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VIII A REVISION OF THE ORIENTAL
SPECIES OF THE GENERA OF THE
FAMILY TABANIDAE OTHER
THAN *TABANUS*

By GERTRUDE RICARDO.

Family TABANIDAE.

Subfamily TABANINAE.

Hind tibiae with no spurs. Ocelli usually absent.

The genera found in the Oriental Region, besides the large genus of *Tabanus* proper, are: *Haematopota*, Meigen, small flies with peculiarly marked wings; *Udenocera*, Ricardo, formed for a species from Ceylon with the long antennae situated on a tubercle; *Diachlorus*, Macquart, including chiefly species from S. America, distinguished by the simple antennae not situated on a tubercle, by the brown or yellowish markings of the wings and by the curved dilated fore tibiae, and slender build. The one species described from the Philippines is unknown to me. A new genus *Neotabanus* is now added, allied to *Udenocera* in having the antennae situated on a tubercle, but the antennae themselves are similar to those of the genus *Tabanus*.

HAEMATOPOTA, Meigen.

Illiger's Magazine, ii, p. 267 (1803); *Chrysozona*,¹ Meigen, Nouvelle Classification, 23 (1800); Kertész, Cat. Dipt., iii, p. 201 (1908).

The described species from the Oriental region now amount to 31, including 11 new species described in this paper.

The following is a list of all the described species and synonyms:—

[NOTE.—The synonyms are printed in italics.]

HAEMATOPOTA *annandalei*, n. sp.
assamensis, n. sp.
asiatica, Rondani = *javana*, Wied.
atomaria, Walker.
bilineata, n. sp.
borneana, Rondani.

¹ For reasons against the adoption of this name see Verrall "British Files," v, p. 772 (1909) Austen, African Blood-Sucking Flies, p. 121 (1909).

brevis, Ricardo.
 cana, Walker.
 cilipes, Bigot.
 cingalensis, Ricardo.
 cingulata, Wiedemann.
cordigera, Bigot (nomen bis lectum) = fuscifrons, Austen.
 dissimilis, n. sp.
 fasciata, n. sp.
 fuscifrons, Austen.
 immaculata, n. sp.
 inconspicua, n. sp.
 irrorata, Macquart.
 javana, Wiedemann.
 lata, Ricardo.
 latifascia, n. sp.
 limbata, Bigot.
 lunulata, Macquart.
 marginata, n. sp.
nigra, Wiedemann? = javana, Wied.
 pachycera, Bigot.
 punctifera, Bigot.
 roralis, Fabricius.
 rubida, Ricardo.
 sinensis, n. sp.
 singularis, Ricardo.
 tessellata, Ricardo.
 unizonata, Ricardo.
 validicornis, n. sp.

The small flies of this genus are easily recognized by the peculiar marking of the wings, three rosettes more or less distinct, formed by pale marks on the darker ground colour are usually present, though in a few species they are absent and only pale streaks are present. The great majority of the species have typical paler rings of colour on the middle and posterior tibiae, occasionally absent, or only present on the middle pair, this character is sometimes indistinct owing to denudation. In the grouping of the species I have taken this character as a means of division, afterwards relying chiefly on the shape of antennae (in the females only) and on the form of the apical band of wing. As many more species will probably be discovered from India and other Oriental districts it seems useless as yet to draw up a table of species.

Synopsis of the Divisions and Groups of Haematopota.

DIVISION I.	Legs uniform in colour with no typical rings on the tibiae	.	<i>Group I</i>
DIVISION II.	Legs not uniform in colour, but with the base of the fore tibiae at least white or yellowish, no rings on tibiae	..	<i>Group II</i>

- DIVISION III. Legs not uniform in colour, but with typical rings on the middle tibiae only, all tibiae whitish at base *Group III.*
- DIVISION IV. Legs not uniform in colour, but with typical rings on the middle and posterior tibiae *Groups IV, V, VI, VII*
- Group IV* First joint of antennae abnormally large and stout, and as long as or longer than the third joint.
- Group V* Third joint of antennae broad and flattened on the first annulation, the last three annulations forming a narrow apex, the first joint incrassate, nearly as long as or longer than the first annulation of third joint.
- Group VI.* Third joint of antennae not very broad at base, the first joint short, often only half as long as or at least always shorter than the third joint which is usually long and slender.
- Group VII.* Antennae long and slender, the first joint as long as the second and third together.

DIVISION I.

Group I.

Legs uniform in colour, with no rings on the tibiae or pale bases to fore tibiae.

***Haematopota roralis*, Fabr.**

(Plate xvii, fig. 24.)

Syst. Antl., 107, 2 (1805); Wied. Dipt. Exot., 97, 1 (1821); *id.*, Auss. zweifl. Ins., i, 215 (1828); Bigot, Bull. Soc. Zool. France, xvi, 78 (1891).

Wings with white spots, abdomen brown, with three stripes and spots, white. Habitat—Tranquebar. Related to *H. pluvialis*. Antennae elongate, yellow. Head ashy grey with two frontal black spots. Thorax dark, with an ashy grey stripe. Abdomen elongated, brown, with three white stripes and spots. Median stripe and spots linear. Wings dark with very numerous white spots and little lines. Legs testaceous. Fabr., Syst. Antl., 107.

Brownish grey. Thorax and abdomen with white stripes. Wings with hyaline little spots. ♀ 4 $\frac{2}{3}$ l. From Tranquebar.

The head is gone in the Fabrician type and the abdomen is crushed; but it is easily distinguished from *H. pluvialis*, by the legs being unicoloured, blackish¹ ochre-brown, not variegated, and by the chestnut brownish costal border and stigma of the wings; segmentations of the abdomen reddish, but of the under side greyish white. In the Fabrician collection. Wied., Auss. zweifl. Ins., i, p. 215.

In Brit. Mus. coll. a male from Velverry, a female from Hot Wells, Trincomalee, and another female from Pankullam Road, Trincomalee; Ceylon (Verbury), 1891.

¹ In Dipt. exot. Wiedemann describes the legs as ochre-brown.

In Indian Museum, males and females from Calcutta; and Goalbathan, E Bengal.

In Howlett coll, a series of females from Gorakhpur, United Provinces; and from Belgatchia, Bengal, "on cow."

A species distinguished by its testaceous legs with no darker bands, or base of fore tibiae lighter, and by the absence of any spots on the face.

The female is long, slender, greyish brown, the abdomen marked with a median grey stripe and with lateral grey spots on each segment. Antennae yellow, long, the first joint nearly as long as the third one which is blackish at apex. Forehead with the usual paired spots, no unpaired spot present. Frontal callus yellowish, transverse. Wings viewed from the base usually appear pale in the basal cells and in the basal portions of the discal, first posterior and submarginal cells, elsewhere greyish brown, with three rosettes distinct, the apical band simple, short, a row of short whitish disconnected bands run from it round posterior border of wing.

The males are more reddish yellow on the abdomen, the first joint of antennae short, stout.

Length of males 9—11 mm., of females $8\frac{1}{2}$ —11 mm.

♀ *Face* greyish with some short white pubescence, the fovea alone appearing darker. *Palpi* pale yellow with black pubescence, stout, ending in an obtuse point. *Antennae* reddish yellow, the first joint yellowish cylindrical, slightly incrassate, barely as long as the third joint, the second joint very small, yellow, both the two first joints with black pubescence, the third joint slender reddish, blackish on the annulated apex. *Forehead* same colour as face or a shade darker, with some white pubescence, broad, hardly narrower at vertex, the frontal callus reddish yellow, shining, reaching the eyes, produced to a short point in the middle of its upper border, a narrow spot proceeds from its lower border to between the antennae, the paired spots blackish, not touching eyes. *Thorax* blackish brown with three grey stripes and *sides* grey, the scanty pubescence consists of short greyish yellow hairs: *scutellum* blackish brown, largely covered with greyish tomentum. *Breast* greyish. *Abdomen* blackish brown or brownish, with a distinct ashy grey median stripe, and grey roundish spots on each segment not reaching the anterior or posterior border, these markings are only distinct in well-preserved specimens, the pubescence chiefly consists of very fine short yellowish hairs, under side uniformly greyish. *Legs* reddish yellow, coxae greyish, base of femora sometimes darker, tibiae not incrassate or hardly so. *Wings* greyish, paler at base and at base of submarginal, first posterior and discal cell, though not always very distinctly so, the stigma and veins yellow, an appendix present on fork of third longitudinal vein, the two upper rosettes distinct, the third small, its outer ring incomplete, continued from above across the anal cell into the axillary lobe of wing, reaching the border, the short pale bands begin from the anal cell and continue round the border

of wing to the apical band which is small and often inconspicuous, crossing the anterior branch of third longitudinal vein, but not always reaching the second longitudinal vein.

♂. Similar, but the *abdomen* is largely reddish yellow, darker at apex. *Eyes* with the large facets occupying two-thirds of surface, coppery coloured, the basal small facets blackish. *Face* more hairy. *Palpi* pale whitish yellow. *Antennae* with the first joint incrassate only about half as long as the third. Frontal triangle with small yellowish callus, the spot between the antennae brown. Hind tibiae fringed with black hairs on each side. Fore tibiae more filiform than in female.

Haematopota limbata, Bigot.

Bull. Soc. Zool. France, xvi, p. 78 (1891); *id.*, Mem. Soc. Zool. France, v, p. 626 (1892); Ricardo, Ann. Mag. Nat. Hist. (7), xviii, p. 115 (1906).

Antennae, palpi and proboscis dull fawn coloured; beard grey; face whitish below, above dark shining chestnut; forehead whitish with two side black spots; the first segment of antennae hardly incrassate; thorax dull reddish; the dorsum with four diffuse blackish stripes, scutellum blackish, sides whitish with hairs of the same colour (or, in the Latin, pleurae ashy grey); abdomen brownish (in Latin, chestnut coloured) with a wide dorsal stripe very regular and greyish white, all the segments narrowly bordered with yellow, with a lateral blackish spot; pleurae and halteres pale fawn coloured; legs uniformly pale fawn coloured; wings very pale yellow, the stigma narrow, reddish, and all the veins bordered with a pale reddish colour, some indistinct very pale white markings. India: one specimen, ♀, 11 mm. Bigot, Mem. Soc. Zool. France, v, p. 626.

The author in his first notice of the species in his table for *Haematopota* in Bull. Soc. Zool. France, xvi, p. 78, describes the antennae as almost entirely yellowish, abdomen chestnut coloured with a wide whitish dorsal stripe; wings yellowish with pale indistinct spots.

From the type kindly lent me by Mr. Verrall in 1906 I made the following description, published in the "Annals" as above:—

Type (female) from Bengal, and another female from Khasi Hills. A fair-sized species, easily distinguished by the prominent bluish grey median stripe of abdomen, with large black spots on the upper part of the face.

Brown. *Face* grey; a large irregular-shaped black spot on each side of antennae, reaching to the eyes. Frontal callus yellow, shining, narrow, concave on the posterior or lower border; the spot between the antennae black. *Forehead* grey, the paired spots black and distinct, the unpaired spot brown, indistinct. *Antennae* yellow; the first joint stout, not so long as the third joint, with black pubescence; the second joint very small, with black hairs; the third joint broad, becoming narrower where the annulations

begin, and tapering to a point. *Palpi* yellow, with dense black pubescence. *Thorax* blackish brown, lighter coloured at the sides, with faint narrow grey stripes, the breast with hoary markings. *Abdomen* brown, the posterior borders of the segments narrowly yellowish; some faint black markings on the sides of abdomen; the under side brown, covered with grey tomentum. *Legs* yellow, with fine black pubescence; the coxae grey pollinose. *Wings* grey, with yellow veins and a long appendix; most of the veins are faintly shaded with darker colour; the typical markings are faint; there is one rosette apparent, enclosing the appendix, and another beyond. Length $11\frac{1}{2}$ mm.

In Indian Museum are two females from Khasi Hills, Assam. One of these is labelled *H. limbata*, n. sp., Bigot, in his handwriting and no doubt may be considered a para-type. Both agree in all particulars with the descriptions, the apical band of wing is simple, narrow, but curved on the part crossing the anterior branch of third vein.

DIVISION II.

Group II.

Legs not uniform in colour, with no rings, but with the base of fore tibiae at least white or yellowish.

(A) *Wings with no typical rosettes but with a pale band and streaks.*

Haematopota cingulata, ♀, Wied.

Auss. zweifl. Ins., i, p. 216 (1828); Bigot, Bull. Soc. Zool. France, xvi, p. 79 (1891); Ricardo, Ann. Mag. Nat. Hist. (7), xviii, p. 115 (1906).

Thorax brown, with a wide yellow stripe; abdomen blackish with whitish segmentations; wings brown, with base, band, and two curved streaks, hyaline. ♀ $4\frac{1}{2}$ lines. From Java.

Antennae leather-yellow, with the apex of third joint blackish. *Palpi* blackish. Face blackish brown, faintly greyish white at sides with black dots; cheeks blackish brown, forehead shining blackish brown, above in certain lights grey with two brown contiguous spots. The yellow stripe of thorax is as broad as the full clear brown sides and is continued on to the scutellum, breast sides full clear brown, breast greyish. Abdomen blackish brown, the first segment with a broad triangular whitish spot which reduces the ground colour at the base to a triangular spot; second segment with a narrower, triangular spot which attains the base and at its own base unites with the white segmentation; the following segments merely with white segmentations; perhaps in perfect un-rubbed specimens these may have white hairs and triangular spots. Under side the same colour, likewise with white segmentations. Wings at the base as far as the middle cross-veins fairly hyaline, only yellowish between the last two veins and on the costal border; otherwise blackish brown; the hyaline band lies a

little behind the middle cross-veins, is somewhat oblique, and is narrower towards the fore border where it meets the posterior end of the stigma, on the inner border it is abbreviated, behind it lies the first streak which starting from the fore border, decreasing, curves forward bow shaped and ends in the band; the second streak nearer the apex begins from the fore border close to the apex of the second vein and runs curved forward, so that it gradually approaches the first one and ends on the inmost part of the band; the inner border of the wing is brown much further towards the base than to the middle. Halteres white. Legs blackish brown, base of tibiae white, posterior femora brown at the base, at the apex to far beyond the half, honey yellow. In the Leyden Museum. Wied., Auss. zweifl. Ins., i, p. 216.

The reference given by Kertész in both of his Catalogues, *viz.*, Cat. Tabanidarum, 1900, and Cat. Dipt., vol. iii, 1908, to v. d. Wulp, Tijds. v. Entom., xxxiv, p. 197, 1891, is incorrect. In Wulp's Cat. of Oriental Diptera, 1896, there is no such reference against *H. cingulata*, and I have not been able to find any reference to this species by v. d. Wulp, and it is unknown to me. It should be an easily identified species by means of the wings which apparently have not the usual rosettes, but are allied to those of *H. rubida* and *singularis*, Ricardo.

(B) *Wings with the usual rosettes, the apical band double.*

Haematopota punctifera, Bigot.

(Pl. xvii, fig. 20.)

Mem. Soc. Zool. France, v, p. 629 (1892); Ricardo, Ann. Mag. Nat. Hist. (7), xviii, p. 125 (1906).

Antennae incomplete, blackish at base, *first joint very short*; face and palpi whitish; forehead wide, dull black with grey tomentum, and a large shining black callus above the antennae; thorax dark chestnut coloured with four greyish white stripes; scutellum brown, greyish in the middle; abdomen blackish brown, sides of segments, a narrow, interrupted, median stripe, and two spots on each segment, greyish; squamae grey, halteres brown; legs brown, tibiae pale yellow, black at apex, tarsi black, anterior tibiae almost wholly black; wings grey, with fine white marking (specimen damaged). The shortness of the first antennal joint makes the exact position of this species doubtful. Length 11 mm.: Java, one specimen. Bigot, Mem. Soc. Zool. France, p. 629.

The following description was published by me after seeing the type:—

The *antennae* are incomplete; the first joint red, short, and incrassate, the second one red, small.

Face grey, with white hairs, no spots, but a dark brown band between the eyes and the antennae. *Palpi* reddish, with black pubescence. Frontal callus black, shining, reaching the eyes, narrow, curved on the posterior border and produced to a point in

the centre ; a black spot between the antennae. *Forehead* (denuded) blackish, with grey tomentum and some golden pubescence. *Thorax* (denuded) brown, with grey stripes and tomentum and some black and grey pubescence ; sides grey, with traces of fulvous and grey pubescence ; *scutellum* brown, with median grey stripe and greyish pubescence. *Abdomen* brown, with grey median stripe, grey spots on each side, and grey sides ; the greyish pubescence rather dense. *Legs* reddish brown, the tibiae yellower, the anterior ones whitish at the base, brown at the apex ; the anterior tarsi brown, the middle and posterior tarsi yellow, darker at the joints and apex ; coxae with rather long white pubescence ; femora with short white pubescence ; tibiae and tarsi with some black pubescence. *Wings* greyish, with appendix ; veins yellowish brown ; stigma brown ; a darker spot is visible above the stigma. Length 8 mm. Ricardo, Ann. Mag. Nat. Hist. (7), xviii, p. 125.

(C) *Wings with the usual rosettes, the apical band single.*

Haematopota indiana, ♀, Bigot.

(Pl. xvii, fig. 19.)

Bull. Soc. Zool. France, xvi, 78 (1891) ; *id.*, Mem. Soc. Zool. France, v, p. 626 (1892) ; Ricardo, Ann. Mag. Nat. Hist. (7), xviii, p. 124 (1906).

Antennae double as long as the head, first and second joints reddish yellow, the third brown, at the base a little reddish yellow, the first cylindrical, the third not incrassate ; palpi chestnut coloured, proboscis brown ; cheeks and face white below ; forehead ashy grey with two black spots, and with a black, shining, anchor-shaped spot below ; thorax chestnut coloured with four ashy grey stripes, scutellum chestnut coloured, pleurae ashy grey ; abdomen brown, with white segmentations and with a median broad white stripe ; anterior and intermediate femora pale chestnut, paler at their apices, the posterior ones dull brown, tibiae not with rings, black, at the base widely white, anterior tarsi black, intermediate and posterior ones white at base ; pleurae brown, halteres reddish yellow with apex black ; wings pale cinereous, at the apex diffusely pale brown, and ornamented with numerous white spots and lines. Bigot, Mem. Soc. Zool. France, v, p. 627.

In Indian Museum one female from Tezapore, Assam.

The following description was published by me in the "Annals" after an examination of the type :—

A brown species, distinguished by its long slender antennae and all the tibiae white at the base.

Face grey, dark brown in the centre, immediately below the antennae ; the stripe between the antennae and the eyes brown, but broken up into dots and spots. *Palpi* reddish, rather long, with brown pubescence and some white hairs ; beard white. Frontal callus narrow, long, reaching the eyes, shining brown, both borders nearly straight ; the spot between the antennae black, bordered

with grey; the paired spots dark brown, large, reaching the eyes and almost touching the callus; the unpaired spot brown, small; forehead yellowish, with brown markings and grey tomentum and short black pubescence. *Antennae* long, slender, yellow; the third joint dusky, reddish at base, black at apex; the first joint as long as the part of the third joint which is unannulated, the second joint small, both with black pubescence. *Thorax* brown, with grey shoulders and three narrow grey stripes; short yellowish pubescence is visible on the dorsum; the sides brown with black hairs, the breast grey. *Abdomen* a redder brown, with light narrow borders to the segments, darker at the apex; the pubescence on the light borders short and yellowish, on the other parts black; a hoary grey median stripe is very distinct from the second to the fifth segment; the under side brown, grey at the sides. *Legs* reddish brown, the fore tibiae and tarsi darker brown, with black pubescence, the base of all the tibiae whitish, on the middle tibiae the white extends further; the basal joint of the middle and posterior tarsi whitish. *Wings* brown, with yellowish brown veins and stigma and an appendix; the apical band single, broad; the first second, third, and fifth posterior cells light coloured at their apices; the dark spot on the fifth posterior cell (as shown in figure) is only noticeable in the wing in certain lights. Length 9 mm. The type is labelled "Margherita, 5373. 8."

