripe; legs black; ♀ 8½ lines. From Java.

Antennae black. Palpi grey brownish. Face mouldy greyish coloured; forehead grey, with a brown shining stripe, very little wider below. Thorax olive-green, yellowish in certain lights. Breast sides mouldy greyish white. Abdomen in certain lights with a paler median stripe and almost square side spots; side borders themselves yellow; under side brownish, side borders broadly, the segmentations narrowly, yellowish. Wings a little tinged, fore border and border of veins, and apex yellowish. Halteres yellowish. Femora mouldy greyish, knees and base of fore tibiae rusty brown. In the Leyden Museum. Wiedemann, Auss. Zweifl. Ins., i, p. 123.

A female from Silago (Middle Sumatra) in June. This is 20 mm. long. The eyes are naked, and with very fine network; the frontal band is narrow, posteriorly a little broader, in the middle with a shining black-brown, below broader, stripe. The third joint of antennae has a distinct tooth. Palpi with light ashy grey tomentum, ending in a point. Beard as well as the pubescence of fore breast and fore coxae light grey. The pale median stripe of the abdomen consists of triangular spots; under side red-yellow, with a black-brown apex. The neuration of wings is normal, the first posterior cell at its opening a little narrowed. Perhaps *Tabanus rubicundus*, Macq., Dipt. exot., Suppl. i, p. 32, 64, Suppl. iii, 10, and Suppl. v, 27, is only a somewhat paler variety of this species. Van der Wulp, Sumatra Exped. Diptera, p. 16.

Several specimens, females, all from Sumatra. The eyes are bare, bronze-coloured, and after being moistened, without cross-bands. *Id.*, Notes Leyden Museum, vii, p. 71.

This species is unknown to me.

Tabanus bubali, Doleschall.

Natuurkund. Tijds. Nederl. Ind., x, p. 407, pl. iii, fig. 3 (1856).

A reddish brown *Tabanus*, eyes very black, antennae black,

forehead like mouth of a horse (*sic*), greyish white, the abdominal dorsal stripe white. Wings hyaline. Length 12 lines. Habitat in Java, hostile to cattle. Doleschall, *l.c.*, p. 407.

It is doubtful whether it will ever be possible to identify the species from this description; the figure proves the description was from a female, but otherwise is of little use.

GROUP VIII.

Forehead with one square, narrow, or oblong callus always prolonged towards the vertex as a more or less narrow line; four to ten times as long as it is broad.

Species with median or lateral spots or both on abdomen, not usually forming a continuous stripe. The subgroup represented by *Tabanus fumifer*, Wlk., contains species distinguished by very narrow foreheads and frontal calli, usually reddish brown or reddish yellow in colour: this is the most difficult group in the Oriental Region, the species being very nearly allied, and apparently distinguished by small, often variable characteristics; they are rather large or medium-sized species. *Tabanus signifer*, Wlk., is the type of a small subgroup easily distinguished by their prominent large abdominal pale spots.

Tabanus rufiventris, Fabr., *felderi*, V. d. Wulp, and *leucosparsus*, Bigot, are not included in the table being unknown to me.

Tabanus triangularis, V. d. Wulp, in the Austro-Malay Fauna, must be nearly related to *Tabanus brunneus*, Macq. but the legs must be lighter judging from the description.

Tabanus amaenus, ♂, Walker.

List Dipt., i, p. 163 (1848).

Tabanus clausacella, ♂, Macquart, Dipt. exot., Suppl. v, p. 45 (1855).

Tabanus administrans, ♂, Schiner, Reise der Novara Dipt., p. 83 (1868).

Tabanus signatipennis, ♀, Portschinsky, Horae Soc. Entom. Ross., xxi, p. 180 (1887).

Bellardia sinicus, ♀, Bigot, Mem. Soc. Zool. France, v, p. 629 (1892).

The description of *Tabanus clausacella* is as follows:—Black. Thorax with ashy grey pubescence. Abdomen with red segmentations, the second segment testaceous at the sides. Antennae with the third joint testaceous at the base. Tibiae white, with the apex black. Wings with first posterior cell closed.

Length 6 lines, ♂. Palpi of a yellowish white. Face, beard and forehead white. Antennae: the two first joints and the small

divisions of the third, black, first division of the third yellow, tooth moderate. Thorax with tomentum of a rather yellowish grey; sides of a whitish grey. Abdomen with fawn-coloured incisions, terminated by yellow; second segment with a testaceous lateral spot reaching the two borders; under side with tomentum and segmentations whitish. Legs black; tibiae of a yellowish white, black at the apex. Wings clear, stigma brown, first posterior cell closed near the border. From N. China (M. Bigot). Macquart, Dipt. exot., v, p. 45.

This description by Macquart of his species is unusually incorrect as he overlooked the grey triangular spots of the abdomen, yet there is no doubt of the identity of the type, which is however a very faded dirty specimen, a male measuring 15 mm. Schiner could hardly identify his male specimen from the above-mentioned description, and gave it a new name. His description is as follows:—

♂, type, from Hongkong. Closely related to *Tabanus mandarinus*, and identical in many respects with it; the differences are as follows.

Abdomen at bottom dark brown, the two basal rings as in the above-mentioned species, the following three rings with white tomentum, leaving four almost triangular spots of the ground colour free on the anterior border; or these segments might be described as brown, each with an anteriorly indented, posterior band; under the white tomentum, in some lights less distinct, the ground colour is reddish yellow, the sixth segment on the under side blackish, at the sides reddish yellow, the tomentum as in *Tabanus mandarinus*. Antennae rusty yellow, the third joint at the apex black-brown, the middle and posterior tibiae are almost wholly red-yellow. In every other respect identical with *Tabanus mandarinus*. 6 lines. One male.

Though this species is so closely allied to *Tabanus mandarinus* I do not think it possible to consider it as merely a variety of it.

I have before me also, from the same locality, a female specimen that possibly may be the female of *T. administrans*, the identity of all plastic characters at least encourages this opinion, but the abdomen is differently marked (and besides is not well preserved), and the first posterior cell is narrowed but not closed. The forehead is fairly broad, whitish grey above the antennae, the callus black, broad at the base, then becoming narrower and continued to the vertex as a line, ocelligerous spot present, but no ocelli visible. Schiner, Reise der Novara, Diptera, p. 83.

Portschinsky described his type from Chinese Mongolia thus—

This species is similar to *Tabanus autumnalis*, from which it is quite distinct, *the first posterior cell of wing being closed* with a long petiole, the size of body is less and it is much narrower in shape.

Black with cinereous or grey tomentum, sub-naked or very shortly pubescent.

Head wholly white and white haired, frontal callus narrow, oblong, ovate, continued in a black line. Eyes naked, not banded. Palpi white. Antennae reddish, at apex more or less widely black, the third joint at base with distinct tooth. Thorax with three wide stripes (anterior half divided by a narrow ashy grey line) in middle with very short black hairs, at sides with yellow hairs. Abdomen black with three grey or white rows or spots, the middle spot triangular as in *Tabanus autumnalis*, rather wider at apex; under side grey with middle stripe brown less conspicuous, each segment at apex narrowly margined with yellow. Squamae dark. Halteres white, at base black. Length $7\frac{1}{2}$ lines. Portsch., Horae Soc. Entom. Ross., xxi, 180 (1887).

♀ The abdomen is blackish marked as in the male, with grey tomentose triangular median distinct spots and with lateral less distinctly defined ones, the segmentations very narrowly lighter. Thorax similar. Tibiae all yellowish with apices black. Palpi reddish yellow, long ending in an acute point, with black pubescence. Antennae with black pubescence on first two joints, third long rather slender with obtuse tooth. Forehead narrow, very slightly narrower anteriorly, about seven times as long as it is broad, covered with yellowish brown tomentum and some scattered pubescence. Frontal callus oblong, not touching eyes, reddish brown or brown with a short spindle-shaped extension. Length of specimens from 15—18 mm.

Three females from Wei Hai Wei have the first posterior cell not closed but very much narrowed at the border, but are in all respects similar, with the exception of the greater size of the lateral spots which take up nearly the whole width of the segments.

♂ The colour of the *abdomen* is yellowish brown or darker brown, the lateral white tomentose spots often yellowish, ill defined. the second segment sometimes almost wholly yellowish brown with three grey spots; the median triangular grey spots always well marked. *Thorax* dark with grey tomentum and stripes, these last often with short scattered yellowish pubescence. The fore tibiae are usually red-yellow as well as the others, but sometimes obscurely so, and always on only the basal half.

Head large, the facets sharply divided, the small ones reaching half-way up the frontal triangle anteriorly and continued posteriorly as a narrow band to the ocelligerous tubercle. Length from 15—18 mm.

The Macquart type came from China (on the label is "China boreal"); the Walker type from Hongkong; the Portschinsky type from Chinese Mongolia; and Schiner's type from Hongkong. In Bull. Ent. France, 1887, p. lxxvii, *Tabanus amacnus* is recorded from near Yeso, N. Japan, by Bigot.

In Brit. Mus. coll. are specimens from Foo Chow and Swatow, and Shanghai (Walker); Formosa; and Japan (Dr. Myajima, 1909). In the Kertész coll. a long series of males and females from Formosa.

The species probably belongs to the northern part of the Oriental Region and the southern part of the Palæarctic Region.

Bellardia sinicus, described by Bigot from one specimen from China, is from the description no doubt this species described by Walker and others, the type is probably now lost.

This species has certainly a great resemblance to *Tabanus autumnalis*, L., but may be distinguished from it by the closed first posterior cell, and even in these specimens with this cell not closed but very narrow, the narrower abdomen and smaller size of insect, the narrower forehead seven times as long as it is wide (in *T. autumnalis* it is only five times) and the frontal callus nearly reaching the eyes will serve to distinguish it.

***Tabanus mandarinus*, ♂, Schiner.**

Reise der Novara, Dipt., 83, 8 (1868).

Tabanus trigeminus, ♀, Coq., Proc. U. States Nat. Mus., xxi, 310 (1898).

Brown reddish; thorax at bottom very dark with white tomentum which makes it in certain lights appear quite white, and with five stripes, the middle one narrow, rather yellowish, divided by a shining brown line, in certain lights very indistinct; the outer ones situated quite on the sides of thorax, and uniting pair-like with the inner ones before the scutellum. Breast sides nearly red-yellow, the shoulders red-yellow. Scutellum brown, in certain lights whitish, the posterior border red-yellow, the pubescence chiefly dark, on the breast sides white, and in certain places tuft-like. Abdomen black, the first and second segment thickly whitish tomentose, leaving of the ground colour only four spots apparent, on each of the 3—5 segments a whitish yellow triangular median spot which (?) takes up the whole hind border with its broad base, and reaches the fore border with its apex, the side borders also whitish, extending on each segment a little inwards, the segmentations narrowly red-yellow; under side blackish with yellow sides and segmentations, in certain lights it appears wholly white with the exception of a broad middle stripe. Head very large, the eyes very convex, the facets below and at the side very small, the upper ones large. Face very concave in the middle, whitish, proboscis short, black, projecting horizontally, palpi white-yellow, the end joint mussel-shaped. Antennae brown, the first joint appearing grey, the second rusty yellow, both quite bare, the first above projecting triangularly, the second with an upper thorn-like point, the third above with a shallow indentation and an obtuse angle. Legs black-brown, coxae and femora appearing white in certain lights and white haired, tibiae red-yellow on their basal half, more so on their outer than their inner side, tarsi black. Wings hyaline, the longish stigma brown, the first posterior cell closed, no appendix. Length 9 lines; one ♂ from Hongkong.

A magnificent species. Schiner, Reise der Novara, Dipt., p. 83.

Schiner thinks it is nearly related to *Tabanus spoliatus*, Walker, but not the same. It has in fact no kind of resemblance to the Walker species.

Brauer in Denkschr. Akad. Wien, xlii, p. 191 (1880), remarks that this species is very similar to *Tabanus rectus*, Loew, from Spain and Marseilles, but that the large facets of the eyes reach to behind the ocelligerous tubercle, and the zone of small facets above is narrow and not so broad as in Loew's species.

This species and *Tabanus administrans*, Schiner (now equal to *Tabanus clausacella*, Macq.), are related to *Tabanus autumnalis*, L., and *Tabanus rectus*, Loew, but the closed first or very much narrowed posterior cell will serve to distinguish both species. This species is distinguished from *Tabanus clausacella* by the absence of spots on the sides of the posterior segments and by its larger broader abdomen, and forehead not so narrow anteriorly.

In Brit. Mus. coll. specimens ♂ and ♀ from Tientsin; ♀ specimens from Wei Hai Wei ("biting cows"); from Chinkiang, Yangtze River, Foo Chow, Shanghai; Formosa and Japan.

Tabanus trigeminus is recorded from Japan, six ♀ specimens measuring 17-18 mm., the first posterior cell narrowed at opening. A long series from Dr. Miyajima from Japan have this same peculiarity. The species belongs to both zoological Regions. It is rather a blackish than a reddish brown species, with well-marked grey triangular median spot and lateral spots on the first two or three segments. The first posterior cell of wings usually closed, but occasionally only narrowed at opening. *Face* greyish tomentose with yellowish white pubescence. *Palpi* large, not very stout at base, ending in an obtuse point, reddish yellow with black pubescence. *Forehead* in ♀ narrower anteriorly nearly six times as long as it is broad, frontal callus oblong, reddish brown, not reaching the eyes, with a thick linear extension, the forehead covered with grey or yellowish grey tomentum and grey hairs, in many specimens a dark patch is present in the middle with black hairs. *Thorax* brownish black with three white stripes on dorsum and sides white, breast sides covered with greyish tomentum. *Scutellum* blackish brown with grey tomentum bordered posteriorly with grey hairs, on dorsum of thorax the pubescence is white and black, at sides black, below white. *Abdomen* black, the first two segments might be described as black, the first with three spots and the sides grey tomentose, the second with a large median and two lateral grey spots, on the third segment in some specimens there appear traces of a third spot, the segmentations usually narrower than as described by Schiner but in the specimens from Japan they are broader, grey tomentose slightly reddish yellow below. *Wings* with first posterior cell closed with a short petiole, or very narrow at the opening, the specimens from Japan have it open, not closed, but very narrow; the ♂ from Tientsin the same.

Length of specimens 15—21 mm.

Tabanus varicolor, Ricardo.

Tabanus variegatus, Rondani, Ann. Mus. Civ. Genova, vii, p. 458 (1875) (*nomen bis lectum*).

Length 14 mm. Antennae with the first two joints and the base of the third reddish yellow, the apex blackish. Forehead greyish yellow, anteriorly paler, the lineal callus red, shining; head above and below white and white haired; palpi very pale, black haired. Thorax on dorsum dark brown, the sides, posterior corners and margin of scutellum reddish; pleurae greyish and white haired.

Abdomen with the first two segments reddish yellow luteous; the following ones streaked blackish brown and ferruginous; the apex black, a pale dorsal stripe present on the four segments before the last one; under side with the basal segments blackish, or black spotted, posteriorly luteous, with white tomentum, and short white hairs. Wings sub-limpid, the costal border luteous. Legs: anterior ones black, the tibiae at the base widely luteous, the posterior tibiae and knees luteous reddish yellow, femora and tarsi more or less blackish. Calyptera ferruginous. Halteres with club outside whitish, inside and the stalk brown-red. Rondani, Ann. Mus. Civ. Genova, vii, p. 458.

The name of *variegatus* being preoccupied by a Fabrician species from N. America, I propose the substitution of *varicolor* for this species, the type of which came from Sarawak, Borneo, and was seen by me at Genoa.

It is a narrow-bodied specimen measuring 17 mm., with a yellowish shining *abdomen* irregularly marked with black on all the segments except the first one, and has besides three series irregular shaped greyish spots median and lateral, indistinct; the blackish markings are situated between the anterior and posterior borders of segments, the seventh segment is blackest, with black hairs on the outer border; the dorsum appears finely punctuated all over, pubescence black, thickest on the apical segments; under side similar but darker. *Thorax* blackish with grey tomentum, reddish at sides, with black hairs at the sides; *scutellum* blackish, red round the outer border. *Legs* yellow, with black pubescence, the femora reddish brown with white pubescence, the tarsi reddish brown. *Face* with grey tomentum and whitish hairs. *Palpi* yellow, thickly covered with black hairs, slender, ending in an obtuse point. *Antennae* reddish, dusky on the third joint, the tooth distinct, the first two joints with black hairs. *Forehead* with yellow-brown tomentum, narrow, anteriorly barely half as wide, about eight times as long as it is broad, the frontal callus yellow mahogany, narrow, oblong, not reaching the eyes.

I have not seen any specimens identical with this isolated type.

Tabanus rubicundus, ♂ ♀, Macquart.

(Pl. xiii, fig. 12.)

Dipt. exot., Suppl. i, p. 160 (1846); *id.*, Suppl. iii, p. 170 (1847); *id.*, Suppl. v, p. 47 (1855).

Tabanus internus, Walker, ♀, List Dipt., i, p. 164 (1848).

Tabanus monilifer, ♀, Bigot, Mem. Soc. Zool. France, v, p. 654 (1892). [*Atylotus*.]

♀ Testaceous, abdomen with dorsal white spots. Legs testaceous; anterior tibiae white at base. Length $7\frac{1}{2}$ lines.

Palpi of a pale yellow. Beard and face yellowish white. Forehead yellowish with a testaceous callus prolonged as a line. Antennae: the first two joints are testaceous, the third is wanting. Thorax and abdomen testaceous (denuded), with traces of a yellowish down; an abdominal stripe of triangular whitish spots; under side with whitish down. Anterior tibiae whitish in front, brown at apex. Wings yellowish, veins normal.

From India, Macq., Dipt. exot., Suppl. i, p. 160.

♂ We have since describing the female observed the male which differs in the dark colour of the thorax and abdomen. Macq., *l.c.*, Suppl. iii, p. 170. From Java. Length 6 lines. Palpi yellowish. Beard white. Forehead and face white, a little yellowish. Antennae testaceous, third joint with the usual tooth and the last divisions black. Eyes: upper part brown, lower part black. Thorax with a yellowish grey tomentum, a testaceous stripe with greyish tomentum, passing above the insertion of the wings; sides with ashy grey tomentum. Abdomen testaceous; segmentations a little yellow (seen sideways), seventh segment brown; under side the same. Legs fawn-coloured, femora blackish, a little fawn-coloured at apex; tarsi brownish. Wings clear, exterior border and stigma yellow: veins normal. From Java. Macq., *l.c.*, Suppl. v, p. 47.

Macquart's types are in Mr. Verrall's coll.

Walker's type from Sylhet, Assam.

Bigot's type from N. Khasi, in a very dirty condition, two other females with it are from Sibsagar, Assam, and India.

In Brit. Mus. coll. specimens (females) from Sylhet; Chargola Valley, Sylhet; Dibia, Khasi Hills District (Chennell), and Khasi Hills (Godwin-Austen, Sladen). In Indian Museum coll. females from N. Khasi and Assam.

This species is distinguished from the species in *Tabanus fumifer* subgroup by its smaller size, broader, almost parallel forehead and reddish yellow colour.

A medium-sized reddish yellow species, the median triangular spots on abdomen small and often indistinct, the pubescence on dorsum scanty. Antennae reddish, rather wide at their base. Legs reddish brown. Length 17-18 mm.

Face covered with yellowish brown tomentum and with white pubescence. Beard yellowish white. Palpi reddish yellow with some grey tomentum and rather thick black pubescence, in shape long and slender, ending in a long apex. Antennae deep red, darker at the apex, the first two joints with some black pubescence, the tooth of third joint prominent. Forehead rather narrow, about six times as long as it is wide, very slightly narrower anteriorly,

the same colour as the face; frontal callus oblong, brownish, not reaching the eyes, the linear extension narrow. *Thorax* obscurely reddish brown, sometimes blackish, stripes indistinct, covered with some yellowish brown tomentum and a few hairs of the same colour and with scattered black pubescence, sides redder with black hairs; breast black with grey tomentum and obscure yellow pubescence. *Abdomen* reddish yellow, the last three segments slightly darker, the small triangular grey tomentose spots with yellowish pubescence are present from the first to the fifth, sometimes reaching the sixth segment, most conspicuous on the third, fourth and fifth; the dorsum with rather dense but inconspicuous black pubescence; under side with lighter segmentations, and yellowish white pubescence. *Legs*: femora reddish brown with grey tomentum below and with yellowish pubescence, tibiae reddish yellow, the fore pair darker at apex with yellowish hairs on the paler part, the tarsi reddish brown with black pubescence. *Wings* grey, tinged with brown on fore border and round veins, veins yellowish brown, an appendix is present only in the Bigot type and in a female from Khasi Hills.

The male type (Macquart) has no sign of median grey spots on abdomen, and may possibly prove not to belong to this species, which seems otherwise confined to India and Assam.

Tabanus stantoni, ♀, n. sp.

(Pl. xiv, fig. 13.)

In Brit. Mus. coll. a long series from Batu Tisa, Labuan Padang, Federated Malay States (Pratt, Stanton), others from Selangor, and Kuala Lumpur, Federated Malay States.

A large reddish yellow broad-bodied species, distinguished from *Tabanus fumifer*, Wlk., by the greater width of the forehead, anteriorly never more than one-third narrower than it is at vertex, in *T. fumifer* the forehead begins to get narrower half-way from the vertex, in this species it is hardly perceptibly narrower and only begins to be so just before it terminates. Thorax has a paler appearance. Abdomen more reddish yellow. Length $19\frac{1}{2}$ —25 mm.

Face with yellowish hairs. *Palpi* yellow with black pubescence, not very stout at base, ending in an acute point. *Forehead* eight to nine times as long as it is broad and barely a third narrower anteriorly, nearly parallel, frontal callus long and narrow, not touching the eyes, slightly club-shaped. *Antennae* reddish, with the third joint black. *Thorax* brownish with indistinct stripes, covered with brownish yellow tomentum, appressed fulvous hairs and some black pubescence. *Abdomen* appearing reddish brown, more strictly reddish yellow, but the close black pubescence gives it the darker appearance and with some brownish yellow tomentum makes it appear not uniform in colour, the median spots often indistinct, are yellow haired, short,

triangular; under side with thick yellow pubescence at the sides and on segmentations, leaving a broad dark median stripe. *Legs*: femora blackish with grey tomentum, the tibiae obscurely yellowish or reddish brown, apices and all tarsi black; the pubescence on coxae and femora yellowish, elsewhere black. *Wings* large, tinged yellowish brown or almost clear with no appendix, veins blackish on fore border, thin brown, the first posterior cell widely open.

***Tabanus indianus*, ♂ ♀, n. sp.**

? *Tabanus mentitus*, ♂, Wlk., List Dipt., i, p. 162 (1848).

In Brit. Mus. coll.

Type ♀ and a series from Kadra, N. Kanara, S. W. India (Bell). Others from Formosa in Dr. Kertész's coll. Type ♂ and a series from Formosa in Dr. Kertész's coll.

A reddish brown species with a long narrow abdomen, distinguished from others of the *fumifer* subgroup by the distinct pale yellow fore tibiae with white hairs of the female, and by the longer narrow white-haired triangular median spots of abdomen. Femora with black pubescence. Length of type ♀ 20 mm., others from 17—22 mm.

♀ Head wider than thorax. *Face* covered with greyish tomentum, with a few white hairs. Beard white. *Palpi* very similar to those of *Tabanus malayensis*, n. sp., with long obtuse apex, only slightly stouter at base, yellow with thick black pubescence. *Antennae* reddish brown, darker at apex, the first two joints and apex of tooth with black pubescence. *Forehead* covered with yellowish brown tomentum and with some black hairs, about eight times as long as it is wide, only slightly narrower anteriorly (barely a third) than at vertex: frontal callus reddish brown, long, narrow, not reaching the eyes, with long linear extension. *Thorax* blackish with some grey tomentum and with black pubescence and fulvous appressed hairs, sides with black hairs; breast with reddish white pubescence. *Abdomen* reddish brown, the median triangular white-haired spots are present from the 2-5th segments, with traces of one on the first and sixth segments, their apices almost reach the anterior border of each segment; pubescence on dorsum black, thicker at apex; under side lighter reddish brown with white pubescence, which is also present on sides of abdomen except at the apex where it is black. *Legs* dark reddish brown or blackish brown, coxae with long white hairs, the femora with grey tomentum and black pubescence, white on the under side of the middle and posterior pairs, tibiae pale yellow, black at their apices, the fore tibiae appear whiter on account of their white hairs; the middle and posterior pairs have some white pubescence below, otherwise it is black, and on all the tarsi. *Wings* long, faintly tinged yellow-brown on fore border and along veins, stigma yellowish brown, veins brown, first posterior cell slightly narrowed at opening.

The specimens from Formosa have the abdomen in females more reddish yellow, the segmentations paler with yellow hairs. Frontal callus a little broader and more pear-shaped.

♂ Redder in colour than the female, the spots on *abdomen* are smaller and the fore tibiae dull yellowish or obscurely red at base with only a few lighter hairs. Eyes large, the large facets occupy the upper half but do not reach the anterior border of the frontal triangle, nor the vertex where the small facets extend as a narrow border. *Palpi* yellow, with yellow pubescence and a few black hairs at apex. Length of males 17—20½ mm.

The type of *Tabanus mentitus*, Walker, a male from Foochow, China (G. T. Lay), is probably identical, judging from its similarity to the male from Formosa, but owing to its bad condition and the fact of its being a male, its identity must remain doubtful till the advent of more material.

The blackish colouring sometimes surrounding the median abdominal spots is more distinct than usual, as oblong black spots on the second, third and fourth segments, and only on the third and fourth segments is a median grey spot visible, probably owing to denudation, the apex of the abdomen is blackish.

Tabanus brunneus, Macq.

Suites à Buffon, i, p. 203 (1834); *id.*, Dipt. exot., i, p. 132 (1838).

In Brit. Mus. coll. one female from Timor and one male from Java.

In Indian Mus. coll. one female from Semangho, Selangor, "on cattle."

Length 8 lines.

Blackish brown. *Palpi* brownish. Face and forehead yellowish grey; the latter narrower than usual, velvety brown; elevation near the antennae longitudinal, and the usual line black. Antennae black, inserted a little lower than in other species. Thorax covered with a short thick, brown tomentum; two brown stripes on the outer border; sides with yellowish hairs; a yellowish space with black hairs under the base of the wings, abdomen with dorsal triangular white spots, the three first segments brown, the four others black; a small yellowish spot on each side of the posterior border of the segments; under side yellowish, a hemispherical black spot on each segment. Legs black. Wings brownish, ♀

From Java, in my cabinet. Macquart, Suites à Buffon, i, p. 203.

Brown. Antennae black. Abdomen with triangular white spots. Legs black. Wings brown. Length 6 lines.

♀ *Palpi* brownish. Face and forehead greyish yellow, frontal callus narrow and little distinct from the line proceeding from it. Antennae black. Thorax black, with brown tomentum. Abdomen black; a dorsal triangular yellowish white spot as well as a spot

on the exterior border of each segment. Legs black, with yellowish tomentum. From East India (M. Marc) Museum. An identical specimen in my collection came from Java. Macquart, *Dipt. exot.*, i, p. 132.

Type ♀ (the one from India I believe) seen by me in Paris Museum. A medium-sized species distinguished from *Tabanus internus*, Wlk., with which I compared it, by the narrower *forehead* and frontal callus and by the spots on *abdomen* which are almost hemispherical in shape, on the second to fifth segments, small and oblong on the sixth, abdomen dark brown in colour, the segmentations very narrowly yellowish, and the lateral margins more widely so, forming the spots mentioned by Macquart; under side brown with yellowish segmentations and yellow pubescence on them.

Wings clear, tinged brown. *Legs* brownish, tibiae appearing obscurely reddish on middle and posterior legs. *Forehead* narrow, eight or more times as long as it is broad, narrower anteriorly, with a long narrow frontal callus and lineal extension. *Antennae* reddish brown, *palpi* rather broad, brownish yellow with black pubescence. *Face* with yellowish white pubescence. Beard the same colour.

