

THE BLOOD-SUCKING ARTHROPODS OF THE DUTCH EAST INDIAN ARCHIPELAGO.

IV.

The Tabanids from Buru.

The Genera *Tabanus* and *Chrysops*.

By

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When returning to Buitenzorg from my trip to the little Soenda Isles, I met my colleague, the zoölogist Mr. L. TOXOPEUS, who was just coming back from his expedition to the island of Buru, one of the Moluccas. He brought with him a beautiful collection of Diptera and amongst others, also a number of specimens belonging to the Genera *Tabanus* and *Chrysops*, which Prof. Dr. J. C. H. DE MEYERE was so kind as to lend me for determination and description for which I am much indebted to him and herewith wish to express my thanks.

Until now *Tabanus flavipennis* RIC. was the only Tabanid known from Buru, but the number of species has now increased to six, two species belonging to the genus *Chrysops* and four species to *Tabanus*. Two of the six species are new.

Tabanus flavipennis RICARDO.

RICARDO. Nova Guïnea XIII, part 19.

RICARDO'S type in the British Museum collections is from Bara, West-Buru, and with it a series of 3 other females.

TOXOPEUS' collection contains 18 females from the following places:—
Station 2, Wa Ha in the neighbourhood of a waterfall; vegetation luxuriant, mountain fauna, 100 M. above sea-level, 1 female, collected 6. 3. '22.

Station 4, Mnges Waen, 860 M. above sea-level, near a little marsh, 1 female.

Station 7, Ehu road, the mountain wood between Mnges Waen and Leksula, 1150 M. above sea-level; 6 females, collected on 23 and 30 April 1921.

Station 9, Rana, a lake amidst a plain, the surroundings are marshy and possess a corresponding vegetation, height 750—850 M; 2 females, collected on 29. 6. '21.

Station 11, On the slope of the mountain Kaku Date, 900 M. above sea-level in a Dammara wood; 1 female, collected on 8. 7. '21.

Station 12, The Kunturun marsh, a high moor 1075 M. above sea-level, 2 females.

Station 13, Fakal, the fauna is a typical woodborder-fauna, dry and cool climate, height 1100—1475 M; 2 females collected in Febr. '22.

Station 17, Foothpath leading from Leksula to Fakal, low wood as in station 7, on a plateau, 1300 M. above sea-level; 1 female, collected on 21. 10. '21.

Station 18, Wa Kuma delta on a wild hog; 1 female.

Station 22, Bahlale N. East from Leksula, thick wood with open spaces 600 M. above sea-level; 1 female, collected on 21. 1. '22.

As appears from the foregoing, *Tabanus flavipennis* is a Tabanid belonging to the hill- and mountainous region; it is found between 100 and 1300 M. above sea-level and prefers moist places.

Tabanus flavipennis RIC. is a large, black species. Its body is covered with scanty, chiefly black, hairs; the wings are tinged deep yellow-brown with lighter, almost clear, areas in most of the cells. Foreborder of wing wholly yellow-brown. Forehead narrow, antennae blackish with a very distinct tooth. Beard black. Palpi reddish brown, black-haired. Legs black; the knees of the first pair of legs reddish brown. The abdomen is unicolorous black and without any ornamentation.

At the first sight this species may be taken for and confounded with:—

Tabanus denticulatus RIC. from New Guinea, to which it shows much resemblance, but on closer examination it is easily distinguished from this species by the relative shortness of the antennal tooth. In *Tabanus denticulatus* the tooth nearly reaches to the apex of the first ring of the third antennal joint. For further differences between *Tabanus denticulatus* and *Tab. flavipennis* see RICARDO, Nova Guinea Vol IX, part III p. 397 loc. cit.

The different specimens were measured. The variation of the dimensions is given in Table I.

TABLE I.

The dimensions of *Tab. flavipennis*.

Body length:— varies between . . .	17.8 and 23.2 m.m.
Most specimens measure	21.- — 22.- „
Width of thorax	5.8— 7.1 „
Width of abdomen	7.8— 9.2 „
Wing expanse	44.- — 52.8 „

Length of head	2.1 — 3.-	m.m.
Length of thorax	7.- — 9.-	„
Length of abdomen	10.6 — 14.8	„
Length of wing	19.- — 23.-	„
Breadth of wing	6.8 — 8.-	„
Forehead index	7.6 — 10.-	
(Forehead index =	$\frac{\text{Length of forehead}}{\text{Breadth of forehead anteriorly}}$)	

Forehead 1/5 to 1/3 narrower anteriorly, the first part runs nearly parallel and is very narrow; at 1/3 from the vertex it enlarges suddenly, so that the vertex-part of the forehead possesses almost the shape of a triangle.

Callus anteriorly egg-pearlshaped, hardly broader than the relatively broad callus-stripe, which ends just under the vertex; beneath it is shining black as the callus itself; at the vertex it becomes dull and appears as a broad convex wall, which shows a little groove. The callus does not reach to the eyes. The callus-stripe and its continuation are accompanied by a stripe of black hairs at each side.

On the deep black vertex-spot many black hairs are seen. The postocular rim is dull sootyblack and fringed by black hairs.

In one of the specimens the forehead does not enlarge abruptly to the vertex as in the type, but more gradually.

The subcallus or antennal triangular plate is sooty grey; just above the antennae it is bordered by a yellow-brown, caramel-coloured stripe.

Antennae, 3-jointed, shorter than the head, basal joint black; thickly beset with black hairs; the hairs on the distal lateral border of this joint are long and erect; second joint reddish brown with an apical fringe of black hairs; third joint angular, showing a very distinct tooth, ornated by black hairs. The base of the third joint is, reddish brown; soon it becomes black, however, and the fingerlike portion of the first ring, as well as the stylus, are wholly black. For the spread of the hairs see the figure.

Clypeus greyish black, sooty, showing some yellow-brown stripes, pubescence black, especially along the longitudinal grooves.

Palpi sooty black at base; at the tip more reddish brown, covered with thick black hairs on the outer border; at base also some yellowish hairs are found. The palpi are long and with a long point.

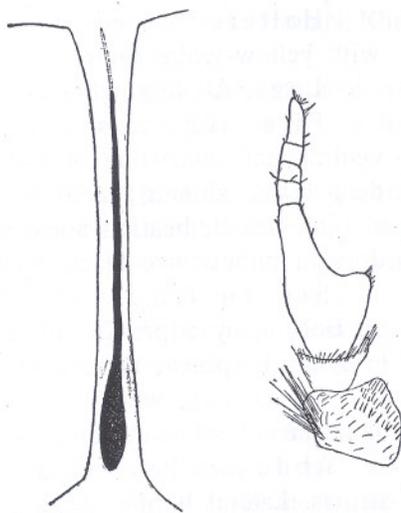


Fig. 1. *Tabanus flavipennis* Ric.
Forehead with callus; and antenna.

Proboscis large, deep dull reddish; sugarflaps stout, bearing a row of yellowish red-brown hairs along the outer brim. Cheeks along the eyeborder dull light yellow-brown; pubescence scanty yellow-brown; the ventral part is sooty black, covered with dark black hairs; beard black.

Thorax dull, sooty black, scutellum same colour. Scutum and scutellum bear scanty black hairs intermixed with some brownish hairs. All pleurae are black-haired.

Breast yellowish brown tomentose. Pteropleuron with a yellowish brown hue, covered with long black hairs. Hairtufts on base of wings black. Just after the wings a little yellow hairtuft is encountered at each side, whilst a third black hairtuft stands between scutum and scutellum. The first stigma is surrounded by a brown rim

Wings reddish brown along the foreborder; in the costal and subcostal cells wholly deep yellow-brown; other cells have dark brown shadows along the veins and clear areas in the middle part of the cell. Costal vein very stout. On costa and mediastinalis, short black hairs.

Halteres composed of a dark brown stalk and a reddish brown club, with yellow-white centres.

Legs. All legs wholly black-brown, except on some articulations.

First leg; coxa black, tomentum yellow-brown; pubescence on the ventral half consisting of long, scattered, black hairs, femur, ventrally bare, deep black, shining; on dorsum pubescence black, knee reddish brown, tibia a little flexed, bearing some long black hairs along the lateral borders. On dorsum pubescence black, tarsalia black.

Second leg, wholly deep black, pubescence on femur erect, black; on tibia many adpressed black hairs are seen. The tibia possesses two unequal long black spines; tarsalia black.

Third leg, wholly deep black, tibiae covered with a big lot of black hairs, tarsalia showing on their foreborder some red-brown, short bristly hairs.

Abdomen broad, regularly black-haired, unicolorous, without spots or stripes. Lateral borders thickly beset with black hairs.