***Haematopota borneana*, ♀, Rondani.**

Ann. Mus. Civ. Genova, vii, p. 461 (1875); Bigot, Bull. Soc. Zool. France, xvi, p. 78 (1891).

Length 6—7 mm. ♀

Antennae with the first joint yellowish brown; the second pitchy blackish with the greater part of the third, whose apex is black.

Forehead dull brown, with two rather small black spots and a wide shining ferruginous brown anterior callus. Face and palpi reddish with two small impressed spots at sides. Thorax with the scutellum above red, the intermediate stripe and side spots brownish, not very distinct; pleurae paler coloured. Abdomen at the base yellowish brown, then black, with white segmentations to the posterior segments, wings brownish, the costal border towards the apex browner, white spotted, the spots small, and a white transverse stripe distinct at apex. Halteres with a white stalk and ferruginous club. Legs with anterior and posterior femora pitchy black, the intermediate ones yellowish brown; all the tibiae white with the apex blackish; anterior tarsi wholly black, the posterior ones reddish at base. Rondani, Ann. Mus. Civ. Genova, vii, p. 461.

I saw the type in the Museum at Genoa in the spring of 1909, it is not in good condition, 6½ mm. long. A small species with a red thorax marked with a broad black median stripe and traces of lateral ones. *Face* dull reddish, convex, no dark spots on it, the

frontal callus reddish brown, shining transverse, produced in the middle on posterior border near antennae. *Forehead* reddish, no other spots visible. *Antennae* yellow, the first joint nearly as long as the third. *Palpi* yellow. *Wings* with the apical band single, the first rosette distinct.

Haematopota cana, ♀, Walker.

List Dipt. Brit. Mus., i, p. 207 (1848); Bigot, Bull. Soc. Zool. France, xvi, p. 79 (1891); Ricardo, Ann. Mag. Nat. Hist. (7), xviii, p. 116 (1906).

Body hoary; head white beneath; eyes bronze colour; feelers black, a little longer than the head; first joint tawny towards the base; mouth black; palpi hoary, tawny towards the tips; chest with four indistinct whitish stripes; abdomen with a broad brown stripe on the back; hind borders of the segments pale tawny; legs piceous; shanks (tibiae) tawny, with piceous tips; four hinder feet (tarsi) tawny at the base; wings very pale grey, adorned with numerous colourless segments of circles; wing ribs and veins tawny, the latter piceous towards the tips of the wings; poisers tawny. Length of the body $3\frac{1}{2}$ lines; of the wings 7 lines.

N. Bengal. From Miss Campbell's collection. Walker, List Dipt. Brit. Mus., i, p. 207.

Type (female), Northern Bengal, 42, 25 (Lieut. Campbell).

A small yellow-brown species, with large grey spots at the sides of abdomen and an indistinct median stripe.

The type is in very poor preservation, which makes any description of it incomplete.

Face grey, no spots; the frontal callus brown, both its borders somewhat irregular; a small brown spot is situated between the antennae; the paired spots are brown, large, oblong, the unpaired one is small. *Forehead* grey. *Antennae* brown, the first joint yellowish, stout, not quite so long as the third; the *palpi* yellow, with black pubescence. *Thorax* blackish, with three grey stripes, the sides and breast greyish. *Abdomen* yellowish, darker at the tip, with large hoary grey spots on the sides; the median stripe appears incomplete, the hind borders of the segments narrowly yellow. *Legs* yellow; the fore coxae very long; the femora brownish; the fore tibiae brown, yellow at the base; the tarsi brown at the tips. *Wings* grey, the veins yellow, with an appendix; the light rosettes and spots fairly distinct. Length 8 mm. Ricardo, Ann. Mag. Nat. Hist. (7), xviii, p. 116.

This type being so deteriorated it is impossible to place it even with any certainty in this group. The wings bear some resemblance to those of *H. rovalis*, Fabr., the basal cells being largely pale, the apical band is single lineal, curved towards the apex where it joins the first small transverse band, which joins the succeeding one, all these bands forming a nearly continuous line round the border of wing, no pale openings are visible in the posterior cells, three rosettes are distinct; only one wing remains.

DIVISION III.

Group III.

Legs not uniform in colour but with rings on the middle tibiae only, all tibiae white at base.

(A) *Apical band of wing double.*

Haematopota dissimilis, ♀, n. sp.

(Plate xvii, fig. 22.)

In British Museum type (female) and others from Baste, and Gersoppa, N. Canara, India, 1907 (T. R. Bell).

A species allied to *H. bilineata*, n. sp., in the wing but distinguished from it by the first joint of antennae being cylindrical hardly incrassate, yellowish or yellowish brown in colour, the frontal callus is also broader. Tibiae not incrassate, the hind tibiae with a white-haired ring at the base, the middle tibiae only with typical rings, in this allied to *H. atomaria*, Walk., but distinguished from it by the cylindrical antennae and narrow frontal callus. Apical band of wing double, the upper branch proceeding from the inner border, the lower and larger one from the outer border. Length 8½ mm.

Face ashy grey with some short black pubescence, a brown band is present on upper part, broken up into spots, so that the ground colour appears yellowish brown, and the spots are dark brown or black. *Palpi* with the second joint swollen at base ending in a narrow apex, obscurely reddish, with black pubescence. *Antennae* reddish yellow, slender, long, the first joint fully as long as the first annulation of third joint, shining with black pubescence, hardly incrassate, the second joint very small cup shaped, likewise with black pubescence, the third joint slender, only slightly broader at base, dusky in colour at tip; a large black spot is present between the antennae. *Forehead* brownish, the frontal callus dark blackish brown, shining, almost straight on both borders, in the type produced slightly on the upper border, reaching the eyes anteriorly and posteriorly, occupying in breadth about a third of the width of forehead; the paired spots large, black, touching the eyes and the frontal callus, the paired spot small, triangular. *Thorax* brown with some yellowish brown tomentum and short pale pubescence, shoulders with some ashy grey tomentum. *Scutellum* similar to thorax. *Abdomen* chocolate-brown with narrow grey segmentations, under side similar, pubescence on dorsum scanty, white on segmentations, elsewhere black. *Legs* blackish, the base of fore tibiae whitish and the usual rings on the middle tibiae reddish yellow or whitish, often indistinct, hind tibiae with only a white ring near base and sometimes a tuft of white hairs beyond, the white base of fore tibiae is more correctly a white ring near the base, fore tibiae hardly incrassate, femora reddish yellow, the basal joint of middle and posterior tarsi pale. *Wings* very similar to those of *H. bilineata*, n. sp., the apical

band in type has the upper branch proceeding from the inner border very insignificant consisting of a very short narrow line not reaching the anterior branch of the third vein, but in the other specimens it usually crosses it or at least reaches it, the lower and larger branch is wide at its base, becoming narrower as it proceeds, crossing the upper branch of third vein.

(B) *Apical band of wing single.*

Haematopota atomaria, ♀, Walker.

(Plate xvi, fig. 11.)

Proc. Linn. Soc. London, i, p. 112 (1856); Ricardo, Ann. Mag. Nat. Hist. (7), xviii, p. 117 (1906).

In British Museum coll.

Type (female), Sarawak, Borneo (Wallace), 56, 44, and two other females from Sarawak, 57, 36.

A small dark species, with brown wings, distinctly marked with the usual rosettes and spots; the first joint of the antennae incrassate.

Face grey; two small black spots beneath the antennae; the upper part of the face with a brown stripe, which becomes yellowish near the antennae; the *palpi* yellow, with black pubescence; the beard white. Frontal callus pitchy brown, shining, broad, reaching the eyes, with the posterior border convex, rounded, the anterior border reaching round the antennae; the paired spots black, round, reaching the eyes and the frontal callus, with yellow borders. *Forehead* brown, yellower on the vertex; the unpaired spot not present. *Antennae* blackish; the first joint dark red, shining, with black hairs, slightly incrassate, considerably shorter than the third; second very small; third broad, ending in a point. *Thorax* brown with traces of darker stripes and of short white pubescence; *scutellum* the same colour; breast brown. *Abdomen* brown, with narrow greyish borders to the segments, which are broader on the under side. *Legs* reddish brown, with black pubescence, which becomes fringe-like on the hind legs; the base of the anterior tibiae white, the middle tibiae with the typical rings, the posterior tibiae brown at the extreme base, then white and brown on the apical half. *Wings* brown, with brown veins and an appendix; the apical band single; all the posterior cells and apical cell with a triangular white spot at their openings with the exception of the fourth posterior cell. Length 9 mm. Ricardo, Ann. Mag. Nat. Hist. (7), xviii, p. 117.

The posterior tibiae are white at base.

Haematopota unizonata, Ricardo.

(Plate xvi, figs. 12, 13.)

Ann. Mag. Nat. Hist. (7), xviii, p. 118 (1906).

Type (male) from Ceylon, 1892 (Yerbury).

Type (female) from Hakgala, and three females from Niuwara Eliya, Ceylon, 1891 (Yerbury), females from Pundaluoya, Ceylon, 1890 and 1898, and one female from Galagedara, Ceylon, 1897 (Green).

There is a note by Col. Yerbury on this species, *viz.*, "Very common at Niuwara Eliya, May 1891."

A reddish brown species, with rings on the middle tibiae only; the other tibiae white at the base; the antennae long, cylindrical.

Face grey; a yellowish stripe covered with brown dots and spots reaches from the antennae to the eyes on each side; *palpi* yellow, with white pubescence; beard white. Frontal callus dark brown, shining, concave on the anterior (lower) border, convex on the posterior (upper) border; the spot between the antennae black, oblong: the paired spots black, oblong, just reaching the eyes, with grey borders. *Forehead* brownish yellow, darker on the vertex, grey at sides. *Antennae* long and slender, reddish yellow, the third joint darker; the first joint not quite so long as the third, the second small, both with black pubescence. *Thorax* reddish brown, the shoulders, two stripes which reach the suture and end in two spots, the base of thorax and a spot on each side grey; traces of a short white pubescence on the dorsum; breast brown with brown pubescence, then grey with white pubescence; *scutellum* reddish brown. *Abdomen* a redder brown, segments bordered with narrow whitish bands; pubescence black, white on the borders of the segments and at the sides; traces of grey spots on the apical segments; the under side brown, with white borders to the segments, grey at the sides. *Legs* dark brown, the middle tibiae redder, with two white rings, and the base of the tarsi yellowish, as are also the posterior tarsi; the middle femora are reddish, with white pubescence. *Wings* brownish, with brown veins and an appendix, the light markings distinct, with three rosettes, the apical band single. Length 8 mm. Ricardo, *Ann. Mag. Nat. Hist.* (7), xviii, p. 118.

Distinguished from *H. atomaria*, Wlk., by the narrower frontal callus, and by the longer cylindrical first antennal joint.

DIVISION IV.

Legs not uniform in colour but with typical rings on the middle and posterior tibiae.

Group IV

The first joint of antennae abnormally large and stout, and as long as or longer than the third joint.

***Haematopota validicornis*, ♀, n. sp.**

(Plate xvii, fig. 23.)

In Brit. Mus. coll.

Type (female) from Biserat, Siam (Robinson and Annandale); others from Phrapatoon, Siam (Dr. P. G. Woolly); and from Siam (W. Palmer).

In Indian Museum females from Biserat, Siam (Robinson and Annandale).

This and the following species are distinguished by the very large stout first joint of antennae as long as the third joint. The antennae in this species are reddish yellow, the face with no black band but one spot on each side touching the eyes, about half way between the antennae and the oral opening. Frontal callus yellowish brown. Thorax with grey stripes stopping short at suture, two others meeting them from the base. Abdomen blackish brown with grey spots. Wings with the apical band single, broad, legs with the usual rings on tibiae, hind tibiae fringed. Length 9 mm.

Face greyish, where the dark band is usually apparent it is more yellowish brown, the black spot irregular in shape, pubescence of face whitish. *Palpi* pale yellow with pale hairs at base, and black pubescence. *Antennae* reddish yellow, the first joint very large, incrassate, as broad as the third joint at its widest part, with black pubescence, the second joint very small with thick black pubescence, the third joint broad and flattened on its basal annulation with the three last ones forming a small apex. *Forehead* greyish with black pubescence, the paired spots touching the eyes and the frontal callus, almost round in shape. Frontal callus yellowish brown, shining, almost straight on both borders, and reaching the eyes on lower border, its outer angles rounded receding from eyes, no well-marked spot between the antennae but brown rings surround the base of each antenna. *Thorax* brown with short yellowish pubescence, the grey stripes dispersed as in *H. javana*, Wied., and the base of the thorax grey. *Scutellum* brown with grey tomentum in centre. *Abdomen* blackish brown, or reddish brown with ashy grey segmentations and round lateral spots and a grey median stripe is often apparent. Under side blackish brown with grey segmentations. *Legs* blackish brown, the fore tibiae at base yellowish, the middle and posterior tibiae brownish, each with two yellowish rings, the tarsi on the basal joints of middle and posterior pair yellowish, the femora with black pubescence, thick below, on the hind pair thickest, above, and below at apex. The fore and hind tibiae slightly incrassate, all with black pubescence, which is thickest on the hind pair, forming fringes. *Wings* brownish, the apical band in type is continuous, crossing the whole width of apex, crescent-shaped, concave towards the apex, in the other specimens often broken in the middle, the small white spot above stigma has a dark centre, which is occasionally absent, another white spot meets it, partly surrounding the appendix and forming the centre of the first rosette, the second rosette is distinct, encircling the small transverse vein and apex of discal cell, the third and fourth rosettes are fairly distinct below, on the hind border of wing white marks are present in the

first, second, third and fifth posterior cells but are small, that in the first cell being largest, below them short bars of white colour appear.

***Haematopota annandalei*, ♀, n. sp.**

(Plate xvii, fig. 21.)

In Brit Mus. coll.

Type (female) from Govt. Gardens, Shillong, Assam; and another from Khasi Hills.

In Howlett coll. females from Govt. Gardens, Shillong, and from Umling, Assam, "on cattle."

Distinguished by the very stout large first joint of antennae, differing from *H. annandalei*¹ by the presence of a black band on face, and the antennae are shining black, the third joint is narrower. The apical band of wing is single but a different shape, being short and curved, not reaching the posterior border. Frontal callus black, shining. Length 8½ mm. (type), other females 7—8 mm.

Face greyish with rather thick long white pubescence, the band between eyes and antennae a deep black, extending across the face below antennae, the *palpi* small, greyish, with white pubescence, darker at tip. *Antennae* black shining, the first joint longer than the third one, very stout along its whole length, the second joint very small, the third joint much narrower than the first joint, the first annulation being hardly broader and the last three annuli only slightly narrower. *Forehead* a darker grey colour, almost brown with some grey tomentum, the frontal callus narrow, black and shining, reaching the eyes on its lower border, above with rounded angles receding from the eyes, almost straight on both borders, the paired spots large, black, touching the frontal callus with their apices, and the eyes with their bases, the unpaired spot narrow, distinct. *Thorax* blackish brown with scattered short yellow pubescence, two grey stripes are apparent ending at the suture, two similar stripes proceed from the base of thorax towards them; sides of thorax a little grey. *Scutellum* same colour as thorax. *Abdomen* blackish brown with grey segmentations, round small side spots are visible in some of the specimens; under side dark with grey segmentations. *Legs* blackish, the base of fore tibiae and two rings on the other tibiae, and basal joints of middle and posterior tarsi yellowish or white, pubescence on femora chiefly black, scanty, a little thicker in posterior pair on whose upper side some white pubescence is visible, tibiae slightly incrassate on fore and posterior pair, with black pubescence on the dark parts and white on the pale rings, the hind tibiae fringed with thicker black hairs, tarsi with black pubescence. *Wings* brown with the apical band simple, short, beginning just above apex of second vein crossing the first branch of third vein ending just beyond it, it has an outward curve towards the base

¹ This is perhaps a mistake for *validicornis*.—ED.

of wing and is concave on its apical border, the round white spot above the stigma is distinct and with no brown centre in the type, in other specimens it is present as a half circle, three rosettes are clearly formed and pale spots appear in the apices of the first, third and fifth posterior cells, and smaller ones occasionally in the others.

Haematopota pachycera, ♀, Bigot.

Nouv. Archiv. Mus. Hist. Nat. Paris (3), ii, p. 206 (1890); *id.* Bull. Soc. Zool. France, xvi, p. 76 (1891); Ricardo, Ann. Mag. Nat. Hist (8), i, p. 59 (1908).

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

Antennae twice the length of head, yellow, the first joint somewhat incrassate, cylindrical, apex brown; second joint stout, pyriform, compressed, apex brown; others yellow, small. Palpi, beard and face dull ashy grey. Forehead ashy grey, at base with a shining transverse yellow callus, brown at vertex with two frontal black spots. Thorax ashy grey, with wide indistinct brown stripes; scutellum brown, abdominal segments with narrow grey borders, and side spots irregular in shape, of same colour. Wings almost black, with white markings. Legs brown, fore tibiae dull white at base, intermediate and posterior tibiae pale yellow, at base apex and ring brown.

Antennae at least twice as long as head, yellow, the first joint cylindrical, rather thick, black at apex, the second shorter, thick, pyriform, truncated, laterally compressed, likewise black at its apex, the last joints indistinct and very small, bright yellow; palpi, beard and face dirty grey, forehead same shade, with a large reddish shining transverse callus situated above the base of antennae, and with two small black spots at border of eyes; thorax blackish, indistinctly striped with grey lines, sides grey; scutellum brown; abdomen blackish, border of segments and two series of little indistinct spots greyish; calyptrae and halteres yellowish grey; wings blackish with rather extensive white markings and spots; legs brown, naked, fore tibiae whitish at base, intermediate and posterior ones pale yellow with the base, apex and a median ring blackish.

Laos, one specimen.

The unusual form of antennae, *notwithstanding the general appearance*, seems to authorize the establishment of a new genus for this and the preceding species. Bigot, Nouv. Archiv. Mus. Hist. Nat. Paris, 1890, ii, p. 206.

The following notes were published after I had seen the type in the Paris Museum:—

This type from Cambodia (the description gives Laos) is also in the Paris Museum.

This species would come under heading "15" in my table of Indian and Ceylon species next to *H. lata*, Ricardo, from which it is distinguished by the hind tibiae not being fringed, and the third joint of the antennae is wider and shorter. It resembles *H. rubida*,

Ricardo, in the antennae. Bigot seems to have overlooked the second joint, which is very small, and described the third joint as the second one; the first joint is long, cylindrical, and the third joint very wide, the basal division being large and swollen, the remaining divisions very small. The abdomen is black, with the segmentations grey; the two rows of spots mentioned by Bigot are hardly noticeable. The legs have two rings of light colour on the middle and posterior tibiae, and the base of the fore tibiae is yellowish. The wings have two indistinct rosettes. Ricardo, *Ann. Mag. Nat. Hist.* (8), i, p. 59.

This species probably belongs to this group with the first joint of antennae very stout and it is possible that my new species *validicornis* is identical, though it is apparently distinguished by the presence of fringes of hair on hind tibiae, said to be absent in Bigot's species; a further examination of Bigot's type with regard to the markings of wing is imperative before coming to a decision.

Since writing this paper I have received from M. Surcouf of the Paris Museum a copy of his paper in *Bull. Mus. Hist. Nat. de Paris*, 1909, No. 7, p. 453, in which he establishes a new genus *Potisa* for this species and suggests my *H. rubida* will belong to it also, but as already remarked I have left this species near *H. singularis* owing to the peculiar markings of wings. The conformation of the first joint of antennae in these species *H. pachycera*, *validicornis* and *annandalei* hardly seems to justify the establishment of a new genus divided off from *Haematopota*, as the shape of the antennae in *Haematopota* varies very considerably, but only in small gradations, while the typical markings of wings and other characteristics remain the same.

Group V

The third joint of antennae broad and flattened on its first annulation, the last three annulations forming a narrow apex; the first joint incrassate, nearly as long as or longer than the first annulation of the third joint.