This is apparently a distinct species, distinguished by the almost wholly black legs, dark palpi and antennae and by the hemispherical spots of the dark blackish brown abdomen.

***Tabanus fumifer*, ♂ ♀, Walker.**

(Pl. xiv, fig. 14.)

Proc. Linn. Soc., i, p. iii (1857).

Types ♂ and ♀ from Sarawak, Borneo (Saunders coll.).

In *Brit. Mus. coll.* specimens from Darien Tipus, Negui Sembilan, Federated Malay States (Stanton coll.); from Sungei, Bessi, Selangor (Durham); from Batu Tiga, Selangor (Stanton coll.); Singapore (Ridley), Sumatra (Forbes).

A somewhat variable species, in colouring, but distinguished by the extreme narrowness of forehead, becoming anteriorly only half the width of what it is at vertex. The abdomen varies from reddish yellow anteriorly, becoming darker at apex (type), to dark reddish brown with small median indistinct spots, sometimes not apparent, the black pubescence on dorsum always rather thick, sides with yellow hairs anteriorly (type), but some specimens have black hairs entirely. Legs blackish, the fore tibiae usually obscurely reddish, on their basal third or half with some yellow hairs occasionally reddish yellow on basal half, the middle and posterior pair obscurely reddish or reddish yellow, only black at their apices. Wings tinged brown all along the veins, but in some specimens only tinged very slightly. Length from 15—21 mm. The female type 21 mm.

♀ *Face* covered with yellowish brown or grey tomentum and with some whitish yellow hairs. Beard pale yellow. *Palpi* large

with obtuse apex, almost the same width throughout, yellowish red but densely clothed with black pubescence. *Antennae* reddish brown, the first two joints with black pubescence, tooth of third joint distinct. *Forehead* narrow, covered with yellowish brown tomentum, nearly eight times as long as it is broad, barely half as wide anteriorly as it is at vertex; frontal callus brownish, long, narrow, not reaching the eyes with a rather long linear extension. Thorax reddish brown or blackish with stripes hardly apparent, some greyish yellow tomentum on dorsum, the pubescence black, with some short appressed yellowish hairs, shoulders more red, sides with black hairs; breast covered with grey tomentum and with yellowish hairs. *Scutellum* identical with thorax. *Abdomen* reddish brown, often more yellow-red anteriorly and darker at apex, spots usually present on each segment but often indistinct and indicated by a few yellow hairs only, usually small with short triangles; under side reddish brown, the segmentations bordered with yellowish hairs; sides of abdomen with black hairs and a few yellow hairs below or with almost wholly yellow hairs. *Legs*: femora black covered with grey tomentum below, the pubescence black and short above, yellow and longer below, coxae black covered with grey tomentum and with thick whitish pubescence on the fore pair, the pubescence on the dark red tibiae black and rather thick, some yellow or white hairs on the fore tibiae at base which alone is reddish. *Wings* in type very distinctly tinged brown on all the veins, but this is fainter in many specimens and sometimes almost confined to fore border; veins brown, stigma yellow.

♂ The male type has now lost part of abdomen, but other males in the Brit. Mus. coll. from Singapore and Sumatra appear identical.

Beard and hairs on face in type brownish, in the other males whitish. The *palpi* yellowish red, with black pubescence. The frontal triangle reddish brown. Eyes with large facets on the upper part, not extending beyond the apex of the frontal triangle, reaching the vertex but gradually sloping away from it towards the centre of eye. *Abdomen* on its anterior half yellowish red, the apex darker, the sides bordered with a short fringe of black hairs, but on the posterior lateral angles of the segments are some yellow hairs; under side reddish brown with yellow-haired segmentations. *Wings* in type deeply tinged yellowish brown, in other males yellow on fore border only, between the costal border and the first vein.

***Tabanus malayensis*, ♀, n. sp.**

In Brit. Mus. coll. type ♀ and a long series from Darien Tipus, Negui Sembilan, Federated Malay States, collected by Dr. A. T. Stanton on a new road running through jungle in February and March, 1908, and others in 1909 by him at Batu Tiga, others from Kuala Lumpur, Selangor, Federated Malay States (Durham), and from Singapore (Ridley).

A species nearly allied to *Tabanus fumifer*, Wlk., distinguished only by its colouring and usually smaller size ($16\frac{1}{2}$ —21 mm.), differing in the bright yellow-haired median spots of abdomen which are larger and very distinct, with longer apices, and by the presence of lateral yellow-haired spots on sides of segments in form of isosceles triangles, usually present from the second to the fifth segments; under side more yellow with yellow pubescence on the sides. The *thorax* and *scutellum* have a paler appearance with greyish yellow tomentum and more numerous appressed fulvous hairs. The tomentum on the femora is more yellowish grey. *Forehead* seven to eight times as long as it is broad, very narrow anteriorly as in *Tabanus fumifer* with the same long narrow frontal callus. *Antennae* blackish brown, in some specimens reddish at base of third joint, the first two joints with some grey tomentum and black hairs. *Palpi* large, ending in an obtuse point, yellowish with dense black pubescence. *Abdomen* reddish brown, redder on the anterior segments, the whole dorsum covered with thick short black pubescence, on the posterior borders of segments appear a few yellow hairs, the spots consist of a small almost square one on the first segment, on the following four they are triangular in shape with short apices which do not reach the fore border of segment, those on the third and fourth segments usually with the widest bases, on the fifth appear traces of a small triangular spot, all have a yellowish or greyish ground colour covered with bright yellow hairs, sides of segments with spots as described above; under side covered with yellowish pubescence leaving a broad central black stripe apparent. *Legs* similar to those of *Tabanus fumifer*, Wlk. *Wings* grey, very slightly tinged brown, chiefly on the fore border, stigma yellowish, veins brown, the first posterior cell slightly narrower at opening.

***Tabanus factiosus*, ♂ ♀, Walker.**

Proc. Linn. Soc. London, iv, p. 102 (1859).

Type ♂ from Celebes. Type ♀ from Makassar, Celebes, both from Saunders coll.

Two females from Negros, Philippines (Whitehead).

♀ This large reddish brown species is very nearly allied to *Tabanus fumifer*, Wlk., indeed the female seems only distinguished from the latter species by its larger size and by the fore tibiae being more largely yellowish or white, for quite two-thirds of their length, and by the wings being nearly clear, even the space between costa and first longitudinal vein being only faintly yellow. The *thorax* appears lighter, having more grey tomentum and a few appressed yellow hairs. *Abdomen* large, broad, with grey triangular spots on every segment except the first and last ones, on the fourth, fifth and sixth the segmentations are lighter, colour of abdomen reddish brown. Length 23 mm.

♂ Male type is not mentioned in Walker's description, but bears a label "factious" in his handwriting. It is immediately distinguished by the eyes which have the facets almost the same size, those where the eyes join hardly perceptibly larger; this character at once distinguishes it from *Tabanus fumifer*. Beard blackish, with the same coloured hairs on face. Fore tibiae black. Wings deeply tinged yellowish brown. Till further material is available, it is impossible to define this species more accurately.

***Tabanus dissimilis*, ♀, n. sp.**

(Pl. xiv, fig. 15.)

Type ♀ from Selangor (Butler), a series from Singapore (Butler, Ridley), two ♀ from Silam, N. Borneo and Borneo.

A species very nearly allied to *Tabanus fumifer*, Wlk., but distinguished from it in general appearance by the redder thorax, covered thickly with ashy grey tomentum, and with black pubescence so that it appears darker than in the Walker species, with no yellowish interspersed hairs, and by the clear wings, only the space between the costa and the first longitudinal vein being yellowish brown. In the less width of the forehead anteriorly with the frontal callus practically reaching the eyes lies the chief plastic difference.

Length of type 21 mm., other specimens 19½—22 mm.

Head large, wider than thorax. Palpi with a rather longer apex than in *Tabanus fumifer*. Forehead about ten times as long as it is wide, hardly more than half the width of the vertex anteriorly. Breast reddish with grey tomentum, and with black above and white pubescence below. Scutellum identical with thorax. Abdomen very similar but anteriorly with traces of yellowish brown or grey tomentum, the spots indistinct, often absent, usually white haired; under side reddish with grey tomentum and white pubescence: the lighter hairs on sides of abdomen below the black ones are white. Legs: the fore femora are reddish brown or black with grey tomentum, but with wholly black pubescence, only the middle and posterior pairs with white hairs below in some specimens, in the type they are black. No white hairs are visible on the fore tibiae, but a few on the hind tibiae below.

***Tabanus ignobilis*, ♀, Rondani.**

Ann. Mus. Civ. Genova, vii, p. 457 (1875).

Length 15—20 mm.

Antennae brown-red. Forehead fulvous, the linear callus reddish. Face white, with white hairs. Palpi very palely luteous, black haired. Thorax with the dorsum obscurely red and with darker stripes, the pleurae and breast whitish and white haired. Abdomen brown-reddish, on the dorsum with black spots, chiefly scattered posteriorly: the posterior margins of the segments narrowly pale; the median whitish stripe of spots; under side

brown-red the margins of the segments posteriorly with pale margins and very short white hairs.

Wings sub-limpid, the costal border brown yellowish, the stigma browner. Calyptera ferruginous. Halteres with the knob yellow, the stem red. Legs brown-red; the apices of femora and tibiae and all tarsi blackish. Rondani, Ann. Mus. Civ. Genova, vii, p. 457. From Sarawak Province.

Type ♀ in Nat. Hist. Museum, Genoa. A specimen ♀ in Brit. Mus. coll. from Sandakan, N. Borneo, compared with type, is identical.

The type in good preservation, measures 20 mm., the black spots mentioned in original description seem accidental stains or marks, the median spots only commence from the third segment, the thorax and scutellum are covered with grey tomentum, being reddish in colour.

A species nearly allied to *Tabanus dissimilis*, n. sp., distinguished from it by its lighter redder thorax, abdomen and legs. The *abdomen* is shining, uniformly reddish with grey median spots from the second to the sixth segments, and with greyish narrow segmentations, the little pubescence present, chiefly black. *Forehead*, frontal callus and palpi similar to those of *Tabanus dissimilis*. *Legs* reddish brown, the tarsi and apices of tibiae darker the fore femora on under side and hind tibiae at base with some white hairs, the pubescence otherwise black. The specimen from Sandakan measures 22 mm. This species is not unlike *Tabanus rubicundus*, Macq., but is distinguished from it by the greater narrowness of the forehead anteriorly.

Tabanus nexus, ♀, Walker.

Proc. Linn. Soc., i, p. 110 (1875).

Type ♀ from Sarawak, Borneo (Saunders coll.).

A large species very nearly similar to *Tabanus ignobilis*, Rondani, from which it is only distinguished by the *wings* being not quite clear, but deeply tinged with yellowish brown on the fore border along the veins, and in the discal cell, reaching beyond its borders. The *palpi* are stouter, almost the same width throughout, so that their apices are obtuse. There are no white hairs on the hind tibiae, but the white pubescence on all the femora is distinct, thickest on the fore pair.

Forehead about nine times as long as it is broad, and hardly more than a third narrower anteriorly, frontal callus not reaching eyes; owing to its great similarity to *Tabanus ignobilis*, Rondani, this species is placed next to it though strictly speaking it should go under the heading of foreheads one-third narrower anteriorly in the table.

Tabanus signifer, ♂, Walker.

Ins. Saund. Dipt., i, p. 452 (1856).

Type ♂ from China.

A red-brown species easily distinguished by the prominent whitish tomentose triangular spots on the third and fourth abdominal segments, and with the same coloured spots on the lateral borders of the first four segments. Wings clear. Legs blackish. Tibiae reddish. Length 21 mm.

Head large. Eyes with the large facets distinct, reaching the apex of frontal triangle, and the vertex, the small facets extending behind as a narrow border but not reaching the vertex apparently (eyes discoloured). *Face* covered with grey tomentum and with white hairs. *Palpi* yellow with black hairs. Beard white. *Antennae* incomplete, Walker does not describe them; the first two joints reddish with black hairs. *Thorax* reddish brown with three grey stripes, sides with black hairs. *Scutellum* reddish brown. *Abdomen* conical, reddish brown, becoming darker towards the apex, the two triangular median spots have very short apices, and broad bases, the spots on lateral borders do not join them, a small whitish tomentose median spot is visible on the second segment at its base, pubescence black, but white on the spots; under side the same but with no median spots visible. *Legs* (incomplete) blackish with black pubescence, the tibiae reddish. *Wings* yellow on costal border, stigma yellow, veins yellowish brown, appendix present.

The species first named by Walker *Tabanus apicalis*, List Dipt., i, p. 176, and later changed by him to *Tabanus finalis* (the first name being preoccupied), List Dipt., v, p. 258, is allied to this species, and is also a male, but differs in having three large white spots on the third, fourth and fifth segments and the cross-veins of wings are shaded; it is a badly preserved specimen from unknown locality; it may possibly belong to the American fauna.

***Tabanus significans*, ♀, n. sp.**

Type ♀ and another female from Kuala Lumpur, Federated Malay States (H. C. Pratt), in London School Tropical Medicine coll. and another female from Darien Tipus, Malay States, in Stanton coll.

This well-marked species allied to *Tabanus signifer*, Walker, from China, is distinguished by the two well-marked grey tomentose median spots on the brown abdomen, by the white tibiae and wings slightly shaded on the cross-veins. *Antennae* red, forehead narrow. Length 18 mm.

Face covered with whitish tomentum and with long white hairs, a band across the base of antennae and the subcallus on its outer borders with yellowish brown tomentum, between the antennae and the eyes the band bears some long brown hairs; centre of subcallus covered with greyish tomentum. Beard white. *Palpi* pale yellow with black pubescence, stout, ending in a point. *Antennae* red, the first two joints paler and yellowish with black pubescence, the third joint broad but with a very slight tooth indeed. *Forehead* very narrow, about ten times as long as it is

broad, and a third narrower anteriorly, covered with greyish tomentum, the frontal callus reddish yellow, very narrow, almost cylindrical with a somewhat raised long lineal extension. *Thorax* reddish brown with short black pubescence, shoulders and sides covered with greyish tomentum which extends round the thorax as a narrow border posteriorly, pubescence on the shoulders black, on the sides white and long, extending round the *scutellum* which is the same colour as thorax but with grey tomentum, this with the white pubescence gives it a pale appearance, at least on its posterior half. *Abdomen* brown or red-brown, clothed with short black pubescence the grey tomentose spots are clothed with white pubescence and are situated on the third and fourth segments, the one on the latter is the largest, with a wide base and short apex, almost half moon in shape, not reaching the anterior border of segment, the other one is smaller, oblong, placed on the posterior border of segment, on the sides of the first and second segments are lateral similar spots, and on the fourth segment at side on posterior margin a small tuft of white hairs, traces of a few white hairs are visible in the middle of the second segment; under side brownish yellow with some whitish tomentum at sides and anteriorly. *Legs*: coxae and femora reddish with white pubescence on the former, and black on the latter, the middle and posterior femora are darker reddish brown, the tibiae white, black at their apices, with the pubescence to correspond, tarsi all deep black. *Wings* slightly tinged with brown on the fore border and round transverse veins, stigma and veins brown. Halteres black

***Tabanus fuscomaculatus*, ♀, n. sp.**

Type female and four others from Sima, Myitkyina District, Upper Burma (Capt. Whitmore, I.M.S.), in Brit. Mus. coll., and another female from Sikhim in Indian Museum coll.

A handsome stout dark reddish species, the abdomen with two large black spots on the second and third segments and the apex black. Antennae and palpi blackish. Legs blackish. Wings tinged with brown and with an appendix. Length of type 20 mm., others 19—21½ mm.

Face covered with greyish yellow tomentum, light yellow on the cheeks, some dark short hairs in middle of face and long soft pale yellowish hairs on cheeks. Beard pale yellowish. *Palpi* stout, much the same width throughout, ending in an obtuse point appearing black, but dark reddish, covered with greyish brown tomentum and with thick black pubescence, brighter red on the inside. Antennae black, the first two joints red with black pubescence, the third joint broad at base with a distinct tooth. *Forehead* narrow, about eight times as long as it is broad, slightly narrower anteriorly, about one third, forehead and subcallus covered with brownish yellow tomentum, the frontal callus black, narrow, club-shaped, not reaching the eyes anteriorly, with a long linear extension.

Thorax blackish, with brownish yellow tomentum, some appressed yellow hairs chiefly along the lateral sides of dorsum and short black hairs scattered over dorsum; sides with yellow hairs, shoulders reddish with black hairs, no sign of stripes on dorsum. *Scutellum* similar to thorax, on posterior border with some long yellow hairs. *Abdomen* reddish, the last three segments wholly dull black, the median black spots very distinct, the one on the second segment largest, bluntly triangular, neither base nor apex reaching the border, the second one on third segment smaller and more irregular in shape, the segmentations on the first four red segments paler, yellowish; pubescence on dorsum black, golden yellow hairs are visible on the lighter segmentations, chiefly at the sides, where they extend upwards, long and thick; under side reddish yellow with a broad median stripe and the apex black, pubescence the same but the golden yellow is more prominent.

Legs appearing blackish, the coxae covered with yellowish tomentum and with long yellow hairs, the femora with some grey tomentum and yellow hairs on the upper and under side, otherwise the pubescence is black, tibiae obscurely reddish with thick black pubescence, tarsi with black pubescence but on the under side of the posterior tarsi it is deep red. *Wings* tinged on fore border and along the veins brownish, appendix short, not always present, all posterior cells widely open, stigma brownish yellow, veins brown.

***Tabanus leucopogon*, ♀, Bigot.**

(Pl. xiv, fig. 16.)

Mem. Soc. Zool. France, v, p. 651 (1892). [*Atylotus*.]

Type ♀ from India and another ♀ from Sikkim, in Indian Museum coll. A small species allied to *Tabanus oxyceratus*, Bigot, but distinguished from it by the large oval frontal callus with hardly any linear extension, and by the wings which are shaded round the veins and have an appendix. Length 15 mm.

The type is a very faded poor specimen.

Face with white tomentum and white hairs. Beard white. *Palpi* slender, long, not very stout at base, ending in a point, dull reddish appearing dark by reason of the thick black short pubescence. Antennae reddish brown. Subcallus and forehead covered with yellowish brown tomentum. *Forehead* short, wide, very slightly narrower anteriorly, practically parallel, about four times as long as it is wide, the frontal callus blackish, not reaching the eyes, oval or nearly square with hardly any prolongation, in the type with a fine short line about the length of the callus itself.

Thorax brownish. *Abdomen* blackish brown, with white-haired median spots on each segment except the last two. *Legs* blackish, tibiae yellowish. *Wings* hyaline with brown shading round the veins, fore border and stigma yellow, veins brown.

Tabanus discrepans, ♀, n. sp.

(Pl. xiv, fig. 17.)

Type ♀ and another from Ceylon (Yerbury coll.)

A long narrow species in general appearance allied to the species of the *fumifer* subgroup and more especially to *Tabanus indianus*, n. sp., but distinguished from them by the wider forehead, parallel in this species, and by the larger less narrow frontal callus. Abdomen reddish brown with small median whitish spots. Legs and antennae reddish. Palpi yellow. Wings tinged yellowish brown. Length of type 20 mm. the other female 18 mm.

Face covered with yellowish grey tomentum, and with some pale yellow short hairs, browner on cheeks. Beard whitish yellow. *Palpi* stout, ending in a point, yellow with black pubescence and a few white hairs intermixed. Antennae reddish, dusker at the tip, the first joint pale yellow with black pubescence, third joint of antennae with very slight tooth. Subcallus and *forehead* covered with darker yellowish brown tomentum, the latter with some black pubescence, parallel, about five times as long as it is broad, the frontal callus red-brown, oblong, not reaching eyes with a short but stout lineal extension. *Thorax* dusky brown, pale reddish brown at sides and on shoulders, dorsum with appressed short yellow hairs, sides with long black pubescence; breast covered with greyish yellow tomentum and with pale yellow pubescence. *Scutellum* same colour as thorax with some of the appressed yellow hairs on sides, in the centre with black hairs. *Abdomen* reddish brown with short black pubescence, on the paler segmentations some yellowish white hairs extending to the sides and up the lateral borders of segments, the grey tomentose median spots present from second to fifth segment, more or less triangular in shape; under side with wider whitish-haired segmentations, and with the black pubescence. *Legs* reddish, the coxae covered with greyish tomentum and with whitish pubescence, the fore and hind femora darker, the apices of fore tibiae and all tarsi blackish brown, femora and basal half of hind tibiae with yellow pubescence, elsewhere it is black.

Wings tinged yellowish brown, the centres of the cells at apex and on posterior border lighter in type, not discernible in the other female, stigma and veins of fore border brown, other veins yellowish brown, type alone with rudiment of an appendix.

Tabanus rufiventris, ♀, Fabr. (nec Macq.).

Syst. Antl., 96 (1805); Wied., Dipt. exot., p. 66 (1821); *id.*, Auss. Zweifl. Ins., i, p. 118 (1828).

Thorax dark, abdomen reddish, wings with a black costal border. Of the size of *Tabanus bovinus*. Head ashy grey haired, antennae black. Eyes golden; thorax dark, hardly ashy grey striped. Abdomen reddish, with a dorsal stripe of white spots.

Wings white, costal border black. Legs black; tibiae red. East India. Mus. Dom. Lund. Fabr., Syst. Antl., 96, 13.

Thorax brown, white pruinose; abdomen red, white spotted, wings with black costal border. $9\frac{1}{2}$ lines. From East India.

Antennae brown, black at the base and apex. Head yellow haired. Forehead reddish with the usual shining stripe hardly wider below. Thorax with hardly perceptible linear-shaped greyish white stripes. Breast sides reddish. The white abdominal spots are situated on the posterior border of each segment, the side borders of these segments and the ventral segmentations are also white. Wings almost hyaline, brownish black on the border. Squamae brown. Halteres white. In the Royal Museum. Wied., Auss. Zweifl. Ins., i, p. 118.

This species judging from the description may be identical with *Tabanus fumifer*, Wlk., but it is impossible to identify it with any other species in this group where the species are only divided from each other by very small differences, unless the type or the specimen determined by Wiedemann is seen.

***Tabanus dives*, ♀, in parte, Rondani.**

Ann. Mus. Civ. Genova, vii, p. 457 (1875).

? = *Tabanus stantoni*, n. sp.

Type ♀ in Genoa Museum seen by me, is the smaller species of two specimens belonging to different species, the larger one I believe to be the same as *Tabanus univentris*, Wlk., and this one is either the same as *Tabanus stantoni*, n. sp., or very nearly allied to it, only differing in the reddish brown abdomen having yellowish segmentations, the under side uniformly yellowish. Wings with lighter veins, yellow in colour, stigma the same, slightly tinged with yellow, no appendix. Face yellowish with yellowish grey hairs. Palpi large, stout, pale yellow with thick black pubescence, and thick yellow pubescence above. Forehead as in *Tabanus stantoni*, n. sp., the frontal callus yellowish mahogany and more pear-shaped, narrower anteriorly, about ten times as long as it is wide, the forehead with yellowish brown tomentum and black pubescence. Antennae incomplete, the first two joints yellow. Length 18 mm. From Sarawak, Borneo.

***Tabanus felderi*, ♂ ♀, Van der Wulp.**

Notes Leyden Museum, vii, 78, 32; pl. v, fig. 7 (1885).

? *Tabanus bucolicus*, ♂, Schiner, Reise Novara Dipt., 81, 4 (1868).

Blackish; antennae, palpi, three first segments of abdomen (except the dorsal spots on segments 2 and 3), the posterior border of the following ones and the legs red; eyes naked; wings greyish red, with the angle of the third longitudinal vein omitting an appendix. ♂ ♀, length 22-23 mm.

Head greyish white; face of the ♂ ochraceous; on the front of the ♀ a raised line, which is broader below. Antennae and palpi reddish yellow; third joint of the antennae on the upper part with a rather sharp tooth, slender towards the end, the tip brown. Palpi in the female as long as the rostrum, in the male much shorter. Eyes bare, bronze-coloured, even after having been moistened without cross-bands; in the male the facets of the upper portion large. Thorax and scutellum greyish black, with hardly any indication of longitudinal bands; pleurae cinereous with a yellow pile. Abdomen in the male pointed, in the female a little narrower towards the end, in both sexes reddish yellow; the first segment blackish below the margin of the scutellum, on the second and third segments a dark grey dorsal spot; the following segments fuscous, with pale reddish yellow hind margin; under surface of abdomen testaceous, with yellow hind margins of the segments. Legs reddish yellow; the tarsi a little darker; front coxae with a long pale yellow pile; hind tibiae in the male fringed with short hairs, the hairs of the outside black. Wings with a reddish grey tinge; the upper branch of the furcated cell angular at its base and with a recurrent vein. A single pair from Ningpo (near Shanghai) presented to Leyden Museum by Dr. Felder. V d. Wulp, Notes Leyden Museum, vii, p. 78.

Tabanus bucolicus was described by Schiner from one male specimen taken at Hongkong, and from the description and the comparison of one male specimen in the Brit. Mus. coll. with no locality specified, it is possible that Wulp and Schiner described the same species, but as there are no females in any of the collections, the matter must be left doubtful for the present. I append all that Schiner says regarding his species.

“Is exactly the same as *Tabanus intermedius*, Egger, which, as the name *T. intermedius* was used earlier by Walker for a North American species, I shall in future name *Tabanus eggeri*. [Brauer however retains the original name as he says Walker's species is doubtful; Kertész in his last Cat. 1906 follows Schiner.] It will suffice to give the differences. The middle of the face in *Tabanus bucolicus* as well as the frontal triangle are snow-white, the remainder bright yellow, the beard is golden yellow, the legs are entirely bright reddish yellow, the tarsi hardly a little darker. In all other respects similar to *Tabanus eggeri*. 11 lines.”

Brauer remarks at the end of his description of *Tabanus intermedius* that *Tabanus bucolicus* has much larger facets of the eye (♂) and these extend above to the ocelligerous tubercle, and thence almost entirely to hind border.

***Tabanus leucosparsus*, ♀, Bigot.**

Nouv. Archiv. Mus. Hist. Nat. Paris (3), ii, p. 203 (1890).

Length 18 mm.

Antennae incomplete, the first two joints brown; palpi, beard, face and forehead whitish grey, frontal callus and tubercle of

vertex chestnut-coloured (ocelli indistinct), the former at the base wider and square, very much restricted in the middle, narrow, oval, prolonged above. Thorax of a pinkish or flesh-coloured grey, sides whitish. Abdomen black, with a median series of triangular spots, wide towards the bases, smaller and smaller towards the extremity, and on each side another series formed of narrow spots, all these spots are whitish; squamae brown; halteres pale fawn-coloured. Legs black, femora with a whitish tomentum below, base of tibiae widely whitish. Wings clear, no appendix. Eyes naked.

Laos (Siam), one specimen, Bigot, *Nouv. Archiv. Mus. Hist. Nat. Paris* (3), ii, p. 203.

This species with black abdomen marked with spots may possibly be allied to *Tabanus leucopogon*, Bigot, from the description of the frontal callus, but is a larger insect.

GROUP IX.

Forehead with one square, narrow, or oblong callus, always prolonged towards the vertex as a more or less narrow line, four to ten times as long as it is broad. Species with paler bands on the abdomen, spots are also sometimes present, large, medium-sized, or small species.

Tabanus orientalis, Wied., *Tabanus geniculatus* and *incultus*, V. d. Wulp, are not included in the table, being unknown to me. *Tabanus geniculatus* has a very narrow parallel forehead and narrow callus, *Tabanus incultus* the same but narrower anteriorly.

Tabanus servillei, ♀, Macq.

Dipt. exot., i, p. 132, 13 (1838); Walker, *List Dipt. Brit. Mus.*, v, p. 246 (1854).

Tabanus pyrausta, ♀, Walker, *Zoologist*, viii, Appendix lxxv (1850); *id.*, *List Dipt. Brit. Mus.*, v, p. 246 (1854).

Antennae black. Thorax fulvous. Abdomen black; with white segmentations. Wings red; the first posterior cell closed. Length 11 lines.