With regard to the antennae of *Tab. flavipennis* RIRARDO mentions the following facts:—

"Antennae blackish, the two joints dull reddish with thick black pubescence; the third joint black; in some of the specimens a little reddish at base and in one as far as the small divisions, long, fairly broad at base, with a distinct tooth. Forehead narrow, anteriorly hardly more than half as wide as it is at vertex about ten times as long as it is broad, black with some greyish tomentum".

In most of the stated points my description agrees fairly well with RICARDO'S, except in the shape of the forehead, which in the specimens examined by me never was more than 1/5 to 1/3 narrower anteriorly. I think this difference is not an essential one.

RICARDO gives the following description of the wings of *Tab. flavipennis*. Wings tinged yellowish brown and on foreborder more largely so. In some of

the specimens the yellow-brown tinge is spread over the wings clear at extreme apex and in centre of cells sometimes, vein appendix, all posterior cells widely open, squamae brown, halteres

I have pointed out already the great likeness of this species to *denticulatus* RIC. The last species is only a little smaller, possesses a very large long tooth to the third joint of antennae; a brown beard and appears more brownish. Legs reddish brown with black pubescence; the fore coxae with grey tomentum.

***Tabanus reducens* WALKER. ¹⁾**

BIGOT. Mem. Soc. Zool. France V, p. 655 (1892) (*monotaeniatus*).

RICARDO. Revision of the species of *Tabanus*, Records Indian Museum Vol. IV No. 6, 1916 p. 159.

RICARDO mentions the following data with respect to the distribution of the above-named species:—

Type (♀) (of *monotaeniatus*) 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 paratypes from India, one of them from Sibagsar, another from N. Khasi, Assam. In HOWLETT Coll. seven ♀ from Nangpoh, Assam, "caught on animal".

In British Mus. Coll. ♀ specimens from Dibia and Sadia, Khasi Hills District, and N. Khasi Hills, lower ranges (CHENNEL) and Nangpoh, Assam.

TOXOPEUS' collection includes two females, collected on 20. 1. '22 and 22. 1. '22 respectively, at station 22 Bahlale, N. East from Leksula, in the woods at 300 M. above sea-level. The wood is thick and grows upon sandstone. Here and there clear spots are found where the inhabitants have felled the trees for culture purposes.

The specimens from TOXOPEUS' collection show, as I will demonstrate, some differences with RICARDO's description from *Tabanus monotaeniatus* BIGOT, but as RICARDO herself mentions a certain variation in the colour of the abdomen and other parts of the specimens originating from different places, I think the observed differences are not essential enough to bring the insects concerned to a new species, so I have determined them, after some hesitation, as *Tabanus monotaeniatus* BIGOT. After having described the different specimens I will discuss this matter more extensively.

Tabanus monotaeniatus BIGOT is a relatively large, dark, blackish species with a single white-haired stripe traced over the abdomen in the median line and reaching to the sixth segment. In the second specimen from Buru,

¹⁾ I had recently an opportunity of comparing the Buru specimens with the species from New Guinea and adjacent countries, and the Australasian Region, in the British Museum (Natural History) in London, and found that the specimens identified by me as *Tabanus monotaeniatus* BIGOT belong to *Tabanus reducens* WALKER, which occurs also in Celebes and the Philippines.

on the sixth segment one finds yet a narrow white line with parallel sides, whereas the spots which compose the median line have the shape of the proglottids of a *Taenia*.

In addition, on each side of the median stripe, round, white tomentose spots are seen. The number of them is, however, liable to some variation. So the first specimen from Buru presents two round spots on the second, and two other somewhat smaller spots on the third segment; the second female misses the spots on the third abdominal segment.

Thorax blackish with 4 whitish stripes.

Legs blackish brown with roe-brown to sienna-brown tibiae.

Wings clear, with light yellowbrown foreborder.

Halteres with whitish club. Forehead nearly the same width throughout with pearshaped callus, prolonged with a narrow filiform stripe. Antennae reddish brown with black long style and an indistinct tooth.

Palpi, brownish yellow-white, stout, ending with a long point. Beard white.

The Buru females present the following dimensions:—

TABLE II.

Dimensions of Buru females.

	♀ 1	♀ 2
Body length	19.2 m.m.	20.8 m.m.
Width of thorax	5.5 "	5.5 "
Width of abdomen	6.5 "	7.- "
Wing expanse	37.5 "	40.5 "
Length of head	3.2 "	3.- "
Length of thorax	7.5 "	8.- "
Length of abdomen	10.6 "	12.- "
Length of wing	16.- "	17.5 "
Breadth of wing	5.- "	5.4 "
Forehead index	6.8	6.8

RICARDO mentions that the BIGOT type is long 18 m.m.; other specimens range from 14—19.5 m.m.

Forehead nearly the same width throughout, only a little bit narrower anteriorly in the first Buru specimen, whereas in the other one it is a fourth narrower anteriorly than it is at vertex.

Callus, at base curved and to the tip a little flattened, long, pearshaped, with a broad base, but not reaching to the eyes.

To the vertex the callus is attenuated gradually and prolonged into a narrow, threadlike stripe, pointed at the end and

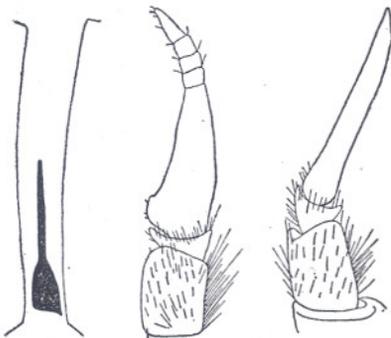


Fig. 2. *Tabanus reducens* WALK.
Forehead with callus; and antenna,
side and dorsal view.

reaching to about 2/3 of the distance of the forehead reckoned from the base. The second specimen possesses a broader callus-stripe which ends at the middle of the forehead. Callus and stripe are both black (in the second Buru-specimen a little brownish). On each side of the callus-stripe thick yellow-brown hairs cover the surface. This pubescence ends abruptly just before the vertex-spot. The median part of the forehead is beset with a relatively broad row of black hairs and there are similar hairs on the winered-brown shaped vertexspot. The tomentum on this spot is brownish grey, sooty.

The forehead between the callus and the vertex-spot bears a greyish white tomentum with yellowish reflection caused by the described hairs. Postocular brim narrow, covered with brownish black hairs.

Triangular antennal plate with a shallow median groove. At the tip of the triangle, where forehead and subcallus meet, the tomentum is blackish brown. Elsewhere it is coloured grey-white.

Antennae 3-jointed. The first Buru-female misses the third antennal joint. In the second female three joints are present.

First joint short, with broad base and a blunt apex. At two-thirds from the distance between base and apex a terrace-shaped indentation is seen. The joint is coloured olive-brown on dorsum at base with a whitish grey powdering; on the distal lateral border of the joint erect, white, fanshaped pubescence, on dorsum at the base black and white hairs intermixed, at the apex a thick black haircovering. On the prominent lateral border also some white hairs are seen. On the ventral half at apex black bristly hairs; towards the base some white hairs are intermixed.

In the second specimen the colour of the first joint is more blackish brown.

Second joint short, crescentiform, coloured reddish brown; the two joints of the crescent moon covered with black hairs. A fringe of black hairs runs along the apical border of the joint. Ventrally the outer border of the joint is fringed by black hairs.

Third joint reddish brown at base; afterwards it becomes deep black. Tooth indistinct and crowned with some black hairs. At the apical borders of the stylusrings similarly some black hairs are found.

Cheeks grey-white, the apical border is covered with short, white hairs, beard relatively short, silvery white.

Clypeus with a median deep groove. Median part sooty grey, sides covered with a yellowish hue, bearing long, loose, silvery grey hairs, intermixed with some black ones.

Palpi 2-jointed.

First joint short, nail-shaped, dirty yellowish brown-white; pubescence loose, erect, brownish white.

Second joint brownish yellow-white. At the base it is mainly covered with white hairs; some black ones are intermixed. Towards the tip of the joint the black hairs increase in number; the tip is wholly covered with

median line on the dorsal surface one sees an irregular row of dark black, scattered hairs; this row becomes thicker towards the apex. On the proximal lateral border a row of yellow-brown-white hairs, between these hairs four long black hairs are found with great interspaces. Along the distal lateral border beautiful yellow-white hairs are placed, intermixed with black ones.

The ventral surface is nearly wholly covered with straw-yellow-white hairs except at the apex, where black hairs abound; 2 subequal spurs.

The rest of the tibia is brownish yellow to light chromate. Hairs on apex ring black, on dorsum median row of black hairs. For the rest on dorsal and ventral half, hairs yellow-white. Tarsalia brown-black with some reddish brown hairs at the apical borders of the different articles. As for the rest the hairs are black.

Third leg. Coxa black-grey tomentose, the lateral borders bear reddish brown hairs. Trochanter short, black; along the proximal lateral border some erect grey-white hairs placed in a row.