This group is allied to the genus *Parhaematopota* established by Grunberg (*Zool. Anzeig.*, xxx, p. 360) in 1906 for a new East African species which he named *P. cognata*. Speiser in *Hymen. Dipt.*, vii, p. 360 (1907), added *H. vittata*, Loew, to this new genus [Mr. Austen states this is incorrect, see *African Blood-Sucking Flies*, p. 122 (1909)] and remarks that *H. decora*, Wlk. (*H. dorsalis*, Loew, is now a synonym of this species), and its related species—differing from other *Haematopota* species by the peculiar form of the third antennal joint—form a connecting link with *Parhaematopota*, the establishment of which as a genus is only justified provisionally, in the present imperfect state of our knowledge. It certainly seems advisable to refrain for the present from creating new subgenera, and to rest content with grouping allied species

together. The figure of the antennae of *Parhaematopota* is not unlike those of this group as regards the third joint, but the produced upper angle of the first joint is not present in these Oriental species.

(A) *Wings with a pale oblique transverse streak and no rosettes.*

Haematopota rubida, Ricardo.

(Plate xvii, fig. 18.)

Ann. Mag. Nat. Hist. (7), xviii, p. 120 (1906).

Type (female) from Burma, 57, 16 (Mrs. Waring).

An easily distinguished red species, with the hind tibiae incrassate; the hind femora with a white bunch of hairs above and a fringe of black hairs on the under side.

Face grey, the whole upper part deep black; the *palpi* yellow with black pubescence and white hairs below. Frontal callus shining brown, protuberant, rounded, the posterior border produced, the anterior border with a deep incision in the middle, filled by the black spot usually present between the antennae, which is large and square with yellow borders; the frontal callus is short, not reaching the eyes; *forehead* grey, darker in the centre; the paired spots are black, small and isolated, the unpaired spot not present. *Antennae* are of an unusual form; the first joint very much incrassate and large, nearly as long as the third joint, yellow and shining, the second very small and narrow, yellow, both joints with black pubescence; the third joint very broad, ending in an obtuse point, reddish yellow, darker at the tip. *Thorax* reddish brown, with lighter stripes, darker at the sides; the breast grey, with white hairs; the *scutellum* the same colour. *Abdomen* reddish brown, with very narrow yellow borders to the segments, darker at the apex; the under side yellow, with grey tomentum. *Legs* reddish brown; the anterior and posterior pairs the darkest, the anterior tibiae white at base, the middle tibiae yellowish brown, the two yellow rings not well defined; the posterior femora broad, with the fringe of hairs on the under side black, on the upper side black on the basal half, on the apical half a tuft of white hairs are present; the posterior tibiae very stout and broad, with ill-defined rings as on the middle pair, and fringed with black hairs above and below; the basal joints of the middle and posterior tarsi pale yellow. *Wings* reddish brown, the veins yellow, with a long appendix, the apical band single; the pale streak across the middle of the wing is very noticeable, and at once distinguishes the species from *H. lata*, n. sp. Length 10 mm. Ricardo, Ann. Mag. Nat. Hist. (7), xviii, p. 120.

This species in the shape of its antennae is very nearly allied to my two new species *H. validicornis* and *annandalei*, and might be almost included in that group, but is left for the present here owing to the similarity of the wing to *H. singularis*, Ricardo.

Haematopota singularis, ♀, Ricardo.

(Pl. xviii, fig. 27.)

Ann. Mag. Nat. Hist. (8), i, p. 58 (1908).

Type (female) from Nhatrang, Annam, 22-x-1905 (Dr. Vassal).

This species I had placed under *H. cilipes*, Bigot, in my paper on *Haematopota* in Ann. Mag. Nat. Hist. (7), xviii (August 1906), p. 126; but since that was published I have had the opportunity of examining the type of *H. cilipes* in the Paris Museum, and find this is quite a different species, not previously described; it is related to *H. rubida*, Ricardo, from Burma, in the wings and also in the fringed incrassate hind tibiae, but differs from it in having all the femora and tibiae fringed, in this resembling *H. cilipes*, Bigot, and *H. lata*, Ricardo, with which it should be placed in the table on p. 114. It is a handsome small black species with densely hairy legs, and is immediately noticeable by the pale streak across the brown wings, which have no rosettes apparent, thus differing with *H. rubida* considerably from the other described species of *Haematopota* from the Oriental Region. In the shape of the antennae it resembles *H. rubida*, with the long incrassate first joint, the very small second joint, and the broad basal division of the third joint, the last division being small and short.

Face grey, the whole upper part deep black, the lower half grey, with white hairs; the beard and under part of head also with white hairs. *Palpi* yellow, with short black pubescence and some longer white hairs. Frontal callus black, shining, narrow, almost reaching the eyes; *forehead* brownish, with grey markings surrounding the two black spots and continued across the forehead; there is a tuft of white hairs on each side of the forehead on the outer border of the black spot and reaching the frontal callus; on each side of the forehead bordering the eyes there is a narrow grey border of tomentum. *Antennae* yellow, in shape as described above, with long black pubescence on the first and second joints; the third is bare. *Thorax* black, with three short grey stripes, the centre one shortest, none reaching the posterior border; the sides grey; the posterior border of thorax is fringed with white hairs; the pubescence on the dorsum black, short, with some white pubescence on the stripes and on the sides; above the root of the wings there is a black tuft of hairs, with some long white hairs below. *Scutellum* appears yellowish, bordered with a fringe of white pubescence. *Abdomen* deep black, the second, third and fourth segments with white segmentations; the pubescence black, with white hairs on the sides of the dorsum of second segment, on the white segmentations, and on the sides of the first segment, on the sides of the other segments chiefly black; under side the same, but more hairy. *Legs* all with fringes of black hairs, which are least thick on the middle femora; they are brown in colour, with two yellow rings on the middle and posterior tibiae, and the base of the fore tibiae is yellow; the middle and posterior femora are largely yellow; the fore tibiae and femora with wholly black fringes, long

on each border of the femora, long on the outer border and short on the inner border of the tibiae; the middle femora with whitish pubescence forming a scanty fringe on their lower borders, with some thick black hairs at apex; the middle tibiae with a fringe of coarse black hairs on each border and white and black pubescence on the dorsum; hind femora with very thick black and white pubescence; the hind tibiae broad, flat, with fringes of short black hairs on their borders and black and white pubescence on the dorsum; tarsi with short black pubescence; the middle and posterior tarsi are almost wholly yellow. *Wings* dark brown, the pale streak is continuous from the round pale spot above the stigma to beyond the apical cell; the pale markings of the apex and the external border are so placed that, viewed by the naked eye, a second pale streak is seen divided from the first by a brown parallel band, with a few brown markings on it, but no rosettes are apparent. Length 8 mm.

(B) *Wings with no pale oblique transverse streak but with the usual rosettes apparent.*

(a) Apical band of wing double.

Haematopota javana, ♂ ♀, Wiedemann.

(Plate xvii, fig. 25.)

Dipt. exot., p. 100 (1821); *id.*, Auss. zweifl. Ins., i, p. 218 (1828), v. d. Wulp, Sumatra Exped. Dipt., 19, pl. i, fig. 12 (1881).

? *Haematopota nigra*, Wiedemann, Dipt. exot., p. 101 (1821).

? *Haematopota asiatica*, Rondani, Ann. Mus. Civ. Genova, vii, p. 461 (1875).

Black; posterior border of thorax, scutellum and segmentations of abdomen whitish (male); or grey-brownish. Abdomen with a whitish stripe of spots, segmentations and femora a little reddish (female); wings smoky grey with whitish markings. 4 lines
♂ ♀ From Java.

Very similar to *H. pluvialis*.

Male. Antennae ochre-brown; face greyish white, with white hairs, a deep black spot on each side between the eyes and the antennae; forehead near the antennae with a black spot. Thorax black and black-haired, brown at the sides, posterior border and scutellum whitish haired. Abdomen at the base slightly ochre-brown; the under side almost wholly reddish ochre-brown. Wings with a white median band, convex towards the apex, with pale brownish spots enclosed in it; behind the stigma with an oblique lambdoidal mark, and with several whitish little lines and spots. Halteres yellowish with a brown club. Legs alternately banded yellow and black.

Female. Antennae and frontal callus ochre-brown; face grey haired, with a deep black spot on each side, another behind the antennae, and the usual two eye-spots on the forehead. Thorax brownish grey, sides and three lineal stripes whitish. Abdomen

somewhat deeper brownish, posterior border of the first segment more broadly reddish, with a triangular grey-haired spot in the middle, round which the reddish colour is conspicuous; second and third segment with a narrow triangular median, and grey-haired side spots; the others with only a median spot. Under side grey-haired with a very broad blackish median stripe and narrow reddish segmentations. Markings of the wings hardly different from those of *H. pluvialis*. Femora very pale reddish, white haired, apex brown above; hind tibiae with three brown bands; the fore tibiae brown, only whitish at the base. In Westermann's collection. Wied., Auss. zweifl. Ins., i, p. 218.

Two males caught in May and July at Rawas and Silago (Sumatra). The first joint of antennae distinctly thicker than the following ones, and very shining black at the end. The facets of the eyes with the exception of those of the lowermost third are very large. Tibiae very broad and flat, on each side with thick black-brown pubescence, which is longer on the posterior pair. The markings on the wings are, according to Wiedemann, very distinct; I will only add that the light band at the apex is double and that a large square pale spot is present on the posterior part which lies in the middlemost basal cell and traverses the middle of the lowest basal cell. V. d. Wulp, Sumatra Exped. Dipt., p. 19.

The plate given by Wulp shows the apical band double, and light markings below the stigma (which is not shown itself).

Bigot in Bull. Soc. Zool. France, 1891, p. 74, where he gives a table of *Haematopota* species, remarks that he does not include *H. asiatica* (Rondani) in it, as the author attributes it to Wiedemann, but Bigot cannot find in what paper Wiedemann published it, neither can I. Probably it is an error of Rondani's—he gives the first two lines of the description of "*H. javana*," from Dipt. exot., p. 100, and then adds a few further particulars. V. d. Wulp, in his Cat. Dipt. S. Asia, says "*asiatica*" is a *lapsus calami*. I saw the type in the museum at Genoa; it was in bad condition, but the face appeared to have no spots, so that it is very probable that it is not a specimen of *H. javana* at all.

The following is the description of *H. nigra*, Wiedemann, given as a synonym by Kertész in his Cat. Dipt., 1906, on what authority I do not know, and without an examination of the type it is impossible to decide:—

Black, the posterior margin of thorax, scutellum and segmentations of abdomen white; wings smoke coloured, with white spots. Length 4 lines, from Java.

Antennae ochraceous, hypostoma greyish white, white haired and on each side between the antennae and eyes is a large black spot; forehead near antennae with a black spot. Thorax black and black haired, sides brown, the posterior border and the scutellum white haired. Abdomen a little ochraceous at base; the under side almost wholly reddish ochraceous. Wings with a median dark band, convex behind, enclosing an obsolete white spot, with

a transverse lambdoidal design beyond the stigma and with many other white lines and spots. Halteres yellowish, the club brown. Legs yellow with alternate black bands. Mus. Westermann. Wiedemann, Dipt. exot., p. 101 (1821).

In Brit. Mus. coll. a series of females from Darien Tipus, Federated Malay States (Stanton coll.).

In London School Tropical Medicine coll. females from Jelebu, Negri Sembilan, Federated Malay States (Stanton); and one from Federated Malay States (H. C. Pratt).

In Indian Museum males from Pusa, Calcutta, Purneah, Rajmahal, and Goalbathan, Bengal; females from Rajmahal (at light on banks of Ganges), Port Canning, Bhogaon in Purneah district, Khoodna and Goalbathan, Bengal.

In Howlett coll. males and females from Pusa, and female from Calcutta "on cattle."

In Kertesz coll. a female from Lushai Hills.

These females belong to this species I believe, though Wiedemann's description is wanting in particulars, but the face with the deep black spots on each side and the similar spot between the antennae, the ochre-brown frontal callus, the yellowish red antennae, the whitish or greyish markings on base of thorax and on scutellum besides the usual stripes, and the pale reddish femora white haired, brown at apex, serve to distinguish the species with the help of the figure of wing given by v. d. Wulp, to which the above specimens correspond. The wing appears to the naked eye distinctly marked with brown and white, the brown colouring being so disposed as to appear a dark square blotch surrounding the stigma with another similar one above, separated from it by a pale interval; the apical band is double, its lower larger half united to a pale blotch in the first posterior cell in Wulp's figure, but in these specimens it is usually disconnected. Length of specimens $9\frac{1}{2}$ —10 mm.

♀ *Face* greyish with silvery white pubescence; the large deep black spots very distinct between the eyes and the antennae, the centre of face just below antennae is also blackish. *Palpi* pale yellow with short black pubescence and some longer white hairs at base and on upper side. *Antennae* yellowish red, the first joint a little incrassate after the base, but not broader than the basal annulation of third joint, which it about equals in length; it has dense black pubescence, as has also the second joint which is extremely small, the third joint devoid of pubescence, the basal annulation large, with the three apical annulations very small and narrow. *Forehead* brownish grey, the two black paired spots large, not touching the frontal callus which is shining yellowish brown, barely reaching the eyes, its upper border straight but produced in the middle, its lower border concave, receiving the black spot between the antennae; no unpaired spot present or only represented by a small brown spot. *Thorax* brownish grey with short pale fulvous pubescence on its dorsum, the three grey stripes distinct, narrow, the lateral ones ending in a grey spot at median suture of

thorax, from the base of thorax other lateral stripes proceed and the base of thorax is grey, this is only apparent in unrubbed specimens; sides of thorax grey, pubescence whitish, breast grey with whitish pubescence. *Scutellum* wholly covered with grey tomentum and with some short fulvous pubescence. *Abdomen* not very well preserved in any of the specimens, blackish or reddish brown, the first two segments usually reddish, the grey stripe apparent and the segmentations grey, side spots not always apparent; under side appears lighter at least at sides. *Legs* brown, the femora pale reddish or yellowish, white haired below, but the fore femora have a fringe of short black hairs; the middle pair has a few at its apices, and the hind femora have a tuft of thick black hairs at the apex, thickest on the under side, tibiae with two yellow rings, the fore tibiae whitish yellowish at base with white hairs, incrassate on the dark part with fringes of short black hairs, the middle tibiae with black pubescence chiefly on the dark rings, the posterior tibiae broader with fringes of longer black hairs intermixed with white hairs on the yellow rings, tarsi blackish, first joint of hind tarsi pale. *Wings* dark brown, with the rosettes not very well defined, but two fairly distinct ones appear, the apical band is double, its upper part narrowest, the lower part concave on its upper border, continued when perfect across the second branch of third vein joining a white mark in the apex of first posterior cell, above the stigma is a large white mark consisting of a round white ring with a dark centre, the upper rosette joins it and encloses the appendix, the second rosette is nearer the posterior border of wing, encircling the upper part of discal cell and bases of second and third posterior cells; below this appear a series of short white bands reaching the fore border of wing below stigma, and continued to the anal cell border, and into the basal cells, representing the third rosette but irregular, forming however a very perceptible mass of pale colouring, the anal cell has a curved white streak, and on the posterior border a pale mark appears in the species of most cells.

♂. The specimens from India in Indian Museum are more reddish coloured than the females, the abdomen largely reddish yellow, blackish at apex. Thorax scutellum lighter coloured.

The antennae are wholly reddish yellow, not black at apex of first joint as v. d. Wulp states is the case with his specimens, the first joint stouter and shorter than in the female. In the wing the pale markings in the fourth and fifth posterior segment almost fill up the basal halves of these cells as shown in Wulp's figure which is taken from his male specimens.

(b) Apical band of wing single.

***Haematopota assamensis*, ♀, n. sp.**

(Plate xviii, fig. 29.)

In British Museum coll. type (female) and others from Nangpoh, Khasi Hills, Assam (H. Maxwell Lefroy); and from Shillong,

Assam (H. Maxwell Lefroy). In Howlett coll. females from Nangpoh.

This species is very nearly allied to *Haematopota javana*, Wied., but is at once distinguished from it by the apical band of *wing* which is single, short; starting from the costal border just above where the second vein ends, it crosses the anterior branch of the third vein, curving downwards, and ends just beyond; it is broad at its base, gradually becoming narrower; a pale indistinct spot sometimes appears beyond it; the first posterior cell is in some specimens more largely filled at its apex with white markings. The frontal callus is black, shining, centre of face with no black spot. The first joint of *antennae* not quite so incrassate or so long and the third joint not quite so wide. The grey stripes of *thorax* and grey colour of *scutellum* is here ashy grey, *abdomen* blackish brown with whitish segmentations, only median spots sometimes apparent on second and third segments, and side spots not present. The hind tibiae are fringed with black hairs. Length 10 mm.

Haematopota lata, ♀, Ricardo.

(Plate xvii, fig. 26.)

Ann. Mag. Nat. Hist. (7), xviii, p. 121 (1906).

Type (female) from Khasi Hills district, India (Chennell), 1878; five females from N. Chin Hills, Burma, iv-93 (Watson).

A dark brown broad-bodied species distinguished by the broad hind tibiae fringed with black hairs.

Face grey, with some brown marks below the antennae, the stripe between the antennae and the eyes yellow, with some brown dots; the beard white; the *palpi* yellow, with white pubescence and a few black hairs intermixed. Frontal callus brown, shining, narrow, reaching the eyes; the anterior border irregular with yellow edges; the posterior border nearly straight; the paired spots black, large, touching the eyes; the unpaired spot small, bordered with yellow; *forehead* grey, yellower on the vertex with short black pubescence. *Antennae* very similar to those of *H. rubida*, long, robust, yellowish red, darker at the tips with black pubescence; the first joint shorter than the third, stout, incrassate, the second very small, the third broad, ending in an obtuse point. *Thorax* brown, with a narrow, indistinct, grey median stripe continued to the scutellum; the side stripes grey, broader, ending at the suture in triangular spots; the shoulders and posterior border of the thorax grey; a short grey stripe from each side of the base of the thorax running up to the suture outside the usual side stripes; the sides and breast grey, the latter with white hairs, traces of silvery white pubescence on the dorsum, with some black pubescence. *Scutellum* brown, grey on its anterior border. *Abdomen* brown, with distinct greyish white borders to the segments; the sides of the first four segments grey; from the fourth segment large grey spots are apparent on each side; a grey median stripe

is here indistinct, but apparent on the other specimens; the pubescence brown, with some white hairs, especially at the sides; under side grey. *Legs* yellowish, the fore tibiae white at base, dark brown on the apical half; the fore tarsi brown, the middle and posterior pale at base; the anterior and middle femora with whitish pubescence, the hind ones with a fringe of black hairs; the tibiae yellowish, with a brown ring in the middle and brown at base, thus appearing as yellow rings on the tibiae; the hind tibiae with a heavy fringe of black hairs extending two-thirds of the length to the apex. *Wings* greyish, with yellow veins and stigma and a long appendix; the apical band single, divided in half, the two upper rosettes distinct; in the corner of the wing is a round circle, and above this a double concave circle extending into the anal cell; above the stigma is a small round circle; the basal half of the first posterior cell is wholly pale; only the upper part of the third rosette is distinct. Length 9 mm.

In the females from Burma the wings are browner and the white markings more numerous at the opening of the cells. Ricardo, *Ann. Mag. Nat. Hist.* (7), xviii, p. 121 (1906).

This species is distinguished from *H. assamensis*, n. sp., by the shape of the first joint of antennae which is much stouter, and as long as the first annulation of the third joint, whereas in *H. assamensis*, it is shorter and not much incrassate. The face has hardly a trace of black spots and there is no spot between the antennae.

The apical band in the type does not reach across the wing, but extends only a short way beyond the anterior fork of third vein, in other specimens it reaches across but is broken in the middle, and in others it is broader, extending the whole width of apex of wing.

***Haematopota sinensis*, ♀, n. sp.**

(Pl. xviii, fig. 28.)

In Brit. Mus. coll. type (female) and others from Wei Hai Wei, China (Dr. W. M. Muat), 1907; and two females from Shanghai (Walker coll.), 1892.

A species distinctly allied to the Oriental species, distinguished by the short antennae with the disk-like broad third joint, on the upper and lower border of which at base appears a perceptible fringe of black hairs, an unusual characteristic; it is allied to *H. assamensis*, n. sp., from which it may be distinguished by the paler coloured wings and by the much broader third antennal joint; from it and from *H. lata*, Ricardo, it is also distinguished by the hind tibiae not being heavily fringed and by the shorter first antennal joint.