Palpi black, wide at the base. Face and forehead greyish yellow; the latter narrow with a black line, a little raised anteriorly. Thorax with greyish yellow tomentum. Abdomen black; the four first segments with a narrow yellowish white posterior band. Calyptera blackish, bordered with white. From E. India. M. Marc. Museum. One specimen from Java occurs in M. Serville's collection. Macquart, *Dipt. exot.*, i, p. 132, 13.

The specimen mentioned as from Java, is apparently the one with another female now in Mr. Verrall's coll. in very bad condition, but from the description and comparison of these with Walker's types there is no doubt they are identical. Walker placed the two

species one after the other in his List Diptera, v, without discovering their identity.

His type (female) from Mr. Argent's coll. and another male from Hon. E. India Company's Coll. are both from Java and well preserved, and from these the following notes are taken.

♀ A large easily distinguished insect, the first posterior cell of the wing closed with a rather long petiole reaching the border; blackish, the thorax covered with fulvous tomentum and the segmentations of the abdomen fulvous. Length 25 mm., the Macquart specimens 22 mm.

Face covered with fulvous tomentum and with brownish pubescence. Beard brown, in one of the Macquart specimens it appears to be mostly golden yellow. *Palpi* large, stout, black, with black pubescence. *Antennae* black, stout, the first two joints with black hairs, the third joint with a large tooth, and broad at base. *Forehead* and subcallus the same colour as face, the former very narrow anteriorly, at the vertex quite double the width, about ten times as long as it is wide, the frontal callus reddish brown, very long and narrow, almost reaching the eyes with a long stout lineal extension. Eyes as remarked by Walker with the facets a little larger above. The bright coloured *thorax* with some scattered yellow hairs, the sides with black hairs; breast same colour as thorax with long yellow pubescence and some brown hairs. *Scutellum* similar to thorax. *Abdomen* broad, the lighter segmentation most apparent on the first four segments; under side with whitish segmentations. *Legs* wholly black, fore tibiae with some greyish tomentum, pubescence black. *Wings* tinged deeply reddish yellow, stigma yellowish, veins yellow.

♂ identical. Eyes with the large facets hardly reaching beyond the apex of the frontal triangle, and the small facets not reaching the vertex. Length 21 mm.

***Tabanus crassus*, ♂, Walker.**

Dipt. Saund., i, p. 50 (1850).

Type male from E. India (Saunders coll.), and other males from Karwan, N. Kanara, India (Bell) ("in bungalow"), Hongkong (Walker), in Brit. Mus. coll.

In Howlett coll. two males from Pusa, Bengal ("in bungalow"). In Kertész coll. males from Formosa.

This species, of which curiously enough no females appear to have been collected, is an easily recognized blackish species, the first two segments of the abdomen covered with a hoary tomentum; wings clear, the first posterior cell narrower at opening. *Antennae* reddish. *Palpi* and legs blackish. Length of type 19 mm., others 15—20 mm.

Face and subcallus covered with yellowish brown tomentum, the former with blackish brown hairs. Beard the same colour thick. *Palpi* black with grey tomentum and black hairs. *Antennae* dull reddish yellow, black on apex, the first two joints with black

pubescence, the third joint narrow, slender, with a small tooth. Eyes large, the large facets very distinct, the small facets hardly reaching the vertex. *Thorax* reddish brown or blackish brown, with yellowish brown tomentum and blackish pubescence. *Scutellum* the same. *Abdomen* blackish brown or reddish brown, the first two segments reddish, densely covered with ashy grey tomentum, the segmentations very indistinctly paler, the pubescence on dorsum close, black, at sides black, under side more reddish brown. *Legs* appearing black, but often dull reddish covered with thick close black pubescence, the femora and hind tibiae with longer black fringes. *Wings* quite clear, stigma hardly apparent, pale yellow, veins on fore border sometimes blackish, otherwise yellow, the first posterior cell in type slightly narrowed, in some others more distinctly so, no appendix.

It is just possible that *Tabanus basalis*, ♀, Macquart, may prove to be the female, but it is a very much narrower bodied insect with dark wings.

***Tabanus albocostatus*, ♀, Bigot.**

Mem. Soc. Zool. France, v, p. 649 (1892). [*Atylotus*.]

Type ♀ from India.

No specimens of this species are in the collections mentioned in this paper. It is a medium-sized specimen distinguished by the lighter colour of the sides of thorax and of scutellum, the abdomen being a dull brown with very narrow pale segmentations, antennæ (incomplete), palpi and beard dark, legs brown. Forehead rather narrow. Length 21 mm.

Face and subcallus brown with yellowish brown tomentum, pubescence dark brown. Beard brown. *Palpi* dull reddish, covered with grey tomentum and with close black pubescence, long, not very stout at base, ending in an obtuse point. *Antennae* with the first two joints same colour as palpi, with black pubescence. *Forehead* brown with grey tomentum, raised, about eight times as long as it is broad, anteriorly reduced to almost half the width it is at vertex, frontal callus black, long, not reaching the eyes, its lineal extension stout, broad, ending in a finer point, not much longer than the callus itself which is oblong. *Thorax* reddish brown on dorsum, its sides redder, covered together with the shoulders with greyish tomentum which extends narrowly round the posterior border, scutellum covered with it also, pubescence of thorax now almost *nil*, a few white hairs present, on shoulders brown; breast brown with yellowish brown tomentum and brown pubescence. *Abdomen* dull brown, the segmentations very narrowly reddish yellow, with traces of a few white hairs in the middle, and white hairs are distinct on the sides of the first five segments, pubescence otherwise black; under side identical. *Legs* blackish with black pubescence, the tibiae more dull reddish brown. *Wings* tinged brown on fore border, veins and stigma brown, no appendix.

***Tabanus explicatus*, ♀, Walker.**

List Dipt., v. p. 328 (1854).

Types, two females from Sikkim, E. Himalayas (Hooker); another female from Khasi Hills (Chennell coll.); two females from Coonor, Central India. One male from Khasi Hills (Chennell coll.).

A black species with narrow fulvous segmentations on the abdomen, yellowish white tibiae and hyaline wings with yellow veins and stigma. Length 21 mm.

Face covered with greyish yellow tomentum and a few white hairs. Beard pale yellowish. Palpi reddish with thick black pubescence, almost the same width throughout, the apices obtuse. Antennae reddish, the third joint dusky, broad at base with a prominent tooth, the first two joints with black pubescence.

Forehead and subcallus same colour as face, the former nearly seven times as long as it is broad and a third narrower anteriorly, the frontal callus blackish brown, shining, oblong, not reaching the eyes with a rather thick lineal extension. *Thorax* with some grey tomentum, reddish at sides, hairs on sides yellowish. *Abdomen* blackish with narrow reddish segmentations on every segment, which in fresh specimens are covered with whitish hairs, often extending in the middle to almost a triangular spot, dorsum otherwise appears devoid of pubescence; under side similar. *Legs* black, tibiae pale yellowish, black at apices, fore coxae densely covered with yellowish grey tomentum, femora and tibiae with white, apices of tibiae and tarsi with black pubescence. *Wings* very slightly tinged yellow on second and third longitudinal veins. The specimens from Coonor probably discoloured have more reddish brown colouring on the abdomen which has yellowish pubescence. The male is identical with the female, the large facets occupy two-thirds of the eye, the small facets extending as a narrow border to the vertex.

***Tabanus nicobarensis*, ♀, Schiner.**

Reise Novara Dipt., p. 81 (1866).

Black: thorax with some grey tomentum and with three paler stripes, only distinct in certain lights and then especially so anteriorly, sides also paler, the shoulders with white tomentum; breast sides and scutellum ashy grey; the short pubescence on the dorsum of thorax chiefly black or at least dark, but whitish on the sides of breast, with a black-haired stripe from the base of wings to the shoulders. Abdomen black-brown, the first segment whitish at the sides, all segmentations clothed with snow-white short hairs which are extended in the middle to small, blunt, triangular spots; under sides identical; viewed from behind towards the light a dark cinnamon-brown tomentum spreads over the whole abdomen which, in comparison with the thorax viewed in the same light and appearing very light grey, stands out in strong contrast. Head black, with whitish tomentum and shining white pubescence; the

forehead anteriorly likewise whitish, but with a bright brassy yellow glimmer; the shining black callus situated rather far from the antennae, oblong, filling up the entire width of forehead, its posterior border with two incisions so that points appear at each side, but from the middle a shining black line proceeds towards the vertex, which is at first wider and from behind to the middle deeply incised fork-like; in the place where usually the ocelli are situated appear two shining black raised little lines near each other; the remaining surface of the forehead is grey tomentose, as is the rather distinctly concave hind part of head; proboscis black and short, the labella long. Palpi black-brown, with paler tomentum, broad at the base then gradually ending in a point, curved, a little shorter than the proboscis. Antennae black, the first projecting above; the second very short with a thorny point, the third on the upper side with a shallow incision, the angle only slightly projecting. Eyes naked. Legs black, the tibiae by reason of the paler thick tomentum at the base, appearing whitish, the fore tarsi unusually broad and short. Wings tinged deep smoky brown, the centres of cells rather paler, fore border darker, the first posterior cell widely open, no appendix. Length 7 lines. Four females from Nicobar Islands, one from Nankauri, the others from Sambelong. The species could only be compared with *Tabanus brunneus*, Macq., but there is no trace of black spots on the abdomen, neither of median spots, and the sides are not whitish yellow. *Tabanus brunneus* is also larger—8 lines. Schiner, Reise Novara Dipt., p. 81.

Two females from Nicobar Islands, 1904 (Bingham coll.; collected by G. Rogers, Esq., Deputy Surveyor of Forests), in British Museum coll.

In these specimens the *wings* are clear, veins brown. The *forehead* is about eight times as long as it is broad, and a third narrower anteriorly. The frontal callus large, a little protuberant, reaching the eyes, with a lineal extension. Length 16-16½ mm. The comparison with *Tabanus brunneus* appears to me misleading, but no doubt Schiner had not had the advantage of seeing the type.

Tabanus justorius, Rondani.

Ann. Mus. Civ. Genova, vii, p. 455 (1875).

From Province Sarawak, Borneo.

Length 15—17 mm.

♀ Body black; forehead brown-grey, callus linear, black, shining; face white.

Antennae black. Palpi obscurely brown. Thorax, particularly at the pleurae, white, pruinose.

Wings blackish, the two basal cells in the middle, and a stripe under the third longitudinal vein almost hyaline: costal border blacker; stigma black, appendix present. Halteres blackish, with the knob largely whitish.

Abdomen black, the posterior segments with white bands, which are a little dilated in the middle of dorsum; under side with four white bands. Legs wholly black. Rondani, Ann. Mus. Civ. Genova, vii, p. 455.

Type female and another from Sarawak seen by me in Nat. Hist. Museum, Genoa. No specimens are present in the collections named in this paper, but an easily identified species.

Blackish with white-haired bands on abdomen, legs and antennae black. Length 17 mm.

Face grey with white pubescence. *Palpi* yellow, with thick black pubescence. *Antennae* now incomplete, the first joint with black pubescence. The frontal callus long on the narrow forehead, with a short linear extension. *Forehead* quite seven times as long as it is wide and nearly two-thirds narrower anteriorly. Subcallus with grey tomentum. *Thorax* blackish brown with grey tomentum, and very indistinct stripes. *Scutellum* brown with grey tomentum. *Abdomen* rather long and narrow, the first segment broadly whitish grey tomentose, second, third, fourth with whitish grey haired narrow bands enlarged in the middle, the fifth and sixth with white-haired median spots, colour of abdomen blackish brown with black pubescence; under side similar. *Legs* brownish black, the pubescence black. *Wings* deeply tinged with brown, the discal, second basal cell and apex almost clear, appendix present.

Tabanus khasiensis, ♀, Ricardo.

Ann. Mag. Nat. Hist. (8), iii, p. 487 (1909).

Type ♀ and two other females from Khasi Hills, Assam, 1,000—3,000 ft. One female from Meerut (Indian Museum coll.).

A black medium-sized species with white bands on the abdomen. Antennae, palpi and legs blackish. Wings hyaline, tinged with brown. Length 15-16 mm.

Nearly allied to *Tabanus justorius*, Rondani, from Borneo but distinguished by the more hyaline wings, by the forehead being the same width throughout, and by the darker palpi.

Face covered with greyish tomentum in the middle, on the cheeks and subcallus with yellowish brown tomentum, the pubescence black. Beard black. *Palpi* on outside appearing blackish covered with grey tomentum and with black pubescence, on the inside obscure reddish yellow, long and pointed, stouter at base. *Antennae* dull reddish black or black, the first two joints with grey tomentum and black pubescence, the tooth of third joint small. *Forehead* same colour as subcallus, the same width throughout, with a few black hairs, nearly seven times as long as it is broad; the frontal callus oblong, narrow, brown, not reaching the eyes, furrowed in the middle, with a long narrow linear extension. *Thorax*, *scutellum* and *abdomen* brownish black, the former with grey tomentum and traces of two stripes, the pubescence black, a few appressed white hairs anteriorly; sides with black hairs, a tuft of white hairs behind the base of wings; breast black with grey

tomentum and black and white hairs. *Scutellum* on outer border covered with grey tomentum, pubescence black, white on the outer grey border. *Abdomen* with distinct white-haired bands on every segment except the seventh, enlarging slightly in the middle to half-moon spots and wider at the sides; under side similar. *Legs* black or brownish black, with black pubescence, coxae with white pubescence, and a few white hairs on hind femora below, the tibiae are sometimes obscurely reddish brown at base. *Wings* clear, tinged faintly with brown, in one specimen it is more distinct and borders the longitudinal veins.

Tabanus sanguineus, ♀, Walker.

Dipt. Saund., i, p. 54 (1850).

Tabanus assamensis, ♀, Bigot, Mem. Soc. Zool. France, v, p. 653 (1892). [*Atylotus*.]

Walker type ♀ from Java (Saunders coll.).

Bigot type ♀, faded, from Assam.

In Brit. Mus. coll. females from Kelantan, Malacca; and Hongkong.

In Howlett coll. from Pusa, Bengal; and Khasi Hills, 1,000—3,000 ft. high.

Others sent for identification from Darien Tipus and Negui Sembilan, Federated Malay States; Kuala Lumpur and Jelebu, Federated Malay States; Lushai Hills, Burma; and Formosa.

In Kertesz coll. two females from Sumatra.

This species has a wide distribution and is a handsome, easily recognised species, but very liable to vary in appearance owing to denudation on abdomen. In well-preserved specimens the abdomen appears blackish or reddish brown, with well-marked whitish-haired triangular spots on each segment, and with white-haired posterior borders, widest at sides. Forehead wide with large club-shaped callus. All the tibiae white. Length of type 17½ mm., others 18—21 mm.

Face covered with light greyish tomentum and with rather thick silvery white pubescence. *Palpi* yellow or light reddish with white pubescence and some black hairs at apex, short, stout, ending in a point. Beard silvery white. *Antennae* reddish brown with distinct tooth, the first two joints with black pubescence, the third joint long and slender. *Forehead* broad, short, rather more than four times as long as it is wide, almost the same width throughout, darker than the face with chiefly black pubescence, the frontal callus red-brown, large, oblong, almost reaching the eyes with a stout spindle-shaped extension. *Thorax* reddish brown or blackish brown, with grey tomentum on dorsum and chiefly black pubescence, stripes on well-preserved specimens distinct, sides with black hairs, round root of wings tufts of white hairs. *Scutellum* same as thorax, bordered with a short fringe of white hairs. *Abdomen* reddish brown, often blackish brown, with white

haired segmentations on a grey tomentose border, enlarged in the middle as broad, triangular spots, and at the sides wider and more distinct; under side blackish with the sides broadly white haired. *Legs* black, all tibiae with the exception of the apices pale yellow or white, the pubescence on coxae, femora, pale part of tibiae white, elsewhere black. *Wings* clear, stigma very pale yellow, veins brown, all posterior cells widely open.

***Tabanus oxyceratus*, ♀, Bigot.**

Mem. Soc. Zool. France, v, p. 652 (1892). [*Atylotus*.]

Type ♀ from India.

In Brit. Mus. coll. females from Cheena Forest, Himalayas, and N. Chin Hills, Burma.

In Indian Museum coll. from Mussoorie, India. A small black species with grey segmentations and grey median spots on the abdomen. Frontal callus large, protuberant, prolonged in a short, very thick line ending in a point. Forehead wide. *Legs* black, tibiae yellowish. Length of type 13 mm., others 11-12½ mm.

Face covered with grey tomentum and with whitish or yellowish hairs. *Palpi* long, not very stout at base, ending in an obtuse point, reddish yellow densely covered with black hairs. *Antennae* dull reddish, darker at apex, the first two joints with black pubescence, the second very small, the third wide at base with very slight angle. Subcallus and forehead covered with brownish yellow tomentum. *Forehead* wide, slightly narrower anteriorly, about four times as long as it is broad, the frontal callus blackish, not quite reaching the eyes, the forehead with dark markings beyond the apex of callus and on vertex. Thorax with two distinct grey stripes, grey at the sides, breast with white pubescence. *Scutellum* in well-preserved specimen with a grey tomentose posterior border covered with white hairs. *Abdomen* short, the broad but shortened triangular grey-haired spots are present from 2—5 segments, the segmentations reddish yellow but covered with grey hairs and grey tomentum; under side with reddish yellow segmentations, pubescence on dorsum of abdomen black. *Legs* black, the tibiae on basal two-thirds reddish yellow with whitish hairs on the lighter part, the fore coxae and hind femora with white pubescence, elsewhere it is black. *Wings* hyaline, stigma yellow veins reddish yellow, appendix present.

In the two specimens from Burma the hairs on the segmentations are yellowish.

***Tabanus orientis*, ♀, Walker.**

(Pl. xiv, fig. 18.)

List Dipt., i, p. 152 (1848).

Tabanus consocius, ♀, Walker, Dipt. Saund., i, p. 56 (1850).

Tabanus perlinea, ♀, Walker, *l.c.*

The type of *Tabanus orientis* is from Nepal, the types of *Tabanus consocius* and *perlina* from India, Saunders coll.

In Brit. Mus. coll. specimens from N. W. Province; Naini Tal and Thandiani, Himalayas; N. India; W. Bhutan.

In Indian Mus. coll. from Mussoorie, N. India, about 7,000 feet; in Brunetti coll. from Naini Tal, Kumaon, 6—7,000 feet (Lloyd); Minda, Nepal, and from Dongagali, Murree district, W. Himalayas. It appears to be a Northern Indian species in distribution.

A medium-sized species with almost clear wings and a reddish yellow abdomen which, when not denuded, is clothed with yellowish or whitish triangular median spots and segmentations. Forehead moderately broad with a large callus, its linear extension almost the same width as itself. Legs black, the tibiae yellowish. Eyes with three bands. Length 15—17 mm.

Face covered with yellowish or greyish tomentum. Beard and pubescence of face yellowish white. *Palpi* long, slender, only slightly stouter at base, ending in a rather obtuse apex, with scanty black pubescence and few white hairs below. *Antennae* red, often darker at apex, the first two joints and the apex of tooth with black hairs. *Forehead* slightly narrower anteriorly, about five times as long as it is wide, covered with yellowish or white tomentum and with some black pubescence, the frontal callus blackish or reddish brown, oblong, not reaching the eyes, its linear extension quite two-thirds its own width, though sometimes narrower at its lower end where it joins the callus. Eyes with three bands. *Thorax* black, when undenuded covered with yellowish tomentum and with appressed pale yellow hairs, the pubescence black, no stripes visible; the hairs at sides black: breast covered with yellowish white tomentum and with white pubescence; scutellum same as thorax. *Abdomen* reddish yellow on the three first segments with the exception of a large black median spot on the second and third, very distinct when insect is denuded, the fourth segment is very largely the same colour but often blackish on its posterior border, the remaining segments appear blackish but in the fresh insect the posterior segments are widely yellow, on all the segments appear yellow-haired triangular spots, and the segmentations are all yellow tomentose with yellow pubescence, elsewhere on the dorsum the pubescence is black, under side reddish yellow, only the extreme apex black, with yellow short pubescence. In some specimens the abdomen is darker with blackish markings on each segment, but the large callus of forehead distinguishes the species without difficulty. *Legs* black, the tibiae a rather transparent yellow, the fore pair black at the apex, the femora with yellowish white tomentum and pubescence, the tibiae and tarsi with chiefly black pubescence. *Wings* usually clear, sometimes slightly tinged, usually without an appendix. The eyes in life are described as greenish with three violet-green bands.

Tabanus orientalis, Wied., Auss. Zweifl. Ins., i, p. 145, from E. India, must be very nearly allied to this species, but Wiedemann

states the legs are ochre-brown, and calls the thorax yellowish with broad reddish brown stripes. It may possibly be identical with *Tabanus consanguineus*, Macquart, which has however yellowish legs.

***Tabanus fulvimedius*, ♀, Walker.**

List Dipt., i, p. 152 (1848).

Tabanus melanopygatus, ♀, Bigot, Mem. Soc. Zool. France, p. 651 (1892). [*Atylotus*.]

Tabanus pagodinus, ♀, Bigot, *l.c.*, p. 654 (1892). [*Atylotus*.]

The type of *Tabanus fulvimedius* is a ♀ from Nepal (Hardwicke Bequest), in bad condition, in the description the locality is given as doubtful; there is another ♀ in the Brit. Mus. coll. from N. Chin Hill, Burma.

There is no doubt that both the Bigot species are identical, though the frontal callus in *pagodinus* varies slightly, having a narrower prolongation, described by Bigot as "fortement retrecie au milieu," he also mentions another callosity on the vertex—which, however, only appears owing to denudation—and the presence of black pubescence. The three bands on the eyes are just discernible.

In Dr. Kertesz's collection there is a long series of females from Formosa, in very good preservation, with the pubescence on the abdomen perfect.

The species is very nearly allied to *Tabanus orientis*, Walker, the only apparent difference being in the more widely black apex, the last four segments being dark in this species. The wings are tinged with brown.

A medium-sized reddish brown species, with a rather broad *forehead* about six times as long as it is broad, only slightly narrower at the vertex, with a large oblong callus prolonged as a thick linear extension. *Antennae* red, palpi slender, reddish yellow with black pubescence. *Abdomen* reddish brown on the first three segments, black on the remaining ones with narrow yellow segmentations, when undenuded with large greyish yellow haired more or less triangular-shaped median spots on each segment, forming a continuous stripe. *Legs* black, the tibiae reddish yellow. *Wings* usually with a short appendix and slightly tinged brown. Length 15-16 mm.

The series from Formosa have the *abdomen* blacker, often only the first two segments being reddish yellow and not always entirely so. The *wings* are very distinctly tinged brown often without an appendix.

***Tabanus consanguineus*, ♀, Macq.**

Dipt. exot., i (1), p. 127 (1838).

Black. Abdomen with three white stripes, the lateral ones not reaching the apex. Legs red. Length 5½ lines.

Palpi yellowish white, terminating in an acute point. Face and forehead of a pale yellowish grey; the latter with an elongated brown callus, continued as a rather wide band. Antennae; the first two joints ferruginous; the third wanting. Thorax brown, with whitish stripes and tomentum; sides ashy grey. Abdomen black; a dorsal narrow stripe of a rather yellowish white, very distinct, extends to the end of the sixth segment and is prolonged on the seventh by a greyish line; a similar stripe on each side only extends to the third segment, being faintly prolonged on the fourth by an oblong little spot; lateral borders whitish; under side pale fawn with white tomentum. Legs with white tomentum. Halteres ferruginous. Alulae and wings clear; stigma yellow.

From the coast of Malabar. Collected by Mons. Dussumier. Museum.

This species resembles *Tabanus guineensis*, *indicus*, *trilineatus*, *lineola*, *occidentalis*, *trivittatus*, *dorsiger*, *quinquevittatus*, *costalis*, *obsoletus*, but appears to us distinct from all. Macq., Dipt. exot., i (1), p. 127.

From the above description I concluded the species was the same as *Tabanus striatus*, Fabr., but on seeing the type in the Paris Museum I find it is not so, but is nearly related to *Tabanus orientis*, and *fulvimedius*, Walker, from which it seems only distinguished by its smaller size, and the legs being wholly yellow.

The type is in a dirty condition, labelled from Malabar. Forehead broad, with the same shaped callus as in *Tabanus orientis*, reddish brown, extending almost as a straight stripe to the vertex. Palpi yellow, small and pointed. Thorax with grey tomentum. Abdomen blackish with pale white-haired segmentations, red-yellow on the first two segments and on the sides of the third; no stripes or spots now visible; under side pale yellowish. Wings clear, veins and stigma yellow. Length 12 mm.

Comparing it with a specimen of *Tabanus orientis* from the Brit. Mus. coll. it appeared similar allowing for denudation, with the exception of the lighter coloured legs and smaller size, so that for the present it seems best to keep it distinct from the Walker species.

Tabanus orientalis, ♂, Wiedemann.

Anal. Ent., 21, 8 (1824); *id.*, Auss. Zweifl. Ins., i, p. 145 (1828).

Yellow; thorax with brown stripes; abdomen posteriorly almost with bands, with a stripe of white spots. $6\frac{1}{2}$ lines; ♂ from East India.

Antennae rusty yellow. Face mouldy grey; palpi colour of chamois-leather; beard grey. Thorax yellowish with broad reddish brown stripes, the median one broadest, cut short behind, divided longitudinally by a pale yellowish line; scutellum clear brown with a paler border; pleurae chamois-leather-colour. (Wiedemann, in Auss. Zweifl. Ins., i, p. 145, where he repeats this description,

substitutes breast sides for pleurae.) Abdomen inclining to rusty yellow; on the posterior segments the base is clear brown, which appears as an indistinctly defined band; on the posterior border of each segment a triangular spot appears, and the border itself has whitish hairs. Wings more or less tinged yellowish, with almost leather-yellow veins. Halteres yellowish. Legs ochre-brown. In the Royal Museum. Wied., *Anal. Entom.*, 21, 8.

***Tabanus incultus*, ♀, Van der Wulp.**

Sumatra Exped. Dipt., 17, 4, pl. i, fig. 8 (1881).

Two females in Lebong, Sumatra, in May.

Brown. Antennae ferruginous. Abdomen with ochraceous segmentations; anterior legs black, tibiae at the base yellow. ♀ Length 14-15.5 mm.

Face yellowish, with ashy grey tomentum, towards the borders of the eyes lighter; forehead more rust-coloured; frontal band very narrow, gradually widening towards the vertex; the black stripe lineal; pubescence of the face brownish. Beard tawny yellow. Eyes naked, with fine network.

Antennae red-yellow, the first joint triangular, the second above with a little bristle, the third at the base with a sharp tooth, the apex of which is brown, the curved end of the joint black-brown (see plate). Palpi grey-brown; proboscis black. Thorax and scutellum grey-brown with partly yellow, partly black-brown pubescence, which is longer on the sides of the breast; on the thorax some traces of lighter stripes. Abdomen above black-brown, with ochre yellow segmentations which are distinctly marked, especially in the middle, by a short white pubescence; under side red-brown with very broad yellow bands on the segments. Fore legs black, the tibiae for wholly two-thirds at the base pale yellow; middle legs brown-yellow, the coxae and femora at their base blackish, the tarsi with the exception of the base, black-brown; hind legs black-brown with the knees besides the inner border and apex of tibiae yellowish; the pubescence of legs pale and appressed, except on the outer side of the hind tibiae where it is very dark brown and upstanding. Halteres yellow. Wings tinged yellow-grey, more brown-yellow along the fore border; the stripe-shaped stigma tobacco-brown, the neuration normal. Although the above specimens have too much conformity with each other, for me to have the least doubt of their belonging to the same species, yet I must refer to single differences. The description is taken from the largest specimen; in the other the forehead and face are uniformly ochre-yellow, also the pubescence of the face, of the beard, and of the segmentations of the abdomen, which are broadened out in the middle into triangular spots; the under side is darker; the hind tibiae are except at the apex wholly yellow, yet they have nevertheless black-brown pubescence on the outsides. V. d. Wulp, *Sumatra Exped. Dipt.*, p. 17.