Femur at the apex with a yellow-brown ring, covered with yellow hairs. On the dorsal surface a thick black haircovering; some yellow hairs are intermixed. Tomentum grey. Along the distal lateral border a row of short yellow-white hairs runs from the apex to the base. At base a bigger tuft of similar hairs is found. The proximal lateral border is covered with a row of long yellow-white hairs. To the apex some black ones are intermixed.

The ventral surface is bluish grey tomentose, covered with adpressed brownish yellow hairs. The apex is here likewise reddish caramel-brown.

Tibia yellow-brown, darker to the apex, with a wholly black apex ring which covers from about $1/5$ — $1/6$ of the article; here the hairs are black; at the base on dorsal surface many scattered black hairs, between which some long white ones are seen. On proximal lateral border a row of relatively long bristly black hairs; the distal lateral border bears a row of likewise black but longer hairs, decreasing in length from base to tip.

On ventral surface haircovering thinner, yellow-white in the median part, adpressed; at the lateral borders it is more erect; at the apex a yellow-haired wedge protrudes into the black-haired apex ring. On the apex some reddish brown hairs. In the median line on the ventral surface a sort of heel, composed of black hairs.

In the second Buru-female the yellow-brown-sienna colored part of the dorsal surface drives a wedge into the black ring, which covers about $1/5$ — $1/6$ of the whole article.

Tarsalia reddish brown, black-haired. On ventral surface and at both sides reddish brown hairs. On dorsum thick black haircovering.

Abdomen blackish with a distinct white median stripe, which ends on the fifth segment. The spots which compose the median line have the shape of the proglottids of a Taenia. On the second segment, at each side

of the median stripe is a big round white spot, covered with white tomentum and yellow-brownish-white hairs. On the third abdominal segment two similar but much smaller spots.

On the median stripe the haircolour is brownish white on the first segment, whereas the other segments bear yellow-brownish-white hairs on the median spots.

At each side of the scutellum a chocolate-brown hairtuft is found.

In the second specimen the sixth segment presents in the median line a narrow longitudinal whitish stripe covered with yellowish white hairs.

The second Buru-female possesses only round sidespots on the second segment, whereas on the first segment, just above the whitish spot, one sees a whitish tomentum.

The rest of the dorsal tergites is covered with black hairs, except on the extreme lateral borders where the haircolour is white; on seventh segment at the same place, between many white hairs some black ones are found. On all tergites the underlayer at the sides is dirty yellow-white.

The ventral surface shows a median longitudinal broad black stripe, composed of halfmoon-shaped spots, covered with black hairs. Sternite of seventh segment wholly black. Segmentations and lateral borders white-haired; underlayer lighter grey-brown.

RICARDO's description of *Tabanus monotaeniatus* BIGOT differs in the following points from the foregoing description:-

Face, a few black hairs on cheeks.

Callus, dark brown in colour. I have often found specimens from one and the same species where the colour of the callus in the different specimens varied from light olive-brown to dark black.

Abdomen, the hairs on sides of first three segments are black, afterwards white, the segmentations very little lighter.

The segmentations were not distinctly lighter in the Buru-females. In the Buru-females the segmentations are only fringed by white hairs on the ventral surface.

Further RICARDO mentions that the sides of the grey tomentose median stripe reaching to the sixth segment are straight. This is the only point of importance wherein the descriptions differ but, without having compared my specimens with RICARDO's, it is in my opinion not permitted to bring the herein described flies to a separate species, as in the median stripes of some *Tabanids* variations also may be found and RICARDO herself remarks on the variations which occur in the specimens seen by her.

She says: — "The two females from N. Kashi 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 succurvus WALKER. ¹⁾

Only one female; collected on 20. 12. '21 from station 18;—Wakuma delta; varying vegetation; shore with Ipomoea, Spinifex and Pandanus. Little wood of Ficus, Cycas, rottan along the river banks. Marshes with Pandanus and Sonneratia. Stagnant pools and dead river arms with an luxuriant vegetation. Fields, covered with alang-alang.

Tabanus succurvus is a large, brown-black Tabanid with a slender, elongated, dark abdomen, which presents in the median line, at the posterior borders of the first five segments small rather indistinct halfmoon-shaped spots, covered with golden-brown hairs. The wings are tinged brown, a little clearer towards the tip. Forehead narrow. Callus long, narrow, prolonged with a filiform stripe. Antennae black-reddish-brown; third joint relatively broad with a strong, blunt tooth; the fingerlike process of the first ring long.

Palpi yellowish red-brown, stout, black-haired. Beard brown-black.

Thorax without stripes or spots.

The female has the following dimensions.

Table III.

Dimensions of the specimen.

Body length	21.5 m.m.
Width of thorax	6.5 "
Width of abdomen	7.- "
Wing expanse	40.5 "
Length of head	3.4 "
Length of thorax	8.- "
Length of abdomen.	12.5 "
Length of wing	17.- "
Breadth of wing.	5.5 "
Foreheadindex	± 13

Forehead barely a half narrower anteriorly than it is at vertex.

Callus deep black brown, long, narrow, rounded at the base. It has the shape of an elongated triangle; to the apex it is gradually attenuated into a sharp point. Here a very fine, hardly visible, impressed line connects the callus with its stripe. The callus-stripe itself is narrow lanceolate, broadest in the middle, and in the same manner attenuated to a sharp point. The callus-stripe ends at a third from vertex.

In the median line the callus presents a shallow groove which, however, divides the apical part of the callus only.

¹⁾ This species, which I first thought to be a new one, is *Tabanus succurvus* WALK.; the type in the British Museum was found at Macassar, Celebes. It is very rubbed and in bad condition, so the triangular spots on the abdomen have disappeared. There is also a male of the same species in the B. M. (London, 25 Jan. 1924, S. S. Jr.)

The forehead is coloured dark chocolate- to dull velvety brown; it is thickly beset with golden-brown, short hairs. The vertex-spot is very dark, shining in the middle, covered with black-brown and golden-brown hairs.

Postocular rim narrow, black-brown with black, erect hairs.

Eyes in death tinged golden-brown.

Subcallus reddish velvety brown. Cheeks darker, chocolate-brown, with dark brown hairs. Beard black-brown.

Antennae 3-jointed.

First joint black-brown with a somewhat reddish brown apex thickly covered with black hairs; distal lateral border bearing a row of long, black, erect hairs. Second joint short reddish brown, possessing the shape of a crescent moon. The apical rim shows a fringe of black hairs; distal lateral border accompanied by a row of black hairs; dorsal spur effiliated, sharp. Third joint presenting a very distinct stout tooth; on the apex of the tooth some black hairs. At base the first annulation of the third joint shows

a reddish brown hue, but soon it becomes darker and the rest is wholly black. The first ring is long, angular and possesses a long fingerlike process. The stylus is long. Short hairs are placed at the limits of the different rings and short hairs also ornate the tip of the long stylus.

Clypeus same colour as the triangular antennal plate or subcallus, only a little darker, bearing two lateral grooves. The sides are a little clearer than the median part, which is covered with brown-black hairs.

Palpi light yellow-reddish-brown, black-haired, the first joint stout, covered with long, erect, flossy hairs; second joint broad and stout, ending with a broad blunt point coloured a little lighter than the first joint and covered with short, black, adpressed hairs.

Proboscis black, sugarflaps large, showing some brown-yellow hairs. Stalk black, bearing long black, erect hairs.

Thorax black, without any longitudinal stripes, dull velvety brown, covered with golden-brown hairs, some black ones intermixed.

Scutellum same colour, but in the median part it is nearly wholly black-haired.

The triangular pteropleuron does not differ in colour with the rest of the scutum; at apex some short golden-brown hairs. For the rest this sclerite bears long black pubescence.

On the epimeron prothoracis golden-brown hairs. The episternum prothoracis tinged more blackish.

The hairtufts at base of wing, like those further behind, are golden-brown. The pubescence on meso- and metasternum is likewise golden-brown. On breast black hairs.

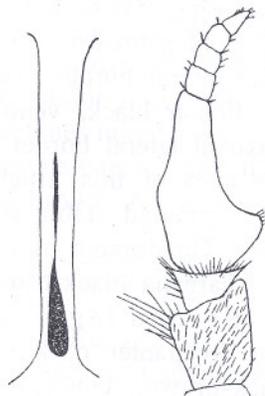


Fig. 3. *Tabanus succurvus* WALK. Forehead with callus; and antenna.

Wings wholly tinged brown, darker to the base, clearer to the apex. Stigma indistinct, golden-yellow-brown. Three clear areas are seen, one in the radial cell at base and two in the upper basal cell.

Halteres, stalk reddish brown, club yellow-brown.

Legs. First leg, Coxa bearing on the ventral half a lot of flossy, long, dull golden-brown hairs; dorsal half with black-brown haircovering; along the distal lateral border long, flossy yellow-brown hairs.