The face has no distinct band, the frontal callus is triangular in shape, the thorax distinctly striped, and the abdomen with lateral spots and a median stripe. Wings with a single apical band and the fifth posterior cell largely pale on its apical half. Length of type 9 mm., others from 9—11½ mm.

Face greyish with white pubescence, a dark brown spot is present usually, between the antennae and the eyes, but in the series of specimens is often absent or indistinct, the *palpi* long and slender, pale yellow with black pubescence. *Antennae* reddish yellow, short, the first joint short, stout, not so long as the first annulation of the third joint, the second joint very small, with its upper and lower borders produced to a narrow process crowned with black hairs, both joints with black pubescence, the third joint with the first annulation remarkably broad, flattened out, on its upper border with a distinct angle about half-way up and distinct black hairs on the upper side nearly the whole length (these are denuded to a great extent in the type), they are also visible on the lower border, the three last annulations almost bi-equal, forming a short apex, some black hairs also visible on them; between the antennae a dull brown spot is visible. *Forehead* greyish with some black markings. Frontal callus triangular in shape, its lower margins touching eyes, shining, brown; the paired spots large, black, not reaching the frontal callus and only touching the eyes at one point in the middle of their outer border, the unpaired spot small, round. *Thorax* brown with three distinct grey stripes, the outer ones interrupted in the middle, and the sides also grey, breast brown with grey tomentum. *Scutellum* covered with grey tomentum. *Abdomen* brown, same shade as thorax, with a narrow median grey tomentose stripe most distinct on the first three or four segments and with round grey tomentose lateral spots, pubescence whitish, short, but when not denuded fairly abundant; under side brown with grey tomentum and pubescence. *Legs* pale reddish yellow, the femora with some grey tomentum, the fore tibiae brownish, hardly incrassate, pale at base, the middle and posterior tibiae brown with the usual pale rings, the hind tibiae with no distinct heavy fringes of hair, the fore tarsi brown, paler at apices, middle and posterior tarsi more largely pale, the pubescence on femora and pale parts of legs whitish, otherwise black. *Wings* pale brown, the stigma darker, yellowish brown, veins brown, three rosettes distinct, the apical band single, lineal, starting from a pale blotch at apex of the second vein and reaching across apex of wing in a sinuous course to the posterior branch of third vein, the first four posterior cells with small pale markings at their apices, the fifth with a large pale irregular-shaped blotch filling up the apex, occupying more than a third of the whole space of cell, three more pale bands are visible in the cell towards the base, the small transverse bands at inner border distinct and regular, in axillary angle the curved pale line is V-shaped.

Group VI.

Third joint of antennae not very broad at base, the first joint short, stout or cylindrical, often only half as long as the third joint or at least never longer than third joint which is usually long and slender.

(A) *Apical band of wing broad, double, almost filling up the apex of wing.*

Haematopota marginata, ♂ ♀, n. sp.

(Plate xviii, fig. 32.)

In Howlett coll. type (female) and another from Pusa, Bengal, and another from Tezpur, Assam.

In Indian Museum type (male) and others from Goalbathan, E. Bengal; and females from same locality.

A species distinguished by the wide double apical band which almost reaches the extreme apex of wing, and continues round the posterior border reaching the second branch of fork of third vein, a pale band continues from it unbroken round the posterior border to the end of wing. The female is blackish brown with a grey median stripe and spots, the frontal callus very narrow the paired spots large, a black spot present between eyes but no spots or band on face. Antennae reddish yellow, the first joint cylindrical, curved. Male with abdomen yellow at base, blackish at apex, legs pale yellowish, no rings apparent, the first joint of antennae considerably incrassate. Length male, type 8 mm., others $7\frac{1}{2}$ —8 mm.; female, type $7\frac{1}{2}$ mm., others 7—9 mm.

♀ *Face* grey with hardly any white pubescence. *Palpi* reddish, covered with grey tomentum, and with black pubescence. *Antennae* slender, reddish yellow, apex black, the first joint not so long as the first annulation of the third joint, the second small, roundish, about one-fourth the length of the first joint, both with some black pubescence, the third joint long slender, only slightly broader at base. *Forehead* blackish brown with lighter circles round the spots and some grey tomentose marks, the frontal callus very narrow, shining, blackish brown, its upper border somewhat curved, on its inner border concave, the band at ends is broader and produced on its inner border forming almost a half circle; a small black spot is present between the antennae; paired spots large, black, oval, not quite reaching the eyes or the frontal callus. *Thorax* blackish brown, with three narrow grey stripes; *scutellum* same colour. *Abdomen* blackish brown with indistinct grey tomentose median stripe and grey tomentose lateral spots; under side darker. *Legs* reddish brown, the pale rings of tibiae yellowish, not always very distinct, fore tibiae at base yellowish, very slightly incrassate, posterior tibiae not incrassate, with some black pubescence. *Wings* brown, the pale markings very numerous, three rosettes distinct; the small transverse bars on posterior border are zigzag and almost touch the pale border, stigma very distinct, dark brown, two zigzag pale stripes cross the axillary angle of wing, the lower branch of the apical band is very narrow and not always continued to end of the upper broad part of band.

♂ *Eyes* with the lower third composed of small facets. *Antennae* yellowish, the first joint very stout, almost as long as the first annulation of third joint, the second very small, the third joint

slender, only slightly wider at base, the first two joints with black pubescence; the black spot between the antennae present and a small shining yellow frontal callus. *Abdomen* with the first four segments reddish yellow, the posterior border of fourth and other segments blackish. *Legs* rather paler than in female, and the ring of tibiae not always apparent. *Wings* identical in design, the small transverse bars smaller, reduced to spots.

This species is allied in the wing to *H. pallens*, Loew, Neue Beschreib. Europ. Dipt., ii, p. 61 (1871). The six specimens of Loew's species in the Brit. Mus. coll. recorded by me in the "Annals" (7), xviii, p. 96 (1906), are *females*, not *males* as erroneously printed; the Indian females of my species have the antennae reddish and no band on the face, whereas in the Algerian specimens the antennae are blackish, only the third joint being pale yellow, black at apex and there is a black band on the face broken up into spots. The Indian males have this band but the first joint of antennae is wholly yellow, incrassate but less so and shorter than in *H. pallens*. The spot between the antennae in both males and females of my species is small and brown, in the Algerian females it is large and black.

(B) *Apical band of wing double, but not almost filling up the apex of wing.*

(a) Both branches of apical band joined at their base, diverging later.

Haematopota tessellata, ♀, Ricardo.

(Plate xvi, fig. 14.)

Ann. Mag. Nat. Hist. (7), xviii, p. 120 (1906).

Type (female), Hot Wells, Trincomalee, 8-xi-91 (Yerbury), 92, 192.

A grey species with brown wings, the white markings very clearly defined, so that the wings have a chequered appearance; the middle and hind tibiae with rings.

Face grey, only a trace of a brown stripe between the antennae and the eyes. Frontal callus black, short, not reaching the eyes, very much produced on the posterior border, ending in a point; the anterior border almost straight; the paired spots large, black, not reaching the eyes; the *forehead* is apparently grey, and no paired spot visible. *Antennae* yellow; the third joint dusky, the first joint incrassate, rather shorter than the third, the second very short, the third long, tapering to a point. *Thorax* brown, with three grey stripes; the shoulders, base, and sides of thorax grey; a short white pubescence on the dorsum; the breast grey. *Abdomen* brown, with rather wide white borders to the segments, grey spots on the posterior segments, and a faint grey median stripe. *Legs* brown, the femora lighter, the middle and posterior tibiae with rings, the basal joint of the tarsi of the middle and

posterior legs whitish. *Wings* brown, with yellowish brown veins and an appendix; the apical band double, the openings of the posterior cells light coloured.

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

A male from Velverry, Ceylon, 26-x-91 (Yerbury), 92, 192, in poor preservation, is probably the male of this species. Ricardo, *Ann. Mag. Nat. Hist.* (7), xviii, p. 120.

The apical band of wing is double, both branches united at base, diverging later. The first joint of the antennae is as long as the first annulation of the third joint.

Haematopota brevis, ♀, Ricardo.

(Plate xvi, fig. 16.)

Ann. Mag. Nat. Hist. (7), xviii, p. 122 (1906).

Type (female), Kanthalla, Ceylon, 19-x-90 (Yerbury), 92, 192, and another female; one female from Velverry, Ceylon, 18-i-91 (Yerbury), 92, 192; two females from Bangalore, Mysore, June 24 (Watson), 95, 28, and type (male) from the same locality.

This species is distinguished from *H. cingalensis* by the short first joint of the antennae, and from *H. javana*, Wied., by the blackish brown abdomen with white incisions and a mere trace of a grey stripe.

A brown species, distinguished by its short first antennal joint and by the rings on the middle and posterior tibiae.

Face grey, with brown pubescence; a dark spot under each antenna and some darker colour continued to the mouth; the stripe on each side yellowish, with brown dots and spots; the beard brown; the *palpi* yellow, with black pubescence and white hairs below. Frontal callus yellow-brown, in some specimens darker in the middle, short, broad, not reaching the eyes, the anterior border nearly straight, the posterior convex; the spot between the antennae small, ill-defined, brown. *Forehead* yellowish brown, darker on the vertex; the paired spots black, triangular, the apices touching the frontal callus. *Antennae* yellowish, densely covered with grey tomentum, at the apices black; the first joint short, robust, with black pubescence, the second small, with black hairs, the third slender, twice as long as the first. *Thorax* brown, with short silvery white tomentum, and three grey stripes all ending in a grey spot, but the median one the longest; the base of thorax and shoulders grey; *scutellum* brown, grey on the posterior border, pubescence at the sides brown; breast reddish brown. *Abdomen* the same colour as the thorax, the borders of the segments whitish, the sides of the first two segments grey; there is a trace of a grey stripe on the second segment only. *Legs* brown-black, the base of the tibiae white; the first joint of the fore tarsi nearly as long as the four remaining joints, which are broad and short; the middle and posterior tibiae reddish brown, with yellow rings; the base of the middle and posterior

first joint of the tarsi yellow. *Wings* brownish, the veins brownish, with an appendix; the apical band double; the openings of the posterior cells mostly light coloured.

Length 9 mm.

Type (male) differs in the third joint of the antennae being broader and shorter, the forehead grey, with a large oblong brown spot. The abdomen is redder brown, with a distinct grey stripe; the scutellum wholly grey, the fore tarsi not so broad, the wings and the base of the tarsi more white than yellow, the apical line of the wing broader. Ricardo, *Ann. Mag. Nat. Hist.* (7), xviii, p. 122.

The short first joint of antennae—shorter than the first annulation of the third joint—and the triangular shape of the yellowish frontal callus distinguishes this species from *H. tessellata*, Ricardo.

- (b) Both branches of apical band separate, starting from opposite borders of wing and usually overlapping in the middle.

***Haematopota bilineata*, ♀, n. sp.**

(Plate xviii, fig. 34.)

In Brit. Mus. coll. type (female) and another. In Indian Museum females, all from Igatpuri, Bombay, 2,000 ft. (H. Maxwell Lefroy).

A species distinguished by the narrow apical band of wing composed of two short lineal bands, each starting from opposite sides and overlapping at ends, the lower branch often broken up into spots, the wing is dark brown, with the pale markings distinct chiefly as small round spots, four rosettes are clearly outlined. The first joint of antennae is considerably incrassate. Face with a band and lower spot. Frontal callus narrow. Paired spots large, touching eyes and frontal callus. Abdomen brown with grey segmentations. Length type 7 mm., others 8—9½ mm. Distinguished from *H. cingalensis*, Ricardo, by the shorter incrassate first antennal joint.

Face grey, the band between antennae and eyes dark brown, in some specimens partially broken up into spots, an oblong brown spot is present below. *Palpi* pale reddish with black pubescence. *Antennae* dusky reddish, the first two joints shining black, the first joint incrassate, as long as first annulation of the third joint, the second very small, cup-shaped, both with black pubescence, the third slender, very little wider at base, and the apex not very narrow. Frontal callus shining, blackish brown, narrow, its upper border straight, the lower one concave in centre, a black spot apparent between the antennae. Paired spots large, black, oblong, their upper apices touching frontal callus, and their base reaching eyes, unpaired spot black, small. *Thorax* brownish with short yellow pubescence, stripes not apparent (denuded).

Scutellum similar. *Abdomen* brown with distinct grey segmentations. *Legs* blackish brown, the fore tibiae at base, and the other tibiae with two rings, yellowish, the base of posterior tarsi paler. *Wings* dark brown, with apical band as described, posterior cells with small pale markings in their apices, the transverse small bands small, chiefly appearing as spots, the stigma darker brown than the colouring of wing.

***Haematopota cingalensis*, ♀, Ricardo.**

(Plate xvi, fig. 15.)

Ann. Mag. Nat. Hist. (7), xviii, p. 119 (1906).

Type (female), 19th milestone, Candy Road, 1890 (Yerbury); two females from Tangleum, 1890 (Yerbury); and a series of females from Anaradhupura, Ceylon; 1899 (Oliver Bartholomew).

There is a note with Col. Yerbury's specimens to the effect that the species is common on the road near Tangleum in October and November.

This species is distinguished from *H. cordigera*, Bigot, by the paired spots not coalescing, by the longer first joint of the antennae, and by the fore legs being lighter in colour.

A dull greyish brown species.

Face grey; an oblong black spot under the antennae, and a black stripe reaching from the eyes half-way across to the lower edge of this spot, the colour above the spot being yellowish. Frontal callus pitchy brown, shining, with a concave fore border from which a black spot proceeds to between the antennae; the posterior border is produced in the middle; the paired spots are black, large, almost touching the eyes; the unpaired spot apparent, sometimes indistinct; forehead yellowish, grey at the sides. *Antennae* yellow; the third joint darker, its last three annulations dull black; the first joint curved, not quite so long as the third, the second joint very small. *Thorax* brown, with three well-marked grey stripes and four grey spots on its posterior border, the side ones ending at the suture in a spot; there are traces of short white pubescence on the dorsum; the breast is grey, with some white hairs. *Abdomen* light mahogany-brown or brownish, with light yellow borders to the segments and a well-marked grey stripe starting from the second segment; there are also distinct oblong grey spots on each side, beginning from the third segment; there is some short white pubescence, thickest on the yellow borders of the segments; the under side with grey tomentum. *Legs* reddish yellow, the fore tibiae white at base, or rather, with one narrow white ring on the basal half; the apical half black; the middle and hind tibiae with well-marked typical whitish rings. *Wings* greyish, with a yellowish brown stigma and yellow veins and an appendix; the rosettes and markings are distinct; the apical band in the type and other specimens is double, but in others the double

branch is only represented by two small spots, as shown in the photograph. Length 8 mm. Ricardo, Ann. Mag. Nat. Hist. (7), xviii, p. 119.

The first joint of the antennae is long and cylindrical, nearly as long as the third joint. Frontal callus narrow.

(C) *Apical band of wing single, formed of spots.*

Haematopota irrorata, ♀, Macquart.

(Plate xviii, fig. 30.)

Dipt. exot., i (1), p. 167, pl. xix, fig. 3 (1838); V d. Wulp, Sumatra Exped. Dipt., 19, pl. i, fig. 13 (1881); Ost. Sacken, Ann. Mus. Civ. Genova, xvi, p. 419 (1882); Bigot, Bull. Soc. Zool. France, xvi, p. 75 (1891).

? *Haematopota pungens*, Doleschall, Naturkund. Tijd. Nederl. Ind., x, p. 407, pl. iv, fig. 3 (1856).

Red. Antennae with the first joint elongated, cylindrical. Legs red, tibiae with white rings. Wings red with white spots (pl. 19, fig. 3). Length 4 lines, ♀

Palpi fawn coloured. Face of a yellowish grey colour. Forehead greyish brown, base shining black; an oval oblique dull black spot on each side of forehead, near the eyes and contiguous to the black spot at base. Antennae: the first two joints fawn coloured; the first one long cylindrical, the third joint wanting. Thorax fawn coloured; sides with scanty grey tomentum. Abdomen fawn coloured. Legs fawn coloured; tarsi brown; anterior tibiae with a whitish ring at base; intermediate and posterior tibiae with two yellowish white rings and apex brownish. Halteres brown. Wings a rather pale reddish brown, with scattered white spots; a whitish circle towards the middle of the marginal cell. From Java Museum. Macq., Dipt. exot., i (1), p. 167.

The ring in the figure of wing has a round white circle on fore border near stigma and another in the axillary lobe of wing, the apical band is only represented by small white spots. The type seen by me in Paris Museum in 1906 is almost destroyed, only the wings remaining.

Nine females from Grabak, Alahan and Lebong (Sumatra).

The specimen caught at Grabak corresponds the most to Macquart's description and figure, owing to its rusty colouring. All the others are darker, but cannot be specifically divided from it, as they do not differ in any important characters. Even the above-mentioned specimen from Grabak has the last segment of abdomen black-brown, always with pale red-yellow segmentations which indeed are also apparent on the anterior part of the abdomen. The figure furnished by Macquart does not give a very exact notion of the insect; the dark, instead of pale, spots on the wings cause the design to be unlike what it is in reality. The third antennal joint (which is missing in the specimen described by Macquart) is one and a half times as long as the first one, and

always black ; the short second joint the same and even the first one at least at the end is darker and very shining, in most specimens wholly black-brown. The pubescence on the face and chin is whitish. The fore legs are darker than the posterior ones, even in the palest specimens, mostly black, so that the white base of the tibiae stands out distinctly. The species can be well identified by the wings, which are almost wholly of a dark colour, the pale colouring being for the most part confined to small round points, which are not present on the border of wing at all ; an oblique series of these points runs through the cubital and basal cells, and the pale band which is present at the apex of wing in other species is here hardly outlined by a pair of spots on both sides of the upper branch of third vein ; the second basal cell is intersected by a pale band, a continuation of pale spots in the first basal cell, and this band continues strongly curved into the posterior angle of wing. It is not unlikely that Doleschall had a specimen of this species before him when he described *H. pungens* but his remarks are too short to make it possible to decide this point ; of the wings he only says that they have white spots and points, and his figure bears witness to the contrary, because it delineates the rows of points as distinct stripes. As I have already remarked, not much value can be attached to them ; however they are, on the whole, better than those of Macquart. V. d. Wulp, *Sumatra Exped. Diptera*, pl. i, fig. 13, p. 19.

Four females. Mt. Singalang, Sumatra, July 1878 (Beccari). I determine this species in agreement with Mr. V. d. Wulp who showed me three closely-allied species from Sumatra, but which could easily be distinguished by the arrangement of the spots at the tip of the wing. Macquart's description shows slight discrepancies. *H. pungens*, Dol. (Java), may be the same species, but the description is too incomplete. Osten Sacken, *Ann. Mus. Civ. Genova*, xvi, p. 419.

The following is a translation of the description of *Haematopota pungens*, by Doleschall :—

Red-brown, the abdominal segments with paler segmentations ; eyes brassy brown, wings dark with white spots and points, legs with indistinct white lines. Length 4 lines.

Numerous in the woods of the mountain Oenarang, and very troublesome to horses in the rainy season.

The figure given by Doleschall is useless as a means of identification.

In the British Museum are two females, one from Negri Sembilan, Malay Peninsula (H. V. Ridley), 1900, and the other from Kobele, N. Borneo (D. Cater), 1895, which I believe belong to this species judging from the wings and the rusty or reddish yellow colour of abdomen, darker at the apex. The wing as figured by V. d. Wulp does not show the round pale circle above the stigma or in the axillary lobe of wing, present in Macquart's type and figured by him ; in these specimens the one above the stigma is present, though not forming a perfect circle, the second one is

absent; the two spots forming the apical band and the small transverse bars usually formed of two spots continued round the posterior border of wing, and the absence of any pale markings in the apices of cell on posterior border of wing distinguish this species from others; two rosettes are fairly distinct. The frontal callus is broad, triangular, being produced on its upper border, the paired spots touch the eyes but not the frontal callus, an indistinct reddish spot appears between the antennae. The first joint of antennae is yellowish cylindrical, not quite so long as the first annulation of the third joint, the second joint yellow, the third is slender, dusky reddish, but black at apex. Legs: in one specimen the fore legs are blackish, in the other the same colour as the remaining ones, *viz.*, reddish, white at the base in both specimens.