Tabanus geniculatus, ♀, Van der Wulp.

Sumatra Exped. Diptera, 16, 2, pl. i, figs. 7, 7a (1881).

From Lebong (Sumatra) in May.

Thorax dark ashy grey, substriated; abdomen brownish red, the fore borders of segments brown; antennae and palpi brown; legs black, knees reddish yellow. Length 21 mm.

Related to the former species (*Tabanus immanis*, Wied.) but somewhat larger and distinguished by the black legs, of which alone the knees are red-yellow, by the darker borders of the abdominal segments and by the darker beard. Frontal band very narrow, posteriorly not wider, in the middle with a shining black stripe-shaped line. Eyes naked, with very fine network, forehead, face and cheeks with reddish grey tomentum; face with red coloured pubescence; beard black-brown. Antennae, proboscis and palpi black-brown; the antennae on the inner side with grey tomentum, the first joint triangular, the second very short, above with a bristle; the third with an acute tooth and in consequence deeply indented. Thorax and scutellum with dark ashy grey tomentum; the thorax with indistinct stripes, between which in some lights appear pale brown-yellow stripes; breast sides dark grey-brown; the fore breast and fore coxae with darker pubescence. Abdomen brown-red, a little metallic, with dark brown fore borders to the segments; under side black-brown with reddish segmentations. Legs black with red-yellow knees. Wings of a grey-brown tinge, along the border distinctly yellow-brown, stigma as a brown shadow at the end of the subcostal vein. V d. Wulp, Sumatra Exped. Dipt., 16, 2, pl. i, fig. 7.

GROUP X.

Forehead with one square, narrow or oblong callus, always prolonged towards the vertex as a more or less narrow line, five to ten times as long as it is broad. Species with the abdomen unicolorous or nearly so, sometimes darker at apex, but with no spots or bands, large, medium-sized or small species.

The following species are not included in the table, being unknown to me, but probably belong to this group.

Tabanus ardens, Wied.; Macquart described the male, the type of which is probably lost.

Tabanus laotianus, ♀, and *melanognathus*, ♂, Bigot, the latter described as having a yellow abdomen and black legs, the former with legs greyish black, the tibiae greyish at base.

Tabanus ixion, ♂, Osten Sacken, from Philippines.

Tabanus fumipennis, Van der Wulp, must be nearly related to *Tabanus caeruleus*, Macq.

Tabanus birmanicus, Bigot.

Mem. Soc. Zool. France, v, p. 653 (1892). [*Atylotus*.]

Type the only specimen, a female, from Burma.

In Brit. Mus. coll. are females from Ningpoh, India (H. M. Lefroy). In Kertesz coll. one from Lushai Hills, Burma; and another from Kuala Lumpur, Malay, London School Tropical Medicine coll.

A medium-sized dark brown species with lighter thorax, wings tinged brown, legs black, with white tibiae and a narrow forehead. Length of type 18 mm., others 16—19 mm.

Face covered with bright yellowish brown tomentum and with brownish yellow hairs. Beard same colour as face. *Antennae* bright reddish, darker at apex, first two joints with black hairs, the third long and slender and narrow, with a small tooth at base. *Palpi* yellow with black pubescence, stout ending in an obtuse point. Subcallus same colour as face. *Forehead* a little darker, with black pubescence, about seven times as long as it is narrow, and a third narrower anteriorly, the frontal callus long, narrow, not reaching the eyes with a linear extension, red-brown in colour. *Thorax* covered with nearly the same coloured tomentum as the face but slightly darker, and with short appressed fulvous hairs and pubescence, shoulders and sides with black hairs; breast the same colour, with black pubescence. *Scutellum* same as thorax. *Abdomen* brown, yellowish brown on the sides of the first two segments, with black pubescence and some yellow hairs, which appear chiefly on the segmentations and as a median line which is, however, not always to be discerned; under side dark brown with black pubescence. *Legs* blackish, the knees yellowish brown, the fore tibiae to their extreme apex, and the others wholly yellowish white, the fore coxae covered with yellowish brown tomentum, the pubescence on them, femora and tarsi black, on the tibiae white, some yellow hairs on hind femora. *Wings* tinged yellowish brown, lighter on posterior border.

***Tabanus flavothorax*, ♀, n. sp.**

Type and another female from Perak, Federated Malay States (Pratt), London School Tropical Medicine coll. In Brit. Mus. coll. one female from Singapore (Ridley); one from Johore (Flower); one from Sungie Krudda, Sungie Siput, Perak (Pratt); others from Batu Tiga, Federated Malay States (Stanton coll.).

A species nearly allied to *Tabanus birmanicus*, Bigot, but at once distinguished from it by the yellow middle and posterior femora, rather narrower forehead, and by the darker brown wings, with a distinctly marked clear apex; in the Bigot species it becomes merely paler on the posterior part of apex. Length 16 mm.

The *forehead* is quite eight times as long as it is narrow, and barely half as wide anteriorly, the frontal callus very narrow, reaching the eyes. *Thorax* more thickly covered with short yellowish pubescence over the yellowish brown tomentum, so that the dorsum appears yellower, the *scutellum* similar, no black pubescence on the shoulders, hairs at sides yellowish. *Abdomen* reddish brown

with black pubescence, long and narrow like the Bigot species; under side yellowish with a black median stripe, being densely covered with yellowish pubescence. *Legs* as in Bigot species but more largely yellow as specified above.

Wings tinged dark brown, on the fore border not reaching the apex and extending almost as a band across the wing to posterior border, becoming smoky brown in colour, costal border yellow, stigma dark brown, veins brown.

***Tabanus tinctothorax*, ♀, n. sp.**

Type ♀ and another female from Malay States, the type from Bukit Katu, Selangor, 3,500 ft. (Robinson), and the other from Kinta Valley, S. Perak, Sept.-Oct. (Ridley).

A blackish species with the thorax and scutellum reddish brown, covered with appressed red pubescence, under side of abdomen with white-haired segmentations. *Wings* pale brown, yellowish on fore border and at base. Length 20 mm.

Face black, with brownish tomentum, pubescence in middle of face brownish, on cheeks thick, black. Beard black. *Palpi* dull reddish, appearing black by reason of the thick black pubescence. *Antennae* dull black, the first two with thick black pubescence, the third long, the last four divisions short, not a third of the length of the whole joint, which is broad at base with a short tooth. Subcallus covered with yellowish brown tomentum. *Forehead* a little darker with some black pubescence, about nine times as long as it is broad, almost half as narrow again at the vertex; frontal callus narrow, long, with a not very long linear extension, reddish brown, shining, furrowed in the type only. The *thorax* and *scutellum* give the insect a distinctive appearance, some black hairs intermixed with the appressed red pubescence, sides of thorax with long black hairs; breast blackish brown with black pubescence. *Abdomen* oval, blackish brown with close black pubescence, in the middle of the first segment some hairs similar to those on the scutellum; under side similar, but with narrow white-haired segmentations on the second, third and fourth segments.

Legs black with black pubescence, femora and tibiae with some yellowish brown tomentum, hind tarsi with red hairs below. *Wings* with costal border, extreme base and stigma yellow, on apical half and posterior border as far as anal cell tinged pale brown, the basal and anal cell and axillary angle almost clear, veins yellow, brown on apical half. Squamae pale brown. Halteres yellow.

***Tabanus nigrotectus*, ♀, Bigot.**

Nouv. Archives Mus. Hist. Nat. de Paris (3), ii, p. 204 (1890). [*Bellardia*.]

Length 20 mm.

Antennae (incomplete) with first two joints reddish; face and forehead of a reddish grey; frontal callus and vertex black, the

former lineal, very narrow, very slightly dilated below; beard short and scanty, black, as are the palpi; the whole body dark black, abdomen a little shining. Wings black, with a long appendix, the first posterior cell closed with a long stalk. Eyes naked. One specimen from Laos, Bigot, *l.c.*, p. 204.

From Siam, not Island Laos as given in Kertész Catalogue. Not known to me.

***Tabanus caeruleus*, ♀, Macq.**

Dipt. exot., i (1), p. 132 (1838).

Black. Antennae testaceous. Thorax with lateral testaceous stripes. Abdomen bluish black. Legs black. Wings brown. Length 8 lines. ♀

Palpi and face black with scanty grey tomentum. Forehead at the base transversely furrowed, reddish grey, then blackish with a shining black spot club-shaped. Antennae brownish testaceous. Thorax black, with scanty grey tomentum: a lateral dull testaceous stripe above and in front of the wings. Abdomen black with blue reflections. Legs black; anterior femora hairy above; anterior and intermediate tibiae blackish brown, with scanty whitish tomentum. Squamae and halteres brown. Wings brown, less dark on the anterior border, the centre of the largest cells hyaline. Neuration normal. From Java Museum, Macq., Dipt. exot., i (1), p. 132.

Type in Paris Museum seen by me. A black species with the wings tinged brown. Forehead very narrow anteriorly, a little wider at the vertex, the frontal callus narrow, with linear extension. Palpi stout, ending in a point with thick black pubescence. Antennae (incomplete) reddish. Thorax black, red on the basal part. Abdomen black. Legs blackish, the posterior tibiae reddish. Length 18 mm. No specimens of this species occur in the collections mentioned in this paper.

***Tabanus tenebrosus*, ♀, Walker.**

List Dipt., v, Suppl. i, pp. 242, 389 (1854).

Type ♀ from Kanara, Malabar, and another female with the name on it but no locality.

Tabanus obscuratus, Walker, from Celebes is nearly related to this species, but has a longer narrower frontal callus, and the abdomen with no sign of the greyish blue tomentum.

From *Tabanus caeruleus*, Macq., it may be distinguished by the dull obscure colour of its abdomen, face not black, legs with no white pubescence.

A dull reddish brown species with a narrow abdomen, narrow forehead and frontal callus, blackish palpi; reddish yellow antennae and blackish legs. Wings brown, paler on posterior border and at extreme apex. Length 18 mm.

Face and subcallus covered with yellowish brown tomentum, the former with rather long blackish brownish hairs in the middle and on the cheeks. Beard blackish brown. *Palpi* appearing black by reason of their very close black pubescence on yellowish brown tomentum, the insides yellowish, stout, ending in a point. *Antennae* reddish yellow, the first two joints with black pubescence, the third with the apex in the other specimen blackish, in the type partly broken off, the tooth at base acute, distinct. *Forehead* about eight times as long as it is broad, and a third narrower anteriorly, frontal callus dark brown, club-shaped, not reaching eyes, with a lineal extension. *Thorax* (damaged) covered when fresh probably with the same plum-coloured tomentum as abdomen, in the type it is discoloured, in the other blackish; shoulders reddish, sides with black hairs. *Scutellum* same colour as abdomen which is an obscure reddish brown, covered with greyish blue or plum-coloured tomentum, pubescence apparently black, under side the same. *Legs* blackish, the tibiae in type dull reddish, in the other female black, pubescence entirely black. *Wings* brown, upper half of submarginal cell clearer and posterior border, in the other female many of the cells have clear middles or streaks.

***Tabanus perakiensis*, ♀, n. sp.**

Type ♀ from Kuala Lumpur, Federated Malay States, Stanton coll., 1909, and another female from Perak (Pratt), London School Tropical Medicine coll.

A black species nearly allied to *Tabanus inobservatus*, a new species from Sumatra, but distinct from it, having the face paler, the beard largely white, the antennae reddish yellow, the palpi paler, yellowish inside and on the outside yellowish but covered with grey tomentum, and the black pubescence is thick. Tibiae dull reddish. Length 15 mm.

Face covered with grey tomentum and with some short black hairs. Beard whitish with some black hairs. *Palpi* obscurely yellow, with some grey tomentum and with black pubescence, slender, a little stouter at base, ending in a point, base of first joint with long black hairs. *Antennae* reddish yellow, darker at apex, the first two joints paler with black pubescence, the tooth of third joint very small. Frontal triangle covered with reddish brown tomentum. *Forehead* narrow, a little greyer, with some black hairs, about eight times as long as it is broad and quite a third narrower anteriorly, the frontal callus reddish brown, long and narrow, not reaching the eyes, with a lineal prolongation. Eyes apparently with two or more cross-bands. *Thorax* brownish black, with some greyish tomentum and traces of appressed pale hairs, pubescence black, *scutellum* same as thorax. *Abdomen* narrow, blackish or brownish black, with close-lying black pubescence, sides with black hairs; under side black with grey tomentum and white-haired segmentations. *Legs* blackish, the femora with grey tomentum, the fore tibiae on basal half and

the other tibiae wholly reddish yellow, the pubescence on legs black. *Wings* dark brown, paler on posterior border and at extreme apex, the centres of cells somewhat paler, veins and stigma blackish brown.

***Tabanus inobservatus*, ♀, n. sp.**

Type ♀ and another from Kajoe-Tanan, Sumatra (Dr. Hagen), in Brit. Mus. coll.

A dull blackish species. Antennae, palpi and legs black. Wings brownish. Forehead very narrow, distinguished from *Tabanus caeruleus*, Macq., by its dull black not blue-black colour and its wholly black colouring, from *Tabanus obscuratus*, Wlk., from Ceram by its dark wings, and the forehead is narrower anteriorly. The thorax also is black, not reddish brown as in the Walker species which has reddish antennae. Length 16½ mm.

Face blackish with some yellowish tomentum, its pubescence and beard brownish black. *Palpi* blackish, on inner border reddish yellow, with black pubescence, fairly stout ending in a point. *Antennae* blackish, the first two joints with black pubescence, the third slender with some grey tomentum, the tooth small. Subcallus covered with yellowish brown tomentum. *Forehead* nearly ten times as long as it is broad, anteriorly about half as broad as it is at the vertex, blackish with a little yellow-brown tomentum and some black hairs; frontal callus reddish brown, shining, long, narrow, almost reaching the eyes with a long lineal extension. *Thorax*, *scutellum* and *abdomen* brownish black, the former with a few golden brown hairs scattered over dorsum, pubescence otherwise black as it is on the abdomen and breast; *abdomen* conical in shape; under side similar to the dorsum. *Legs* black with black pubescence, the tibiae with some greyish tomentum. *Wings* deeply tinged with brown, paler at extreme apex and on the posterior border, where however all the veins are shaded, the discal cell paler in the centre; rudiment of an appendix in the type, none on the other female, veins brownish black, stigma black, all posterior cells widely open.

***Tabanus fulvissimus*, ♀, Rondani.**

Ann. Mus. Civ. Genova, vii, p. 458 (1875).

Length 20 mm. From Borneo.

Body fulvous-reddish, unicoloured. Forehead brown fulvous, with the linear-shaped callus reddish, shining face paler. Antennae and palpi red.

Thorax on dorsum reddish brown, the pleurae and breast fulvous haired. Abdomen on dorsum with the posterior borders of segments margined with short fulvous hairs; the ventral segments at the base obscurely red, with the apices more or less paler. Wings pale brown-yellow, base and costal border fulvous. Calyptera brown-red. Halteres reddish with the knob paler. Legs

ferruginous, the coxæ reddish yellow, the tarsi pitchy black. Rondani, Ann. Mus. Civ. Genova, vii, p. 458.

Type seen in the Museum at Genoa. Only the one specimen, from which I made the following notes:—

A very large broad-bodied species. Abdomen reddish yellow, very broad. Antennae yellow. Legs reddish brown. Wings large, hyaline, tinged yellow. Length 22 mm.

Face covered with yellowish grey tomentum and a few scattered grey hairs. *Palpi* reddish yellow, long, and a little stout at base ending in a long point, with black hairs, darker at the extreme apex. *Antennae* the same colour, darker at apex, the first two joints with black hairs, the third with a distinct tooth. *Forehead* the same width throughout, about six times as long as it is broad, the frontal callus mahogany-coloured, oblong with a linear extension, not touching the eyes, the forehead and subcallus are covered with yellow-brown tomentum, some black hairs on the former. *Thorax* and *scutellum* the same colour as the abdomen with some grey tomentum, most noticeable on the anterior part of thorax. *Abdomen* with narrow yellow-haired segmentations; on the under side these are wider and whiter and the red-yellow colour is darker. *Legs* uniform reddish brown, the pubescence black.

Four specimens sent me by Dr. Kertész for identification from Borneo and Sumatra, agree with these descriptions with the exception of the wings which appear more brown than yellow, but the specimens are faded and dirty; and the palpi have yellow hairs.

Tabanus univentris, ♀, Walker.

List Dipt., i, p. 151 (1848); *id.*, Proc. Linn. Soc. London, i, p. 9 (1857).

Tabanus dives, in parte, ♀, Rondani, Ann. Mus. Civ. Genova, vii, p. 457 (1875).

Type ♀ from Borneo. (Presented by the Admiralty.)

In the Proceedings Linn. Soc. Walker refers to two varieties of the species from Mt. Ophir, Malaysia, which are not to be found in the Brit. Mus. coll.

A large species easily recognised by the uniform yellow abdomen, the colour of *Tabanus par*, Wlk., the small African species. Length 20 mm.

The Rondani type measures 22 mm.

Face with yellowish grey tomentum and hairs. *Palpi* large, stout, ending in a point, yellow with black pubescence, some yellow hairs at base. *Forehead* and subcallus with yellowish tomentum and some black hairs on the former, which is narrow, about eight times as long as it is broad, only slightly narrower anteriorly; frontal callus red-brown, oblong, with a linear extension. *Antennae* with the first two joints reddish with black hairs, the third blackish with a prominent tooth. *Thorax* brownish but covered with dense

yellowish grey tomentum, and with two very indistinct grey stripes. Under side of *abdomen* yellow with blackish median stripe. *Legs* yellowish red, femora reddish brown, covered on the under side with dense yellow-grey tomentum, and chiefly whitish pubescence, the apices of tibiae, and tarsi reddish brown, some white hairs on the tibiae, otherwise the pubescence on tibiae and tarsi is black. *Wings* hyaline, tinged faintly with yellow, stigma yellow, veins yellow-brown. In Walker's type the abdomen has segmentations and a faint median stripe, paler.

Rondani labelled two specimens (females) from Sarawak as *Tabanus dives*, but on examining these specimens it was clearly evident they belonged to two different species, the one measuring 22 mm. with a uniformly coloured yellowish abdomen marked with no spots is identical with *Tabanus univentris*, Wlk. The description was evidently drawn up from an examination of both specimens. The smaller specimen is probably nearly allied to or identical with *Tabanus stantoni*, see page 174.

Tabanus flavissimus, ♀, n. sp.

Type ♀ from Pundaluoya, Ceylon (Green), and another ♀ likewise from Ceylon.

A large bright yellow-bodied species nearly allied to *Tabanus fulvissimus*, Rondani, but distinguished from it by the narrower forehead, not parallel, and by the smaller narrower frontal callus. It is a larger species than *Tabanus univentris*, Walker, to which it is related in the shape of the forehead and frontal callus, but has wholly yellow legs and antennae, and the thorax is yellowish. Length of type 24 mm., the other is 20 mm.

Face, palpi, antennae, forehead, whole body, and legs uniformly fulvous, the colour of *Tabanus par*, Wlk., a South African species. *Abdomen* a brighter yellow. The pubescence of *palpi* black, they are long, rather slender, ending in a point. Beard brownish yellow, long. *Antennae* long and slender, the third joint narrow at base with hardly any tooth, its apex with some hairs, the first two joints with yellow pubescence. *Forehead* about seven times as long as it is broad, and barely a third narrower anteriorly, the frontal callus yellow, narrow, not reaching the eyes, with a lineal extension. *Thorax* (denuded) with whitish yellow hairs at sides and some white pubescence. *Abdomen* with yellow pubescence, thicker on the apical half; under side similar. *Legs* with chiefly short black pubescence. *Wings* yellow on costal border, tinged narrowly yellow on all the longitudinal veins, appendix present, stigma yellow, veins yellow.

Tabanus pauper, Rondani.

Ann. Mus. Civ. Genova, vii, p. 456 (1875).

Length 20 mm.

♀ Dull brown; the forehead subluteous, the linear callus pitchy red. Antennae brown-red, the apex, and the first two joints

partly, blackish. Head above and below white with white pubescence; palpi pale with very short black hairs. Thorax and scutellum subcoriaceous, with brown stripes; pleurae and breast greyish. Abdomen dull brown, with a dorsal intermediate series of whitish spots, but obsolete; the segmentations with short pale yellow hairs, on the under side with more distinct white hairs. Wings palely brownish, the veins bordered brown yellowish, the costal border browner, the stigma ferruginous. Legs, the anterior femora black, the anterior tibiae at the base widely reddish; posterior femora pitchy black, the tibiae red, the anterior tarsi wholly black, the posterior ones reddish at the base. Halteres reddish, with the club pale subluteous. Rondani, Ann. Mus. Civ. Genova, vii, p. 456.

Type ♀ seen in the Museum at Genoa. This large reddish brown species, length 23 mm., from Sarawak, is nearly allied to *Tabanus stantoni*, n. sp., but is distinguished from it by the absence of any median spots on the *abdomen* (the type is not in very good condition, but does not appear much denuded) which appears reddish brown, from the third segment onwards it is covered with yellowish brown tomentum, and with some short yellow pubescence, under side the same but with black pubescence. *Thorax* reddish brown covered with the same tomentum, and some greyish tomentum on the shoulders, the pubescence appears to have been chiefly black, the *scutellum* reddish with tomentum yellowish brown. *Wings* hyaline, tinged pale yellowish brown along all the longitudinal veins, no appendix, veins yellow. *Face* with grey tomentum and white hairs. *Palpi* pale yellow, long, slightly stout at base, ending in an obtuse point. *Forehead* narrow and about seven times as long as it is wide, and two-thirds narrower anteriorly, the frontal callus pear-shaped with a rather short linear extension. *Antennae* reddish, dusker at the tips, with a prominent tooth, pubescence black on the first two joints.

No specimens of this species are in any of the collections mentioned in this paper.

Tabanus leucohirtus, ♀, Ricardo.

Ann. Mag. Nat. Hist. (8), iii, p. 488 (1909).

Type ♀ and two other females from Kanara, Bombay, in Howlett coll.

A medium-sized dull reddish brown species, not unlike *Tabanus fumifer*, Walker, in appearance, but distinguished from it by the absence of spots on the abdomen and by the dark beard and hairs on face. Wings tinged with brown. Legs blackish brown, tibiae obscurely red. Length 20—22 mm.

Face covered with grey tomentum, pubescence brown, but some white hairs are visible on sides of face, beard is similar but very scanty. *Palpi* dull reddish, thickly covered with black hairs, large, stout ending in an obtuse point. Subcallus, forehead and sides of cheeks covered with yellowish brown tomentum. *Antennae* bright reddish, the apex black, and the first two joints with

black pubescence, the third joint long, slender, the tooth near the base distinct, crowned with a few black hairs. *Forehead* narrow, about seven times as long as it is narrow, very slightly narrower anteriorly, the frontal callus dark reddish brown, narrow, oblong, not reaching the eyes, prolonged as a narrow raised line towards the vertex, hairs on forehead black. *Thorax* brown with yellowish brown tomentum and scattered black pubescence, a few appressed pale yellow hairs are visible, chiefly on the anterior half of dorsum and at sides. *Scutellum* similar. *Abdomen* dull reddish, appearing darker owing to the close short black pubescence, segmentations obscurely yellowish or lighter, a few white hairs at the sides of abdomen; under side brown, but with grey tomentum on the sides and the segmentations, which latter are wider and more distinct, the pubescence black. *Legs* with black pubescence, but the fore coxae with long white pubescence, the fore tibiae reddish at base, the others reddish brown. *Wings* with brown veins and stigma, tinged with brown on the fore border becoming paler on the posterior border.

***Tabanus atrohirtus*, ♀, n. sp.**

In Brit. Mus. coll.

Type ♀ and three other females from Ceylon (Yerbury coll.).

This species is very nearly related to *Tabanus leucohirtus*, n. sp., but appears a distinct species differing in the following particulars.

The *face* is covered with yellow-brown tomentum similar to the forehead and subcallus. The beard is wholly brown and thicker, and no white hairs visible on the face. The *forehead* narrower, being about ten times as long as it is narrow, and narrower anteriorly, the frontal callus longer and narrower.

The *thorax* is more thickly covered with the short appressed yellow hairs, as is the *scutellum*. The *abdomen* appears darker, in the type almost black, owing to the thicker short black pubescence lying all over the dorsum, in the other specimens this pubescence is not quite so thick and shows the red-brown ground colour of the abdomen, the same colour as *Tabanus leucohirtus*; under side has no light tomentum or pubescence but is similar to the dorsum. The fore coxae have black pubescence. Length 18—20 mm.

***Tabanus pallidepectoratus*, ♀, Bigot.**

Mem. Soc. Zool. France, v, p. 658 (1892). [*Atylotus*.]

Type female from Saigon, Cochin China.

No other specimens of this species identified in the collections mentioned in this paper.

Type in fairly good preservation is a robust reddish yellow fly, with a very narrow forehead and frontal callus, reddish antennae, yellow palpi, black legs, only the tibiae whitish at the base, and clear wings tinged yellowish brown. Length 19 mm.

It is nearly allied to *Tabanus joidus*, Bigot, from Assam, but

is distinguished from it by the narrower, longer frontal callus, and narrower forehead, by the broader base of third antennal joint, and wings less deeply tinged. The tibiae are less widely whitish at base. The abdomen is broader and shorter with no golden yellow pubescence on the segmentations, only a little appears at the sides of the segments. The thorax is a little lighter in colour.

Face covered with greyish tomentum which becomes yellowish brown on the upper parts of cheeks, on subcallus and forehead, pubescence on face of white hairs, with darker ones on the cheeks. Beard white. *Palpi* yellow with thick black pubescence, large, stout, ending in an obtuse point. *Antennae* long, slender, the first two joints pale yellow with thick black pubescence, the first joint with the upper angle produced, the third joint reddish with a small tooth, dusky at its extreme apex. *Forehead* about ten times as long as it is broad, and a third narrower anteriorly, the frontal callus reddish brown, long, narrow, not reaching the eyes, with a rather thick lineal extension. *Thorax* brown covered with yellowish brown tomentum, denuded, pubescence remaining is chiefly yellowish, on shoulders and at sides chiefly black; breast covered with greyish tomentum. *Scutellum* similar to thorax. *Abdomen* fulvous, a little browner on the anterior borders of third, fourth and fifth, and almost wholly blackish brown on the last two segments, pubescence short, golden yellow, scanty, thickest on the segmentations, black on the last two segments; under side darker, reddish brown with paler under segmentations, appearing banded on anterior segments, at apex wholly dark, pubescence golden yellow only on segmentations, black elsewhere. *Legs* black, knees and basal third of all the tibiae whitish with some yellow hairs, fore coxae with pale hairs, elsewhere the pubescence is black. *Wings* tinged yellow-brown on fore border, veins and stigma yellow.

***Tabanus nigropictus*, ♀, Macquart.**

Dipt. exot., Suppl. v, p. 44 (1855).

Testaceous (denuded). Thorax with black stripes, breast black. Wings hyaline, the veins margined with brown. Length 8 lines, ♀ *Palpi* yellow, long. Beard yellowish. Face and forehead testaceous, frontal callus the same colour, prolonged in a line. *Antennae*; the first two joints testaceous, the third missing. Eyes naked. Thorax (denuded) testaceous with three wide black stripes; sides with traces of yellowish tomentum; breast black. *Scutellum* testaceous. *Abdomen* (denuded) testaceous; under side testaceous with the segmentations less dark, those of the fifth and sixth segments yellow. *Legs* testaceous, the last two joints of the tarsi brown. Wings brownish on the outer border, veins normal, bordered brownish, stigma reddish brown. From India. M. Bigot. Macquart, Dipt. exot., Suppl. v, p. 44.