Femur black, ventral half nearly bare; the rest is black-haired, along the proximal lateral border short hairs; along the distal border long erect hairs. The apex of this article is yellow-brown. On the dorsum the black hairs are adpressed. Tibia slightly curved; at the base hazel-brown; at the apex black. On dorsum as on ventre black pubescence.

Tarsalia black-brown, black-haired.

Second leg. Coxa, thickly covered with black hairs.

Trochanter dark red, totally bare on ventral side. Femur, ventral half black-brown, covered with black hairs; on the proximal lateral border a golden-brown hairtuft. At the articulation with the tibia the femur exhibits a yellow-brown ring covered with black hairs at dorsal surface. Tibia dorsal surface about three-fifths hazel-brown; at the apex it is black, black-haired; ventrally the same. Here the tip shows a somewhat reddish brown hue.

Tarsalia reddish brown, black-haired.

Third leg. Coxa and trochanter deep black covered with black hairs.

Femur on dorsal and ventral surface black-haired.

Tibia on ventral half reddish bismarck-brown, clear in the median line; black hairs scanty; along the distal lateral border a thick row of black, erect hairs, decreasing in length to the apex. The hairs along the proximal lateral border are shorter, black-brown. On dorsal surface adpressed black hairs.

Tarsalia reddish brown, black-haired.

Abdomen, black-haired; the prime colour is dark black-reddish-brown. In the median line at the posterior borders of the first five segments, small halfmoon-shaped spots covered with golden-brown hairs are seen.

On the first segment, beneath the scutellum at each side, a dark yellow hairgroup is found. For the rest, the dorsum is black-haired.

On the ventral surface black haircovering, some yellowish hairs on the segmentations. The prime colour of the selerites, composing the ventral half of the abomen, is black-reddish-brown.

According to WALKER, *Tabanus succurvus* possesses piceous palpi, antennae black and the third antennal joint has a small horn. Wings of the same species are dark grey, brownish about the veins towards the base; veins black, piceous towards the base, fore branch of cubital vein simple nearly straight, halteres ferruginous with luteous knobs. Length of body 11 lines = ± 18 mm.

Tabanus obscuratus WALKER, which is common on Ceram, is much smaller, measures only 15—16 mm.; the forehead is about eight times as long as it is broad anteriorly. Besides it possesses no median abdominal spots.

Abdomen deep black with black pubescence, a few pale hairs scattered on segmentations, which on the underside are very narrowly pale. Wings dark rich-brown, pale at the extreme apex and on posterior border; at base there are also pale streaks in the discal cells and sometimes in the other cells. In the submarginals or in the posterior cells, there is also one between the first and second longitudinal vein; at base the veins brown.

***Tabanus brunneothorax* nov. spec.**

TOXOPEUS' collection includes eight females from Buru.

From station 5, Wakatin 540 M. above sea-level, wood on chalkhills with thick and high forest, one female.

From station 7, see above, one female, height above sea-level 1000-1250 M. 1921.

From station 8, Marshy forest, on the border of the lakeplain, height 800—900 M. above sea-level, along the way to Waieno, the soil is poor in chalk. Forest at the same time is poor in flowers, but broadleaved grasses and Araceae abound; March 1921, 2 females.

From station 9, Rana, marshes and marshy forest, 750—850 M. above sea-level, 3 females, caught on 16. 5. '21, 26. 6. '21 and 5. 7. '21 respectively.

From station 13, Fakal, 1100—1475 M.; Febr. '21, one female.

The species is therefore captured at an height which lies between 540 M and about 1400 M above sea-level.

It might be called a hill, or perhaps rather a mountain species as it is captured in the mountainous region of the island.

Tabanus brunneothorax is a medium sized brown species with brown thorax and reddish brown abdomen, which shows in the median line a rather indistinct longitudinal stripe composed of triangular yellow-haired spots. The median stripe ends on the sixth abdominal segment. Abdomen darker to the apex, nearly blackish brown.

Wings yellow-brown along foreborder, duskiest to the apex; yellow-brown shadows accompany the different veins. Some specimens with appendix.

Forehead nearly the same width throughout, only a little bit narrower anteriorly.

Callus long, narrow, broader at base, to the apex gradually pointed to the long linear callus-stripe.

Antennae short, yellow-brown to ferruginous, stylus black, third joint with indistinct, small tooth.

Palpi reddish yellow-brown, covered with black hairs.

Beard light yellowish white.

TABLE IV.

Dimensions of *Tabanus brunneothorax*.

Body length	13.2	—	16.-	m.m.
Width of thorax	3.8	—	5.-	"
Width of abdomen	4.8	—	5.4	"
Wing enpanse	27.4	—	32.4	"
Length of head.	2.-	—	3.2	"
Length of thorax	5.-	—	8.5	"
Length of abdomen	6.2	—	9.-	"
Length of wing	11.8	—	14.2	"
Breadth of wing	4.-	—	5.-	"
Forehead index	6.2	—	8.6	"



Fig. 4. *Tabanus brunneothorax* n. sp. Forehead with callus; and antenna.

Forehead in some specimens nearly the same width throughout; in others from 1/5 to 1/7 narrower anteriorly.

Callus in the type black-brown, narrow, egg-shaped, gradually attenuated to the at first broad, but afterwards pointed, lineal callus-stripe. Callus not reaching to the eyes. Callus-stripe ending at about 1/4 from vertex.

Colour of forehead roe-brown, vertex-spot present, diffuse blackish, hairs on forehead brown and black-brown.

Subcallus golden-brown with a shallow median groove; at the limit between forehead and subcallus a transverse black stripe.

Antennae 3-jointed.

First joint yellow-brown, thickly covered with black hairs; distal lateral border bearing erect, long yellow-brown hairs. Second joint short, in the shape of a crescent moon, ferrugineous; along the apical border it is fringed with black hairs.

Third joint curved, reddish ferrugineous at base becoming gradually darker above the small indistinct tooth; stylus black. On tooth only a pair of black hairs; some black hairs to the base of the third joint and hairs of the same colour at the borders of the stylus-rings.

The apex of the fifth ring is adorned with two subequal black hairs.

Cheeks reddish yellow-brown along the eye-borders; more ventrally bluish grey. On the first areal pubescence blackish brown; the ventral part bears greyish white hairs. Beard same colour, a little yellowish.

Clypeus in the median part grey-white; at lateral borders yellowish brown; at the base just beneath the antennae pubescence black-brown; at the apex near the mouth the hairs are golden-yellow.

Palpi 2-jointed, reddish yellow-brown.

First joint dark velvety brown, covered with brown hairs.

On the second joint many adpressed black hairs, intermixed with some yellow ones. The second joint ends with a long point.

Proboscis black, about $\frac{1}{3}$ longer than palpi; on the sugarflaps short yellow-brown hairs; on stalk long brown hairs.

Postocular rim narrow, fringed by short brown hairs.

The following variations are observed:—In one of the specimens the callus is clear nutshell-brown colour; another callus exhibits a reddish hue. The callus-colour ranges from nutshell-brown and light reddish brown to dark reddish brown and black-brown.

Thorax wholly dark brown, covered with a mixture of black-brown and yellow-brown adpressed hairs.

At base the thorax shows a somewhat lighter nuance.

Scutellum same colour as thorax; lateral borders lighter ferrugineous.

Pteropleuron rusty brown, covered with black hairs, except on the apical border, where reddish rusty brown hairs abound. Epimeron prothoracis dull brown, bearing grey-white hairs, episternum prothoracis dull golden-brown; tomentose hairs golden-brown; mesopleuron, with first stigma surrounded by a brighter ring, reddish brown.

Mesosternum golden-brown; the big mesosternum-lobus bears long black-brown hairs.

Along the other sternites and tergites, at base of wings as well as on the hind part of the lateral borders of the scutum, beautiful dark brown and yellow-brown hairtufts are found.

Halteres reddish brown with dark brown stalk.

Wings. Stigma blackish sooty brown; foreborder totally yellow-brown. Upper and under basiscell tinged yellow-brown except two clear spots, one at the base of the first, and the second at the limit between the first and second cell, partly overlapping on the second.

To the tip of the wings runs a sooty stripe. Brown shadows accompany the veins. For the rest the wings are clear. In six of the eight females the appendix is absent. The seventh does show an appendix to the upper branch of the cubital fork, whereas the eighth female has an appendix on the right wing and a small rudimentary knob at the same place on the left wing.

Legs. First leg.—Coxa bluish grey tomentose. On the ventral surface erect, silvery grey hairs. Lateral borders covered with brownish hairs.

Femur, coloured deep reddish brown. On dorsum scattered black hairs. Along the proximal lateral border short, erect, black hairs; at the distal lateral border dirty white long hairs with some long black ones intermixed in a thick row. On ventral surface in the median line brown-yellow hairs.