(D) *Apical band of wing single, broad, band-like, reaching from outer to inner border of wing.*

Haematopota lunulata, ♀, Macquart.

Dipt. exot. Suppl. iii, p. 175, pl. i, fig. 6 (1847); V d. Wulp, Sumatra Exped. Dipt., 20, pl. i, fig. 14 (1881); Ost. Sacken, Berlin. Ent. Zeit., xxvi, p. 97 (1882).

Black. Antennae red at the base. Legs red, tibiae whitish. Wings brown, spotted with white, with a lunate spot (pl. i, fig. 6). Length 4 lines. ♀.

Palpi brown with white tomentum. Face with white tomentum. Forehead black with scanty grey tomentum; anterior callus black; a small dull black spot on each side at border of eyes and contiguous to the callus. Antennae: first joint fawn coloured, cylindrical, a little elongated, second and third black; third joint once and a half as long as the first. Thorax with scanty greyish tomentum. Abdomen dull brownish black; a little whitish at the segmentations; second segment with a dorsal triangular spot of white tomentum. Femora of a fawn colour inclining to brown; anterior tibiae incrassate, a little convex on the outer border, anterior half white; posterior half black; anterior and posterior white with black apex (*sic*); tarsi black, first joint of anterior pair fawn coloured. Wings with white spots and a lunate shaped white one at apex. From Java, from M. Payen. Macquart, Dipt. exot. Suppl. iii, p. 175.

One male from Moeara Laboe, and one female from Alahan.

Both agree so nearly with Macquart's description as regards the design of the wing that I do not hesitate to ascribe them to this species; a male from Silago probably belongs here but is not in good condition and is set in such a manner that it cannot be distinctly identified. The male from Moeara Laboe is 8 mm. long; the antennae are wholly black or black-brown; the first joint is little stouter than the following ones, and very shining; the eyes

have tolerably large facets above, below very small ones, the small triangular forehead is almost wholly occupied by the shining black frontal callus.

The legs are very dark brown, the fore legs black, except the basal third of the tibiae which is white; on the middle tibiae the white colour extends further, almost three-fourths of the length; the hind tibiae are distinctly incrassate, more red-yellow and only white at the base, on both sides with thick black-brown fringes of hairs.

The female is somewhat larger and has more wholly black antennae contrary to Macquart's account, who described the female only and called the first antennal joint red-yellow. The legs are also distinctly darker than Macquart's description would lead one to believe. The facets of the eyes are wholly very small. The ground colour of the wings is darker than that of the two preceding species, especially on the anterior part; the pale colouring consists of a large quantity of spots which are spread over almost the whole wing, but are absent at the apex, being there replaced by a very broad transverse band which is convex on its discal border, commencing at the apex of the second vein (radial vein), crossing the upper branch of the third vein and across the apex of wing, ending in the posterior border of wing (this is probably the moon-shaped form which was the cause of the specific name); the pale band intersecting the second basal cell ends in the posterior angle of wing, curving like a hook and forming with a pale spot situated on the anal vein a more or less eye-like form. V. d. Wulp, *Sumatra Exped. Diptera*, p. 20, pl. i, fig. 14.

Osten Sacken places the following remarks under the heading of *H. lunulata*, Macq. :—

H. sp. ?

All the specimens before me have the design on the wings like the above-quoted figure of v. d. Wulp, but some of them have the antennae reddish, except the latter part of the third joint which is black; and at the same time two whitish rings on the hind tibiae; the other group of specimens has altogether black antennae and only one white ring near base of hind tibiae. Neither of them agrees entirely with Macquart's description. Osten Sacken, *Berlin. Ent. Zeit.*, xxvi, p. 97.

Type in the Paris Museum seen by me in 1906. A small species. Frontal callus black, convex, reaching eyes, and the two usual black spots on forehead present. Legs yellowish with brown rings. Macquart's figure shows the apical band (his "lunule blanche") single, crescent-shaped, the same width throughout: v. d. Wulp figures it as broader and more irregular; in the apices of cells on posterior border he shows small pale markings, the third posterior cell appears paler with many white spots, the fourth and fifth and axillary angle of wing largely paler, only the first rosette at all distinct. Macquart's figure is useless except as regards the

drawing of the apical band. I have not seen any specimens of this species in the collections to which I have had access.

Haematopota latifascia, ♀, n. sp.

(Plate xvi, fig. 10.)

Type (♀) in Brit. Mus. coll. from Shillong, Assam (H. Maxwell Lefroy).

In Howlett coll. a female from the same locality.

A species distinguished by the broad band-like apical band of wing extending across the whole breadth of apex of wing, by the long stout first antennal joint, fully as long as the first annulation of the third joint, by the black band of face and the narrow frontal callus. It differs from *H. lunulata*, which it approaches in the shape of apical band, by the greater length of first antennal joint and by the presence of the black band on face. Length 9 mm.

Face covered with greyish tomentum, more yellowish brown in centre, the black band very distinct, reaching across from border of one eye to the other and extending more than half-way down the cheeks; pubescence on face white. *Palpi* fawn coloured, slender, with black pubescence and some grey tomentum. *Antennae* reddish yellow, the first joint stout, the same width throughout, the second one very small, both with black pubescence, the third joint dusky at apex, the first annulation moderately broad, the last three narrower; spot between antennae present, blackish. *Forehead* brownish, with grey circular markings, the pubescence black; the frontal callus blackish brown, narrow, almost straight on both borders, reaching the eyes, the paired spots large, blackish, almost touching it and contiguous to eyes at one point, unpaired spot present. *Thorax* reddish brown, with some reddish yellow short pubescence, stripes hardly apparent, sides greyish. *Scutellum* similar to thorax. *Abdomen* brown with greyish white segmentations and some greyish white hairs at sides; under side brown. *Legs* blackish brown, the base of fore tibiae, the rings on middle tibiae, the base and ring of posterior tibiae yellowish white, the basal joint of middle and posterior tarsi also pale coloured, the fore tibiae are slightly incrassate, the hind tibiae broad with thick black fringe of hairs on borders, thickest on the outer one. *Wings* brown, with three rosettes clearly outlined, the broad apical band starts from the junction of the second vein at border and crosses in an almost straight line to the inner border, which, commencing from the first posterior cell, has a continuous pale edging to the axillary angle; this is not quite so continuous in the second female; the small transverse bars between this and the rosettes are distinct, each usually taking up the whole breadth of the cell in which it is situated; the white spot above the stigma is conspicuous either as a round white circle or a plain spot; veins and stigma brown.

(E) *Apical band of wing single, narrow, not band-like, reaching from outer to inner border of wing.*

***Haematopota fuscifrons*, Austen.**

(Plate xvii, fig. 17.)

Ann. Mag. Nat. Hist. (8), i, p. 411 (1908).

Haematopota cordigera ♀, Bigot, Bull. Soc. Zool. France, xvi, p. 76 (1891); *id.*, Mem. Soc. Zool. France, v, p. 626 (1892); Ricardo, Ann. Mag. Nat. Hist. (7), xviii, p. 125 (1906).

Antennæ yellow, the first joint cylindrical, the third not at all swollen, blackish toward the apex, about twice as long as the axis of head; palpi whitish, proboscis brown, face and beard white; a large wide shining black spot above the antennae; and beyond this on the pale ashy grey forehead a large dull black cordiform spot, vertex brownish; thorax dull reddish with three greyish stripes, sides with white tomentum, scutellum chestnut coloured, greyish in the middle; squamae greyish, halteres pale yellow; abdomen blackish, and little shining, all the segments narrowly bordered with white; femora yellow, the base and apex brownish, the anterior pair blackish, anterior tibiae black with the base white and the tarsi black, intermediate and posterior tibiae with the base, apex and median ring black, white above the latter and reddish below, their tarsi black, yellow at the base; wings grey, with numerous whitish spots dispersed in irregular series, and at the apex a transverse concave straight simple whitish band.

Length 9 mm. Bengal, one specimen. Bigot, Mem. Soc. Zool. France, v, p. 626.

Type from India.

This species is easily distinguished by the colouring of the forehead, by the cylindrical antennae, and by the rings on the middle and posterior tibiae.

Face grey, no spots except faint traces of two below the antennae. *Palpi* yellow with black pubescence; beard white. Frontal callus dark brown, shining, reaching the eyes, broad, bordered in front by a shining yellow narrow band, which is continued between the antennae instead of the usual black spot. *Forehead* grey, with a large brown-black heart-shaped spot in place of the usual paired spots; it joins the posterior border of the frontal callus and almost reaches the eyes at the sides; becoming narrower on its posterior half it is continued to the vertex as a broad stripe. *Antennae* yellow, long, slender, but not so long as those of the preceding species (*H. indiana*, Bigot), the first joint being not much more than half as long as the third, the second joint short, both with black pubescence; the third with the extreme apex dusky. *Thorax* brown, with grey shoulders and grey stripes, ending in spots at the suture; grey spots at the base; the sides are also grey, as is the breast which has white hairs. *Scutellum* brown, grey in the centre. *Abdomen* dark brown, with distinct white borders to the segments, but no sign of stripe

or spots; the under side brown, with grey tomentum. *Legs* yellowish brown; the fore tibiae white at base, the middle and posterior tibiae with the typical rings, and the basal joint of the tarsi whitish. *Wings* pale brown, with brown veins and an appendix: the apical band single, broad and curved. Length 8 mm. Ricardo, Ann. Mag. Nat. Hist. (7), xviii, p. 125 (1906).

Haematopota fasciata, ♀, n. sp.

Type (female) from Howlett collection, Shillong, Assam, and another in Howlett collection from same locality.

A species allied to *H. latifascia*, n. sp., but distinguished from it by the narrower, more irregular apical band, by the first joint of antennae being less cylindrical but more incrassate or globular, as long as the first annulation of the third joint, by the band of face being indistinct, broken up into brown spots, and the hind tibiae are not incrassate and are less heavily fringed. Length 8 mm.

Face greyish with white pubescence, the band is represented by an upper and a lower brown spot. *Palpi* reddish yellow, slender, with black pubescence, and some longer white hairs below. *Antennae* reddish yellow, the first joint shining, slightly narrower at base, incrassate, almost bare of pubescence, the second joint small with black hairs, the third joint dull red at base and then blackish, narrow; the difference between the antennae and those of the preceding species is not very marked. *Forehead* greyish with black pubescence. Frontal callus blackish brown, narrow, almost straight on both its borders, spot between antennae black; paired spots black, touching eyes and frontal callus; unpaired spot present. *Thorax* blackish with short appressed yellowish hairs, and some grey tomentum. *Scutellum* similar. *Abdomen* reddish brown, redder on basal segments, with distinct pale segmentations clothed with short yellowish hairs which are also scattered over dorsum, sides with white hairs; under side reddish yellow. *Legs* reddish yellow, fore pair blackish, the base of fore tibiae white, middle and posterior tibiae with faint brown typical rings which are fairly distinct however on the other female, apical joints of all tarsi blackish. *Wings* very similar to those of *H. latifascia*, but the apical band is not band-like but narrower and irregular, reaching across the whole width of wing however or very nearly so, broadest at its base, the inner border with a less pronounced pale edging.

(F) *Apical band of wing single, narrow, not band-like, short, not reaching from outer to inner border of wing.*

Haematopota inconspicua, ♀, sp. n.

(Plate xviii, fig. 31.)

In Brit. Mus. coll. Type (female) and another from Igatpuri, Bombay (presented by H. Maxwell Jefroy). In Indian Museum females from same locality and collector (1904).

A small species with brown wings, the apical band single, short, and five distinct small transverse white bars on posterior border of wing in the submarginal, first, second, third and fourth posterior cells, distinctly divided from the rosettes and almost touching the pale marks in the apices of these cells. Frontal callus black, shining, narrow, reaching the eyes, the paired spots large, touching it. Antennae reddish yellow, the first joint about half as long as the third one. Face with narrow black band and a black spot between the antennae. Abdomen brown with grey segmentations. Length type 7 mm., the other specimens $6\frac{1}{2}$ — $7\frac{1}{2}$ mm.

Face grey with white pubescence, with narrow black or brown band between eyes and antennae and below on each side touching eyes a brownish or black spot almost joining or distinct from the band. *Palpi* dull reddish yellow with pale pubescence. *Antennae* dull reddish yellow, the first two joints with black pubescence, the first joint cylindrical, not incrassate, the second small, round, about a third of the size of the first joint, the third joint slender, the first annulation a little dilated and broader than the three last ones. *Forehead* yellowish grey, broad, the paired spots large, almost round, not quite touching the eyes on the frontal callus, the unpaired spot small, round. Frontal callus black, narrow, a little produced on its upper border; a black spot is present between the antennae. *Thorax* brown with three distinct yellowish grey stripes interrupted at median suture, base of thorax with a grey border; sides of thorax yellowish grey; breast grey. *Scutellum* same colour as thorax or more reddish brown. *Abdomen* reddish brown with distinct grey segmentations, no spots visible, pubescence short and fulvous; under side similar. *Legs* reddish brown with base of fore tibiae, two rings on middle and posterior tibiae and basal joints of middle and posterior tarsi yellowish, the fore tibiae hardly incrassate, pubescence of legs nowhere thick or noticeable. *Wings* pale brown, the pale markings very distinct, the apical band single, short, three rosettes distinct, from the centre of the lower one situated in the apex of the second basal cell a curved white line starts, crossing the anal cell into the axillary angle of wing, reaching the posterior border, produced to a point in the middle of the axillary angle; stigma and veins reddish brown.

***Haematopota immaculata*, ♀, n. sp.**

(Plate xviii, fig. 33.)

In Howlett coll. type (female) and others from Kanara, Bombay, and from Bombay.

A species allied to *H. inconspicua*, n. sp., but distinguished by its larger size, the greater length of the first joint of *antennae* (more than half as long as the third joint), by the absence of any black spot between the antennae, and of any black band on the face, though a spot is usually present below on each side. Frontal

callus is wider and with its borders straight, the paired spots are smaller and further removed from the frontal callus. *Thorax* with no stripes visible as a rule, brown with short fulvous pubescence. *Scutellum* similar. *Abdomen* brown or blackish brown with some greyish yellow tomentum which in some specimens appears as lateral spots, but in the type the colour of abdomen is uniform with some pale yellowish pubescence at sides. *Wings* very similar to those of *H. inconspicua*, n. sp., the apical band similar, and the transverse bars near posterior border of wing, but on the border there are no light markings in the apices of the cells. In all other respects similar to *H. inconspicua*, from which however it is very distinct. Length type 8 mm., others 8—9 mm.

Group VII.

Antennae long and slender, the first joint as long as the second and third together.

Haematopota cilipes, ♀, Bigot.

Nouv. Archiv. Mus. d'Hist. Nat. Paris (3), ii, p. 205 (1890); *id.*, Bull. Soc. Zool. France, xvi, p. 77 (1891); Ricardo, Ann. Mag. Nat. Hist. (8), i, p. 57 (1908).

Length 11 mm.

Antennae chestnut coloured, elongated, the first segment not incrassate, as long as all the others taken together, the third joint at base very much longer than the apical ones together; palpi and face ashy grey, beard white; forehead black-brown, at the base shining chestnut coloured, marked with two lateral black spots; the whole body black-brown. *Thorax* ashy grey behind, with narrow margins, pleurae ashy grey; calyptrae and halteres brown; wings almost black with white markings and spots; anterior and posterior tibiae fringed below with thick short black hairs, anterior legs black, tibiae at base white, intermediate femora and tarsi dull chestnut coloured, intermediate tibiae pale fulvous, base, apex and median ring brown, posterior legs similarly coloured, femora above with long white pubescence.

Antennae rather slender, much longer than the head, brownish, at the base slightly reddish, the first joint narrow, the first annulation of the third joint much longer than the following ones together; palpi and face grey; beard white; forehead blackish, a transverse irregular callus above the base of the antennae, shining red, two black spots near the eyes; body wholly blackish, with the posterior border of thorax and of the abdominal segments very narrowly bordered with grey colour; calyptrae and halteres brownish, wings blackish with white markings and rather scattered spots; *anterior* and *posterior* tibiae shortly and densely fringed black; anterior legs black, the tibiae whitish at base, intermediate and posterior legs brownish, the tibiae fawn coloured, black at base and apex, ornamented with a median black ring, the posterior femora furnished above with white hairs. Laos 1 specimen.

The conformation of the antennae and in particular the hairiness of the tibiae as well as the posterior femora might establish this species as a new genus, divided off from the old genus *Haematopota*, which perhaps itself is very little homogeneous. Bigot, *Nouv. Archives Mus. d'Hist. Nat. Paris*, 1890 (3), ii, p. 205.

The type came from Laos, a district of Siam, and was seen by me in the Paris Museum after my paper on *Haematopota* had gone to the printers.

It should go in the table published on p. 114 of the *Ann. Mag. Nat. Hist.* (7), xviii (August 1906), under the heading "15", preceding *H. lata*, Ricardo, thus:—"Black species, with all the tibiae densely fringed and the posterior femora with white hairs on their lower border." The hind tibiae have a very thick black fringe, and with the white-haired femora should easily distinguish the species. The antennae are long, the first joint being longer than the second and third together and is a little incrassate; the second is very small, the third rather long and slender. The wings are of the ordinary type and have three distinct rosettes, the apical band reaching across the apex; the appendix is long. The frontal callus is large, reddish, with the black paired spots above. Ricardo, *Ann. Mag. Nat. Hist.* (8), i, p. 57.

UDENOCERA, Ricardo.

Ann. Mag. Nat. Hist. (7), xiv, p. 352 (1904).

This genus is nearly related to the two South American genera *Diachlorus*, Ost, Sack., and *Acanthocera*, Macq., and is formed for a species from Ceylon which bears a general resemblance to the latter genus, but is distinguished from it by the absence of a tooth on the third joint of the antennae, which also divides it from *Dichelacera*, Macq. It is distinguished from *Diachlorus* by the length of the first joint of the antennae, which is nearly as long as the third joint, and by the altogether longer slender antennae, the third joint being cylindrical; the fore tibiae are neither curved nor broader; these differences, together with the presence of a tubercular projection situated more than half-way down the face on which the antennae are placed, seem to justify the formation of a new genus.

Generic characters.—Antennae long, cylindrical, with no tooth or projection on the third joint; the first joint is quite two-thirds the length of the third joint, the second more than half as long as the first joint, the third joint has the first division as long as the four last divisions together, the latter being of equal length, with the exception of the last one, which is a little longer, ending in a blunt point; they are situated on the lower edge of a protuberant tubercle which reaches the eyes on each side and is itself placed more than half-way down the face; the forehead is long, gradually narrowing to the vertex. The palpi are *Tabanus*-like in shape, ending in an acute point. The abdomen is long and narrow,

the same width throughout. The wings are longer than the body and rather large. The legs are long and slender.

Udenocera brunnea, ♀, Ricardo.

(Plate xvi, fig. 8.)

Ann. Mag. Nat. Hist. (7), xiv, p. 355 (1904).

Three females from Kandy, Ceylon (Yerbury). The type is numbered 31, 5, 92, the others 18, 5, 92 and 30, 5, 92.

Brown. *Face* shining brown below the antennae, forming a triangular convex tubercle, with the apex reaching the proboscis, and longer than the cheeks; on each side of the face is a brown shining stripe bordering the eyes for a short distance and then the facial tubercle to its apex; the cheeks are ashy grey, with long white hairs. The proboscis short, the *palpi* nearly as long; the first joint short, the second stout at its base, curved, ending in a point, yellow, with black pubescence. The first two joints of the *antennae* yellow, with black pubescence, the third black; the antennal tubercle brown, shining, grey below; the *forehead* brown, shining, convex in the middle, with a transverse groove near the tubercle. Eyes bare, the facets of equal size; on the posterior border the eyes project beyond the vertex of the forehead. *Thorax* brownish, shining, with indistinct linear yellow stripes on each side, yellow at the sides; the breast brown with black hairs, then grey with whitish hairs. *Scutellum* yellow-brown at extreme base, with yellow pubescence. *Abdomen* of a uniform brown, somewhat shining, with brown pubescence, the under side yellowish at the base. *Legs* pale yellow, with the femora, apices of tibiae and apices of all the joints of the tarsi except the first one brown; the last joint of the tarsi wholly brown, with pulvilli and claws; the pubescence of the legs is yellow on the yellow parts and black on the brown parts. *Wings* hyaline, the veins yellowish brown, the fore border and the apex brown; some light spaces are apparent in the brown of the apex; the brown shading extends along the posterior border faintly into the fourth posterior cell; on one wing of the type the apical brown is reduced to a shading of the veins.