This type is much denuded as stated by Macquart, no other specimens yet met with by me. The species is distinguished by the uniform colour of the abdomen, which is however darker at

the apex, and *legs*, and by the long narrow *palpi* only slightly stouter at the base with a long obtuse point. *Forehead* almost parallel but anteriorly a little *broader*, about six times as long as it is broad, the frontal callus large, oblong, not reaching the eyes, yellow, shining, with a long lineal extension. Breast only black below legs, is probably reddish in fresh specimens and the same may be said of the thorax. *Abdomen* with short black pubescence on the dorsum. *Legs* with some white pubescence on the fore coxae and on the femora, otherwise black. *Wings* with all the veins tinged with a brown border, veins and stigma yellow. Length 18 mm.

***Tabanus joidus*, ♀, Bigot.**

Mem. Soc. Zool. France, v, p. 657 (1892).¹ [*Atylotus*.]

Type ♀ from India and another female from Sibsagar, Assam, this is the second specimen included in the original description.

In Indian Museum coll. females with no locality specified, with the exception of one labelled Sibsagar; two have MS. names in Bigot's handwriting.

A narrow-bodied species with a reddish brown abdomen and a darker apex, sometimes the third and fourth segments are darker. Wings deeply tinged yellowish brown, paler on posterior border. Legs black, tibiae white. Forehead narrow with an oblong narrow callus. Antennae slender, reddish. Length of type 17½ mm., others from 16—20 mm.

Face reddish brown with brownish yellow tomentum, pubescence appears brownish. Beard brown or yellowish brown. *Palpi* yellow with thick black pubescence, stout ending in a point. *Antennae* pale red, the first two joints yellowish red with black pubescence, the third joint longer, slender, not very wide at base, with a distinct but small tooth. *Forehead* about six times as long as it is broad, and a third narrower anteriorly, covered with brownish yellow tomentum and some black pubescence, the frontal callus yellowish brown, narrow, oblong, furrowed in the middle, not reaching the eyes, with a lineal extension. *Thorax* brown with some short yellow or reddish yellow pubescence and greyish yellow tomentum, shoulders with long brownish hairs; breast covered with greyish yellow tomentum and with yellow hairs; *scutellum* same as thorax. *Abdomen* long and narrow, reddish brown, the last three segments in type black, segmentations fringed with golden yellow hairs, on the black part they only appear in the middle, pubescence on apex, and elsewhere black, but in one specimen it is almost entirely golden yellow on the anterior segments, on one specimen the blackish colour extends on to the third and fourth segments; under side reddish brown with black bands commencing from the second segment and lighter segmentations, the extreme apex wholly black, pubescence black. *Legs* blackish, the coxae covered with greyish yellow tomentum, the fore pair with long yellow hairs at base, and at apex with shorter black ones, femora with black pubescence, the fore tibiae pale yellowish on their basal half

with white hairs, the others also pale yellow at base with white hairs extending only a third of length, then becoming a rusty dirty yellowish with thick short black pubescence; in the specimens in Kertesz coll. the bases of tibiae are same colour as the rest, with no white hairs, all the tarsi blackish. *Wings* with no appendix, veins yellowish brown, first posterior cell not narrowed at opening.

***Tabanus siamensis*, ♀, n. sp.**

Type ♀ and another from Siam, June 1906 (W Palmer). Received from T. R. Bell, Bombay, per H. E. Andrews, in Brit. Mus. coll.

A species allied to *Tabanus joidus*, Bigot, but distinguished from it by the shining black thorax, and reddish yellow abdomen with black apex, the under side identical. In shape of forehead and frontal callus, colour of antennae, palpi and legs and of wings it is very similar to the Bigot species. From *Tabanus laotianus*, Bigot, from Siam, it will differ in the colour of thorax, abdomen and legs. Length 17½ mm., the other female 16 mm.

Face, subcallus and forehead covered with yellowish tomentum, the former with some yellow hairs, and a few brown ones on the cheeks. Beard scanty, brownish. *Palpi* pale yellow with black hairs, some yellow ones towards the apex, stout, ending in an obtuse point. *Antennae* reddish yellow, the first two joints paler with black pubescence, the third one broader at base than in *Tabanus joidus*, with a distinct but small tooth. *Forehead* about seven times longer than it is broad and a third narrower anteriorly; frontal callus oblong, not reaching the eyes with a long linear extension, reddish brown, a large spot of the same colour on the vertex, probably owing to denudation. *Thorax* shining black, with traces of yellowish brown tomentum anteriorly and at the sides, and on the dorsum as stripes, shoulders reddish and breast black, both with the same coloured tomentum. *Scutellum* similar to thorax. *Abdomen* reddish yellow, somewhat shining, the fifth partly and the last two segments wholly, black, dorsum devoid of pubescence; under side identical but the black segments fifth and sixth have distinct yellowish segmentations, hardly visible above, some yellow and black pubescence on the under side. *Legs* black, the tibiae reddish yellow on their basal half, pubescence black, the coxae covered with the yellow-brown tomentum. *Wings* tinged brown, yellowish on the fore border, stigma yellowish brown, veins brown.

***Tabanus palpalis*, ♀, Ricardo.**

(Pl. xiv, figs. 19, 20.)

Tabanus angustus, ♀, Bigot (*nomen bis lectum*), Mem. Soc. Zool. France, v, p. 652 (1892). [*Atylotus*.]

Type ♀ and another female from India, in the description one specimen only is mentioned.

The name is preoccupied by a Macquart species from S. America.

A small narrow-bodied species, of which no specimens are present in the various collections dealt with in this paper, the type and other specimen are both in a faded dirty condition, but the species seems distinguished from any I have yet seen by its very narrow hairy palpi; the frontal callus is club-shaped with a short rather stout lineal extension; Bigot gives the colour of the abdomen as light chestnut with a yellowish tomentum, which appears fairly correct. Legs uniformly dull yellow. Wings tinged yellow.

Length of female specimen 13 mm., the type has the abdomen broken off and gummed on to the label, it appears about the same length.

Face covered with grey tomentum which becomes on the upper part on cheeks near the eyes, and on subcallus yellowish brown, cheeks with some brown hairs. Beard brownish with some yellow hairs. *Palpi* narrow, almost the same width throughout, dull yellow, the first joint with long brownish hairs, which continue not quite so long on the lower border of second joint, which above is covered with the usual short black pubescence. *Antennae* reddish yellow, the first two joints with black pubescence, the third narrow but with a very prominent short tooth, at apex it is dusky in colour with hairs at the joints, apex of tooth also with a few black hairs. *Forehead* about five times as long as it is broad, and slightly narrower anteriorly, the frontal callus reddish brown, pear-shaped, with a short lineal extension, not reaching the eyes. *Thorax* brownish. *Abdomen* apparently chestnut-brown the segmentations lighter with traces of golden yellow hairs, which are distinct on the sides and scattered on the dorsum; under side the same. *Legs* chestnut-brown, the tibiae yellowish, fore coxae covered with grey tomentum and with pale hairs, femora with some long soft pale hairs, pubescence otherwise black.

***Tabanus flaviventris*, ♀, Bigot.**

Mem. Soc. Zool. France, v, p. 657 (1892).

Type ♀ and two others from Sibsagar, Assam.

In the description India only is mentioned, but the specimens are all labelled with the locality; the fourth specimen included by Bigot under this species does not belong to it but is a new species now named *Tabanus diversifrons*.

In Indian Museum coll. other females evidently of the original typical series from Sibsagar. In Brit. Mus. coll. one male and two females from Ceylon (Yerbury), one of the females is marked as "not common." None of the specimens are in very good condition.

A small yellow species easily recognised by its yellow abdomen, legs and antennae, clear wings and parallel forehead with a small indistinct yellow frontal callus. Length type 13 mm: others 11—14 mm.

♀ *Face* covered with yellowish tomentum and with some yellowish hairs. Beard pale yellow. *Palpi* pale yellow with sparse black pubescence and some longer yellow hairs below, stout, swollen, tapering suddenly to a slender point, so that the upper side is curved, the lower side straight. *Antennae* slender, reddish yellow, the first two joints paler, with a few yellow hairs, the tooth of third joint distinct. *Forehead* parallel, about six times as long as it is broad, same colour as face, the frontal callus small, not reaching eyes, yellow, shining, often very indistinct, with usually no linear extension visible. *Thorax* covered with greyish yellow tomentum and with fulvous appressed hairs, sides with yellowish hairs. *Scutellum* similar. *Abdomen* yellow, slightly darker at extreme apex, pubescence fulvous, and fairly thick, in well-preserved specimens; under side similar. *Legs* wholly yellow, apices of tarsal joints a little browner, pubescence chiefly yellow. *Wings* hyaline, veins and stigma yellow, appendix usually present.

♂ Similar, but the small facets of eye do not reach the vertex.

There are males and females in the Indian Museum coll. from Calcutta and Tenasserim with the apices of fore tibiae, the fore tarsi wholly and the others partly brown, which may perhaps justify their being divided from this species, but the material is too poor for decision on this point at present.

***Tabanus diversifrons*, ♀, n. sp.**

[*Atylotus flaviventris*, Bigot, *in parte*.]

Type ♀ and seven others from Shillong, Assam (H. M. Lefroy, Entomologist to Govt. of India), in Brit. Mus. coll. and Howlett coll., three females from North Khasi Hills, Lower Ranges (Chennell coll.), one female from N. Khasi Hills, in Bigot coll., which was placed under *Tabanus flaviventris*, Bigot, and others from Buxar Duars, Bengal and Sylhet, Assam.

A species very nearly allied to *Tabanus fuscicauda*, Bigot, but distinguished from it by the broader forehead nearly parallel, by the larger frontal callus, by the third joint of antennae being bright reddish yellow, black at apex, and rather wider at the base, by the more slender palpi and by the rather lighter coloured abdomen. Length 11—15 mm.

Face with hardly any brown hairs above. *Palpi* yellow with black pubescence, only slightly stouter at base. *Antennae*: the first two joints yellow with black hairs. The subcallus in some specimens is almost bare owing to denudation. *Forehead* about six times as long as it is narrow, almost parallel, the frontal callus reddish brown, darker posteriorly and on linear extension, callus not reaching the eyes but oblong or pear-shaped with a rather stout linear extension. *Thorax* blackish with fewer appressed fulvous hairs, and the shoulders are not reddish. *Abdomen* reddish yellow, darker at apex, the black pubescence on dorsum not so thick, some grey tomentum on dorsum, segmentations narrowly paler with some yellow hairs; under side is similar. *Legs* black, tibiae reddish, fore tibiae black at apex. *Wings* very slightly tinged brown.

It is distinguished from *Tabanus subcinerascens*, n. sp., by the reddish yellow abdomen with black apex, and no grey tomentum, and by the antennae being black at apex.

***Tabanus subcinerascens*, ♀, n. sp.**

(Pl. xiv, fig. 21.)

In Brit. Mus. coll.

Type and three other females from N. Chin Hills, Burma (Watson), 1894.

This species is very nearly related to *Tabanus cinerascens*, Bigot, but appears a distinct species, shape of the antennae, forehead and *frontal callus* being different.

The third joint of the *antennae* is wider at the base and the whole joint shorter, the *palpi* a little stouter. The *forehead* is broader, almost the same width throughout, barely six times as long as it is broad, the frontal callus is larger, practically reaching the eyes, and is prolonged as a thick spindle-shaped line, reddish brown in colour.

Thorax and *scutellum* reddish brown with black pubescence and some yellowish white hairs. *Abdomen* more uniformly reddish brown, a pale median stripe appears in some lights formed of greyish tomentum with a few scattered yellow hairs which also appear on the segmentations, sometimes forming a narrow fringe chiefly on the apical segments. *Legs* reddish yellow, femora frequently darker. Length 12-13 mm.

***Tabanus obconicus*, Walker.**

Dipt. Saund., i, p. 54 (1850).

Type ♂ from Central India.

One female from India (Wroughton) in Brit. Mus. coll. One female from Bombay and one from Belgatchia, Bengal, in Howlett coll. ♂ A specimen with a yellowish brown conical *abdomen*, posterior borders of segments covered with grey tomentum, which in the middle reaches the anterior border of segment on the third and fourth segments at least, so that the anterior yellowish brown part of segment has a zig-zag posterior border, the last two segments blackish, the pubescence on dorsum black, longer at the apex, and on sides black; under side yellowish brown covered with grey tomentum, and with scanty black pubescence. The *legs* are reddish brown, the middle and posterior tibiae more yellowish brown, the fore coxae with grey tomentum and whitish pubescence. The *thorax* is reddish brown. The *wings* hyaline tinged brown on the veins, the cross-veins included. The eyes have the large facets on the upper part, reaching just beyond the beginning of the frontal triangle, and small ones occupy the lower portion, attaining the vertex as a narrow border. The *antennae* are yellowish on the first two joints with black hairs, the third joint is wholly of an obscure black (whether this is owing to the bad state of preservation of the

specimen, or is peculiar to it, is doubtful), tooth distinct but small, *Face* appears yellowish with chiefly yellow pubescence. The *palpi* the same colour. Length 15 mm.

♀ Similar. *Face* with grey tomentum and white hairs, the subcallus and forehead with similar tomentum. *Palpi* yellow, stout at base, ending in a point. *Forehead* almost parallel, about five times as long as it is broad. Frontal callus large, oblong, not reaching the eyes, reddish brown with almost a spindle-shaped extension. *Antennae* wholly yellow. *Thorax* with some white hairs anteriorly and at the sides, otherwise the pubescence is black on dorsum and on shoulders; breast with grey tomentum and white hairs. *Abdomen* in like manner has some white hairs on dorsum and at sides, the pubescence otherwise black as in ♂. *Legs* blacker, the fore tibiae at base obscurely yellow, the middle and posterior tibiae yellowish.

***Tabanus borniensis*, ♀, Ricardo.**

Tabanus apicalis, ♀, Rondani, Ann. Mus. Civ. Genova, vii, p. 459 (1875). Name preoccupied by a species from Brazil described by Wiedemann in 1828.

In Brit. Mus. coll. one female from Sarawak. (Purchased Stevens 1857.)

Length 12 mm. ♀ Body fulvous, with the apex of the abdomen blackish. *Antennae* widely red. *Palpi* reddish. *Forehead* between the eyes dull brown, the lineal callus pitchy black, the exterior part behind the antennae fulvous. Head before and below pale grey yellowish and pale haired. *Thorax* with scutellum brown reddish, pleurae and breast grey yellowish. *Abdomen* with the three basal segments above and below fulvous, the two following especially at the base, streaked with black; the two apical ones black-brown and brown haired; the preceding ones posteriorly shortly ciliated with pale yellow hairs. *Wings* subhyaline, the costal border brown yellowish, towards the apex brownish. *Legs*: the anterior pair dull piceous, the posterior ones yellowish red, all the tarsi blackish brown. *Calyptera* blackish. *Halteres* red, the club pale yellowish, its apex paler. Rondani, Ann. Mus. Civ. Genova, vii, p. 459.

Type ♀ seen by me in the Museum at Genoa. A small species from Sarawak, with a pale yellow abdomen, apically darker. *Antennae* yellow with hardly any tooth. *Legs* yellowish. *Wings* clear. Length 12 mm.

Face yellowish grey with scattered white hairs. *Palpi* yellow with black pubescence, slender. *Antennae* wholly yellow with yellow hairs on the first two joints. *Forehead* narrow, about eight times as long as it is broad, and nearly two-thirds narrower anteriorly, apparently dark coloured, with the frontal callus narrow not reaching the eyes, brownish, the lineal extension short, some yellow hairs on the vertex. *Eyes* bronze-coloured, spotted black. *Thorax* yellowish somewhat shining, with grey tomentum, the *scutellum* yellowish, shining. *Abdomen* transparent yellow on the first three segments,

the remaining segments blackish and reddish brown, with thick yellow-haired segmentations on third, fourth and fifth segment, less distinct on the second, the fifth is almost covered with yellow pubescence, the sixth and seventh with almost wholly black pubescence; under side similar, the segmentations lighter coloured with no pubescence. *Legs* yellow, fore pair and all tarsi reddish brown. *Wings* slightly tinged yellow on the fore border and apex; veins and stigma yellow.

The specimen in Brit. Mus. coll. has a few black hairs on the first joints of antennae. Beard scanty, pale yellow. *Forehead* one-third narrower anteriorly, brown, covered with grey tomentum, the lineal extension of callus reaches more than half way to the vertex, which is reddish brown. Sides of *thorax* with yellowish white hairs. *Legs* yellow, the fore femora reddish brown, the posterior ones paler.

Another specimen from Sarawak has a label in Walker's handwriting "hybridus" but I believe it to be a specimen of this species; the fore femora and tibiae are wholly yellow.

Tabanus fuscicauda, ♀, Bigot.

Mem. Soc. Zool. France, v, p. 658 (1892). [*Atylotus*.]

? *Tabanus andamanicus*, ♀, Bigot, *l.c.*, p. 668. [*Atylotus*.]

Type ♀ from Ceylon; and 3 other females from Pundaluoya, Ceylon (Green); and another from Peradeniya, Ceylon (Green); others from Kajoe-Tanan, Sumatra, June 1907 (Dr. Hagen).

This species described by Bigot from a single specimen is a reddish brown medium-sized species with clear wings, blackish, legs and tibiae yellowish, with a very narrow forehead and long narrow frontal callus. Abdomen with no spots except an indistinct black median mark on the second segment, the segmentations narrowly paler. Length of type 15 mm., others from 14-15 mm.

This species might possibly be confounded with small specimens of *Tabanus fumifer*, Wlk., but may be distinguished by the absence of any median pale spots on abdomen, by the lighter reddish yellow tibiae and by the paler segmentations of abdomen with white or yellow hairs.

Face covered with grey tomentum, on cheeks and near antennae with yellowish brown tomentum, pubescence white. Beard white. A few brown hairs are present on the upper part of face and at sides of antennae. *Palpi* stout, ending in a fairly long point, yellow with black pubescence, a few white hairs visible at the base. *Antennae* dull red, dusker at the apex, the first two joints and apex of tooth which is distinct, with black hairs. Subcallus and forehead yellowish brown with grey tomentum. *Forehead* very narrow, about nine times as long as it is broad, a third narrower anteriorly, the frontal callus very narrow, long, brown, not reaching the eyes, with a linear extension, the pubescence on forehead black. *Thorax* blackish brown, no stripes visible, covered with grey tomentum

and with scattered short appressed yellowish pubescence and longer black hairs, shoulders reddish, sides with black hairs, a tuft of white hairs behind at base of wings. Breast covered with grey tomentum and with white hairs. *Scutellum* similar to the thorax. *Abdomen* reddish brown, blackish towards the apex, and with a faint black median mark on the second segment, the segmentations yellowish, with yellow pubescence which is scattered and on some of the specimens is hardly visible, on the type it appears on the median line, the pubescence of dorsum thick, black; under side very similar but appearing darker in the middle with grey tomentose sides. *Legs* black, the fore tibiae at their base, the others wholly, reddish yellow, pubescence on fore coxae and on posterior femora white or yellowish white, on the others a few whitish hairs appear, otherwise the pubescence on them and elsewhere is black. *Wings* clear, veins yellowish brown, stigma yellow. In the specimens from Sumatra the black mark on the second segment is often not visible.

Atylotus andamanicus is a very badly preserved female specimen from the Andaman Islands, it appears to me to be identical with the above, the only difference appearing to be the presence of a round grey tomentose spot on each side of the second and third segments.

***Tabanus uniformis*, ♀, n. sp.**

Type ♀ and a long series from Darien Tipus, Negui Sembilan, Federated Malay States, collected February and March 1908 by Dr. A. T. Stanton, who informs me that the locality is a new road running through jungle country.

A species with a uniformly coloured abdomen, reddish, with brighter reddish yellow haired narrow segmentations. Antennae and legs reddish yellow, the femora darker. Forehead narrow with a long narrow callus. Wings clear, tinged yellow on the fore border. Length of type 16 mm., others 14—16 mm.

Face covered with yellowish grey tomentum, the upper part of cheeks bordering eyes, the subcallus and forehead with darker reddish brown tomentum, pubescence on face scanty yellow, on the cheeks browner and longer, beard dark yellowish with brown hairs intermixed. *Palpi* yellow, thickly covered with black hairs, stout, ending in an obtuse point. *Antennae* reddish, the first two joints yellow with black pubescence, the third moderately broad at base with a distinct tooth. *Forehead* about eight times as long as it is broad, and a third narrower anteriorly, frontal callus shining yellowish brown, very narrow, long not reaching the eyes, furrowed in the middle with a fine lineal extension, pubescence of forehead black. *Thorax* reddish brown as abdomen but with some greyish brown tomentum anteriorly and at sides, the pubescence on dorsum very largely of short fulvous hairs, but black hairs are intermixed especially in the middle of dorsum. hairs at sides blackish. *Scutellum* is similar.

Abdomen reddish brown with bright reddish yellow short pubescence, always present on segmentations and in type and well-preserved specimens on the whole dorsum, black hairs intermixed, all pubescence is short but thick; under side the same but with paler segmentations, the black pubescence predominates. *Legs* reddish yellow, the coxae and femora reddish brown, on the middle and posterior pairs however this colour appears only in streaks, the fore coxae with grey tomentum and whitish hairs, the femora with short black pubescence, some yellow hairs intermixed at knees, and on outer border of the middle femora, in the tibiae it is black, largely yellow at the base, on the tarsi it is black. *Wings* clear, distinctly tinged yellow on the costal border, and more faintly so on the fore border, stigma yellow, veins yellow, a pale white streak is visible below the stigma.

***Tabanus subhirtus*, ♀, Ricardo.**

Tabanus cinerascens, ♀, Bigot, Mem. Soc. Zool. France, v, p. 669 (1892). [*Atylotus*.] (*Nomen bis lectum*.) The name is preoccupied by a species from Australia named by King in 1827.

Type ♀ from Java.

In Howlett coll. females from Belgatchia, Bengal, and from Bombay.

A small olive-coloured or reddish brown species, the abdomen appearing dusky with yellowish brown tomentum and black and white pubescence, the thorax olive-brown with white hairs intermixed with the black pubescence. Antennae light red, palpi pale yellow with black and white pubescence, slender. Legs pale reddish yellow. Wings clear. Length 12 mm.

Face covered with whitish grey tomentum and with white pubescence. Beard white. *Palpi* with a long pointed apex. *Forehead* covered with yellowish brown tomentum and with black pubescence, narrow, anteriorly one-third narrower than at vertex, about seven times as long as it is wide, frontal callus yellowish brown, long not reaching eyes, extended as a fine line beyond the middle of the forehead. *Antennae* long and slender, the first two joints with grey tomentum and some black hairs, the apex of third joint dark brown. *Thorax*: shoulders red with black hairs, white hairs round base of wings, breast covered with whitish grey tomentum and with white hairs. *Scutellum* same as thorax. *Abdomen*: segmentations very narrowly pale yellow, the apex appears darker, dorsum sprinkled with white hairs; under side ashy grey with short white pubescence. *Legs* almost unicolorous, the femora and tarsi a little browner, pubescence black, on femora some white tomentum and on tibiae some few yellow hairs. *Wings* clear, veins yellowish and brown, stigma yellow.

The specimens from Bengal have the abdomen rather redder in colour, and the very short white hairs are yellowish in colour and not so numerous.

Tabanus formosiensis, ♀, n. sp.

Type ♀ and another from Formosa in Dr. Kertesz's coll.

A small species nearly allied to *Tabanus cinerascens*, Bigot, distinguished from it by the narrower shining black frontal callus and narrower forehead, and by its olive-coloured abdomen with short yellow pubescence scattered over the dorsum. Antennae and legs yellow. Wings clear. Length 11 mm.

Face covered with whitish tomentum and white hairs, the upper cheeks, subcallus and forehead with yellowish brown tomentum, the former with black hairs. Beard white. *Palpi* pale yellow, with black pubescence, slender, not very stout at base, with a long slender apex. *Antennae* reddish yellow, the first two joints pale yellow with black hairs, the third with a very small but distinct tooth crowned with a few black hairs, narrow, not very wide at base. *Forehead* nearly ten times as long as it is broad, being only half as wide anteriorly as it is at vertex, frontal callus cylindrical, with narrow lineal extension, not reaching the eyes, black; some black hairs on forehead. *Thorax* blackish with some grey tomentum anteriorly, the dorsum with scattered short yellow pubescence, shoulders reddish with black hairs; sides and breast ashy grey with white pubescence. *Scutellum* similar to thorax. *Abdomen* olive-brown, covered with yellowish brown tomentum and with black pubescence, short appressed yellow hairs are scattered over the dorsum; under side black covered with ashy grey tomentum. *Legs* yellow, the coxae covered with ashy grey tomentum and with white pubescence, the femora with the same tomentum chiefly on their lower sides and with some white hairs below, fore tibiae on their basal half with yellowish pubescence, and the others with some on their lower sides, elsewhere the pubescence is black, fore tarsi black, the others more or less brownish. *Wings* clear, veins and stigma pale yellow.

Tabanus tuberculatus, ♀, n. sp.

From Indian Museum coll.

Type ♀ and another from Companiganj, Sylhet district, Assam (B. Warren); and another female from Belgatchia, Bengal, in Howlett coll., and type ♂ from Pusa, Bengal.

A small yellowish species allied to *Tabanus diversitrons*, n. sp., but distinguished from it by the shining bare subcallus, forehead narrower anteriorly. Thorax covered with yellowish tomentum. Abdomen more red-yellow and narrower. Legs almost wholly yellowish. Length, male and female types 13 mm., others 12 mm.

♀ *Face* covered with greyish tomentum and with some short yellow hairs. Beard yellow. *Palpi* bright yellow, a little stout at base ending in a long point, pubescence of yellow and black hairs intermixed. *Antennae* (incomplete): the first two joints yellow. Subcallus shining, mahogany-yellow, rather protuberant. *Forehead* covered with greyish yellow tomentum, about seven times

as long as it is broad, slightly narrower anteriorly, the frontal callus large, oblong, nearly reaching the eyes, red-brown, with a short rather stout lineal extension. *Thorax* black, but covered with greyish yellow tomentum and with yellow appressed hairs, sides and shoulders reddish yellow with pale yellow hairs; breast black, covered with greyish tomentum and with pale yellow pubescence. *Scutellum* same as thorax. *Abdomen* narrow, reddish yellow, the last three segments blackish with some grey tomentum, the pubescence on dorsum short, black, with bright yellow hairs intermixed which become thick at sides, on apical segments the black hairs are longer; under side the same, but the yellow pubescence predominates. *Legs* bright reddish yellow, the tibiae and tarsi pale yellow, the fore tibiae at apex and the fore tarsi black, the other tarsi brown on their apical joints, the fore femora with black short pubescence which is also present on apices of fore tibiae and on fore tarsi and apical joints of others, the pubescence elsewhere yellow. *Wings* hyaline with pale yellow fore border, stigma and veins.

♂ The males are similar. Eyes with the large facets distinct, occupying two-thirds of the eye, the small facets extending to the vertex as a narrow border. *Face*, subcallus and frontal triangle covered with greyish white tomentum, the pubescence of former and the beard white. *Palpi* pale yellow with yellow hairs and a few black ones at apex.

Antennae light reddish yellow, the first two joints pale yellow, the third joint slender with a very slight tooth. *Thorax* blackish covered with greyish yellow tomentum, the pubescence consisting of long pale yellow hairs, sides and breast covered with grey tomentum and white pubescence. *Scutellum* the same with a fringe of long yellow hairs on its basal border. *Abdomen* the same as in female, conical, the blackish colouring begins on the fourth segment. *Legs* the same, but the tibiae have chiefly black pubescence. *Wings* clear, the stigma and veins pale yellow, the rudiment of an appendix present.

***Tabanus simplissimus*, ♀ ♂, Walker.**

Proc. Linn. Soc., i, p. 111 (1857).

Tabanus minimus, ♀, Van der Wulp, Sumatra Exped. Dipt., 18, pl. i, fig. 11 (1892); *id.*, Notes Leyden Museum, vii, p. 71 (1885).

Walker's types male and female from Sarawak (Saunders coll.); and others in Brit. Mus. coll. from Perak (Pratt), Kuala Lumpur, Selangor (Durham); Railway, Sungei Bessi, Selangor (Durham), and Selangor (Meade Waldo); Bidor, S. Perak (Robinson and Annandale coll.); one male from Singapore (Ridley). V d. Wulp described his species as follows:—

“A female from Soeroelangoen (Sumatra) in August. Piccous; antennae, tibiae and posterior tarsi at the base red; frontal callus black, shining; wings subhyaline. ♀, length 10 mm.