Tibia, the apex is intense black. As for the rest, that is about three-fourths of the article, it is brown-yellow, at base a similar black ring covered with black hairs.

On the brownish yellow part scattered black hairs are seen between the yellow-brown ones. The hairs on the apical band are likewise black, but very tightly placed.

Ventral half nearly totally bare, except some black hairs at the apex. For the rest yellow-brown, adpressed hairs are more numerous.

Tarsalia reddish brown, thickly covered with black hairs. Pulvilli reddish brown.

Second leg. Coxa bluish grey with brownish grey apex, hairs brownish yellow-white. Trochanter black-brown, hairs on ventral surface black; on dorsum brownish yellow-white.

Femur yellow-brown, white-haired. Along the distal lateral border more to the apex one sees a lot of long hairs. On the apex and the dorsal surface in the median line a few black hairs are scattered between the white ones. Just at the apex one encounters a row of fine bristly black hairs. On ventral surface similar pubescence.

Tibia same colour as femur, a little reddish to the apex; on dorsum black hairs are scattered irregularly over the surface. On ventral half hairs ochraceous yellow, adpressed, 2 unequal spurs.

Tarsalia, the first one half reddish brown, otherwise wholly black, thickly covered with black hairs.

Another female shows on the femur of the second leg on dorsal half no other black hairs than the few at the apex. As for the rest the hair covering is coloured brown-yellow-white.

Third leg. Coxa greyish blue tomentose, covered with brown-yellow hairs. Trochanter yellow-brown, black bordered; at the apex black hairs; the rest is covered with brown-yellow-white hairs.

Femur, violet reddish brown; on dorsum yellow-white hairs; on proximal lateral border hairs mainly black, a few yellow-white ones are intermixed; along the distal lateral border a row of short black hairs. Ventral half coloured brown-yellow.

Tibia reddish caramel-brown, at distal lateral border a row of long erect black hairs; dorsal surface covered with black hairs; along the proximal lateral border short yellow-brown hairs. Ventral half covered with yellow-brown hairs.

Tarsalia reddish brown, with thick black pubescence.

In another specimen on femur some black hairs are scattered on the dorsal surface between the yellow-white ones.

Abdomen reddish brown, darker, nearly black-brown, at the apex.

In the median line one detects an indistinct stripe, composed of yellow-haired triangles, running from segment one to six. The lateral borders of the tergites are coloured yellow-brown, covered with yellow-white pubescence.

Segmentations fringed by short yellow hairs. The rest is black-haired.

On ventral surface the segments are coloured dark black-brown, lighter at the segmentations, where yellow-brown hairs abound. Same hairs cover the lateral borders of the abdominal sternites.

The median band is black-haired.

The seventh segment bears long black erect hairs on its ventral surface.

In one of the other specimens the median dorsal stripe is covered with white hairs. The segmentations are lighter and show yellow-white hairs, whereas the outer border of the seventh segment is fringed with yellow-white hairs also.

In some of the specimens the median stripe is continuous, but the haircovering on the composing triangles is seldom equally thick everywhere, which means that on the posterior border black hairs are intermixed, so that it sometimes appears that the median stripe is not continuous.

Viewed in certain lights one can see it as a whole.

Our specimens may be compared with the following species:—

From *Tabanus cohaerens* WALKER it differs in several respects. The last-named species has a totally different callus; a forehead that is narrower anteriorly; a distinct tooth on the first ring of the third antennal joint, whereas in specimens in good preservation the median abdominal stripe is very distinct, whitish with straight sides.

***Chrysops atrivittata* nov. spec.**

A series of 9 females from Buru.

5 females from station 9, Rana, collected respectively on 11. 5. '21; 4. 6. '21; 13. 6. '21; 3. 7. '21., 750—850 M above sea-level.

4 females from station 12, the Kunturun marsh 1075 M above sea-level, collected on 6. 2. '22.

Chrysops atrivittata is a beautiful yellowish species, whose abdomen exhibits a peculiar striation. 4 stripes are present, on the second and third segment, and the stripes are united by means of transversing connective black bands, so that little fenestrae with yellow centres are brought about.

Wings with crossband and apical spot. No clear area in the discal cell. Fifth posterior cell with a very distinct, sharp circumscribed clear area.

Anal cell open. Antennae long 3,5—4 mm.

Body length 9,2—11 mm.

The variation of the body dimensions is shown in Table V.

TABLE V.

The dimensions of *Chrysops atrivittata*.

Body length varies between . . .	9.2 and 11.- mm.
Width of thorax	2.5 " 3.- "
Width of abdomen	2.6 " 3.5 "

Wing expanse	20.7	„	23.4 mm.
Length of head	1.3	„	1.8 „
Length of thorax	3.2	„	4.- „
Length of abdomen	5.2	„	6.8 „
Length of wing	9.-	„	10.2 „
Breadth of wing	3.-	„	4.- „
Length of antennae	3.5	„	4.- „

Forehead broad, as in all *Chrysops* species, nearly as broad as long, only a little narrower behind, besides being nearly the same width throughout; tomentum yellow-grey, sooty in some places. Between callus and ocellar plate, there exists a dark olive-yellow-brown coloured excavation, surrounded by a whitish grey margin.

Callus dark black-brown, shining, convex to the posterior, pointed between the antennae, bearing a shallow flat groove, which divides the halfmoon-shaped callus into two unequal halves.

Ocellar plate triangular with rounded sides, bearing 3 punctiform ocelli and a relatively thick covering of long yellow-brown hairs; similar hairs in the space between the eyes and the ocellar plate; in the excavation close behind the callus the hairs are white.

The callus does not reach the eyes.

Eyes in death unicolorous mauve, when moistened 3 indistinct dark patches appear.

Postocular rim very narrow dark brown, beset with very short fine brown hairs.

In some of the specimens the callus showed a somewhat different colour. Variations between black-brown and red-brown were met with.

In most of the other specimens instead of one groove two grooves divided the callus in three parts, the middle part a little prominent and convex; the two lateral parts flattened.

In one of the specimens the excavation in the forehead exhibits a yellow centre and sooty grey borders; in another it was dark olive-brown, whereas a third specimen possessed a yellow velvety brown excavation. Once the colour of the excavation was reddish brown.

Antennae 3-jointed. The 1st and 2d joint equally long, the 3d joint longer than each of the preceding joints; whole length 4 mm.

First joint, bright yellow-brown, showing a darker bismarck-brown hue to the apex, ringed indistinctly; number of rings 6 or 7. At base the rings are barely visible but at the apex they become clear and distinct.

Pubescence increasing in density and length from the base of the joint to the tip. The hairs are placed more or less in festoons, corresponding with the described rings; at base they are short and adpressed; at the tip, and more especially on the 3 apical rings, the hairs are erect.

Most hairs are black-brown; at the apex also some white ones are encountered.

The first joint is curved a little, its apex is dilated. The apex is directed outwards.

At the distal lateral border a row of black hairs may be found.

At the ventral half the haircovering is less dense, but arranged in the same way as above.

Second joint, dark olive-brown with a blackish hue, nearly as long as the first joint, showing 5 rings; hairs placed in festoons, the apical ones longer and more erect than the basal ones which are adpressed. On the distal lateral border the pubescence is longer than on the proximal lateral border of the joint; colour dark blackish; some white hairs are intermixed. The surface of the joint is corrugated; it is a little broader than the first.

Third joint, shorter than the first and second one together, but longer than each of them, and possesses 5 distinct rings; colour velvety brown; at the apex nearly black-brown.

The basal ring shows some yellow traces and is longer than the following ones together.

The fifth ring is nearly as long as the third and fourth ring together. The third joint is broader than the preceding ones; its basal ring is a little swollen, whereas the fifth ring ends with a blunt point.

Each antenna is fixed in a hollow excavation of the head, which is surrounded by a dull brown wall whose outer rim is tinged by a yellow hue.

At the apical rings of the first antennal joint in some specimens short yellow hairs are seen.

Instead of 5, the second antennal joint may sometimes show 6 rings. In one of the specimens the third antennal joint was longer than the first and second together.

Palpi 2-jointed.

The first joint is very short, triangular, cut off slanting (oblique) and covered with long black hairs. The colour of the joint is brown-black.

The second joint, at least four times as long as the first, articulates with the first sideways, colour ochraceous yellow-brown, ending with a blunt point; pubescence mainly yellow-brown, some black hairs intermixed; hairs decreasing in length towards the apex. The joint is curved dorsally; its length amounts to about two-thirds to three-fourths the length of the proboscis.

Proboscis with long sugarflaps, at dorsum reddish ochre-brown, ventral half more black-brown, sugarflaps covered ventrally with long and short dark brown hairs.

Stalk nearly totally bare; near the apex its ventral surface bears some short, dark black-brown hairs.