Length 11 mm.

♂. Four specimens from Kandy, Ceylon, are evidently the males of this species though differing in colouring, being reddish yellow.

Eyes.—The large facettes occupy two-thirds of the eye, reaching the upper end of frontal triangle. *Face* ashy grey with some weak brownish hairs. Beard white. *Palpi* short and stout, yellow with greyish tomentum and brown hairs. Antennal tubercle not quite so protuberant as in female. Frontal triangle blackish with grey tomentum. *Thorax* bare, chamois-coloured, with a few long yellowish hairs on dorsum and shorter ones. *Scutellum* the same, covered with greyish tomentum. *Abdomen* reddish yellow, shining,

darker and narrower at apex, some black short pubescence on dorsum, with some yellow hairs at the segmentations. *Wings* with the brown colouring fainter.

The specimen named by Walker *Chrysops parallelus*, and referred by me doubtfully to *Diachlorus* [see Ann. Mag. Nat. Hist. (7), ix, p. 372 (1902)], from Batjan Island (Batchian) (Wallace coll.), may possibly belong to this genus; but the antennae are wanting, the formation of the forehead, of the antennal tubercle and face, besides the shape of the abdomen and legs, agrees with that of the species described above.

NEOTABANUS, gen. nov.

This genus is formed for a species from Ceylon not unlike a *Tabanus* species in appearance, but distinguished from any species of *Tabanus* known to me by the prominent tubercle below the forehead where the subcallus is usually situated, bearing the antennae, and by the narrow forehead with *no frontal callus* or other spots visible, the narrowest part of the forehead is at the vertex. No ocelli present. Hind tibiae with no spurs. Antennae are *Tabanus*-like, the first two joints short, the third slender with a very slight angle at base, and composed of five divisions. The genus therefore belongs to the division Tabaninae, and is allied to *Udenocera*, Ricardo, in the possession of the antennal tubercle, but differs in the shape of antennae.

Neotabanus ceylonicus, ♀, n. sp.

Two co-types ♀ from Pundaluoya, Ceylon.

A species not unlike a *Tabanus* species, with a blackish thorax and a brownish abdomen, covered with yellowish grey tomentum and some scattered pale yellow pubescence. Antennae and legs yellowish red. Wings hyaline, tinged yellow on the fore border. Length 12—13 mm.

Face greyish yellow with some greyish tomentum, the cheeks with long blackish hairs, below and on face some pale yellow hairs are discernible, face with small foveae on each side below antennae. Beard pale yellow. *Palpi* red or yellow with long pubescence, chiefly black, but whitish on outer sides and at base, the first joint very small, the second swollen, curved, ending in an obtuse point, nearly as long as the short proboscis. *Antennae* reddish, the third joint black, the first two joints with black pubescence, the first joint short, stout, nearly as broad as it is long, the second small, roundish, barely half as long as the first joint, the third slender, slightly wider at base, the last four divisions narrower, the last division longer than the preceding ones, some black hairs present at each segmentation. *Forehead* brownish with black pubescence, the tubercle projecting above the plane of forehead, shining reddish brown with traces of grey tomentum, placed below the eyes, and rounded off below, divided in the middle, so that

each antenna may be said to be surrounded by a tuberculous base, the forehead is narrow, about three times as long as it is broad anteriorly above the tubercle, at vertex about half as broad as it is anteriorly. *Thorax* blackish brown with traces of grey tomentum, with some appressed yellowish pubescence, and scattered black hairs on dorsum, thick at sides which with shoulders are lighter in colour. *Scutellum* similar to thorax. *Abdomen* yellowish brown with some grey tomentum, with appressed yellowish pubescence and some short black pubescence, sides with yellow hairs; under side similar. *Legs* reddish yellow, pubescence on femora chiefly yellowish white, yellow and black on tibiae and tarsi. *Wings* hyaline with the usual neuration of *Tabanus* species, short appendix present, fore border narrowly tinged yellow, veins yellow.

DIACHLORUS, Osten Sacken.

Diachlorus flavipennis, ♀, Macquart.

Dipt. exot. Suppl. iv, p. 339 (1850).

Thorax black. Abdomen red, with the apex brown. Antennae and legs red. Wings yellow, unspotted. Length $4\frac{1}{2}$ lines ♀. Palpi pale yellow. Face with whitish tomentum, sides shining black, as well as the forehead. Antennae pale fawn coloured. Thorax (denuded) shining black, traces of whitish tomentum, a fawn-coloured spot at base of wings. Abdomen shining (denuded), rather narrow and elongated; the three first segments dark fawn coloured, with a dorsal brown stripe; the four others black with fawn-coloured segmentations; under side black with grey tomentum and fawn-coloured segmentations. Legs fawn coloured; posterior femora blackish. Wings a little yellowish, at base and on outer border yellow; neuration normal.

From the Philippines. M. Bigot. Macquart, Dipt. exot. Suppl. iv, p. 339.

Subfamily PANGONINAE.

Hind tibiae with spurs. Ocelli usually present.

The following table is drawn up for those genera only which are represented in the Oriental Region:—

- | | | | |
|----|---|----|-------------------------------------|
| 1. | Third joint of antennae with eight or at least seven divisions. Proboscis usually prolonged | . | 2 |
| | Third joint of antennae with five divisions. Proboscis short | . | 3 |
| 2. | Proboscis long. First posterior cell of wing open. Eyes hairy | .. | <i>Diatomineura</i> , Rond. |
| | Eyes bare | . | Subgenus <i>Corizoneura</i> , Rond. |
| 3. | First and second joints of antennae short | .. | 4 |
| | First and second joints of antennae long | .. | 7 |

- | | | |
|----|---|--------------------------------|
| 4. | Face concave in the middle . . . | <i>Rhinomyza</i> , Wied. |
| | Face not concave in the middle | 5 |
| 5. | Third joint of antennae with an acute spine on the first annulation | <i>Gastroxides</i> , Saunders. |
| | Third joint of antennae simple | 6 |
| 6. | Second joint of antennae shorter than the first joint. | |
| | Wings usually hyaline | <i>Silvius</i> , Meigen. |
| 7. | Second joint of antennae as long or nearly as long as the first joint. Wings usually with a black or brown design | <i>Chrysops</i> , Meigen. |

The genus *Mycteromyia*, Philippi, is not included in the table owing to the uncertainty of the genus and of the one species recorded from India.

PANGONIA, Latreille.

This genus was subdivided by Rondani into four genera: *Pangonia* and *Erephopsis* with the first posterior cell closed, *Diatomineura* and *Corizoneura* with it open. The only genus as yet represented in the Oriental Region is *Corizoneura* with two species, not including the doubtful *Pangonia amboinensis*, Fabr.

Corizoneura longirostris, Hardwicke.

Trans. Linn. Soc. London, xiv, p. 135, pl. vi, fig. 5—6 (1823) (*Pangonia*); Wied., Auss. zweifl. Ins., ii, p. 621 (1830) (*Pangonia*); Gay in Griffith's Cuvier Anim. King., xv, pl. cxiv, fig. 3 (1832) (*Pangonia*); Macq., Ann. Soc. Entom. France, vi, p. 429, pl. xv, figs. 20—23 (1837) (*Pangonia*); Röder, Stett. Entom. Zeitg., xlii, p. 384 (1881) (*Pangonia*); Ricardo, Ann. Mag. Nat. Hist. (7), v, pp. 167 and 168 (1900).

Pangonia with yellow hairs, thorax ferruginous, abdomen black-brown; margins of segments yellow, wings unspotted (pl. vi, figs. 5 and 6). Rostrum about twelve times longer than the head. Antennae approximated at the base, short, consisting of three pieces, the two lowest of which are very small, the upper one long, tapering to a point, and composed of eight small articulations. Eyes large, very prominent. Head and thorax very hairy both above and beneath, longer under the throat; of a bright yellow beneath, brownish above. Wings longer than the abdomen, hyaline; costal nerves brown. Body black; the margins of each segment shining, the sides hairy. Halteres short, having the shafts yellow and the knobs ovate, black. Length of the insect from the base of the rostrum to the apex of the abdomen ten lines; and of the rostrum two inches and a half. Hardwicke, Trans. Linn. Soc. London, xiv, p. 135. Hardwicke's figure of wing has the first posterior cell very narrow, but not quite closed at border.

Gay, in Griffith's Cuvier Anim. Kingdom, xv, p. 696, pl. cxiv, fig. 3, gives in the figure of *P. longirostris* the wing with the

first posterior cell closed and the proboscis nearly three times the length of the body.

Macquart in Ann. Soc. Entom. France, vi, p. 429, only refers to the species in a general article on the genus *Pangonia*.

Röder, after some remarks on the descriptions given by other authors, more especially by Wiedemann who probably did not know this species, adds, from a specimen he had from Allahabad, the following particulars:—

The two first antennal joints are brownish black the third quite black. The two first furnished on the upper and lower sides with long black hairs. The long face is covered with yellow tomentum. Palpi yellow. Ocelli absent. The very long proboscis black, but not two and a half inches long as Wiedemann gives, but only 1 inch 7 lines; my specimen is only 9 lines long. The beard on cheeks and chin is long, yellow, but the forehead clothed with short black hairs. The thorax has a brown ground colour, covered with longer pale brown hairs, which are quite pale yellow on the lateral borders and breast sides, so that two paler stripes thus appear on the side borders. The scutellum is brown like the thorax and with the same pubescence. The abdomen is reddish at the sides, dark brown in the middle, the pubescence is more golden yellow. Under side of abdomen yellow, becoming brownish towards the apex. The legs are wholly yellow. The first two joints of fore tarsi are wider in a peculiar form, the tarsal joints of the fore legs increasing in length.

On the two hind pair the metatarsus is longer than the other tarsal joints together, the legs have only very sparse yellow pubescence. Wings tinged yellowish, the upper fork of the third vein with an appendix. The first posterior cell is rather narrower at its apex. Wings longer than the body. Halteres not so short as Wiedemann gives, with a pale stalk and browner head. Röder, Stett. Entom. Zeitg., xlii, p. 384.

The males have the prolongation on fore tarsi as in some African species. Röder mentions it. One or two of the females have long bristles on these joints. The first posterior cell is closed in some of the females with a short petiole. Two males, one of which was wrongly labelled "*amboinensis*, Fabr.," seem a variety of this species, having no prolongation on the fore tarsi; the third joint of antennae is bright red, not black. The yellow colour on the abdomen is more prominent; the face is shining and dark, with hardly any greyish pubescence.

Hab.—North-West India; Muktesar, North-West Provinces (Lingard); Thibet (Landor). Ricardo, Ann. Mag. Nat. Hist. (7), v, p. 168 (1900).

This species is easily recognized by the very long proboscis, the first posterior cell of wing is usually open, though it varies in degree, often being so very narrow that it appears closed at the border, but is never pedunculated. The males mentioned above as differing slightly from the typical form will belong to the subspecies given below.

***Corizoneura longirostris*, Fabr., subsp. *varipes*, subsp. nov.**

The males with no prolongation on the first two joints of fore tarsi and the females with these joints not at all prolonged cup-like appear to be a distinct subspecies of *C. longirostris* distinguished by the plain fore tarsi and also by the bright reddish third antennal joint, the first two joints being reddish grey with black hairs, by the shining reddish brown face, no grey or yellow tomentum covering it, and by the abdomen being usually more largely reddish yellow, the first three segments being almost wholly so, with only median blackish spots, the remaining segments blackish with reddish segmentations covered with short yellow hairs.

Male specimens of this subspecies in Brit. Mus. coll. from Nepal (Hardwicke bequest); and from Darjiling (G. C. Champion, 1895).

In Indian Museum from Sikhim; Trivandrum, Travancore; Sadiya, Assam; Margherita, Assam; Himalayas.

***Corizoneura taprobanes*, ♀, Walker.**

List Dipt. v, Suppl. i, p. 324 (1854) [*Pangonia*].

Ricardo, Ann. Mag. Nat. Hist. (7), v, p. 167 (1900); *Pangonia rufa*, ♀, Macq., Dipt. exot. Suppl. iv, p. 322 (1850), *nomen bis lectum*.

I believe the type of *taprobanes* is the same as the species described by Macquart as *P. rufa*, but I have not seen this last type. The species belongs to the subgenus *Corizoneura* probably, though Macquart describes his type as having the first posterior cell closed; in most of the specimens I have seen it is open, varying in width, but in two specimens it is so narrow that it might almost be called closed. Walker's name must take precedence as Macquart described another *P. rufa* from Peru in 1838.

In Brit. Mus. coll. the Walker type ♀ from Ceylon (Templeton); others from Karwar, N. Canara, India (Bell); Bangalore; Nilghiri Hills, 6,000 feet (Hampson); Periyakulam, Kandy and Trincomalee (where it is stated to be very common), Ceylon (Yerbury).

In Indian Museum specimens from Bangalore (common), Arnadi, Melghat, Berar, 1,800 feet (I. H. Burkill) (1908).

Thorax black, with red pubescence. Abdomen red with dorsal black spots. Eyes naked. Antennae and legs red. Wings with the second submarginal cell appendiculated.

Length 6 lines ♀, proboscis as long as the body. Palpi brown. Beard yellow. Face black, with some grey tomentum. Forehead black, sides with yellowish tomentum; ocelli present. Antennae a light fawn colour. Thorax with indistinct bands. Abdomen fawn coloured; the first four segments with transverse black spots; the three last with black bands on the anterior borders; segmentations yellow; under side wholly of a testaceous fawn colour. Legs fawn coloured; coxae brown. Wings reddish, second submarginal cell with a long appendix; the first posterior closed.

From Bombay. M. Fontanier. Museum. Macq., Dipt. exot. Suppl. iv, p. 322.

A species with a comparatively short proboscis, about the length of the whole insect, with a reddish yellow abdomen marked with median black spots and white or yellowish segmentations on the apical segments. Thorax blackish with two well-marked stripes. Antennae and legs reddish yellow. Palpi with the second joint shorter than the first (female). Length (without proboscis) males 14—17 mm., females 13—18 mm.

♂ *Face* black, protuberant, covered more or less with greyish tomentum, cheeks-black but densely covered with greyish yellow tomentum and with yellow hairs. *Palpi* brown, the second joint nearly as long as the first joint, slightly pointed, with short black hairs, first joint with some longer yellow hairs at its base. Beard pale yellowish or white. *Antennae* bright reddish yellow, the first two joints dull yellowish grey, with some long yellow hairs, the third joint bare. *Forehead* covered with yellowish grey tomentum and with pale pubescence. *Eyes* not quite contiguous. *Thorax* blackish brown with yellowish sides and two yellowish grey tomentose narrow stripes, these and the whole dorsum with fairly thick yellow pubescence, sides and breast with yellowish pubescence. *Scutellum* blackish brown with a yellowish grey tomentose outer border and with yellow pubescence. *Abdomen* pale reddish yellow, the first segment with a median black spot which extends anteriorly to the sides, the second and third with broad transverse black marks, the fourth with a narrower one, the last two almost wholly black, with whitish grey or yellowish segmentations, on the second and third these are slightly indicated on the centre, all segmentations with yellow hairs, which are white on the last two or three, some scanty black pubescence appears even on the yellow parts and also on the black parts; under side paler, only blackish at extreme apex, segmentations with white hairs. *Legs* light reddish yellow, coxae black, posterior tibiae and all tarsi at apex brownish, pubescence on femora yellowish, elsewhere chiefly black. *Wings* hyaline, fore border pale yellowish, veins brown, first posterior cell open.

♀ *Palpi* brown, the first joint long, narrow, about one and a half times as long as the second joint, which is slightly incrassate and awl-shaped. *Forehead* almost twice as broad anteriorly as it is at vertex, covered with yellowish grey tomentum and with two distinct brown stripes which start from vertex and reach more than half-way towards antennae, pubescence anteriorly black, posteriorly yellow.

The species is at once distinguished from *C. longirostris*, Hardw., by the shorter proboscis which is rarely longer than the body.

Pangonia amboinensis, Fabr.

Syst. Antl., p. 91 (1805); Latr., Encyclop. Méthod., viii, p. 704 (1811); Wied., Dipt. exot., i, p. 53 (1821), et Auss. zweifl. Ins., i, p. 92 (1828); Ricardo, Ann. Mag. Nat. Hist. (7), p. 167 (1900).

Thorax with indistinct stripes ; abdomen above brown ; margins of segments testaceous, white below. Head with ashy grey pubescence, antennae ferruginous and at apex brown. Thorax brown with white indistinct stripes. Abdomen brown above, the segmentations testaceous. Body below pale. Legs testaceous. Fabr., Syst. Antl., p. 91.

Head with ashy grey hairs, its vertex is blackish. Antennae are fawn coloured. Thorax is blackish almost striped with white. Abdomen blackish above, the borders of segments of a yellowish fawn colour, under side of abdomen pale. Legs of a yellowish fawn colour. The insect was brought from Amboina by M. Labillardiere. Latr., Encyclop. Méthod., viii, p. 704.

Brown ; thorax with white stripes ; abdomen with side spots and segmentations ferruginous ; under side pale red (or chamois leather coloured). Six lines ♀ From Amboina.

Antennae and palpi rusty yellow. Face chamois leather coloured. Beard whitish. Thorax with yellow pubescence ; breast sides mouldy grey coloured. The side spots of abdomen are situated on the first three segments ; on the others the side borders are also rusty brown ; segmentations with yellow little hairs. Wings brownish grey. In Fabricius's coll. Wied., Auss. zweifl. Ins., i, p. 92.

This species may possibly be the same as *Corizoneura ruja* or *Corizoneura longirostris*, subsp. *varipes*, but as no mention is made of the length of the proboscis nor of the first posterior cell of wing it is impossible to decide without seeing the type or specimens from further east ; I have seen no specimens of the genus beyond Malaysia.

RHINOMYZA, Wied.

Rhinomyza fusca, ♀, Wiedemann.

Nova Dipt. Gen., 8 (1820) ; *id.*, Dipt. exot. i, 59 (1821) ; St. Farg. et Serv., Encyclop. Méthod., x, 544 (1825) ; Wied., Auss. zweifl. Ins., i, 104, pl. i, fig. 3 (1828) ; Jensen, Bullet. Soc. Imp. Nat. Moscow, iv, 323 (1832) ; Macq., Suites à Buffon, i, 196 (1834) ; Ricardo, Ann. Mag. Nat. Hist. (7), viii, 289 (1901).

Brown ; base and middle of abdomen rusty yellow ; wings brown with two yellow spots, 6 lines ♀ From Java. Wiedemann, Nova Dipt. Gen., p. 8. Antennae black ; a tooth-like prolongation at the base of the last joint ; face yellowish brown, concave. Thorax slightly shining, brown with brown down ; sides of breast with a yellow spot. First segment of abdomen rusty yellow, in the middle a little brownish, the second dull brown narrowly whitish at the base, third and fourth rusty yellow in the middle, brown at the sides and on posterior borders, the others brownish black. Wings at extreme base and a median and smaller apical spot yellowish. Pleurae blackish brown with brown fringes of hair. Halteres brownish with yellow club. Legs blackish brown. In Westermann's collection. Wied., Auss. zweifl. Ins., i, p. 104.

The other references are merely copies of the original descriptions, the insect apparently not being known to the authors. It is unknown to me.

GASTROXIDES, Saunders.

Trans. Entom. Soc. London, iii, p. 59 (1841).

Ditylomyia, Bigot, Rev. et Mag. Zool. (2), xi, p. 305 (1859).