Face and cheeks dark grey; beard white; subcallus above the antennae wholly taken up by a shining black tubercle, which has

a longitudinal furrow in the middle, and is prolonged above as a stripe-shaped line on the grey narrow frontal band. Eyes naked with very fine network. Antennae red-yellow, the two first joints projecting above tooth-like; the third at the base with a small tooth; at the apex brownish. Palpi grey-brown ending in a point, proboscis black-brown. Thorax, scutellum and abdomen brown-black, slightly shining. Thorax with short pale pubescence, the shoulders and the triangle at base of wings brown; breast sides black-grey with whitish pubescence; abdomen with some trace of reddish segmentations; under side with distinct grey segmentations. Coxae and femora black, the fore coxae with whitish grey tomentum and pubescence of same colour; knees and tibiae pale red-yellow; on the fore legs the apex of tibiae as well as the whole tarsi black, on the hind legs the first tarsal joint red-yellow with the apex and following joints black-brown. Halteres yellow. Wings hardly a little greyish; the stigma marked by an almost unnoticeable brown-yellow shadow; veins normal. This species seems related to *Tabanus pusillus*, Macq. (Dipt. exot., i (1), 127, 12), from China, which has also a black subcallus, but the palpi are described as pale yellow and the legs as uniformly red-yellow." V d. Wulp, Sumatra Exped. Dipt., p. 18.

"I need only add to my original description that the eyes are bare and of a bronze colour, with small facets; even after having been moistened they show no trace of cross-bands. In these Javan specimens the yellow colour of the legs is so pale that it may be called whitish. Two females from Ambarawa in Java (Ludeking)." V d. Wulp, Notes Leyden Museum, vii, p. 71 (1885).

Van der Wulp evidently re-described the same species as Walker had described years before, but the colour of the *abdomen* as stated by him hardly applies to the specimens in Brit. Mus. coll. and in London School Tropical Medicine coll., which range from yellowish at the base becoming darker towards the apex, to reddish brown becoming blackish at the apex, the pubescence on dorsum black but not very thick, the segmentations in fresh specimens fringed with yellow hairs. The tibiae whitish or very pale yellow. The *wings* hyaline but very faintly tinged yellowish on fore border, the costal border yellow.

The *forehead* is narrow nearly ten times as long as it is broad, about a third narrower anteriorly, the frontal callus narrow, long, blackish, reaching the eyes with a linear extension, forehead covered with grey tomentum. The *palpi* vary from usually yellow with black pubescence to almost black with grey tomentum, swollen at base, ending in a rather fine point. Length from 9—12 mm. The male type (now headless) has the abdomen almost wholly yellow, underneath dark at the apex.

The male from Singapore has the large facets of the eyes distinct, reaching across almost as far as the posterior border of the subcallus, the small ones are continued as a narrow border to the vertex.

This species may usually be distinguished from those specimens of *Tabanus ceylonicus*, Schiner, which have the abdomen almost

wholly reddish brown (not merely somewhat reddish brown at the sides as Schiner describes), by its whitish or yellowish beard and lighter palpi which even when darker have grey tomentum, appearing greyish, but on examining a long series of specimens of both species, I found that some with the reddish brown abdomen had yellowish beards but the palpi dark, or blackish beards and the palpi rather reddish. I can find no other specific difference to divide the species, and it appears doubtful whether they can be maintained as two distinct species, both in shape of palpi, antennae and frontal callosities are almost identical, and both occur in the same localities but Walker's species is not so numerous in the collection. Van der Wulp was mistaken in thinking *Tabanus pusillus*, Macq., had a black shining subcallus, his species has no relation to the Macquart type which I examined in the Paris Museum.

***Tabanus ceylonicus*, ♀, Schiner.**

(Pl. xiv, fig. 22.)

Reise Novara Diptera, p. 93 (1868).

Tabanus nitidulus, ♀, Bigot, Mem. Soc. Zool. France, v, p. 679 (1892).

Bigot type from Java and other females in Brit. Mus. coll. from Trincomalee, Ceylon (Yerbury), with note from donor "Rare", from Dinding, Siam (Ridley); from Singapore, Straits Settlement (Falshaw), with note from donor "Found in Singapore and Federated Malay States, bites cattle and horses, found in town and jungle; very rarely seen and not so common as other Tabanidae"; from Tapah Road, Perak, Federated Malay States (Durham); and a long series from Bidor, S. Perak (Robinson and Annandale coll.); from Kuala Lumpur (Stanton coll.); from Kajoe-Tanan, Sumatra, Dr. Hagen, "on cow." One male from Trincomalee, Hot Wells, Ceylon (Yerbury).

Shining black, very bare, the thorax at the sides and especially the triangle at base of wings as well as the abdomen at the sides somewhat brown-red, on the sides of breast just under the root of the wings is a rusty brown small spot; the under side of abdomen is likewise but not very distinctly reddish brown, the short hairs on the sides of abdomen black. Head black, the face in certain lights dark cinnamon-brown, the forehead narrow, somewhat broader behind, the shining black callosity just above the antennae large, occupying the whole space between the eyes, beyond it a rather long square less shining spot, from which three fine shining stripes reach to the vertex, the space between it dull bluish grey. Antennae bright red-yellow, the third joint black at the apex, the first joint cylindrical, not wider above, the second short with no spine above, both bare, the third hardly concave above so that the angle projects but little, the joints ringed as in other genuine *Tabanus* species. Proboscis black with long sucking discs. Palpi black-brown, little shorter than the proboscis, broad at the base, ending in a point, somewhat curved; the scanty beard black. Legs black,

the knees and tibiae white-yellow, as well as the metatarsi of the middle and posterior legs, and to a certain extent the succeeding tarsal joints. Wings wholly hyaline, the subcostal vein pale yellow and similarly shaded, the first posterior cell open, no appendix, but the angle is acute, 6 lines.

Two females from Ceylon.

A species deviating very much from all *Tabanus* species, and which might be considered as the type of a definite group of species. Schiner, Reise Novara Dipt., p. 93.

The Bigot specimen agrees with above description and is no doubt the same. The species is easily recognised by its shining subcallus, black beard and *palpi*, black *legs* with white tibiae and almost clear *wings*, but the *abdomen* varies from wholly black to almost wholly brown-red, as in the specimens from Sumatra in which only the last four segments or only the apex are blackish, it is always shining but in undenuded specimens with unnoticeable short black pubescence. The *thorax* is blackish, sometimes with the shoulders and sides reddish, appressed fulvous pubescence appears on fresh specimens, but not in the wholly black specimens, sides with black hairs.

♀ The *face* is black covered with cinnamon-brown tomentum, the *palpi* always blackish, though yellowish on the inside. The *antennae* are rather narrow and slender, the third joint especially so, the first two joints *have* black pubescence which is thickest on their upper angles. The *forehead* is narrow, about eight times as long as it is broad, from a third to half narrower anteriorly, the frontal callus sometimes long and narrow, not square, but always reaching the eyes, linear extension not usually reaching the vertex. Forehead covered with the bluish grey tomentum, but posteriorly with darker brown tomentum and with black hairs. The eyes have two more cross-bands. The fore tibiae are black at their extreme apex. *Wings* with yellow veins and stigma and costal border. Length of Bigot type 12 mm., of others 10—12 mm.

♂ The male is similar to the female. The hairs on the *face* are much thicker and very black, as is the beard and the hairs on the *palpi*. Subcallus black, shining. Eyes with the large facets very distinct, reaching across, just beyond the apex of the frontal triangle, the small facets are continued as a narrow border to the vertex. The *abdomen* in this one specimen is reddish brown, black at the apex. Length 10½ mm. On the relationship of this species to *Tabanus simplissimus*, Wlk., see under that species.

***Tabanus ardens*, ♀, Wiedemann.**

Dipt. exot., i, 78, 31 (1821); *id.*, Auss. Zweifl. Ins., i, p. 154, 68 (1828).

Macquart, Dipt. exot., i (1), p. 129, 16 (1838).

Thorax glauco, fulvo pubescente; abdomine ferrugineo; alis infumatis; pedibus fulvis. Thorax mouldy grey with golden yellow pubescence. Abdomen rusty yellow. Wings smoke-grey. Legs golden yellow, 6 lines. ♀ From Java.

Antennae very bright rusty yellow, black at their extreme apex. Face and beard golden yellow. Palpi light brownish; forehead ochre-brown, a little narrower than usual with a brown shining stripe very little broader below. Thorax rusty yellow striped. Breast sides golden yellow and mouldy grey. Abdomen with the first segment at the sides broadly, and the following ones only on the side-borders, waxy yellow with golden yellow pubescence, otherwise the abdomen above is almost rusty yellow, clothed with very short black small hairs, in the middle of the posterior border of the first segment a golden yellow haired spot. Wings on fore border and towards the base, also in the middle a little yellowish. Halteres golden yellow. Tarsi brown. In Westermann's coll. Wied., *Auss. Zweifl. Ins.*, i, p. 154.

♀ Wiedemann only described the female. We refer to this species a male specimen from the collection of M. Serville. It differs from the female by the antennae, the third joint of which is blackish, yellow at the base. The face and the base of the forehead are of a dirty light yellow. The thorax is brown without distinct stripe. From Java. Macquart, *Dipt. exot.*, i (1), p. 129.

This species is not known to me.

***Tabanus fumipennis*, Van der Wulp.**

Sumatra Exped. Diptera, p. 18, 6, pl. i, fig. 10 (1881).

One female from Alahan (Sumatra), caught in October.

Bluish black, subglabrous. Antennae and legs piceous, the knees of anterior legs and base of tibiae red; wings brown. Length 16 mm.

Face and forehead with light ashy grey tomentum; moustache dirty white. Eyes naked. Forehead narrow, posteriorly somewhat broader, with a stripe-shaped, shining, black line. Antennae black-brown, the first joint cylindrical, the second very short, with a small spine above, the third at the base with a hardly perceptible tooth (see figure). Proboscis shining black. Palpi dark brown with a little ashy grey tomentum. Abdomen unicoloured, bluish black, a little shining; the thorax and the scutellum covered with a greyish bloom; the sides of breast, at least the part near the fore legs light grey, with pubescence of the same colour; under side with light grey segmentations. Legs black-brown; but because of the grey pubescence partly greyish; the knees of fore legs and the basal half of tibiae red-brown. Wings of a tobacco-brown tint, which is darker along the veins and on the fore border; the veins and the stripe-shaped stigma black-brown; neuration normal. *Tabanus caerulescens*, Macq. (*Dipt. exot.*, i (1), p. 128), might be noticed in the determination of this species, were it not for the antennae which are there described as brown-yellow, and the shining black spot on the forehead of which Macquart speaks is wanting in this species in the specimen lying before me. Van der Wulp, *Sumatra Exped. Diptera*, p. 18.

This species is not known to me; it would appear from the description that its chief differences from the Macquart species, to which it must be very nearly allied, lies in the black-brown not reddish antennae; thorax with no reddish stripes or colour; legs with the base of the tibiae red, not black as in the Macquart species, the posterior tibiae of which only are reddish. The shape of the forehead and frontal callus appears identical in both species.

Tabanus ixion, ♂, Osten Sacken.

Berlin. Ent. Zeit., xxvi, p. 99 (1882).

Dark brown, abdomen and legs black; wings brown, the tips and a part of the discal cell hyaline. Length 15 mm.

Palpi and face dark brown, with some black pile; head, ♂, flattened from above; the division between the large and the small facets very distinct. Antennae dark brown or reddish brown; the third joint long and narrow; its upper angle projecting squarely, the excision of its upper side very shallow. Thorax dark brown, with black pile, especially on the pleurae; abdomen black, shining; legs black; halteres with a yellow knob. Wings brown, axillary angle paler, apex hyaline within the second submarginal cell, the proximal half of which is brown, a hyaline spot in the middle of the discal cell both ends of which are brown; on both sides of that hyaline spot the brown ground colour of the wing is somewhat yellowish; the first posterior cell open although somewhat coarctate towards the tips; no stump of a vein. Two ♂

From Philippine Islands. Ost. Sacken, Berlin. Ent. Zeit., xxvi, p. 99.

This male is unknown to me. The females I have described as *Tabanus inobservatus* from Sumatra must be nearly allied to it.

Tabanus melanognathus, ♂, Bigot.

Nouv. Archiv. Mus. Hist. Nat. Paris (3), ii, p. 204 (1890). [*Atylotus*.]

Length 17 mm.

Antennae dull yellow, the third joint black at its apex, deeply incised above with a considerably projecting tooth; face, beard and palpi yellowish grey, the former very short, the lower half of the composite eyes blackish; the whole body yellow, thorax paler; pleurae brown, halteres yellow; legs entirely black; wings pale yellow at the base, the posterior third hyaline (apex widely hyaline in the Latin description); no appendix; eyes naked. Laos, one specimen. Bigot, *l.c.*, p. 204. This species is not known to me.

Tabanus laotianus, ♀, Bigot.

Nouv. Archiv. Mus. Hist. Nat. Paris (3), ii, p. 205 (1890) [*Atylotus*.]

Length 16 mm.

Antennae dull yellow, blackish at the base and at the apex, the third joint deeply incised above with a fairly prominent tooth; palpi dull yellow (in the Latin description flesh-coloured). Face, beard and forehead grey; frontal callus and spot at vertex blackish; the former very narrow, elongated, suddenly dilated below. Thorax dull yellow, a little reddish, with four wide stripes indistinct, abbreviated posteriorly, blackish (dull chestnut in the Latin description); sides greyish; scutellum brownish yellow; abdomen pale yellow, a little brown at the apex; pleurae brownish as well as the stem of the halteres, the club of latter whitish; wings very pale grey, narrowly tinged brownish at the base, stigma the same colour, no appendix; legs greyish black, tibiae pale grey at the base, the posterior ones longitudinally tinged with brown behind; eyes naked. From Laos. One specimen. Bigot, *l.c.*, p. 205.

This species is not known to me.

GROUP XI.

Subgenus **Theriopectes**, Zeller.

Isis, 1842, xi, 819 (1842).

In this group are comprised all species with distinctly pubescent eyes, and ocelligerous tubercle on vertex. The heads of the males not differing much in size or shape from those of the females. The facets of the eyes in the males are uniform in *T. hirtus*, Wlk., but in *T. subcallosus*, n. sp., they are very distinctly different in size; the other males are not known. Eyes with cross-bands.

There are only four species from the Oriental Region, forehead broad, three to four times as long as it is broad. Species rather pubescent. Length 11—17 mm.

Tabanus (Theriopectes) subcallosus, ♂ ♀, n. sp.

Types ♂ and ♀ and two other females from Mussoorie, India (Brunetti coll.); others from N.-W Provinces and Dalhousie in Brit. Mus. coll.

A small black species with white bands on abdomen, easily recognised by the shining, yellowish brown subcallus, by the two separate transverse calli of forehead, and by the slightly incrassate white fore tibiae. Length 11½ mm.

♀ *Face* covered with greyish tomentum and white pubescence. *Palpi* obscurely yellow, thickly covered on the outside with grey tomentum, with thick long white pubescence at base and with some short black hairs elsewhere, stout, ending in short acute point. *Antennae* reddish, the first two joints yellowish with black pubescence, the tooth of third joint very slight. Subcallus convex, brownish yellow. *Forehead* broad, about three and a half times as long as it is broad, almost the same width throughout, covered with grey and

brown tomentum, frontal callus black, transverse, not reaching eyes, the fore border near subcallus irregular, the median callus black, smaller, irregularly heart-shaped, ocelligerous tubercle small, pubescence of forehead black. Eyes hairy; "green black, with central bright green band edged each side with purple" (from note by collector), thus with two stripes, ♂ with large facets above. *Thorax* black with grey tomentum and with black pubescence and some appressed fulvous hairs; at sides and base of wings with long white pubescence. *Scutellum* black covered with grey tomentum. *Abdomen* with white-haired bands on each segment, not produced in the middle, under side with the white bands broader. *Legs* black, tibiae yellowish white, black at apices, pubescence on coxae, under part of femora, light parts of tibiae white, elsewhere black. *Wings* hyaline.

Male identical, with the exception of the second and third segments of the abdomen which are yellowish red at the sides.

The hairiness of eyes is not very apparent in the specimen from N.-W P. and the palpi are pale yellow with black hairs.

***Tabanus (Therioplectes) hirtus*, ♂, Walker.**

Ins. Saund., p. 52 (1850). [*Tabanus*.]

Type male from India (coll. Saunders), and another male from India; females from Naini Tal, Himalayas (Lt.-Col. R. Moore); near Muktesar, U. P., India (Capt. J. E. Holmes), and N.-W Provinces (C. Horne), all in Brit. Mus. coll.

In Indian Museum coll. females from Phagu, 9,000 ft., Simla hills (Annandale).

This species bears a superficial resemblance to *Tabanus orientis*, Wlk., but is at once distinguished by its hairy eyes. A robust species with black abdomen largely reddish yellow at the sides. Forehead almost parallel with the frontal callus, broad continued as a thick spindle-shaped line towards the vertex. Legs blackish. Length of male type 15 mm., of females 16-17 mm.

♀ *Face* and subcallus covered with greyish tomentum, the latter hairy, with long yellowish hairs, beard the same colour as hairs of face. *Palpi* dull reddish, covered at the base with long yellow hairs, elsewhere with chiefly short black pubescence, stout, ending in a short point. *Antennae* blackish, the first two joints with black pubescence, the third joint with hardly a perceptible angle in place of a tooth, broad at base. Eyes with three cross-bands, densely pubescent. *Forehead* rather darker than face, clothed with blackish pubescence, longer at vertex, almost parallel and barely four times as long as it is broad, frontal callus black, shining, triangular, broad at base almost reaching eyes, its apex continued in a spindle-shaped line, ocelligerous tubercle present on vertex.

Thorax blackish with three indistinct narrow greyish or yellowish stripes broadly separated, pubescence of black long hairs with fulvous short often appressed hairs intermixed, shoulders reddish with long black hairs, tufts of white hairs above wings on sides,

breast greyish with yellow and black hairs intermixed. *Scutellum* same colour as thorax, posteriorly reddish, with long black pubescence. *Abdomen* black, broad and stout for size of insect, the reddish yellow colour largely predominates on the first two segments, and sometimes on the third segment, the segmentations yellow haired, often produced in the middle as triangular spots, the whole dorsum in well-preserved specimens to a great extent covered with short yellow pubescence, intermixed with longer black hairs at the apex and on sides; under side blackish covered with grey tomentum and lighter segmentations. *Legs* blackish, the fore tibiae at base and the others more largely so, dull reddish, pubescence on coxae yellow, femora with some grey tomentum and chiefly black pubescence, some yellow hairs present, the pubescence on tibiae and tarsi almost wholly black.

Wings clear, tinged brown along veins, and on cross-veins, stigma and veins brown, appendix present, first posterior cell widely open.

♂ Similar, but the yellow on sides of *abdomen* is less, and the pubescence on dorsum chiefly black, the segmentations yellow haired. *Legs* darker. Eyes with three cross-bands, densely pubescent, facets uniform in size, hairs on cheeks long, blackish, in middle of face yellowish. *Palpi* reddish with long black hairs, some yellow hairs below.

***Tabanus (Theriopectes) wyvillei*, ♀, n. sp.**

Type female and two others from Narkanda, Himalayas, 9,000 ft., July 1907 (Lt.-Col. F. Wyville Thomson, I.M.S.); and another female from Kasauli, India, from the same donor, who says of those from Narkanda, "Very common in the Himalayas; annoys man and animals by biting." He also notes the eyes are red with three transverse green bars.

A smaller species than *Theriopectes hirtus*, Walker, distinguished from it by the slender palpi, and by the golden yellow pubescence on abdomen, which in well-preserved specimens almost wholly covers it, whereas in the Walker species the same coloured pubescence is chiefly confined to the segmentations; the sides are very much less reddish yellow, only appearing so on the sides of the second segment. The tibiae are much lighter reddish yellow. Length of type 13 mm., others from 13-14 mm.

Face covered with greyish yellow tomentum and with long chiefly black fine hairs. Beard yellowish. *Palpi* reddish yellow, slender, stouter at the base ending in a long acute point, the pubescence long, black, a few yellow hairs at base below.

Antennae reddish, darker at apex, the first two joints with black pubescence, the third with hardly a perceptible angle in the place of a tooth, subcallus and *forehead* covered with grey tomentum, *forehead* almost parallel, very slightly narrower at the *vertex*, barely three times as long as it is broad, the frontal callus blackish, very indistinct in all the specimens, in the type it appears as a small

irregularly shaped spot, perhaps in well-preserved specimens the forehead may prove to have no real callus, ocelligerous tubercle small. Eyes hairy, not very thickly covered with pale yellowish hairs, with three cross-bands. *Thorax* black, covered with grey tomentum and with pale yellow hairs, shoulders with long black hairs, breast blackish with grey tomentum and yellowish pubescence. *Scutellum* same as thorax. *Abdomen* brownish black, appearing reddish yellow on sides of second segment, the whole dorsum almost wholly covered with short golden yellow pubescence, and the sides with identical pubescence; under side blackish almost devoid of hairs but with yellowish grey tomentum. *Legs* blackish, the femora with chiefly yellow pubescence, the fore tibiae except at apices, and the others wholly, reddish yellow, with black pubescence, but some yellow hairs intermixed, fore tarsi brownish, the others reddish yellow. *Wings* hyaline, shaded brown on transverse and longitudinal veins, stigma and veins brownish, no appendix present.

***Tabanus (Theriopectes) albilateralis*, ♀, Macquart.**

Dipt. exot., i (1), p. 129, 17 (1838). [*Tabanus*.]

Black. Eyes hairy. Thorax with sides and stripes white. Abdomen with golden yellow dorsal spots and segmentations, the two first segments testaceous at sides. Legs red. Length 5 lines, ♀

Palpi whitish yellow, elongated, pointed, the apex appearing to form a separate joint. Face and forehead fawn coloured with whitish tomentum, the latter wide, with a broad callus, brownish yellow, posteriorly with three points. Antennae are wanting. Eyes pubescent. Thorax black, with long brown hairs and whitish stripes; above the wings is a longitudinal stripe of long white hairs bordered above by yellow hairs; sides with long white hairs. Abdomen wide; the first two segments testaceous with a dorsal triangular spot; the others black with dorsal triangular spots; posterior borders testaceous covered with golden hairs; under side of a dirty fawn colour. Legs yellowish, anterior pair wanting. Halteres yellowish. Squamae brownish. Wings slightly brownish, darker at the base and on outer border, the first posterior cell a little narrowed. From Java. Macquart, Dipt. exot., i (1), p. 129.

Type in Paris Museum, distinguished from *Theriopectes hirtus*, Wlk., with which I compared it by its broader forehead with a broad yellowish callus, smaller size and yellow legs. A small species with a black *abdomen*, reddish yellow on the first two segments and partly so on the third segment, median spots and segmentations yellowish haired; under side pale yellowish white. *Thorax* with yellowish white hairs at sides. *Legs* yellow. *Wings* tinged brown, the first posterior cell much narrowed.

LIST OF SPECIES OF *TABANUS* FROM THE ORIENTAL REGION, INCLUDING ALL SYNONYMS.

[NOTE. — All synonyms are printed in italics.]

- TABANUS** abbreviatus, Bigot.
 abscondens, Walker.
administrans, Schiner = *amaenus*, Wlk.
 agricola,¹ Wied., an Arabian species recorded by Schiner from Hongkong; identification doubtful.
 albilateralis, Macq. (*Theriopectes*.)
 albimediis, Walker.
 albocostatus, Bigot.
 albofasciatus, n. sp.
alboscutatus, Rondani = *optatus*, Wlk.
albulus, Walker = *virgo*, Wlk.
amaenus, Walker.
andamanicus, Bigot? = *fuscicauda*, Bigot.
angustus, Bigot = *palpalis*, Ricardo (*nomen bis lectum*).
 annamitus, ♂, Bigot.
apicalis, Rondani = *borniensis*, Ricardo (*nomen bis lectum*).
 ardens, Wied., *assamensis*, Bigot = *sanguineus*, Wlk.
 atrohirtus, n. sp.
auricinctus, Macq. = *barbarus*, Coquebert. A species from S. Europe and N. Africa.
 auriflamma, Walker.
 auristriatus, n. sp.
 aurotestaceus, Walker.
 basalis, Macq.
 bicallosus, Ricardo.
 bicinctus, n. sp.
 birmanicus, Bigot.
bituberculatus, Bigot = *fulvus*, Macq.
 borniensis, Ricardo.
 brunneus, Macq.
 brunnipennis, n. sp.
 bubali, Doleschall
bucolicus, ♂, Schiner? = *felderi*, Wulp.
calidus, Walker? = *albimediis*, Wlk. Type recorded from Asia with a query.
 ceylonicus, Schiner.
chinensis, Thunberg? = *striatus*, Fabr. Delete from list.
cinerascens, Bigot = *subhirtus*, Ricardo (*nomen bis lectum*).
clausacella, Macq. = *amaenus*, Wlk.

¹ Macquart records his species as from the islands of the Indian Ocean, but this large black species with golden haired bands on abdomen has not since been recorded from the Oriental Region, which makes it appear doubtful whether Macquart's locality is correct, so that for the present it is not included in the species from the Oriental Region,—see Macq. Dipt. exot., i, p. 134.

- caerulescens, Macq.
conicus, ♂, Bigot? = abbreviatus, Bigot.
 consanguineus, Macq.
consocius, Walker = orientis, Wlk.
costalis, Lichtenstein. Delete from list, description un-
 recognisable.
 crassus, ♂, Walker.
 discrepans, n. sp.
 dissimilis, n. sp.
 ditaeniatus, Macq.
 diversifrons, n. sp.
dives, Rondani { = univentris, Wlk., *in parte*.
 = stantoni, n. sp., *in parte*.
dorsilinea, Wied. = striatus, F.
equestris, Wulp = optatus, Wlk.
 explicatus, Walker.
 factiosus, Walker
 felderi, Wulp.
 [*fervidus*, Walker = conformis, Wlk., a South African
 species, therefore does not belong to the Oriental
 Region.]
 flavicinctus, n. sp.
 flavissimus, n. sp.
 flaviventris, Bigot (= diversifrons, n. sp., *in parte*).
 flavothorax, n. sp.
 flexilis, Walker, from Celebes.
 formosiensis, n. sp.
 fulvimedius, Walker. Type described from unknown
 locality.
 fulvissimus, Rondani.
 fulvus, Mg.
 fumifer, Walker.
 fumipennis, Wulp.
 fuscicauda, Bigot.
 fuscicornis, n. sp.
 geniculatus, Wulp.
 hilaris, Walker.
 hirtipalpis, n. sp.
 hirtistriatus, n. sp.
 hirtus, Walker. (Theriopectes.)
 hybridus, Wied.
 ignobilis, Rondani.
 immanis, Wied.
 incultus, Wulp.
 indianus, n. sp.
 [*indicus*, Fabr., a South American species not occurring
 in Oriental Region as stated by Walker.]
 inobservatus, n. sp.
inscitus, Walker. Delete from list, type lost.
internus, Walker = rubicundus, Macq.