Cheeks and face yellowish pollinose, except on the two shining dark olive-brown streaks which border the clypeus laterally. There is a second pair of shining bright olive-brown spots, shadowed by a rusty hue and bordered at their dorsal sides by a black stripe more in the neighbourhood of the jowls.

Clypeus bright ochraceous in the median line; at sides shining bare; here the colour is olive-brown. The median line is covered with relatively long yellow hairs.

In another specimen the streak just beneath the eyes is of a greyish white colour. A reddish rusty brown band surrounded by a sooty stripe fits close to it.

The clypeus shows a shining brown lining; at the mouth it is yellow pollinose, which part ends just before the sooty stripe.

Beard bright brownish yellow-white. The rest of the cheeks is nearly devoid of long hairs.

The thorax is divided into three fields by a median longitudinal dull rusty brown stripe. The median breadth is attenuated a little to the base, where one finds, just as at the apex, some darker lines. The median stripe is shadowed a little at each side.

The two lateral fields are reddish brown to black with a violet hue; pubescence short and sparse, varying from bright to dark brown-yellow. At the hind border of the scutum, where a groove divides scutellum and scutum, a broad streak of magnificent golden-yellow hairs encloses the scutum from behind and ends at each side in a triangular tuft of golden-yellow hairs.

On pteropleuron golden hairs abound.

On the pronotum, which shows a dark olive-brown colour, but few short hairs are seen.

The epimeron prothoracis, triangular to oval-round in shape, bears a short haircovering and at the apex a tuft of beautiful golden-yellow hairs. The underlayer of this sclerite is dull olive-brown.

The episternum prothoracis, quite next to this skeletonpart, possesses the same prime colour; it bears only a few adpressed yellow-brown hairs.

The mesopleuron with its first stigma shows no further particularities.

The mesosternum is black-brown, covered with hairs of the same colour.

The episterna meso- and metathoracis bear tufts of golden-yellow hairs.

Breast dark brown to black; nearly bare.

The triangular scutellum is dark reddish brown with a median transverse very narrow black spot, surrounded at all edges by brown to bright yellow-brown short pubescence.

Halteres with a dark black-brown club and a somewhat lighter dull bismarck-brown stalk.

Wings with a dark transverse band and an apical spot, stigma dark reddish brown.

A yellow-brown stripe runs along the foreborder off the wing and covers the whole costal cell.

The transverse band is cut off straight at its apical border; whereas the basal border is more or less concave with an edge just before the place where the vena posticalis spreads. The radial cell is wholly dark brown.

The apical spot becomes broader at the tip of the wing and fades away on the apical fork-cell. Discal cell without clear area.

The fifth posterior cell shows a distinct clear area whereas its sides are wholly brown. Anal cell of wing open.

Along the vena posticalis a light yellow-brown shade is found. The same thing fits for the basal part of the vena radialis, whereas the upper basal cell presents also a bright yellow-brown streak. A brown spot of the same colour as the transverse band runs over the bases of the upper and lower basis cell.

For the rest the wing is clear.

In two of the 9 specimens, the fourth posterior cell is not wholly brown as in the type, but presents a small clear area to the tip of the cell. In another specimen a small white isle is found in the apical spot.

Legs. First leg. Coxa, at the articulation with the body shining black, the median part swollen.

At the proximal lateral border the colour is bright oak-brown, with a reddish hue; at the ventral side the hairs are brown-black decreasing in length to the apex. Laterally the hairs show the same colour; some white hairs are intermixed. The underlayer is whitish tomentose.

On dorsal half hairs dark black; proximal lateral yellow-brown, decreasing in length to the base.

Femur darker than trochanter, rusty brown, bearing on dorsum a thick dark black haircovering. At the lateral distal border one sees a row of erect, long, black hairs, decreasing in length to the base. At the proximal lateral side the hairs are short, likewise black. Ventrally on the distal lateral border near the base a spot is found, covered by long, erect, yellow-brown hairs. The ventral surface is bare. The whole article is nearly equally broad. Its tip is bright yellow.

Tibia oak-brown, thickly covered with short, adpressed hairs. The article is dilated a little above the middle and mainly at the distal lateral border, dorsally it is bended a little. The ventral half bears short black adpressed hairs.

Tarsalia 1—4 dark brown, same colour as tibia, tarsale 5 black; on its hind border some erect, relatively long, dirty white hairs are seen. For the rest the article is covered with black hairs.

Second leg, coxa and trochanter both short, dark brown, bearing only a few hairs.

Femur as in the first leg, bright oak-brown with yellow tip. On the ventral half in the median line hairs long, adpressed, lateral borders beset with black hairs increasing a little in length to the apex. On dorsal half black adpressed hairs.

Tibia black-red-brown, dilated a little, thickly covered with black hairs; on the ventral half in the same way bearing a black haircovering, but at base and at apex some white hairs are intermixed. Further two unequal spurs. First tarsale very long, nearly as nearly as the other ones together. At apex on the ventral surface a festoon of piceous hairs; for the rest short black hairs are scattered over the surface of the article. At base, for nearly one third of

the whole length short, adpressed, yellow hairs are seen dorsally; in the median line scattered, black hairs. To the apex along the foreborder of the article, also some short black hairs. At sides the hairs are yellow. Along the proximal lateral border some thick black hairs are seen.

Tarsale 2—4 yellow-haired with an apical ring of black hairs; on the proximal lateral border some black hairs. At the ventral half, on the tip, also a thick festoon of black hairs. Tarsale 5 black, at apex some 5 long white hairs; 3 pulvilli. Hairs black, except a few white ones on the dorsal side. On the ventral half prime colour yellow with a festoon of black hairs at apex.

Third leg. Coxa swollen; yellow-brown-haired also some black hairs are intermixed. Trochanter short, narrow.

Femur dark yellow-brown thickly covered with black hairs. For the main part these hairs are relatively short and adpressed, but at the apex they are long and erect; some longer yellow-white hairs are scattered all over the surface.

Tibia shining dark brown, swollen at base. Along the distal and proximal lateral borders a row of black hairs; at apex on the ventral half two thick spurs.

Tarsale 1 attenuated, long, brown-yellow, longer than the following ones together; on dorsal surface rows of black hairs, along the lateral borders also some yellow-white hairs.

On the ventral half the black hairs are confined mainly to the apical ring, and in addition one sees some other ones scattered over the surface. As for the rest, the pubescence is yellow-white.

Tarsale 2—4 yellow-brown black-haired, on ventral surface black apexring, otherwise yellow-haired. Tarsale 5 black on dorsal half; ventral part yellow-brown with black-haired apexring.

In another specimen the hairs at the base on the dorsal half of the first trochanter are yellow-brown.

Abdomen. Segment 1, hazel-brown with two black spots placed laterally from the median line.

Segment 2, foreborder yellow, a median longitudinal stripe is equally yellow. On each side of the median line a black fenestra with yellow centre.

Segment 3, four longitudinal black stripes connected two by two at the fore border of the segment by equally black connectives. The enclosed parts are yellow-brown; middle stripes as well as side stripes are interrupted at the segmentations; middle stripes broader than the lateral ones.

Segment 4, four longitudinal stripes black; intermediate stripes lighter yellow-brown; black stripes fainter at the segmentation.

Segment 5, the colour of the intermediate stripes and the black ones differs less than in the foregoing segment, both are rather dark black-brown.

On the 6th segment the difference between the described striations becomes yet more indistinct. The stripes approach each other. The whole segment makes a dark black-brown impression.

On the 7th segment the stripes end with a point.

The pubescence is black on the spots of the first segment; for the rest it is brown-yellow. On segment 2 pubescence yellow-white on yellow parts; for the rest black. On the third segment some white-yellow hairs, but the greater number are black. On the following segments all hairs are black, except on the segmentations, where some yellow hairs are found.

On ventral half, on segment 1 and 2, pubescence yellow-white; on segment 3—7 prime colour reddish brown, covered with black hairs; on segment 7 also some yellow hairs.

Along the lateral borders of the abdomen hairs dirty yellow-white.

There is a black stripe at the lateral borders which connects the fenestrae on segment 2 and the black spots on the first segment. In some specimens the yellow centre of the fenestrae is very small.

Chrysops atrivittata shows some resemblance with *Chrysops mlokosiewiczzi* BIGOT, as this species possesses in the same way an abdomen with 4 longitudinal stripes.

These stripes which, "according to SHIRAKI," are more or less interrupted at the segmentations, show the following particularities:— The two middle stripes broader than the lateral ones, usually extending from the anterior margin of the first abdominal segment to the posterior margin of the sixth segment. SHIRAKI and RICARDO mention the fenestrate markings on the second segment, whereas the markings on the first segment differ widely from what is seen in *Chrysops atrivittata*. Besides, in *Chrysops mlokosiewiczzi* the centre of the discal cell is hyaline. The thorax is yellowish cinereous with three very distinct, narrow blackish brown or black stripes, of which the middle one is about half broader than the lateral ones and is gradually narrowed towards the front and pointed.