This last genus was formed for one species from Ceylon, which, however, on examination proves to be a specimen of *Gastroxides*, Saunders, a genus in the division Pangoninae: see Ricardo, Ann. Mag. Nat. Hist. (7), viii, pp. 289, 297 (1901). (*G. ater*, ♀, Saunders, *l.c.*, pl. v, fig. 4; ♂, Saunders, *l.c.*, etc., should read thus, not as printed on page 298.)

Ricardo, Ann. Mag. Nat. Hist. (7), xiv, p. 372.

Gastroxides ater, ♂ ♀, Saunders.

(Plate xvi, fig. 9.)

Trans. Ent. Soc. London, iii, p. 59, pl. v, fig. 4, ♀ (1841); et iv, p. 23, pl. xiv, fig. 3, ♂ (1847); Loew, Dipt. Südafrik., p. 15 (1860); Ricardo, Ann. Mag. Nat. Hist. (7), viii, p. 298 (1901); et (7), xiv, p. 372 (1904).

Head transverse, with three ocelli placed in an equilateral triangle on vertex; proboscis straight, inclined downwards, about as long as the head. Antennae rather longer than the head, three-jointed: first joint cylindrical, twice as long as the second, which is longer than broad; third joint a little longer than the two first, with four distinct rings dividing the joint into five divisions, the first of which is as long as the four following, and produced at the bases on the superior part into an acute spine pointing forwards, the four last divisions equal in length. Thorax oval, rather broader than the head. Abdomen seven-jointed, ovato-conical, terminating in an acute point. Legs long and slender.

♀ Coal-black, hairy; the wings of a black-brown, with a yellowish irregularly oval spot crossing the middle of the disk, and a smaller spot of the same nature towards the apex. Expansion 1 inch, length $\frac{1}{2}$ inch. From Central India. In my own collection.

Obs.—This genus approaches nearest to *Tabanus* but differs in having ocelli, in the antennae, and in the shape of abdomen. Its approach to other genera of the family Tabanidae is also evident, but it differs from all the genera I am acquainted with, and therefore I have made it the type of a new sub-genus under the name of *Gastroxides*, in allusion to the shape of the abdomen, which is unusual in the family to which the insect belongs. Saunders, Trans. Ent. Soc. London, iii, p. 59.

♂ Differs from the female in having the second joint of the abdomen rufous, and the eyes large and contiguous vertically.

Head broader than the thorax, semicircular. *Face* yellowish brown, with a large, elevated, shining chestnut-brown tubercle in the centre, extending from the mouth to the base of the antennae. *Region of the mouth* black, hairy. *Proboscis* about the length of the head. *Eyes* dark rufous brown, large and meeting on the vertex. *Antennae* black, rather more slender than in the female, and having the spine at the base of the terminal joint not so prominent. *Thorax* orbicular, black, hairy. *Wings* marked as in the female. *Abdomen* black, with the posterior margin of the first joint, the whole of the second joint, and the anterior margin of the third joint, bright rufous. *Legs* black.

Length $\frac{1}{2}$ inch, expansion of wings 1 inch. From Northern India. In the collection of Col. Hearsey. Saunders, *l. c.*, iv, p. 233, pl. xiv, fig. 3.

One male from Barrackpore, Calcutta (Rothney), 82, 15; one male from India (Saunders coll.); 54, 13; one female from Bengal (Campbell), 42, 25; one male (Saunders coll.), 68, 4.

Saunders described and figured both the sexes; the male type he mentions as belonging to a Colonel Hearsey, so that it seems probable that the Museum does not possess the male type, and certainly not the female type. There are said to be three specimens labelled Saunders coll. in the Oxford Museum, which may perhaps include the types. Ricardo, *Ann. Mag. Nat. Hist.* (7), viii, p. 298.

This species is easily distinguished by the presence of a prolongation on the third joint of antennae at base. The male is black, with basal segments of abdomen bright rufous, the female wholly black, both with blackish brown wings in which two pale spots are very distinct, the lower one situated at base of second submarginal cell, extending across the apex of the first basal cell and base of first posterior cell, occupying the basal half of discal cell, and the apex of second basal cell and bases of fourth and fifth posterior cells; the upper one is on the second submarginal cell round the base of fork of third longitudinal vein extending into the first posterior cell. There are two females in the Indian Museum from Calcutta and locality not specified.

Gastroxides ornatus, ♀, Bigot.

Rev. et Mag. Zool. (2), xi, p. 305 (1859). [*Ditylomyia*.]

Ricardo, *Ann. Mag. Nat. Hist.* (7), xiv, p. 372 (1904).

The type, by the markings of the wings and the general shape of the abdomen, bears a general resemblance to *Gastroxides ater* (Saunders), the only heretofore known species of the genus. Bigot mentions the presence of ocelli, but did not note the spines on the hind tibiae, these two characters dividing the division Pangooninae from Tabaninae. The antennae have only five rings on the third joint, not eight or nine as he supposes. In the shape of the head, the insertion of the antennae, and the presence of the tubercles on the forehead it resembles *G. ater*, but is larger and of different colouring.

Black, with lighter hind borders to the segments of the abdomen.

Face blackish, with grey tomentum, the tumid triangular projection in the middle shining red-brown; the *palpi* large, flat, as long as the proboscis, dark brown with black hairs. *Forehead* black, shining, with two prominent tubercles, one situated near the antennae, the other about in the middle of the forehead, neither reaching the sides; vertex reddish; the yellow ocelli are placed on a brownish, not very prominent tubercle bordered with grey which is continued along the sides of the forehead. *Antennae* longer than the head, red-brown, the long spine or tooth brighter red; the first joint stout, long, the second only half as long, both with black pubescence; the third joint twice as long as the first, its first ring as long as the remaining four together, stout, bearing the long spine at its base, the second ring is the smallest, the third and fourth about equal, the fifth as long as the last two together. The hairs below the head are blackish. *Thorax* reddish brown, with indistinct grey tomentum and two yellowish stripes; the *scutellum* yellowish red; the breast reddish, with brown tomentum and black pubescence. *Abdomen* black, long and pointed; the second segment widest, the first and third with yellow, the second and fourth with grey hind borders, the remaining segments black with some red on the sides; under side black. *Legs* reddish brown with black pubescence, the fore femora stout. *Wings* dark brown with clear base; a clear band in the middle crossing the base of the discal cell and extending to the fifth posterior cell, another on the apex crossing the fork of the third longitudinal vein; there is also a clear space in the anal cell, and the axillary part of the wing is clear.

Length 18 mm.

Through the kindness of Mr. Verrall this species is now placed in the British Museum collection with the species for which the genus *Gastroxides* was formed. Ricardo, Ann. Mag. Nat. Hist. (7), xiv, p. 372.

♂ A male in the Indian Museum coll. from Colombo, and another in the Brit. Mus. coll. from Henaratgoda, Ceylon (Yerbury), are apparently males of this species, though the antennal third joint in both is wanting. The colouring of abdomen is different from that of the female, being reddish with black spots, only black at the apex. *Face* with the same tumid red-brown shining middle, not so protuberant however and confined to middle of face; the *palpi* shorter than proboscis, club-shaped. Frontal triangle reddish. *Eyes* with the large facettes reaching the base of antennae, bordered posteriorly by a narrow band of the small facettes. *Thorax* and *scutellum* reddish brown, the latter more red on its posterior border, sides of thorax with black hairs. *Abdomen* reddish, shining, on the first three segments, with a median black spot on each, the second segment narrowly black at sides, the third segment with a black spot at each side, the fourth segment black, dull yellow on its posterior border, the remaining ones

black, sides with black hairs; under side red on basal segments, then deep black, the abdomen has a flat appearance with a pointed apex. *Legs* reddish brown, the femora darker. *Wings* as in female. Length 16 mm.

MYCTEROMYIA, Philippi.

Verh. zool.-bot. Ges. Wien, xv, p. 712 (1865).

This genus was established by the author for *Pangonia conica*, Bigot, from Chili, and Bigot later added other species from Brazil, Cape of Good Hope and one from India. Philippi gives the chief characteristics as: Head narrower than thorax, elongated in front. Eyes naked. Ocelli present. Antennal joints rather longer and narrower than in *Pangonia*. Palpi biarticulate, the first joint short, the second elongated, compressed, narrow, the apex rounded. Legs slender. Wings with first posterior cell closed. Dr. Lutz in Zool. Jahrb., Suppl. x, 4, p. 62, 5 (1909), remarks that the genus can only be retained for the Chilean species with naked eyes, the four Brazilian species described by Bigot having eyes distinctly pubescent. The description of the Indian species is too short and incomplete to enable anyone to judge to what genus it belongs, and I have seen no specimen from India at all resembling the original description.

Mycteromyia nigrifacies, ♀, Bigot.

Mem. Soc. Zool. France, v, p. 607 (1892); Ricardo, Ann. Mag. Nat. Hist. (7), v, p. 99 (1900).

♀ Length 20 mm. (without proboscis).

Proboscis and antennae (incomplete) black; palpi black; forehead dull black, face shining black, beard greyish white; thorax and scutellum dull black; abdomen shining black; squamae and halteres black; legs black; wings blackish, no appendix to the fork of third vein. India. One specimen. Bigot, Mem. Soc. Zool. France, v, p. 607.

SILVIUS, Meigen.

Syst. Beschreib., ii, p. 27 (1820).

Ectenopsis, Macq., Dipt. exot. i, p. 115 (1838).

Mesomyia, Macq., Dipt. exot. Suppl. iv, p. 341 (1850).

Veprius, Rondani, Archiv. per la Zool. Modena, iii, p. 83 (1863).

This genus, characterized by the short first and second joints of antennae, the second one shorter than the first, and by the usually hyaline wings, has not hitherto been represented in the Oriental Region, but a female specimen in the Indian Museum from Bhura, Naini Tal district, United Provinces, India, is no doubt a species of *Silvius* not unlike in general appearance to the European species *Silvius vituli*, Fabr., but distinct.

Silvius indianus, ♀, n. sp.

A small reddish yellow species, antennae and face, frontal callus, palpi and legs yellowish. Wings hyaline, with the fore border narrowly dark brown. Length 9 mm.

Face greyish yellow, convex in the middle, the sides of this middle part are shining reddish yellow with a greyish yellow rather tomentose median stripe, foveae on cheeks distinct, lower part of face with short white pubescence, some black hairs near the eyes. Proboscis short. *Palpi* reddish yellow, the first joint short, the second about four times as long, slightly curved, flat, ending in a point, with some very short black pubescence. *Antennae* reddish yellow, the first two joints yellowish with black pubescence, the first joint twice as long as the second one, the third long and slender, very slightly wider at base, blackish on the last four annulations. *Forehead* greyish yellow, the frontal callus shining reddish yellow, heart-shaped, not reaching the eyes, ocelli at vertex placed on a blackish spot. *Thorax* blackish but densely covered with greyish yellow tomentum and pubescence, appearing yellowish. *Scutellum* identical. *Abdomen* more reddish yellow, with a median short black stripe on the first two segments reaching to the third segment, pubescence chiefly consists of very short black hairs; under side the same. *Legs* reddish yellow, the apex of fore tibiae and all tarsi blackish. *Wings* hyaline, the costal cell wholly yellowish brown, the marginal cell the same at its base with a slight shading at its apex on fore border, the stigma large, dark brown, the first longitudinal vein thickened, dark brown, the others pale yellow, all cells open except the apical cell, appendix hardly visible.

CHRYSOPS, Meigen.

Nouvelle Classification, p. 23 (1800); Illiger's Magazine, ii, p. 267 (1803).

The species of this genus of the subfamily Pangoninae are easily recognized by the wings being usually ornamented with a dark median cross-band, by the shining black tubercles on the face and forehead, with three ocelli on the vertex, and by the long antennae, the second joint usually as long or nearly as long as the first joint. The species are small in size and are not very numerous; in Ann. Mag. Nat. Hist. (7), ix, p. 372 (1902), I brought the number up to 20, now reduced by discovery of further synonyms to 16 with 1 new species described, making the total 17. The following is a list of all the described species and synonyms:—

CHRYSOPS alter, Rondani.

bifasciata, Macquart = *dispar*, Fabr.

cincta, Bigot.

clavicrus, Thomson? = *cincta* Bigot.

designata, sp. n.

dispar, Fabricius.

fasciata, Wiedemann.
fixissima, Walker.
flaviventris, Macquart.
flavocincta, Ricardo.
impar, Rondani = *dispar*, Fabricius.
indiana, Ricardo.
iranensis, Bigot = *mlokosiewiczzi*, Bigot.
ligata, Walker = *dispar*, Fabricius.
lunata, Grey (*Haematopota*) = *dispar*, Fabricius.
manilensis, Schiner.
mlokosiewiczzi, Bigot.
pellucidus, Fabricius.
rufitarsis, Macquart.
semicircula, Walker = *dispar*, Fabricius.
signifer, Walker.
sinensis, Walker.
stimulans, Walker.
striata, V. d. Wulp (nomen bis lectum) = *mloko-*
siewiczzi, Bigot.
terminalis Walker = *dispar*, Fabricius.
translucens, Macquart.
unizonata, Rondani = *fixissima*, Walker.

Table of species.

1.	Wings with a dark transverse band and an apical spot	2
	Wings with a dark transverse band but no apical spot	11
2.	Wings with a hyaline sinus on the posterior part of the band, in the fifth posterior cell	3
	Wings with no hyaline sinus on the posterior part of the band, in the fifth posterior cell	7
3.	Abdomen blackish, yellow at apex, with grey bands on the first two segments and a grey median stripe	<i>manilensis</i> , Schiner.
	Abdomen yellowish with black stripes	. 4
	Abdomen black, whitish or yellowish at base	. .. 6
4.	Discal cell hyaline. Abdomen with four long black stripes	<i>mlokosiewiczzi</i> , Bigot.
	Discal cell not hyaline	5
5.	Abdomen with a short black bifid stripe on the second segment, often extending to the third or fourth segment	.. <i>dispar</i> , Fabr.

- Abdomen with a bifid stripe on the second segment and a network of black markings on the third segment, leaving only three yellow spots free .. *designata*, n. sp.
6. Abdomen whitish on the first four segments, apex black .. *rufitarsis*, Macq.
 Abdomen black, the first two segments largely yellow, the second and third segments with small median yellow spots. Face yellowish. Apical border of band of wing straight concave .. *translucens*, Macq.
- Abdomen black, the second segment yellowish on fore border. Face blackish. Apical border of band of wing straight .. *pellucida*, Fabr.
- Small species, abdomen blackish, the first two segments yellow anteriorly. Face black .. *alter*, Rondani.
- Large robust species. Abdomen blackish with paler median spots, largely yellow on the basal segments. Face yellowish. Apical border of wing irregular *sinensis*, Walker.
7. Wings with a clear spot in the discal cell, first joint of antennae slightly incrassate. Abdomen blackish with pale spots *stimulans*, Walker.
- Wings with no clear spot in discal cell 8
8. Band of wing broad throughout. Abdomen yellow with a black bifid stripe in the second segment . *indiana*, Ricardo.
- Abdomen yellowish with a black band in the middle 9
- Abdomen yellowish with two distinct black bands 10
9. Abdomen with blackish legs and face *fasciata*, Wied.
- Abdomen with yellowish brown legs and face . *fixissima*, Walker.
10. Abdomen with the black bands narrow . *signifer*, Walker.
- Abdomen darker, the black bands broader .. *cincta*, Bigot.

11. Abdomen black with a yellowish band on the second segment.

Small species

flavocincta, Ricardo.

NOTE.—*Chrysops flaviventris*, Macquart, is not included owing to the insufficient description. The only species of *Chrysops* recorded from New Guinea is *Chrysops albicinctus*, V d. Wulp (Tijd. Ent. xi, p. 103, 1868), which Osten Sacken in Ann. Mus. Civ. Genova. xvi, p. 418 (1882), remarks may be the same as *C. pellucida*, Fabr., but if V d. Wulp's figure of the wing is correct it is quite distinct from any species of the Oriental Region, the whole apex of the wing being brownish grey, bearing between it and the transverse dark band a hyaline streak.

Chrysops manilensis, ♀, Schiner.

Reise Novara Diptera, p. 104 (1868); Ricardo, Ann. Mag. Nat. Hist. (7), ix, p. 373 (1902).

Thorax and scutellum black, with slaty grey tomentum, the former with two other indistinct contiguous pale grey stripes and on each side a rusty yellow spot; in front of the scutellum appears a conspicuous band of golden yellow hairs; similar hairs appear on the rusty yellow spots (perhaps in well-preserved specimens they are spread over the whole thorax). Breast sides blackish, a yellow callus beneath the base of wings. Abdomen black with an oblique grey band at the bases of the first two segments, the second and third segments with a similar coloured median line, the following segments rusty yellow, the under side chiefly yellow on the middle, blackish at the base and *apex* ("mitte" is given in the original, probably an error). The abdomen is somewhat compressed in both specimens, it may therefore be somewhat different in design in well-preserved specimens. Head black, the face with golden yellow pubescence on each side and in the middle, so that the shining black tubercle takes the shape of a Latin V. Forehead with yellowish grey tomentum, with a large convex shining black callus above the antennae, impressed in the middle, and a shining black spot at vertex. Antennae unusually long and very slender, the joints almost equal in length, the two basal joints yellowish, the third brown. Palpi bright red-yellow. Legs red-yellow, the femora at their extreme bases, and the posterior ones almost wholly, brown. Tarsi blackish on the last joints. Fore tibiae a little curved. Wings hyaline, the fore border and a median band pale brown, the outer border of the latter concave, posteriorly with a bluntly triangular hyaline incision. The lower margin of the brown fore border is paler on the other side of the median band. Two females from Manila. Length 3 lines.

The species could only be compared with *Chrysops bifasciatus*, Macq., but this species has a reddish yellow scutellum and the markings of the under side of abdomen are different; there can be

no question of its identity with *Chrysops costatus*, W., which Walker takes to be identical with *Chrysops bifasciatus*, Macq. *Chrysops costatus* is distinguished from both species by the wholly grey apex of wing. Till now no species of *Chrysops* has been known from Manila, and in general few from the continents lying to our east. Schiner, Reise Novara Diptera, p. 104.

The allusion to Walker's identification of *Chrysops costatus* with the Macquart species is to be found in List Dipt. Brit. Mus. v, Suppl. i, p. 288, and may be disregarded; *Chrysops costatus* is a South American species. As I believe *Chrysops bifasciatus*, Macq., to be a synonym of *Chrysops dispar*, Fabr., this species is probably identical in the wing-markings with this latter, but can hardly be the same, judging from Schiner's description of the abdomen. The species is unknown to me.

Chrysops mlokosiewiczzi, ♀, Bigot.

Ann. Soc. Entom. France (5), x, p. 146 (1880); Ricardo, Ann. Mag. Nat. Hist. (7), ix, p. 378 (1902).

Chrysops striatus, ♀, V. d. Wulp, Notes Leyden Museum, vii, p. 79 (1885).

Chrysops iranensis, ♀, Bigot, Mem. Soc. Zool. France, v, p. 602 (1891).

Thorax ashy grey with three brown stripes: abdomen ochraceous with four black stripes, head yellowish with a shining black frontal callus, the facial calli shining testaceous; antennae, palpi and legs red; apex of antennae black; wings hyaline; with the base, the costal border to the apex, and the median band which does not reach the posterior border, brown. ♀. Length 6 mm.

Antennae one and a half as long as the head, almost bare, reddish yellow, black towards the end; second joint shorter than the first; the third one about as long as the other two together. Front with yellowish grey dust; the ocellar triangle darker; above the antennae a large, shining black knob; face rather prominent on account of the two large knobs, which are testaceous, very shining and coherent; cheeks with yellowish grey dust. Rostrum fuscous; palpi reddish yellow. Thorax yellowish cinereous, with three very distinct fuscous stripes; scutellum coloured like the thorax. Abdomen ochraceous, with two black longitudinal bands, which are interrupted at the segmentations, and moreover with a less distinct lateral row of blackish spots; under surface of the abdomen uniform ochraceous, darker towards the end. Legs reddish yellow; posterior coxae cinereous; tarsi brown; the tibiae not dilated. Halteres yellowish brown. Wings hyaline, the base, the costal border and the usual cross-band brown; the latter extends till half the breadth of the wing, surrounds the discal cell, the centre of which remains hyaline, and goes along

the posterior cross-vein and the apical portion of the postical vein. A female specimen from Amoy, China (Buddingh). V d. Wulp, Notes Leyden Museum, vii, p. 79.