- ixion, Osten Sacken.
 javanus, Fabr.
 joidus, Bigot.
 jucundus, Walker.
 justorius, Rondani.
 khasiensis, Ricardo.
lacrymans, Bigot = *albimedi*us, Wlk.
 laotianus, Bigot.
 leucocnematus, Bigot.
 leucohirtus, Ricardo.
 leucopogon, Bigot.
 leucosparsus, Bigot.
macer, ♂, Bigot = *striatus*, Fabr.
 malayensis, n. sp.
 mandarinus, Schiner.
manilensis, Schiner? = *striatus*, Fabr.
megalops, ♂, Walker = *striatus*, Fabr.
 melanognathus, ♂, Bigot.
melanopygatus, Bigot = *fulvimedi*us, Wlk.
mentitus, ♂, Walker? = *indianus*, n. sp.
minimus, Wulp = *simplissimus*, Wlk.
monilifer, Bigot = *internus*, Wlk.
 monotaeniatus, Bigot.
 negativus, n. sp.
 nemocallosus, Ricardo.
 nephodes, Bigot.
 nexus, Walker.
 nicobarensis, Schiner.
 nigromaculatus, n. sp.
 nigropictus, Macq.
 nigrotectus, Bigot.
nitidulus, Bigot = *ceylonicus*, Schiner.
 non-optatus, n. sp.
 obconicus, ♂, Walker.
 optatus, Walker.
 orientalis, Wied.
 orientis, Wied.
 oxyceratus, Bigot.
pagodinus, Bigot = *fulvimedi*us, Wlk.
 pallidepectoratus, Bigot.
 palpalis, Ricardo.
partitus, Walker = *striatus*, Fabr.
 pauper, Rondani.
 perakiensis, n. sp.
perlinea, Walker = *orientis*, Wlk.
pictipennis, Wulp = *flexilis*, Wlk., from Celebes.
 pratti, n. sp.
priscus, Walker = *albimedi*us, Wlk. Type described
 from unknown locality.
puella, Walker = *virgo*, Wied.

- puteus, n. sp.
pyrausta, Walker = *servillei*, Macq.
pyrrhus, Walker = *ditaeniatus*, Macq.
 rarus, n. sp.
 rubicundus, Macq.
 rubidus, Wied.
rubiginosus, Walker. Delete from list, type lost.
rufiventris, Fabr. Delete from list, impossible to identify from description.
rufocallosus, Bigot = *striatus*, Fabr.
 sanguineus, Walker.
servillei, Macq.
 sexcinctus, n. sp.
 siamensis, n. sp.
 signifer, Walker.
 significans, n. sp.
 simplissimus, Walker.
sinicus, ♂, Walker = *striatus*, Fabr.
 speciosus, n. sp.
 stantoni, n. sp.
 striatus, Fabr.
 subcallosus, n. sp. (Theriopectes.)
 subcinerascens, n. sp.
 subhirtus, Ricardo.
sumatrensis, ♂, Macq. Delete from list, type lost, description being of ♂ only, not sufficient for identification.
 tenebrosus, Walker.
tenens, Walker = *striatus*, Fabr.
 tinctothorax, n. sp.
trigeminus, Coquillet = *mandarinus*, Schiner.
 tristis, Wulp.
 tuberculatus, n. sp.
umbrosus, Walker = *albimedi*us, Wlk.
 uniformis, n. sp.
 univentris, Walker.
vagus, Walker = *albimedi*us, Wlk.
vagus, Walker, from Hongkong. Delete from list, type lost.
 vanderwulpi, Osten Sacken.
 varicolor, Ricardo.
variegatus, Rondani = *varicolor*, Ricardo (*nomen bis lectum*).
 virgo, Wied.
 wyvillei, n. sp. (Theriopectes.)

GEOGRAPHICAL DISTRIBUTION OF SPECIES.

India, including Assam and Burma, 59 species.

Tabanus hirtipalpis, *bicallosus*, *flavicinctus*, *leucocnematus*, *bicinctus*, *sexcinctus*, *ditaeniatus*, *virgo*, *nemocallosus*, *optatus*,

non-optatus, *nephodes*, *albofasciatus*, *basalis*, *auriflamma*, *striatus*, *hilaris*, *rubicundus*, *abbreviatus*, *rubidus*, *albimedi*, *speciosus*, *monotaeniatus*, *brunnipennis*, *abscondens*, *auristriatus*, *hybridus*, *jucundus*, *indianus*, *brunneus*, *nigromaculatus*, *leucopogon*, *crassus*, *alboscutatus*, *explicatus*, *khasiensis*, *sanguineus*, *oxyceratus*, *orientis*, *fulvimedi*, *consanguineus*, *orientalis*, *birmanicus*, *nigrotectus*, *tenebrosus*, *leucohirtus*, *nigropictus*, *joidus*, *palpalis*, *flaviventris*, *diversifrons*, *subcinerascens*, *obconicus*, *subhirtus*, *tuberculatus*.

Theriopectes subcallosus, *hirtus*, *wyvillei*.

Ceylon, 12 species.

Tabanus ditaeniatus, *striatus*, *albimedi*, *speciosus*, *jucundus*, *puteus*, *discrepans*, *flavissimus*, *atrohirtus*, *flaviventris*, *fuscicauda*, *ceylonicus*.

Nicobar Islands, 1 species.

Tabanus nicobarensis, Schiner.

Siam, Federated Malay States, Annam, and Cochin China, 29 species.

Tabanus rarus, *bicinctus*, *pratti*, *annamitus*, *striatus*, *abbreviatus*, *rubidus*, *hirtistriatus*, *brunnipennis*, *hybridus*, *stantoni*, *brunneus*, *fumifer*, *malayensis*, *dissimilis*, *significans*, *leucosparus*, *sanguineus*, *birmanicus*, *flavothorax*, *tinctothorax*, *perakiensis*, *pallidepektoratus*, *siamensis*, *uniformis*, *simplissimus*, *ceylonicus*, *melanognathus*, *laotianus*.

Sumatra, 16 species.

Tabanus optatus, *basalis*, *striatus*, *rubidus*, *tristis*, *immanis*, *fumifer*, *sanguineus*, *incultus*, *geniculatus*, *inobservatus*, *fulvissimus*, *fuscicauda*, *simplissimus*, *ceylonicus*, *fumipennis*.

Java, 17 species.

Tabanus javanus, *optatus*, *striatus*, *rubicundus*, *abbreviatus*, *rubidus*, *albimedi*, *immanis*, *bubali*, *brunneus*, *servillei*, *sanguineus*, *caerulescens*, *subhirtus*, *ceylonicus*, *ardens*.

Theriopectes albilateralis.

Borneo, 14 species.

Tabanus optatus, *pratti*, *hybridus*, *varicolor*, *fumifer*, *dissimilis*, *ignobilis*, *nexus*, *justorius*, *fulvissimus*, *univentris*, *pauper*, *borniensis*, *simplissimus*.

Philippines, 4 species.

Tabanus vanderwulpi, *striatus*, *factiosus*, *ixion*.

South China and Formosa, 18 species.

Tabanus fulvus, *negativus*, *fuscicornis*, *striatus*, *abbreviatus*, *abscondens*, *hybridus*, *aurotestaceus*, *jucundus*, *amaenus*, *mandarinus*,

indianus, *signifer*, *felderi*, *crassus*, *sanguineus*, *fulvimedius*, *formosiensis*.

The species peculiar to each district, *viz.*, not as yet recorded from elsewhere, are printed in italics. They number from Indian district 39, and two common to India and Ceylon (*flaviventris*, Bigot, and *speciosus*, n. sp.); from Ceylon 4 species, all new; from Nicobars 1 species; from Malay district 14 species, chiefly new species; from Sumatra 5 species; from Java 7 species; from Borneo 7 species; from S. China district 8 species, from Philippines 3 species.

SPECIES OF *TABANUS* FROM N. CHINA AND JAPAN.

The following is a list of species and synonyms occurring in China above the line dividing the Oriental Region from the Palaeartic Region, roughly about 35° lat. N., and in Japan. The descriptions of those species which occur in both Regions are included in those of the Oriental Region. The description of *Tabanus cordiger*, Mg., and *Tabanus fulvus*, Mg., are to be found in Brauer's monograph of the species of the Palaeartic Region in Denkschr. Akad. Wien, xlii. The descriptions of the other species are given here, with the exception of *Tabanus hoang*, ♂, Macq., which should be deleted from list being apparently destroyed.

TABANUS *amaenus*, Walker.

angusticornis, Loew. (? *Atylotus*.)

bituberculatus, Bigot = *fulvus*, Mg.

buddha, Ports. = *chrysurus*, Loew.

chrysurus, Loew.

clausacella, Macq. = *amaenus*, Wlk., occurs in Palaeartic and Oriental Region.

confucius, Macquart = *yao*, Macq.

cordiger, Mg.

ditaeniatus, Macq.

fulvus, Mg., occurs in Palaeartic and Oriental Region.

hirticeps, Loew. (*Theriopectes*.)

hoang, Macq. Delete from list, type lost.

humilis, Coquillet.

japonicus, Bigot. (? *Atylotus*.)

lama, Ports.

[Region

mandarinus, Schiner, occurs in Palaeartic and Oriental

pulchriventris, Ports. (*Theriopectes*.)

pusillus, Macq. "China" given as locality.

pyrrhoceras, Bigot ? = *chrysurus*, Loew.

pyrrhus, Walker = *ditaeniatus*, Macq., a South African species.

rufidens, Bigot ? = *yao*, Macq.

signatipennis, Ports. = *clausacella*, Macq.

sinicus, Bigot [Bellardia] = *amaenus*, Wlk.

¹*tataricus*, Ports.

¹ This species is included here, though not strictly recorded from China, but being very near its borders, is likely to be found there.

tenebrosus, Coquillet (*nec* Walker).

trigeminus, Coquillet = *mandarinus*, Macq.

trigonus, Coquillet = *yao*, Macq.

yao, Macq.

yokoamensis, Bigot.

***Tabanus angusticornis*, ♀, Loew. [? *Atylotus*.]**

Wien. Entom. Monatschr., ii, p. 104 (1858).

From Japan.

Ashy grey to yellow. Abdomen darker at base, on each side with luteous spots. Eyes short haired. Forehead very wide, with no smooth callus. Antennae ochraceous, narrow, the third joint angulated above. Legs obscurely luteous, base of anterior femora, apical half of anterior tibiae, anterior tarsi wholly and four last joints of posterior tarsi black.

Wings brownish cinereous, stigma and veins dark brown, no appendix. Length of body $5\frac{3}{4}$ lines. Length of wing 5 lines.

Face yellow pollinose and yellow haired. Palpi yellowish, clothed with pale yellowish and black hairs. Antennae: first joint produced, black haired, second black above, third ochraceous, narrow, above angulated, hardly forming a tooth. Forehead very wide, yellow pollinose, on vertex and as far as the anterior angle of eyes with very short black hairs, and with no shining callus. Eyes short pilose. Thorax yellow pollinose and yellow haired, intermixed with black hairs, at the base of the wings thicker. Abdomen blackish, slightly yellow pruinose and with a very large luteous spot on each side from the exterior angle of the first segment, and as far as the posterior margin of the third segment, a blackish spot lying between, which is extended contiguous to the anterior margin of the third segment; first segment with the borders of the following segments except the last, and lateral borders of abdomen yellow haired, rest of abdomen black haired. Under side blackish, with yellowish ashy grey tomentum, borders of apical segments luteous, pubescence of abdomen for the most part black, at the base, sides and posterior border of anterior segments yellow haired. Legs obscurely luteous, black haired, anterior femora at base, anterior tibiae on apical half, extreme apices of posterior tibiae, whole of anterior tarsi, and posterior tarsi from apex of the first joint, black. Halteres luteous. Wings brown cinereous, yellow before the first longitudinal vein, stigma and veins dark brown, with an appendix (!), first posterior cell at apex subdilated. Loew, Wien. Entom. Monatschr., ii, p. 104. This species is not known to me.

***Tabanus chrysurus*, ♀, Loew.**

Wien. Entom. Monatschr., ii, p. 1035 (1858); Portschiinsky, Horae Soc. Entom. Ross., xxvi, p. 202 (1891); Coquillet, Proc. U. States Nat. Mus., xxi, p. 309 (1898).

? *Atylotus pyrroceras*, ♀, Bigot, Ann. Soc. Entom. France (6), vii, Bullet. lxxvii (1887).

Tabanus buddha, ♀, Portschinsky, Horae Soc. Entom. Ross., xxi, 181 [*Budda*] (1887); *id.*, xxvi, p. 202 (1891).

Black-brown. Eyes naked. Antennae broad, ferruginous red; palpi luteous, with reddish yellow hairs; face, forehead and dorsum of thorax with reddish yellow hairs; abdomen with reddish yellow and reddish yellow haired segmentations, the posterior segments wholly reddish yellow haired; femora black-brown, the apices yellowish; tibiae yellow, the anterior pair blackish at the apex, anterior tarsi black, the posterior one dark yellow; wings brown. Length of body $9\frac{5}{8}$ lines, of wings $8\frac{5}{8}$ lines.

Black-brown, but not wholly dark. Head with reddish yellow pubescence. Eyes naked. Antennae ferruginous red, the first joint arched (*fornicatus*), the third broad, the broad joints with short black hairs. Palpi yellow, clothed with very short reddish yellow hairs. Forehead narrow, the callus oblong below, continued upwards as a long stripe. Thorax on dorsum reddish yellow haired, more frequently with hairs intermixed towards the posterior margin. Scutellum with black hairs. Pleurae the same. Abdomen black-brown, anteriorly with short black hairs, the posterior margin of the first segment dull reddish yellow, at the sides reddish yellow haired, the posterior margins of the remaining segments reddish yellow and with reddish yellow pubescence; with the fourth segment almost wholly and the following ones wholly reddish yellow haired; under side black-brown, with short black pubescence, with all the segmentations except the first one reddish yellow, and with pale reddish yellow pubescence. Femora brownish black with black hairs, the apices yellowish and with ferruginous hairs, the tibiae luteous, with pale yellow hairs, the anterior ones with blackish apex and ferruginous pubescence; anterior tarsi brown-black, the posterior ones dull luteous. Halteres black-brown. Wings brown, the first longitudinal vein yellowish, the third one with no appendix, stigma hardly distinct, the discal cell longer than is usual in most large European species. From Japan. Loew, Wien. Entomol. Monatschr., ii, p. 103, 5.

Tabanus buddha is recorded from Chinese Mongolia and described in Latin in Horae Soc. Entom. Ross., xxi, and the following was published in the twenty-sixth volume in Russian, the translation of which I procured through a friend from Mr. Aylmer Maude:—

“The well-known dipterologist V. v. Röder, in a private letter among other things, kindly informed me that in his opinion, the above-named species described by me, is no other than the *Tabanus chrysurus* described by Loew from Japan. There is not the least doubt of the great resemblance of the two species; yet it seems to me certain, nevertheless, that they are different species. Not having a *Tabanus chrysurus* at hand, I can only point out the differences between the two species; basing myself on a comparison of my specimens of the *Tabanus buddha*, with Loew's description

of the *Tabanus chrysurus*. The chief difference is that the basal joints of the antennae of the *Tabanus chrysurus* are covered with short black hairs, the frontal callus is oblong and stretches upwards in the form of an elongated stripe; the thighs are of a brownish black, and the front tibiae blackish at the ends, the front metatarsus brownish black, and the discal cell of the wings is longer than that of large species of the European *Tabanus*.

The basal joints of the antennae of *Tabanus buddha* are quite bare; the frontal callus of the forehead is quite round, and does not extend upwards at all, all the legs are of a reddish yellow, only the thighs at the base are yellow-brown, and the discal cell of the wings does not differ from that of large species of our *Tabanus*.''

These small differences hardly seem sufficient to keep *Tabanus buddha* as a distinct species, the lighter colour of the femora may perhaps allow it to be considered as the Chinese subform of *Tabanus chrysurus*.

Coquillet records seven specimens from Japan. In Brit. Mus. coll. are females from Yokohama District (Prior), and Hakodate, Japan (Fletcher); and in Kertész coll. from Japan.

The frontal callus is large, reddish brown, shining, club-shaped, the linear extension usually short, rather stout, or nearly non-existent. The *forehead* about five times as long as it is broad, almost parallel. The *legs* in all of the specimens have the femora black, reddish yellow at their apices, in some the apices of fore tibiae are hardly darker, or very slightly so. Length 25—30 m.m.

Atylotus pyrrhoceras was described from one female from north of Yeso, Japan; judging from the description it is probably a denuded example of *Tabanus chrysurus*, which is distantly related to *Tabanus barbarus*, Coq., which occurs in S. Europe and N. Africa, but easily distinguished from it by the wholly yellow-haired abdominal apex, by the yellow beard and darker femora. *Tabanus auricinctus*, Macq., Dipt. exot., i (1), p. 134. pl. xvii, fig. 2, described from the islands of the Indian Ocean, is apparently a synonym of *Tabanus barbarus*, as given by Pandellé in *Revue d'Entom.*, ii, p. 201, i (1883), the older specimen is recorded from South Europe and N. Africa, and has therefore an extended range if Macquart's locality is correct, which appears doubtful from the absence of any specimens in the collections from the Oriental Region which I have had access to (see *ante*, p. 491).

Tabanus cordiger, Meig.

Syst. Beschreib., ii, p. 47 (1820).—see Kertész's Cat. 1906 for full references.

In Brit. Mus. coll. four females and two headless specimens from Japan (Dr. Miyajima, 1909). The subcallus is almost entirely black, shining, perhaps from denudation as the insects suffered much damage on the journey; otherwise they are identical with European specimens. This species has thus a very wide

distribution over Europe and Asia, having previously been recorded from Asia Minor.

Tabanus hirticeps, ♀, Loew. (**Theriopectes**.)

Wien. Entom. Monatschr., ii, p. 105 (1858).

From Japan.

Ashy grey. Thorax white striped. Abdomen marked with a double series of ashy greyish spots. Eyes hairy. Antennae black, the third joint brown, apex black. Forehead wide, the lower callus duplicated, large, the middle one smaller, tuberculated, the third wart-like at the vertex, all black. Legs black, tibiae brown. Wings ashy greyish, stigma and veins black brownish, no appendix. Length of body 6 lines. Length of wing $5\frac{1}{2}$ lines.

Face white ashy grey, with white hairs. Palpi ashy greyish, clothed with longer white and black hairs. Antennae curved, the basal joints black, the first arched a little, the third joint brown, at apex black, wide, above angulated, the angle obtuse. Forehead very wide, ashy grey; lower callus duplicated, the anterior part wider and contiguous to antennae, upper part filling the whole width of the forehead, middle callus smaller, remote from margin of eyes, less smooth, below tuberculated, vertical callus minute, wart-like. Eyes hairy. Thorax and abdomen very much denuded, blackish, but with traces of whitish grey pollinose and ashy grey colouring, stripes of thorax whiter. Abdomen with double series ashy grey spots, the median stripe of abdomen composed of hardly apparent triangular spots. Hairs of thorax white, mixed with black at base of wings. Posterior margin of abdominal segments dull white. Legs black, tibiae brown, toward apices blackish, femora mostly white haired, tibiae black haired, the posterior ones at base white haired, tarsi black haired. Halteres black. Wings somewhat ashy grey, transverse veins very slightly shaded with brown, stigma and veins dull brown, no appendix. Loew, Wien. Entom. Monatschr., ii, p. 105.

This species is not known to me.

Tabanus humilis, ♀, Coquillet.

Proc. U. S. Nat. Mus., xxi, 311 (1898).

Female from Japan, differs from *Tabanus trigonus*, as follows :

Head above antennae yellow and brightly polished, antennae wholly reddish yellow, the tooth of the third joint very small, hairs of the palpi mixed white and black, those of the occiput, lower side of the head and on the pleurae, white. Scutellum noticeably lighter grey than the mesonotum. Abdomen somewhat polished, black, marked with grey as in *trigonus*, the median triangles extremely small on the last two segments; venter black, light grey pruinose. Extreme apices of the middle and hind tibiae brownish black. Wings hyaline, stigma yellow, base of anterior branch of the third longitudinal vein not appendiculate, first posterior cell

not narrowed at its apex. Length 12-13 mm., two specimens. Coquillet, Proc. U. S. Nat. Mus., xxi, 311.

This small species with shining subcallus is not known to me.

***Tabanus japonicus*, ♀, Bigot.**

Mem. Soc. Zool. France, v, p. 632 (1892). [*Dichoelaccra*.]

Ricardo, Ann. Mag. Nat. Hist. (7), xiv, p. 368 (1904).

Antennae yellowish, the apex black; palpi yellowish; eyes tomentose; forehead grey, callus narrow, elongated, black; beard white; thorax and scutellum black, with scattered yellowish tomentum, sides with yellowish grey hairs, abdomen reddish yellow, the base of the segments tinted with reddish brown, those of the last ones blackish; legs black, tibiae yellowish; wings almost hyaline, the outer border tinged pale yellow, stigma pale reddish. 15 mm. From Japan, one specimen. Bigot, Mem. Soc. Zool. France, v, p. 632. I have not seen any specimens of this species, which apparently has eyes hairy and may possibly belong to the subgenus *Atylotus*.

***Tabanus lama*, ♀, Portschi.**

Horae Soc. Entom. Ross., xxvi, p. 201 (1891), pl. i, fig. 1 (eyes).

From Chinese Mongolia.

Oblong, ovate, luteous. Eyes naked, ornamented with four bands, the middle ones dark purple with red margins. Head with white tomentum and hairs. Forehead grey, callus subquadrate, black, shining. Antennae luteous, the third joint testaceous, at apex darker. Palpi white and with white hairs. Thorax black, white pruinose with four dark grey stripes. Scutellum black, white or grey pruinose. Abdomen luteous, each segment in the middle with a white triangular spot girdled on each side with an oblique black line and with two small black side spots, under side and all legs wholly luteous, all hairs of abdomen white or whitish, only the last segment of abdomen at apex clothed with some black hairs. Wings subhyaline, shining white, nervures pale ferruginous with a long appendix. 4½—6 mm. Portschi., Horae Soc. Entom. Ross., xxvi, p. 201.

This species is not known to me.

***Tabanus pulchriventris*, ♀, Portschi. (*Theriopectes*.)**

Horae Soc. Entom. Ross., xxi, p. 179 (1887).

From Etschjin-Choro, Chinese Mongolia.

In size, stature and colour of body this species is similar to *Tabanus tropicus*, but is easily distinguished from it by the abdomen being entirely and densely covered with long fine red golden hairs, brown palpi, etc.

Black, with rather long pubescence. Head black, ashy grey pruinose, underneath with white beard, round eyes with sparse black pubescence. Frontal stripe rather wide, ashy grey, and with black hairs on vertex. Frontal callus not large, subrotund, black,

continued as a narrow black line. Eyes shortly but distinctly pale haired, with three bands; ocelligerous tubercle small. Palpi brown, on apical half narrow with obtuse apex, above and a little below channelled, on basal half incrassate, and at base with proboscis with rather long black hairs. Antennae black, basal joints with rather long black hairs, second joint wholly, and third at base, widely red, third joint at base with no tooth. Thorax black with rather long black pubescence and numerous yellow hairs intermixed. Pleurae long and densely covered with snowy or white hairs. Scutellum black with rather long yellow pubescence. Abdomen black, the three first segments widely yellow at sides and all densely covered with red golden hairs, under side black, each segment in the middle black haired, but at apex narrowly margined with yellow hairs. Wings subinfusate, darker round the transverse veins, stigma brown. Squamae ashy grey, margined with brown. Halteres brown. Legs black and black haired. Tibiae yellow testaceous with yellow hairs, and apex with tarsi brown or darker. Length 7 mm. Portsch., Horae, etc., p. 179.

This species is not known to me.

Tabanus pusillus, ♀, Macq.

Dipt. exot., i (1), p. 131 (1838).

Black. Antennae red. Abdomen with yellow hairs.

Legs red. Length $4\frac{1}{2}$ lines, ♀

Palpi of a pale yellow. Face and forehead brownish grey; the latter with a black roundish callus. Antennae fawn coloured. Thorax black, denuded; a brownish spot on each side. Abdomen black, with yellow hairs; segmentations fawn coloured. Legs fawn coloured. Halteres yellow. Wings a little yellowish, pale yellow at base and on outer border.

From China. Museum, Macq., Dipt. exot., i (1), p. 131.

Type ♀ in very bad preservation seen by me in Paris Museum.

A small species with clear wings, the veins yellow. Legs wholly yellow. Abdomen apparently dark brown with yellowish pubescence. Eyes apparently bare. Forehead with only one callus, nearly square, not reaching eyes, no linear extension, the same width throughout, about four times as long as it is wide. Antennae yellow. Face hairy. Beard white. Palpi slender, a little stout at base with a slender point and rather long black hairs.

I have not found any specimens identical with this species. There is another *T. pusillus* named by Macquart from New Holland. This is left for the present in the Palaearctic Region, but as only "China" is given, it may belong to the Oriental Region.

Tabanus tataricus, ♀, Portsch.

Horae Soc. Entom. Ross., xxi, p. 178 (1887).

From Btschan, Central Asia; Mt. Altai,—see Verrall, British Flies, v, p. 10, 1909.

Related to *Tabanus astur*, Erichs.

Body ovate, black with rather long and dense pubescence. Head comparatively rather small, ashy coloured, pruinose and with the wide frontal stripe long and densely pale yellow haired. Forehead above antennae and the narrow band below, each side of eyes, black, shining. Frontal callus black, shining, short (but equal in width to the front), eyes shortly but distinctly yellow haired with three wide bands, ocelligerous tubercle small. Palpi black and black haired, with apex moderately acute.

Antennae reddish brown, at base black haired, the third joint at base with no tooth, brown testaceous, apex and upper side more or less widely black. Thorax, pleurae, breast and scutellum all wholly black with long and densely yellowish (shining white) hairs. Abdomen short, wide, ovate, stout, black, the three first segments at sides fulvous, the fourth with golden or reddish hairs, with shining luteous rather long and dense pubescence, the other segments with luteous pubescence; under side black, shining, the last segments alone with very narrow pale incisions, the first segments mostly with black incisions, the three last alone luteous haired. Wings subhyaline, stigma brown, all veins black, middle transverse veins clouded, the third vein with an appendix, clouded at its base, halteres brown, apices white. Squamae ashy coloured, margined with white. Femora all black and black haired, anterior tibiae yellow, anterior half and tarsi brown, intermediate tibiae and tarsi and all posterior ones wholly yellow with white hairs. 6-7" Portsch., *Horae*, etc., p. 178.

This species apparently differs from *Tabanus astur* which was described from Siberia in the absence of the small tooth, the frontal callus being black, not grey, the thorax and abdomen more yellow haired, the femora black haired instead of yellow haired, the wings subhyaline, not black-brown.

It must be nearly allied to *Tabanus pulchriventris*, described on the next page by the author, from Chinese Mongolia.

***Tabanus tenebrosus*, ♀, Coquillet.**

Proc. U. S. Nat. Mus., xxi, p. 310 (1898) (*nec* Walker).

Female. Differs from *Tabanus trigonus* as follows. Head above the antennae yellowish grey, pruinose, tooth of third joint of antennae very small, hairs of occiput, of under side of the head and on the pleurae, white.

Abdomen opaque, black, sometimes a reddish spot on sides of the second segment, wholly greyish pruinose, the median triangles, posterior and lateral margins of segments 2-6 a lighter grey than the remainder of the abdomen, the darker markings consist principally of pairs of spots bordering the median triangles; venter black, brownish grey pruinose in the middle, the sides a lighter grey. Wings hyaline, stigma pale yellowish. Length 18—20 mm.

Four specimens from Japan.

This name is preoccupied by a Walker species from India.

The species is very probably the same as the specimens I have identified from Japan as *Tabanus cordiger*, Mg., but the description is too short to make a decision possible.

***Tabanus yao*, ♀, Macquart.**

Dipt. exot., v, p. 44 (1855).

Tabanus confucius, ♀, Macquart, *l.c.*, p. 46.

Tabanus trigonus, ♀, Coquillet, Proc. U. S. Nat. Mus., xxi, p. 309 (1898). (Japanese subform.)

? *Atylotus rufidens*, ♀, Bigot, Ann. Soc. Entom. France (6), vii, Bullet. lxxviii (1887). [*Atylotus*.]

Both the Macquart types in Mr. Verrall's coll. are from N. China, and with them are a series of females from Japan which are almost identical and may perhaps be considered as the Japanese subform *T. trigonus*.

In Brit. Mus. coll. are females from Wei Hai Wei, China (Muat), "biting horses;" and from Shanghai; and males from China (Walker coll.), and males and females from Japan (*T. trigonus*).