Antennae nearly twice as long as the head; the third joint is much longer than the two basal joints together. The basal annulation is shorter than the rest of the third antennal joint.

The back of the head bears a pale greyish yellow tomentum; pubescence same colour.

Chrysops designata RIC. shows further some resemblance with *Chrysops atrivittata* but can be discerned at once from the last-named species by the black markings on the abdomen. It presents fenestrate markings on the second and third abdominal segments but, as for the rest, the abdomen of *Chrysops designata* makes a totally different appearance. Besides, the discal cell of the wing possesses, according to RICARDO'S figure (Plate), a clear area, whereas the colouration of the femora and the apical joints of tarsi is blackish.

So it is quite another species, for which I propose the name *Chrysops atrivittata*.

Chrysops signifer ♂ WALKER.

WALKER, Proc. Linn. Soc. London V p. 276, (1861).

RICARDO, Ann. Mag. Nat. Hist. (7) IX p. 376 (1902).

OSTEN SACKEN, Berlin Ent. Zeit., XXVI, p. 97 (1882).

The type, a male, is in Brit. Mus. Coll. from Batchian (Batjan) S. from Halmaheira. OSTEN SACKEN records males and females from the Philippines; they vary very much in size.

TOXOPEUS' collection contains 1 male from:—

Station 1, from the neighbourhood of Leksula, the coastland, with a very variable vegetation; each group with its own special fauna. The male was collected on 24. 8. '21.

There exist many remarkable points of resemblance between the descriptions of *Chrysops signifer* ♂ WALKER and of *Chrysops cincta* ♀ BIGOT, so that it is doubtful in my opinion, whether these described Chrysopsids present really two distinct species or are only both sexes of one and the same species.

At the moment I have not an opportunity to compare TOXOPEUS' specimen with females of *Chrysops cincta* BIGOT. After having given a description of this specimen, I will, however, discuss all arguments which speak in favour of a synonymy between *Chrysops signifer* ♂ WALKER and *Chrysops cincta* ♀ BIGOT.

The studied male of *Chrysops signifer* shows the following particularities:— beautiful yellow-brown markings on the eyes, abdomen yellow to reddish brown, possessing a transverse black-brown band on the first second and third segment.

Wings with crossband and apical spot. No clear area in the discal cell. Fifth posterior cell with a somewhat clearer, but not sharply circumscribed, area.

Anal cell closed with a short petiole.

Antennae long 4 mm. Body length 10.5 mm.

The only specimen gave the following data:—

TABLE VI.

The dimensions of *Chrysops signifer* WALK.

Body length	10.5	mm.
Width of thorax	3.6	”
Width of abdomen	3.2	”
Wing expanse	20.-	”
Length of head	1.8	”
Length of thorax	3.8	”
Length of abdomen	6.-	”
Length of wing	8.2	”
Width of wing	3.5	”
Length of antennae	4.-	”

The eyes touch in the median line. On the apical part of the eyes the facets are big; at base near the antennae they are small. There is a yellow-brown spot at each side of the eye borders in the median part of the eyesurface just above the antennae. A second, black-bordered yellow-brown marking runs from the vertex to the limit, where big and small facets meet.

A third coffee-brown stripe follows the hind border of the eyes.

The black area resembles a compass, it is a little notched.

Ocellar plate present covered with short, erect hairs bearing three ocelli.

On the place where the female possesses its callus the male exhibits a dark black triangular incrustation of the skeleton.

Antennae 3-jointed, implanted in a piceous excavation, surrounded by a convex rim.

First joint dorsally coffee-brown at its base, at the apex it is blackish, covered with black hairs showing the indications of 8 indistinct rings.

Second joint black; 8 indistinct rings are seen, the last three broad, swollen at the borders, the first five rings narrow and indistinct. The second joint equals the first in length.

Third joint bare, black; incrustated at its base, it is divided in 5 distinct rings, the first one being as long as the following ones together. The third joint as a whole is a little longer than the second joint. The first ring of the third joint at its turn is divided into four indistinct rings by shallow grooves. The fifth ring of the third joint ends in a blunt point.

The clypeus is shining dark black with a narrow yellow-grey tomentose stripe in the median line just beneath the antennae.

The small triangular space between the implantation of the antennae and the clypeus, as also the apical brim of the antennal wall, shows likewise a yellow tomentum.

The cheeks are golden-yellow coloured; along the eyes at the extreme apex a black rim connects the eyes with the clypeus. Hairs on cheeks golden-yellow. Beard same colour.

Proboscis piceous; sugarflaps covered with short, brown-black hairs.

Palpi very short, black.

Thorax. Scutum dark black. As a big part of the scutum is covered with a thin layer of mould, the haircolour and other peculiarities cannot be discerned distinctly. In the median line short golden hairs are seen. A broad band at the hind border of the scutum is covered with a thick golden-yellow haircovering.

Along the lateral border of the thorax a golden-yellow curved stripe is seen, composed of golden-yellow hairtufts on the pteropleuron, on the epimeron prothoracis, on meso- and metasternum; the underlayer is black.

Scutellum piceous.

Wings with crossband and apical spot. At the base of wings, posterior to the basal wingcells, the wing is tinged orange-yellow-brown. Just before it, a brown streak runs obliquely over the base of the anal cell, the upper and under basiscell.

Wing dark brown along the foreborder, including the costal, subcostal and radial cell. The stigma is chocolate-brown. Nearly the whole cubital cell is brown, except a little clear piece situated in the edge between the trunk and the upper branch of the cubital vein. The tip of the wing is similarly brown for a large part. The brown colour fades away over the ventral part of the apical forkcell.

The apical border of the crossband is shallow concave with a little edge. Discal cell without a clear area. In the fifth posterior cell there exists a small indistinct, not sharply circumscribed area. Along the upper and lower branch of the postical vein the brown colour is very deep.

The anal cell is closed with a short petiole.

Halteres stalk black, with a brown black knob.

Legs. First leg. Coxa piceous, broad, on dorsal half with a row of long, erect, black hairs, decreasing in length from the base of the article to the apex. Along the lateral borders are long, erect hairs. Femur deep chocolate-brown, black-haired, the hairs along the proximal lateral border short, adpressed; the distal lateral hairs long and erect.

Tibia swollen as a biceps; at base chocolate-brown; at the apex black; black-haired.

Tarsalia blackish brown, black-haired. The 5th tarsale is black.

Second leg. Femur and tibia similar to the same articles of the first leg; the femur is only of a little brighter brown colour and shows a dark apex. The tibia presents two unequal spurs. On the femur rows of erect black hairs are found.

Tarsale 1 long, possessing at its proximal lateral border a row of black hairs. The following tarsalia exhibit a brownish hue. Their main colour is pale white, whilst their apices are bordered by rows of black hairs.

On the ventral half of the tarsalia the black hairs are placed close.

Third leg. Femur and tibia black, covered with long, erect, black hairs. Tarsale 1 dirty yellow-brown with a black haircovering, which becomes dense along the lateral borders. The other tarsalia conform to the first one.

Abdomen. The first abdominal segment shows at its posterior border a narrow, black, transverse band-shaped marking, which touches the foreborder of the second segment in the median line, whereas its two lateral ends are curved inwardly to about the half of the length of the first segment.

For the rest the first segment is yellow, shadowed by a brownish hue, caused by the brownish yellow hairs, which cover the pure yellow underlayer.

The second segment possesses at apex a crescenti-form black-brown band; for the rest it is pellucid yellow.

The third segment presents a broad black-brown band, adopting the shape of an inversed hoof. The ends of the hoof touch the crescenti-form marking on the second segment. Both markings include, therefore, a curved, triangular, yellow spot with very sharp basis edges.

On the markings the hairs are black-brown; the yellow spot bears yellow-white hairs.

Segments 4—7 are reddish brown, terracotta-coloured.

On segment 4 at apex a blackish indistinct spot is seen.

The hairs on the last segments are brown and yellow intermixed. The tip of the abdomen is a little darker.

On the ventral half, the fourth segment exhibits a brown-red, nearly black, band. It is prolonged by a blackish stripe which sets forth along the third segment, thus connecting the markings. On the dorsal and the ventral half there remains however a narrow yellow spot between the dorsal and ventral markings of the third and fourth segment. The seventh segment is wholly black on its ventral half.

Segment 5 and 6 are oakleaf-coloured, reddish brown on the ventral side; their hairs show the same colour.

On the first three segments of the ventral half yellow hairs abound.

WALKER'S type of *Chrysops signifer* WALKER was found in Batchian (Batjan), South of Halmaheira in the Moluccas. OSTEN SACKEN mentions the same insect from the Philippines. As one may see from the following quotations, my description agrees nearly fully with WALKER'S original description except that the *Chrysops signifer* from TOXOPEUS' collection is a little longer than WALKER'S type.