Black. Thorax with ashy grey pubescence. Abdomen blackish, with dorsal white spots and red segmentations. Antennae red with the apices black. Legs red. Wings with an appendix.

Length 9 lines, ♀ Palpi yellow. Beard white. Face with white tomentum, sides with yellow tomentum. Forehead anteriorly with white tomentum, then with yellowish grey tomentum; anterior callus testaceous, prolonged by a black line. Antennae yellow; the last four divisions of the third joint black, this joint with the usual tooth. Eyes naked. Thorax with ashy grey tomentum, and yellow hairs. Abdomen blackish, with dorsal triangular spots of a greyish white tomentum, as well as the posterior borders of the segments at the sides; sides of the three first sometimes of brownish yellow; under side yellow; the three last segments blackish with yellow posterior borders. Legs yellow, anterior coxae with yellow hairs. Wings a little yellowish, veins normal with the exception of the appendix. From N. China. M. Bigot. This *Tabanus* resembles *T. confucius* strongly; and as I have only observed males in this latter and females in the former, it appears that they belong to the same species. However the appendix, which is not found in *T. yao*, is a character that we have never observed to be sexual, and this determines us to consider these two species as distinct. Macq., Dipt. exot., v, p. 44.

On page 46 Macquart gives the description of *Tabanus confucius*, as follows:—

Black. Thorax with white stripes. Abdomen with the sides and segmentations testaceous. Antennae red with the apices black. Legs red.

Length 8 lines, ♂ Palpi brownish, the last joint oval. Beard yellow. Face with white tomentum, sides with yellow tomentum.

Forehead anteriorly with white tomentum, sometimes traversed longitudinally by a brownish stripe. Antennae yellow, the last four divisions of the third joint black, this joint with the usual tooth. Eyes naked. Thorax with indistinct yellowish grey tomentose stripes; sides with grey tomentum and yellow hairs; a small black stripe sometimes indistinct; breast with whitish tomentum and hairs. Abdomen: the testaceous sides reach more or less towards the middle, sometimes only leaving a black dorsal mark on the second and third segments; the last four segments with their posterior borders of a bright red testaceous; with a posterior yellow edging; under side testaceous; the three last segments black, with a testaceous posterior border. Legs of a dull testaceous; anterior coxae pale, with yellow hairs, posterior tibiae brownish on the posterior side. Wings almost clear, a little brownish on the ~~outer~~ border; veins normal, as those of *T. bovinus*.

From N. China. M. Bigot.

A large species allied to *Tabanus bovinus*, L., but distinguished from it by the larger tooth of the *antennae* which are bright reddish yellow, usually black at the apex, and by the wholly yellow legs.

♀ *Abdomen* reddish yellow with apex blackish, and a large median series of grey tomentose, triangular spots on a black median stripe and grey tomentose segmentations, the anterior borders of segments are to a great extent reddish brown; under side almost wholly yellow. *Legs* yellow, but the tarsi reddish brown. *Wings* often tinged with brown along the veins, or nearly clear. *Forehead* very slightly narrowed anteriorly, about eight times as long as it is narrow. Frontal callus pear-shaped, large, hardly touching the eyes with a linear extension. *Palpi* reddish yellow, long, almost the same size throughout. Length 24 mm.

This species may be considered as the Chinese form of *Tabanus bovinus*.

Tabanus confucius, ♂, Macquart, type (male), was distinguished from this species by the absence of an appendix to wing, which of course is not a trustworthy character, some of the specimens in Brit. Mus. coll. possess one and some have none; I believe the male type of *confucius* is the same species as *Tabanus yao* but so denuded that the black median stripe is not covered with the triangular median grey spots, though traces of them can be seen. *Tabanus trigonus*, Coq., is identical, with the exception of the colouring of the *legs*, with the Macquart species, and can only be considered as a subform so far peculiar to Japan. *Abdomen* darker. The femora and coxae are blackish or reddish brown with grey tomentum and bright yellow pubescence on the coxae and under part of femora, on the upper sides of the latter it is shorter and black, tibiae yellow, appearing blackish at apices owing to the thick black pubescence which elsewhere is largely yellow, tarsi blackish with black pubescence.

Atylotus rufidens, Bigot, may possibly be a denuded specimen of the subform *trigonus*, described from one female, collected north of Yeso, Japan.

Tabanus yokoamensis, ♀, Bigot.

Mem. Soc. Zool. France, v, p. 678 (1892).

Antennae black, base of the third segment reddish, this last joint very concave above with a projecting tooth; palpi very pale yellow; face and beard white; forehead grey, callus black, narrow, pointed above, much enlarged below and nearly square, on the vertex is a very indistinct tubercle and no ocelli; thorax blackish with three wide greyish indistinct stripes; scutellum blackish; sides grey with grey hairs; the two first segments of abdomen grey, with a large blackish spot on each side, the others black narrowly bordered reddish, squamae whitish bordered with brown, halteres yellow, the club brown with its apex whitish; legs black, base of tibiae widely whitish; wings almost hyaline, stigma pale yellowish.

Var.? Abdomen black with a dorsal stripe formed of triangular greyish spots, smaller in size.

I place this species in the genus *Tabanus* (*proprie dictus*) but with some doubts, owing to the very mediocre development of the vertical tubercle. Length 14 or 17 mm. Yokohama, Japan, three specimens, Bigot, Mem. Soc. Zool. France, v, p. 678 (1892).

This type and species is unknown to me.

SPECIES OF *TABANUS* FROM PERSIA, TURKESTAN,
AFGHANISTAN, BALUCHISTAN, ASIA MINOR
AND SYRIA.

The following is a list of the species with all synonyms from the above localities in the Palaearctic Region, including three new species here described. *Tabanus infuscatus*, Loew = *apricus*, Mg., *Tabanus fulvicornis* = *montanus*, Mg., var., and *Tabanus bromius*, L., are given on the authority of Bigot who inserts them in a Catalogue of species of *Tabanus* from N. Persia and Caucasus, in Ann. Soc. Ent. France (5), x, p. 140 (1880).

Tabanus abazus, ♀, Bigot, Ann. Soc. Ent. France (5), x, p. 146 (1880), was described from two specimens as black, with some greyish reflections. Eyes hairy. *Antennae* black. Frontal callus cordiform with linear extension. *Abdomen* with segmentations narrowly white and three series small indistinct grey spots. *Legs* black, tibiae pale testaceous. ? Persia, Caucasus.

Tabanus niveipalpis, ♀, Bigot, Mem. Soc. Zool. France, v, p. 645 (1892) [*Atylotus*], described from one specimen from ? Persia. Eyes naked. *Abdomen* blackish with the segmentations narrowly yellowish, and a large oval spot on the sides of second and third segment reddish yellow. *Legs* blackish, anterior tibiae whitish, the apices black, the other tibiae testaceous white. *Wings* hyaline. Length 12 mm. Bigot used this name later for a species from the Cape of Good Hope which is however a synonym of *Tabanus albilinea*, Wlk.

Tabanus canipalpis, Bigot, Mem. Soc. Zool. France, v, p. 649 (1892) [*Atylotus*], from Persia was described from one specimen. *Abdomen* black with yellowish segmentations and red on the first two segments. Length 11 mm.

Tabanus polyzonatus, Bigot, Mem. Soc. Zool. France, v, p. 648 (1892) [*Atylotus*], from Persia. Abdomen black with three series greyish spots and segmentations greyish. Length 17 mm.

These types are not known to me.

Tabanus glaber, Bigot, *polygonus* and *pulverifer*, Wlk., *sabuletorum* and *quadrifarius*, Loew, not included in Brauer's monograph of species of Palaearctic Region, are therefore given here, with the descriptions of the four new species, one from Japan, one from Perso-Baluchistan Frontier, one from Cyprus and Persia and one from Persia.

TABANUS *abazus*, Bigot (? *Atylotus*).

adjacens, n. sp.

alexandrinus, Wied.

apricus, Mg.

autumnalis, L.

bifarius, Loew (*Atylotus*).

bromius, L.

canipalpis, Bigot.

cordiger, Mg.

cyanops, Brauer.

cyprianus, n. sp.

decorus, Loew (*Theriopectes*).

eggeri, Schiner.

fulvicornis = *montanus*, Mg., var.

gigas, Herst. (*Atylotus*).

glaber, Bigot.

graecus, F.

infuscatus, Loew = *apricus*, Mg.

ispahanicus, Rond. [*aspahanicus*] = *spectabilis*, Loew.

lunatus, Fabr. (*Atylotus*).

montanus, Mg., var.

mühlfeldi, Brauer (*Theriopectes*).

miyajima, n. sp.

nigrita, Fabr.

niveipalpis, Bigot. ? Persia.

persis, n. sp.

polyzonatus, Bigot.

polygonus, Walker.

pulchellus,¹ Loew.

pulverifer, Walker.

quadrifarius, Loew (? *Atylotus*).

sabuletorum, Loew (? *Atylotus*).

solstitialis, Mg.

spectabilis, Loew.

tricolor, Zell. (*Atylotus*).

umbrinus, Mg. (*Atylotus*).

unifasciatus, Loew.

¹ Occurs also in Algeria, see Ricardo, Ann. Mag. Nat. Hist. (7), xvi, p. 200 (1905).

Tabanus adjacens, ♀, n. sp.

Five females. Co-types from Perso-Baluchistan Frontier in Indian Museum coll.

A small species with reddish yellow or yellow abdomen and a large broad black median stripe, yellowish legs and antennae. Forehead with two small callosities. Length $8\frac{1}{2}$ —10 mm.

Face brown covered with grey tomentum. Beard very scanty, white. *Palpi* whitish, large and nearly the same width throughout. *Antennae* yellow, the third joint with little more than an angle, broad at base. *Forehead* parallel, about three and a half times as long as it is broad, the frontal callus small, heart-shaped, not reaching the eyes, the median one about the same size, irregular in shape, both reddish brown. *Forehead* and subcallus same colour as face. *Thorax* shining black, no trace of stripes, but with thick grey tomentum on the anterior border, and on sides which are yellowish. Breast blackish covered with grey tomentum. *Scutellum* black. *Abdomen* bare, shining, reddish yellow, the broad black median stripe with irregular lateral borders, frequently extending on the posterior borders of segments to the sides of abdomen as narrow segmentations, and on the last three segments occupying their whole surface with the exception of the sides; under side yellowish. *Legs* yellowish, the fore tibiae at apices, and fore tarsi brown. *Wings* very hyaline, the veins brown, yellow on the fore border and at base, with a long appendix, the stigma yellow. None of the specimens are in good condition and are probably denuded.

Tabanus cyprianus, ♀, n. sp.

Type ♀ from Kelopside, Cyprus (Dr. G. A. Williamson), and two females from Seistan, Persia (A. S. Leese); these last in the Howlett coll., with label "from horse, very common."

This species *Atylotus*-like in the shape of head, though no hairs are visible on eyes with a lens, does not appear to have been described before, though it may be related to *Tabanus agricola*, Wied.; it is related to the group containing *Atylotus ditaeniatus*, *fulvus*, *rusticus*, *latistriatus* and *fuscipes*.

Seistan is a province in Eastern Persia bordering Afghanistan, so that the species presumably has a wide range.

A small yellowish grey species with clear wings, yellow legs and antennae, broad forehead with two small callosities, abdomen yellowish at base and on segmentations, covered with grey tomentum and with four series small black spots. Length 12-13 mm.

Face covered with greyish white tomentum and with white pubescence. Beard white. *Palpi* yellowish white with white pubescence, almost straight, not so curved as usual, stouter at base ending in a point. *Antennae* pale yellow, the third joint more reddish yellow, the first two joints with chiefly white hairs, but a few black ones are visible, first joint small, not cap-shaped, second very small, third with hardly any tooth but only an angle, broad at

base for its size. *Forehead* and subcallus same colour as face, the former about four and a half times as long as it is broad, parallel, the frontal callus small, square or oval, not reaching eyes, the median one smaller, both shining, mahogany-brown, hind part of head with white hairs, pubescence on forehead scanty yellowish. Eyes with no bands.

Thorax, *scutellum* and *abdomen* blackish but covered with grey tomentum appearing greyish, and clothed with short yellowish or white pubescence, some black hairs on shoulders. *Abdomen* reddish yellow on sides of first two segments, and segmentations the same colour, hardly appearing so in the type, owing to the pubescence, four round black dots appear on the fore border of each segment except the last one; under side a little paler with same pubescence, the black spots not present. *Legs* pale reddish yellow, apices of fore tibiae and tarsi blackish brown, the other tarsi brownish, pubescence on coxae and femora white. on tibiae mixed white and black, and on tarsi black. *Wings* clear, veins brown, stigma pale yellow, long appendix present.

***Tabanus eggeri*, Schiner.**

Reise Novara Dipt., 81 (1868).

Tabanus intermedius, Egg., Verh. zool.-bot. Ges. Wien, ix, 389 (1859); Brauer, Denkschr. Akad. Wien, xlii, 182, 42, pls. iii and vi, fig. 42 (1880); Gobert, Mem. Soc. Linn. Nord. France, 21, 6 (1881); Pandellé, Revue d'Entomol., ii, 202, 4 (1883).

This species is as yet only recorded from South Europe, Egypt and Asia Minor.

Two females in Mr. Howlett's coll. identified as this species from Seistan, Persia, 'on horse, uncommon' (A. S. Leese).

The males have the first posterior cell open, not narrowed, the females have it closed or very considerably narrowed, in these specimens the latter is the case.

***Tabanus glaber*, ♀, Bigot.**

(Pl. xiv, fig 23.)

Mem. Soc. Zool. France, v, p. 678 (1892).

Type ♀ from Afghanistan (in description India is given) in Brit. Mus. coll. Six females from Helmund, Afghanistan, Indian Boundary Commission (Aitchison), 1889, and another female labelled *T glaber* in Bigot's handwriting from Afghanistan, in Indian Museum coll. These appear to have been the original series of specimens from which Bigot made his type, all having a small yellow-papered "9" attached to them.

One ♀ in Brit. Mus. coll. from Kashgar, E. Turkestan (Lansdell), 1889, and two ♀ from Seistan, Persia, in Howlett coll., 'taken from horse'; these are identical though the frontal callus differs a little from that of type. This species does not appear to have been

described under any other name among the Palaearctic species to which Region it belongs.

A species easily recognised by the broad black stripe on the red abdomen, with the thorax black, the wings clear, the antennae black, the legs black, the tibiae reddish yellow.

Length type 14 mm.

Face covered with grey tomentum and with white pubescence. Beard white. *Palpi* pale yellow, almost devoid of pubescence, with only a little short white pubescence, and an occasional black hair, large, ending in a fairly long apex. *Antennae* wholly black. *Forehead* of medium breadth, narrower anteriorly, about five times as long as it is wide at its narrowest point, covered with grey tomentum and with a few white hairs at vertex. Frontal callus blackish brown, square, reaching the eyes, at a short distance beyond it appears a spindle-shaped callus in the middle of forehead, united posteriorly to a broader irregular shaped callus on the vertex. Eyes with cross-bands. *Thorax* with grey tomentum, stripes hardly distinct, shoulders reddish, pubescence on dorsum consists of black hairs with some scattered pale yellowish hairs intermixed.

Abdomen: the black stripe almost entirely covers the first segment, on the next three segments it is about a third of the width of abdomen, and on the remaining segments almost entirely covers them, leaving only their sides and narrow segmentations red; under side reddish, the stripe not so well marked, the pubescence on dorsum black with some yellow hairs, and grey tomentum on the red parts. *Legs* black, the knees of femora and the tibiae pale yellow or reddish yellow, the apices of fore tibiae black. *Wings* clear, veins and stigma yellowish brown, the first posterior cell slightly narrowed at its opening.

Tabanus miyajima, ♂♂, n. sp.

Type (male) from Japan (Miss Pascoe's coll.), 1896. Co-types, four females from Tokio, 1909, and Japan sent by Dr. Miyajima in a small collection of Japanese Diptera to the British Museum; unfortunately the collection was much damaged by the journey, but these females are sufficiently well preserved and of such a striking, easily distinguished appearance, as to justify their description as a new species.

♀ A black species, the abdomen with whitish-haired bands, most prominent on the fourth and fifth segments where they are produced in the middle as triangular spots; scutellum grey. Legs black, the tibiae largely yellowish white. Wings with all posterior cells widely open. Frontal callus club-shaped with stout linear extension. Length of male 18 mm., of females 18-19 mm.

The species has a general resemblance to *Tabanus significans*, n. sp., of the Oriental Region.

Face covered with greyish tomentum and with some silvery white pubescence, the sides of cheeks and the subcallus and centre of face immediately round base of antennae covered with yellowish brown tomentum, the hairs on sides of cheeks short, brown. Beard

silvery white. *Palpi* obscurely reddish, with some grey tomentum and with thick black pubescence, stout, ending in an obtuse point.

Antennae incomplete, the first two joints dull red with black pubescence. *Forehead* narrow, about seven times as long as it is broad, very slightly narrower anteriorly, black, with greyish tomentum, and some black hairs, the frontal callus brownish black, club-shaped, a little protuberant, long, stout, not quite reaching the eyes, prolonged in a stout short linear extension. *Thorax* black, with grey tomentum, disposed as indistinct stripes, pubescence sparse, black, with some appressed fulvous hairs intermixed, shoulders with longer black hairs, at base of wings some tufts of white hairs. *Scutellum* thickly covered with grey tomentum and with some white pubescence on its outer border. Breast black, covered with grey tomentum and with white pubescence. *Abdomen* black, the first segment with only some white hairs at sides, the second and third with indistinct grey tomentose narrow bands on their posterior borders, silvery white hairs only on the sides, the fourth with a wider one, covered with silvery white pubescence extending in the middle as a short triangle not reaching the anterior border, on the fifth a broad median white-haired spot; the dorsum is covered elsewhere with close black pubescence; under side black, covered with grey tomentum and short silvery white pubescence, the last three segments blackish without the lighter tomentum and pubescence. *Legs* black, the fore tibiae on their basal half, the other tibiae on their basal two-thirds yellowish white, the pubescence whitish on fore coxae, on femora black with white hairs intermixed on under side chiefly, on pale parts of tibiae white, on their dark parts and on all tarsi black. *Wings* hyaline, very slight traces of brown shading on the cross-veins, stigma and veins brown, no appendix.

♂ Male is browner, the *abdomen* conical brownish black, not so thickly covered with black pubescence, *scutellum* brownish like the thorax with rather thick brownish pubescence. *Legs* with wholly black pubescence, the fore tibiae only yellowish white on their basal third. *Face* brown with brownish black pubescence, the palpi brownish with black hairs. Beard blackish. *Antennae* brownish black, the third joint long, slender, with a fairly prominent tooth at base. Eyes large, convex, with large facets on their upper surface reaching to the middle of the frontal triangle, the small ones occupying the lower part and continued as a narrow border to the vertex.

***Tabanus persis*, ♂, n. sp.**

(Pl. xiv, fig. 24.)

Type male and female from Seistan, Persia, on the Afghanistan frontier, in Mr. Howlett's coll., and others from same locality. The females are labelled by the collector, A. S. Leese, as taken off camels or horses and common, the males as uncommon and taken off horse, and off gauze door.

This species, *Atylotus*-like in the shape of head though no hairs are to be discovered on the eyes with a lens, does not appear to

have been described before; it has a general resemblance to *Atylotus rusticus*, L., but is distinguished from it by the shape of frontal callosities and by its black antennae.

A small species with greyish black abdomen reddish at sides of first two segments, clear wings, yellow legs, broad forehead with two transverse callosities, and black antennae. Length ♂ type 12 mm., ♀ type 13 mm., other females 13—15 mm.

Face covered with whitish tomentum and thick silvery white pubescence, with a yellowish brown band above between the antennae and eyes. *Palpi* stout, short, ending in a point, white with white pubescence. Beard silvery white. *Antennae* black, a character which distinguishes it from other species of the same group, the first two joints with some greyish brown tomentum and black hairs, the third joint broader at base but with hardly a perceptible tooth, only an angle, with some grey tomentum on the basal part of joint. Subcallus and *forehead* covered with greyish tomentum, the latter hardly three times as long as it is broad, and a third narrower anteriorly, the frontal callus large, transverse, almost reaching the eyes, convex, black, shining, with its posterior border towards vertex irregular, the median callus is the same colour but smaller, not reaching the eyes, irregular in shape, in the type broken up, but in others heart-shaped, the pubescence of forehead short, yellow, scanty, thicker towards the vertex. Eyes with apparently one band starting from the frontal callus. *Thorax* blackish covered with grey tomentum, stripes indistinct. Scutellum the same. *Abdomen* narrow, blackish with grey tomentum, the first three segments reddish yellow at the sides, so that the blackish colour appears only as a median stripe, on each side round grey tomentose spots appear, and also as narrow median ones on the black colour, the segmentations and sides of abdomen reddish yellow, pubescence white at sides and on segmentations, black at apex, but always scanty; under side paler, yellowish, covered with grey tomentum. *Legs* yellow, fore tibiae at apex and tarsi blackish, middle tarsi with the last four joints brown, the posterior tarsi almost wholly brown, femora with some whitish pubescence. *Wings* clear, veins brown, no appendix or only the root of one, stigma yellow, very narrow and small.

♂ Similar, the *thorax* and *abdomen* more pubescent, the former with yellowish pubescence, the *scutellum* with long white hairs on posterior border, the abdomen with chiefly whitish yellow pubescence.

Eyes large, bare, the large facets yellowish, very distinct, the smaller ones black, continuing to vertex as a narrow border, no stripe is visible. One male measures 16 mm., the reddish yellow colour of abdomen is more extended in the males.

***Tabanus polygonus*, ♂ ♀, Walker.**

List Dipt., v, Suppl. i, p. 237, 357 (1854); Ricardo, Ann. Mag. Nat. Hist. (7), xvi, p. 201 (1905).

Male (type) from Bagdad (W. K. Loftus), 50, 105; and another male from the same locality.

Female (type) from same locality.

The males would come in Brauer's table near *autumnalis*, *spectabilis* and *rectus*. The female, which is much smaller, may possibly not belong to the same species and has a slight resemblance in appearance to *Atylotus rusticus*, L.

A redescription may prove of use :—

Reddish brown species, with grey median triangular spots on the abdomen. Eyes bare; no long hairs on the hind part of the head.

Male. Head large; facets of eyes unequal, sharply divided, the large facets yellowish, extending over more than half the eyes, surrounded by a narrow zone of small facets above and a broad zone on the basal half. Frontal triangle grey, reddish at apex. Antennae red, with the apex darker; the third joint with a small tooth, long and slender, the annulated portion not so long as the basal joint; the ocelligerous tubercle small, brown. Face whitish, with white hairs; beard white; palpi white, the second joint oval, with white pubescence. Thorax blackish, with four grey stripes and greyish pubescence; the shoulders red; the sides reddish, with black hairs above and whitish ones below; scutellum black, with grey tomentum. Abdomen long and narrow, reddish, with a row of median grey triangular spots, which on the second and last segments are surrounded by black margins; the hind borders of the segments narrowly white, the pubescence black; the under side brighter red, with some irregular black markings. Legs red; the coxae and femora with longish white hairs; the tibiae with short black pubescence on the sides and some whitish yellow hairs on their flat surfaces; tarsi with black pubescence, pulvilli yellow. Wings longer than the abdomen, hyaline, the stigma and veins yellow; no appendix.

Length 18 mm., width of head 5 mm.

Female. Eyes not large, the facets equal, with two bands (in the male I can see no trace of bands). Frontal callus reddish brown, almost square, a little wider at its base, nearly touching the eyes; frontal stripe grey, forehead parallel, about five times as long as it is broad, with black markings (probably denuded), the middle callus being a black stripe not joining the frontal callus; the vertex blackish; no ocelligerous tubercle. Antennae at base red (the rest wanting). Frontal triangle grey. Face grey, with white hairs; beard white; palpi pale yellow, the second joint long and slender, at the base stouter, gradually tapering to a point, nearly straight, with a few black hairs. On the abdomen the grey triangular spots are replaced by a broad stripe of greyish tomentum, the black pubescence is longer, the abdomen not so pointed as in the males. Wings with the first posterior cell distinctly narrowed at the apex (this is not the case in the male).

Length 14 mm., width of head 4 mm. Ricardo, *Ann. Mag. Nat. Hist.* (7), xvi, p. 201.

Tabanus pulverifer, ♀ ♂, Walker.

List Dipt., v, Suppl. i, p. 236, 356 (1854); Ricardo, Ann. Mag. Nat. Hist. (7), xvi, p. 201 (1905).

Male (type) from Turkey in Asia (Loftus).

Three females from the same locality (co-types) are nearly related to *Tabanus cordiger*, Mg., but belong to a distinct species; they differ in the following particulars:—

Antennae wholly red, black at the apex. Forehead one-third narrower anteriorly, about four times as long as it is broad, frontal callus reddish brown. Coxae and femora reddish yellow, as are the tibiae, only the anterior tibiae with a brown apex; tarsi reddish brown, all with white pubescence. The under side of abdomen has no median black stripe. The species is much lighter in colour and slighter in form than *cordiger*; the four specimens vary in size from 12—14 mm. In the female the band under the eyes is narrow and yellowish brown. In the male the black hairs on the hind part of the head are not present; the under side of the abdomen is reddish, greyer at the apex. Ricardo, Ann. Mag. Nat. Hist. (7), xvi, p. 201.

Tabanus quadrifarius, ♀, Loew.

Zeitschr. f. d. ges. Naturwis., N. F., ix, xliii, p. 414, 3 (1874). [*Atylotus*.]

From Schahrud, Turkestan.

Near *Tabanus bifarius*, Loew, but ornamented with four black stripes on abdomen, and with the femora except the grey base easily distinctly luteous, fore tibiae except the apices and the posterior wholly, the posterior tarsi at base wholly luteous. Eyes with one band. Forehead with two black spots. Length $5\frac{3}{4}$ —6 lines. Wings $5\frac{1}{4}$ — $5\frac{1}{3}$ lines. Loew, Zeitschr., etc., p. 414.

There are examples of *Tabanus bifarius*, Loew, in the Brit. Mus. coll. determined by Dr. Kertész, from Greece and Hungary; these (females) have the frontal callus square, yellow, not reaching the eyes, the middle callus oblong, larger than the frontal callus, black. The femora wholly blackish, the tibiae yellow, black at apices, all tarsi blackish.

Presumably *Tabanus quadrifarius* has likewise two calli on forehead and probably belongs to the subgenus *Atylotus*; there is one female from Bagdad in Brit. Mus. coll. which may possibly be this species.

Tabanus sabuletorum, ♀, Loew.

Zeitschr. f. d. ges. Naturwis., N. F., ix, xliii, p. 414, 4 (1874). [? *Atylotus*.]

From Schahrud, Turkestan.

Dull whitish, with the thoracic stripes and the scutellum cinereous. Eyes naked, banded. Forehead very wide, the lower callus large, the upper one in undenuded specimens irregularly shaped, black. First joint of antennae whitish, the second red,

the third black, towards the base widely red, above concave but hardly at all excised. Palpi short, thick, white, and white haired. Abdomen cinereous, white spotted.

Legs black, femora greyish, knees and tibiae except the apices pale yellowish. Wings white, hyaline, veins however pale brown, auxiliary wholly and others towards base of wing dull yellowish with appendix. Length $5\frac{1}{3}$ lines, wings $4\frac{1}{2}$ lines. Loew, *Zeitschr.*, etc., p. 414.

This species is not known to me.

***Tabanus spectabilis*, ♀, Loew.**

Verh. zool.-bot. Ges. Wien, viii, p. 605, 34 (1858).

Tabanus ispahanicus, ♂, Rondani, *Ann. Mus. Civ. Genova*, i, p. 300, 8 (1873) [*aspahanicus*].

Rondani's type was not labelled, but owing to its striking appearance, I had no difficulty in recognising the one male specimen from N. Persia described by Rondani, and have no doubt it is the male of *Tabanus spectabilis*, recorded from Europe and Brussa in Asia Minor. The type ♀ came from Servia. There are two females of this species in the Brit. Mus. coll. from Bulgaria.