"*Chrysops signifer* n. s. Mas. Niger, Capite atro aureo-tomentoso, antennis elongatis, basi fulvis, thorace fascis duabus, aureo pilosis, abdomine flavo fasciis tribus apiceque nigris, femoribus obscure rufis, tibiis dilatatis, tarsis posterioribus fulvis, alis cinereis costa fasciisque duabus nigricantibus."

"Male black. Head deep black and shining in front, with a patch of golden tomentum on each side of the face, and with a smaller one at the base of the antennae. Antennae filiform, tawny towards the base, much longer than the breadth of the head. Thorax with two bands of golden hairs. Abdomen yellow, blackish at the tip, with a black band at the base, and in the middle with two black bands, which are connected on each side and enclose a triangular space between them. Femora mostly dark red, tibiae dilated posterior, tarsi tawny. Wings cinereous blackish along the costa, and with two blackish bands, the second very much broader than the first, which is near the base. Length of the body 4 lines; of the wings 7 lines."

WALKER does not mention the yellow-brown markings on the eyes but perhaps they had faded away and become invisible.

RICARDO does not mention the black transversal band on the first abdominal segment. With respect to the other black markings she says that the second band on the third segment is concave in the middle; neither of the bands reaches the sides, but the third and fourth segments are bordered with a narrow black stripe.

The latest quotations give a completion to WALKER'S descriptions of the same abdominal markings.

Legs in the type yellowish brown, the hind pair darker, tibiae slightly incrassate. Length 9.5 mm.

Locality	Chrysops clavivrus THOMPSON Malacca	Chrysops cincta BIGOT BIGOT's description Philippines	Chrysops cincta BIGOT RICARDO's description Philippines	Chrysops signifer WALKER WALKER'S description Batchian (Batjan) Philippines	Chrysops signifer WALKER S. S. description Buru
Body length	10 m. m.	—	—	9.5 m. m.	10.5 m. m.
antennae	as long as head and thorax	idem	idem	—	4 mm. (shorter than thorax + abdomen)
colour antennae	black	black	black	—	black
1st joint antenna	yellow	pale yellow	idem	tawny towards the base	yellowish coffee-brown towards the base
2d joint	same length	same length	same length	—	same length
3d joint	1 1/2 X longer than 2d joint, 5-ringed	—	—	—	little longer than second joint, 5-ringed
palpi	yellowish awl-shaped	whitish yellow	idem	—	black
callus	large shining	oval, shining black	"	—	dark black patch
forehead	golden-haired	—	—	absent	absent
face	golden-haired	yellowish tomentum	idem	golden tomentum	yellow-grey and yellow tomentum
facial tubercle	subprotuberant hear-shaped shining	—	—	—	shining black
cheeks	golden-haired	—	—	—	golden-haired
proboscis	brown-black	—	—	—	piceous with brown-black hairs
thorax	black subglabrous	black	idem	black	black
ornamentations	golden-haired at sides and beneath wings; at the base above scutellum golden-haired	yellowish down at sides	idem	two bands of golden hairs	short golden hairs in the median line, broad band of golden hair before scutellum, two bands of golden hair at sides
scutellum	black	black	black	—	piceous
halteres	dull yellow, club black	club brown	idem	—	black, club brown-black
wings	brown foreborder, crossband and apical spot, foreborder widely brown, crossband narrower before the base, elsewhere wide	blackish anteriorly from the base to the apex included with a large median crossband of the same colour	idem dark along foreborder to the apex with the usual transverse band which extends to the posterior border	blackish along costa with two blackish bands, the 2nd very much broader than the first, which is near the base	dark brown along foreborder and to the apex, with the usual transverse band. The apical spot is broad and makes a sharp edge with the crossband transverse band, extends to the posterior border

	<i>Chrysops clavivrus</i> THOMPSON	<i>Chrysops cincta</i> BIGOT	<i>Chrysops cincta</i> BIGOT	<i>Chrysops signifer</i> WALKER	<i>Chrysops signifer</i> WALKER
coxae	anterior coxae dull testaceous brown at apex, posterior ones black	black	idem		piceous
1st and 2nd pair	brown, the anterior pair dull testaceous	reddish	idem	mostly dark red	chocolate-brown black-haired, second pair darker at apex
3rd pair	brown	black exteriorly	idem	mostly dark red	black
4th pair	anterior tibiae stout, club-shaped, brown; the intermediate ones less stout, dull testaceous, brown in the middle	dilated reddish blackish exteriorly	idem	dilated	anterior two pairs dilated, chocolate-brown, black at the apex, black-haired, third pair black; intermediate pair less stout
5th pair	yellow with the apex brown	reddish with the apex blackish	idem	posterior tarsi tawny	anterior tarsi black-brown, median pair faded white with black apex; posterior tarsi yellow-brown, black-haired
men	with fine yellow pubescence, subopaque	black		yellow, blackish at tip	with few yellow pubescence and black markings, subopaque
1st segment	pellucid yellow with a narrow band before the apex	narrowly bordered with yellowish white	pale yellow and a narrow black posterior border	a black band at the base of abdomen	a narrow somewhat curved black band at posterior border, for the rest yellow
2nd segment	yellow denuded posteriorly black	large yellow band at base.	anteriorly pale, yellow, black band posteriorly nearly equal in width to the yellow colour	---	a narrow crescentiform black-brown band at apex; for the rest pellucid yellow, black part much narrower than the yellow one
3rd segment	black part wider, narrow yellow basal part	---	almost wholly black, a narrow yellow border anteriorly, two black bands join at the sides, second band entirely straight on posterior border whereas in <i>C. signifer</i> it is deeply indented in the centre	black band concave in the middle	broad black-brown hoof-shaped marking which touches with ends to markings of second segment, triangular yellow spot is included. Markings of 2nd and 3rd segment do not touch to lateral border; posterior border straight
4th segment	---	---	the two black bands join at the sides	third and fourth segments are bordered with a narrow black stripe	along 4th and 3rd segment longitudinal black stripe, connecting markings on dorsal and ventral half
5th segment	obsolete, discal brown spot, brown	---	reddish-yellow obscure black square spots in centre of 4th and 5th segment	---	a blackish indistinct square spot at apex, reddish brown
6th segment	brown at the base yellow	---	---	---	brown-red, bordered by black band
7th segment	brown	---	reddish yellow square black spot on 5th	---	terracotta-coloured, 7th, blackish, square spots in 4th-6th segm.
8th segment	base yellow	---	---	---	base yellow-haired

The legs in *Chrysops signifer* from Buru are also darker than in the type seen by RICARDO.

For comparison of our specimen with RICARDO'S description of the female of *Chrysops cincta* BIGOT see Table.

The differences between the above-named species are but small.

As it may be concluded from the descriptions and the features of the species summarized in the foregoing table, in all probability *Chrysops clavicrus* THOMPSON and *Chrysops cincta* BIGOT are one and the same species.

In *Chrysops clavicrus* there exists only an obsolete, discal brown spot on the 4th abdominal segment, whereas in *Chrysops cincta* the 4th and 5th segment show an obscure black square spot in the centre, but this is not an essential difference.

When one compares the descriptions of *Chrysops signifer* WALKER according to WALKER'S and my own observations, a far-reaching similarity comes to light.

The only sharp difference consists in the colour of the palpi which is black in *Chrysops signifer* WALKER and whitish yellow in *Chrysops cincta* BIGOT.

The main features of the crossband and apical spot of the two species are identical.

The tibiae of the concerned species exhibit only a little difference in the intensity of the brown colouring.

As to the differences in the outlines of the black markings on the abdomen, these may be ascribed to sexual secondary characters as it is a matter of fact, see SHIRAKI, that the male and the female belonging to the same species may show a relatively big variation in the shape of the black abdominal markings.

In this way, the more or less broadness of the transverse band on the second segment and the degree of indentation of the black band on the third segment may find an easy and unconstrained explanation.

I consider therefore *Chrysops signifer* WALKER, *Chrysops cincta* BIGOT, *Chrysops clavicrus* THOMPSON as synonyms, so that the last two names must be sunk.

Further literature.

BIGOT Mem. Soc. Zool. France, V p. 602. 1892.	} <i>cincta</i> .
RICARDO, Ann. Mag. Nat. Hist. (7) IX p. 378. 1902.	
THOMPSON Eugen. Resa Dipt. p. 452. 1868.	} <i>clavicrus</i> .
RICARDO Ann. Mag. Nat. Hist. (7) IX p. 373. 1902.	

Buitenzorg 19. 3. 1923.

Appendix.

After having finished my article on the Tabanids of Buru, I found in the collection of the Zoological Museum at Buitenzorg a female of *Tabanus ceylonicus* SCHINER labelled as being found in Buru. I would particularly mention that it was a black specimen belonging to the above-named species.

Buitenzorg 10. 4. 23.