In Brit. Mus. coll a male and female from Tygosan, Chusan Archipelago, 1892 (Walker); and a series from Japan, 1909 (Dr. Myajima).

A well-marked species easily distinguished by the four narrow black stripes on the yellow *abdomen* and by the cross-band of *wing* not reaching beyond the fifth longitudinal vein, the posterior cross-vein and apical portion of the sixth longitudinal vein being shaded with brown only, the centre of the discal cell is hyaline. The *face* is covered with yellowish tomentum, the sides with shining testaceous tubercles, and the centre of face over the oral opening is the same colour; a transverse black shining spot is present on the lower part of each cheek, not attaining the oral opening. *Forehead* with greyish tomentum darker at vertex, the frontal callus convex, black and shining, not reaching the eyes. Under side of *abdomen* often with medium black markings besides being darker at the apex. Length of specimens 8-10 mm.

Among the types kindly lent me by Mr Verrall there is one (? female) specimen with the head wanting, labelled as above and from the Caucasus, but the specific name is crossed out and "*iranensis*" scribbled underneath; there is another female specimen only labelled "N. Persia." Bigot described one female as *C. mlokosiewiczzi*, from N. Persia or Caucasus, and later two females from N. Persia as *C. iranensis*; apparently he concluded finally that all were one species, which certainly seems likely judging from the descriptions: in this case the name *mlokosiewiczzi* would have priority; it seems nearly related, if not identical, with a species described by Wulp from Amoy, China, and named by him *C. striatus*. On comparison of the two specimens of his species in the British Museum collection with the Bigot specimens, the only difference to be seen is the colour of the tubercle above the antennae, which is nearly wholly reddish in the specimen from N. Persia, not shining black, as Wulp describes; they are exactly similar in the wing; the headless specimen has the colouring of the abdomen more greyish than ochraceous, as in *C. striatus*. Considering the distance between the localities, it is perhaps preferable to keep the species apart for the present, placing, however, the Bigot species among those of the Oriental Region. Ricardo, Ann. Mag. Nat. Hist. (7), ix, p. 378 (1902).

There can now be little doubt that the two Bigot species are the same as Wulp's species "*striatus*," as in the series lately received from Japan there is one female with the tubercle reddish yellow. As the name *striatus* is preoccupied by a species so named by Osten Sacken from N. America in 1876, the species must henceforth be known as *Chrysops mlokosiewiczzi*, and belongs to both the Palaearctic and Oriental Regions, ranging apparently from east to west of the Continent.

Chrysops dispar; ♂ ♀, Fabricius.

(Plate xv, fig. 3.)

Ent. Syst. Suppl. 567 (*Tabanus*) (1798); *id.*, Syst. Antl., p. 112, 5 (1805); Wied., Dipt. exot., p. 102, 1 (1821); *id.*, Auss. zweifl. Ins., i, p. 196 (1828); Macq., Dipt. exot., i (1), p. 163 (1838); *id.*, Suppl. iii, p. 174 (1848); V. d. Wulp, Sumatra Exped. Dipt., p. 19 (1881); Ost. Sack., Ann. Mus. Civ. Genova, xvi, p. 418 (1882); *id.*, Berlin. Ent. Zeitschr., xxvi, p. 97 (1882); Röder, Ent. Nachricht, xix, p. 234 (1893); Ricardo, Ann. Mag. Nat. Hist. (7), ix, p. 374 (1902).

Haematopota lunata, ♀, Gray, in Griffith's Cuvier Anim. Kingdom, xv, p. 696, pl. cxiv, fig. 4 (1832).

Chrysops bifasciata, ♀, Macquart, Dipt. exot. (1), i, p. 161 (1838).

Chrysops ligatus, ♀, Walker, List Dipt. Brit. Mus., i, p. 195 (1848).

Chrysops semicirculus, ♀, Walker, List Dipt. Brit. Mus., i, p. 196 (1848); Ricardo, Ann. Mag. Nat. Hist. (7), ix, p. 375 (1902).

Chrysops terminalis, ♀, Walker, List. Dipt. Brit. Mus., i, p. 195 (1848).

Chrysops impar, ♀, Rondani, Ann. Mus. Civ. Genova, vii, p. 460 (1875).

Abdomen with the first segment pale; with a black half-moon, wings white: with a black band. Antennae testaceous, the apex dark. Head below the antennae yellow with two large, raised, ovate, testaceous spots, above the antennae pale, with a large transverse raised black spot. Thorax ashy grey with sides yellow. Abdomen brown with the first segment pale, the middle half-moon-shaped spot brown. Wings white, the costal border and wide middle band black, the latter at the margin paler with an ovate white spot. Male with eyes joined, abdomen testaceous, the first segment however pale with a half-moon-shaped brown spot.

Habitat.—E. India. Fabr., Ent. Syst. Suppl. 567 (*Tabanus*).

Abdomen with the second segment pale; with a black half-moon. Wings white with a black band. Habitat in East India. Fabr., Syst. Antl., p. 112, 5.

Antennae ochre brownish with a blackish brown apex. Face rusty brownish with a paler middle line; cheeks light rusty yellow with a smooth brown spot; forehead yellowish; in the female with a blackish brown transverse oval tubercle. Thorax brown with two mouldy grey stripes only separated by a brown line, with golden yellow pubescence: breast sides brown with a golden stripe under the base of wings. Scutellum rusty yellow. Abdomen of the male rusty yellow, the first segment brown in the middle, the second segment pale, with two brown spots united towards the base of the segment in a somewhat rounded angle, not resting on the base

itself, continued as far as the base of the third segment ; sides of abdomen brown, in the middle of the under side of abdomen an abbreviated brown band. Abdomen of the female more brownish, the first segment pale, the second paler still, almost whitish anteriorly, the spots as in the male, but not continued to the third segment. All segmentations broadly paler, the first brown in the middle. Wings perfectly hyaline, on the fore border from the base to the apex, brown, below the cross-veins at the base is a somewhat oblique small inconspicuous band ; the larger band has a deep incision on the inner border. Legs bright rusty yellow. In Fabricius's, Westermann's and my own collection. Wiedemann, *Auss. zweifl. Ins.*, i, p. 196.

A female specimen from Java in the collection of M. Serville differs from Wiedemann's description by the shining blackness of the face, with a grey spot on each side ; by the grey forehead with two black calli, by the posterior border of thorax with golden yellow hairs, by the black scutellum, by the fawn-coloured legs with black coxae, and also the posterior femora. Macquart, *Dipt. exot.* i (1), p. 163.

According to Wiedemann the spot or rather the brown bifid stripe of the abdomen extends over the second and third segment of the male, it does not extend beyond the second one in the female. We have observed five females and two males in which the stripe is equally present on the second and third segments. From Java. M. Payen's collection. Macquart, *Dipt. exot. Suppl.* iii, p. 174.

Seven females from Buitenzorg, Java (1875) (Ferrari). The identification is certain, although there are discrepancies, especially in the description of the face. Macquart notices the same differences in *Dipt. exot.* i, p. 163. Osten Sacken, *Ann. Mus. Civ. Genova*, xvi, p. 418. Röder, *Ent. Nachricht*, p. 234, records the species from Ceylon.

Six females from different places (in Sumatra). The above specimens differ from the description and from most specimens from Java by their darker colour, especially by the black scutellum and the black-brown posterior femora. The posterior tibiae in this species are broader in their whole length, and each side with a short fine fringe of hairs. The face is very shining. V d. Wulp, *Dipt. Sumatra*, p. 19.

The figure of *Haematopota lunata* is evidently that of a specimen of *Chrysops dispar*. No description is given. *Chrysops ligatus*, Wlk., from Bengal is only a rather pale-coloured specimen with some lighter spaces in the wing-cells. *Chrysops semicirculus*, a female in very bad condition, is, I now believe, only a poor specimen of this species with the black markings of the abdomen obsolete or almost so. *Chrysops terminalis*, Wlk., is a pale-coloured specimen with the black bifid stripe not reaching beyond the second segment, as in Wiedemann's original description of *Chrysops dispar*. Walker identified several specimens as Wiedemann's species and then described his two new species, placing

them directly after *Chrysops dispar* in his Catalogue, but I can see no differences sufficiently marked to justify them being made distinct species. *Chrysops impar*, Osten Sacken believed to be the same as the Wiedemann species, after seeing the type (see Berlin. Ent. Zeit., xxvi, p. 97), an opinion with which I agree, having also seen the type, which has the abdomen however entirely black after the third segment, and the frontal callus is deeply incised posteriorly a peculiarity I have not seen in any other specimens, but there are very few specimens in the collections I have had access to, from Borneo, whence Rondani's came.

The type of *Chrysops bifasciata*, Macquart, I have seen in the Paris Museum and believe it to be a specimen of *Chrysops dispar* though the black stripes on abdomen are of unusual length, extending to the end of the abdomen, which I have not observed in any other specimens from India or elsewhere. Macquart's type is from Bengal. His description of the antennae is incorrect, they are almost wholly yellowish, a little darker on the second and third joints, not "black, red at the base."

The species varies a little, chiefly in the colour of the *scutellum* which ranges from reddish to reddish brown or nearly black. The *legs* are usually testaceous or yellowish but the posterior femora are sometimes brownish or blackish, the coxae are also darker in some specimens. The *forehead* is greyish or yellowish. The abdominal stripe beginning on the second segment is continued to the base of the segment or to the base of the third and occasionally reaches the fourth segment. It is an easily distinguished species, with a yellowish *abdomen*, the bifid stripe always distinct, and a dark narrow band on the posterior border of the first segment. The *thorax* in well-preserved specimens has golden yellow pubescence at the sides and base. The *face* and cheeks yellowish brownish in the centre with the exception of a narrow yellow line and with two black stripe-like spots on the lower part of cheeks. *Wings* with a brown fore border and transverse band, chiefly incised on its outer border. Length from δ —11 mm.

In the British Museum are specimens from Ceylon (Yerbury, Green); Nepal (Hardwicke bequest); Bangalore (Watson); Moulmein, E. India (Clark); Singapore and Penang (Ridley); Rangoon; Annam; Hongkong (Bowring); Java; Sumatra.

In Indian Museum coll. from Balighai, near Puri, Orissa; Kulattupuzha, W base of W. Ghats, Travancore; Nedumangad, 10 miles N. E. of Trivandrum, Travancore; Morapai, S. Bengal; Bukit Besar, Patani States, Siam; I have also identified specimens from Formosa. On one of the specimens from Ceylon Col. Yerbury has the following note: "Common and generally distributed. Torments cattle. The scutellum and pilose stripe on the pleurae in life bright gamboge yellow."

[Flies of this common species conceal themselves during the day on the lower surface of the leaves of shrubs, becoming active towards evening. I found the species exceedingly common at Balighai in October.—N. ANNANDALE.]

***Chrysops designata*, ♀ ♂, sp. n.**

(Plate xv, fig. 1.)

Type female from Sarah, Nepal, 24-xi-08, in Indian Museum coll. and another from Yunnan, W China; type male from Jaulasal, Naini Tal district.

♀ Abdomen yellowish, marked with black on the first three segments, bearing only three yellow spots on the third segment. Wings with cross-band and apical spot, the former with a well-marked sinus on posterior border, its outer border irregular. Antennae long, cylindrical. Length 9 mm.

Face yellowish, the facial tubercles shining, blackish brown, reaching the oral opening but bearing a large yellow stripe in the centre of face, lower part of cheeks black, with yellow hairs. *Palpi* reddish yellow with scanty yellowish pubescence. *Antennae* long, cylindrical, the first joint a little longer than the second one, reddish yellow with black pubescence, the second and third blackish, the second with black pubescence, the third joint the longest of the three but barely as long as the first two joints together. *Forehead* same colour as face with yellow pubescence, the frontal callus shining, blackish brown, transverse, not reaching the eyes, with an impressed line in the centre and slightly produced toward the antennae, ocelli visible at vertex which is not darker in colour. *Thorax* blackish brown, with a very broad yellowish grey tomentose median stripe divided in two by a narrow brown line, sides yellowish clothed with bright yellow pubescence, which is also present on the dorsum as short scanty pubescence. *Scutellum* yellowish grey, blackish in the centre but probably this is due to denudation, with darker pubescence. *Abdomen* yellowish, paler yellow on the first two segments, on the following segments more reddish yellow, with the apical slightly darker, pubescence yellowish, thick on the apical segments; the black markings consist of a narrow band on the posterior border of first segment widening in the centre into a broad median spot reaching the anterior border, with concave sides, on the second segment of the ordinary chevron-like black spots meeting on the anterior border, with likewise a narrow band on the posterior border, on the third segment the black chevron-like spots are present but broader, not meeting on the anterior border, the sides and posterior border have black bands, so that the yellow colour remains as three large spots, the middle one irregularly triangular, the side ones oblong, large, on the fourth segment two small black triangular spots with their apices pointing downwards are present on the anterior border which is also blackish at the sides; under side wholly yellow. *Legs* reddish yellow, the coxae, femora and apical joints of tarsi blackish. *Wings* hyaline with brown fore border reaching the apex, at base extending slightly into the basal cells, and with a brown cross-band which reaches the anal cell; the fifth posterior cell is largely hyaline, the lower border of band almost straight not extending into the basal cells, its upper border

irregular, produced towards the base of fork of third longitudinal vein and again at the fourth posterior cell; the apical spot is narrow, the same width throughout, reaching exactly to the centre of apex of wing.

♂ Smaller than the female, measuring 8 mm.

Palpi blackish. First joint of *antennae* nearly the same length as the second, both darker in colour. *Eyes* join between the frontal triangle and the ocelligerous tubercle. *Thorax* with a wide median black stripe bordered by a yellow stripe, black beyond; sides yellow with a black stripe, pubescence yellow, golden yellow on the sides. *Scutellum* black. *Abdomen* similar to that of female with the exception of the first segment which is wholly black, only pale yellow on the sides, the black spots on second segment are larger and leave only a small yellow dot in their centre, the middle yellow spot on the two following segments is smaller; under side yellow, black at apex. *Legs* black, only the middle femora and first joint of middle and posterior tarsi pale yellow.

Chrysops rufitarsis, ♂, Macquart.

Dipt. exot. Suppl. iii, p. 174 (1847); Ricardo, Ann. Mag. Nat. Hist. (7), ix, p. 373 (1902).

Thorax black. *Abdomen* white, at the base and apex black. *Wings* at the base, costal border and band brown. Length 4 lines, ♂

Palpi brown. *Face* yellowish white with two shining black callosities. *Forehead* black. *Antennae* slender; first joint hairy, dark testaceous; the two others black. *Thorax* with blue reflections, a spot of yellowish white hairs in front of the wings; *scutellum* black. *Abdomen*: first segment black, yellowish white on its posterior border, second and third the same white colour; the second with a small triangular spot resting on the anterior border; the fourth on the anterior part white, sinuous, and posteriorly black, the fifth, sixth and seventh black; under side as the dorsum. *Legs* black; *tibiae* dilated, a little rounded on the outside, the posterior ones lightly ciliated; *tarsi* fawn coloured, the anterior ones black; the two last joints of the intermediate and posterior pair black. *Wings* hyaline; the cross-band hollowed out on its interior border; veins pale, normal. From Java. Monsieur Payen's collection. Macquart, Dipt. exot. Suppl. iii, p. 174.

This type is unknown to me, but there is a male from Burma in the Brit. Mus. coll. which may perhaps belong to this species though there is no sign of a black spot on the second segment, the *abdomen* being almost silvery white or very pale yellow, black at base and apex. The colouring of the large facial tubercles is reddish brown, of the *antennae* chiefly reddish yellow, of the *legs* more reddish brown than black; the *tibiae* are all incrassate. *Wings* with a faint large hyaline sinus on posterior border, apical spot reaching apex uniform in width, apical border of band slightly concave.

***Chrysops translucens*, ♀, Macquart.**

Dipt. exot. (1), i, p. 162 (1838); Ricardo, Ann. Mag. Nat. Hist. (7), ix, p. 375 (1902).

Black. Abdomen with the first and second segment white pellucid at the base. Femora brown, red below; tarsi red. Wings with a black band, excised on the interior border. Length 4 lines.

Palpi brownish. Face pale fawn coloured, shining; sides and cheeks shining black, with a spot of grey tomentum at the border of the eyes. Forehead denuded, entirely shining black. Antennae: first joint bare, pale fawn coloured, of ordinary length; the second bare, same length as the first, brownish fawn coloured; the third wanting. Thorax denuded, shining black; a triangular spot of golden yellow hairs in front of the wings. Abdomen: first segment transparent white, black on its posterior border, a little narrowed in the middle, reduced to nothing on the outer borders; second silvery white with a large triangular black spot on the posterior border in the middle of which is a small dorsal white spot, transparent and triangular; the third shining black with a small dorsal white band, following that of the second segment, the others shining black; under side: the first two segments transparent white, the second black on its outer borders. Femora brownish black above, posterior ones black; tibiae brown, rather stout; anterior tarsi brown; base of the first joint fawn coloured, intermediate and posterior ones fawn coloured; the last joints brown. Halteres black. Wings hyaline; the outer border narrow, reaching the apex; a little spot near the base and a cross-band brown; this latter hollowed out in the middle of the fifth posterior cell. From Java. Monsieur Serville's collection. This species is nearly related to *Chrysops pellucidus*, Fabr. and Wied., of which perhaps it is only a variety, but the latter differs in particular by the antennae being $1\frac{1}{2}$ lines long (though the third joint is wanting in *C. translucens*, they could not attain this length), by the abdomen and by the black legs. Macquart, Dipt. exot. (1), i, p. 162.

One female from Kuala Lumpur (H. C. Pratt). Presented to Brit. Mus. coll. by London School Tropical Medicine.

From a comparison of this specimen with the male and female specimens of *Chrysops pellucida*, Fabr., in Brit. Mus. coll. the distinctions between the two species *translucens*, Macq., and *pellucida*, Fabr., appear well marked. The face in *Chrysops translucens* is yellowish with a black spot on each side below antennae, the sides of face bordering the median line yellowish brown shining, becoming blackish over the oral opening, base of cheeks black. Forehead black, with broad band of grey tomentum below the frontal callus, which appears transverse, its anterior border sinuous, reaching the eyes. Antennae yellowish, not bare, the second one browner and the dark pubescence thicker. Abdomen distinguished at once from the Fabrician species by the white base of the first segment, and by the presence of the whitish or yellowish spots on second and third segment, as described by Macquart, conspicuous in the

middle of the black colouring. *Legs* brownish, the anterior femora yellowish, the anterior tibiae curved and slightly incrassate, the posterior ones broad, all with short fringes of black pubescence, most conspicuous on the hind pair, tarsi pale yellowish on first joint and at base of other joints. *Wings* similar to those of *Chrysops pellucida*. Length about 8 mm.

Chrysops pellucida, Fabr.

(Plate xv, fig. 2.)

Syst. Antl., 113, 11 (1805); Wied., Dipt. exot., 107, 8 (1821); *id.*, Auss. zweifl. Ins., i, p. 206 (1828); Ricardo, Ann. Mag. Nat. Hist. (7), ix, p. 373 (1902).

Black, with the second segment of the abdomen at its base white, pellucid. Wings white: band black. Habitat Tranquebar (S. E. India).

In size and general appearance related to *Chrysops dispar*, of which it is perhaps only a variety. Antennae cylindrical, black, almost as long as the body. Head and thorax black, unspotted. Abdomen black, with the second segment at the base white, pellucid, which colour extends to the sides. Wings white; the wide middle cross-band black, paler at the border with a white spot. Legs black, tibiae compressed. Fabr., Syst. Antl., p. 113.

Black, the second segment of the abdomen white pellucid; wings with a black band, excised on the interior margin. 3 lines, ♀.

Undoubtedly a distinct species from *Chrysops dispar*. Antennae yellowish at the base; their length hardly more than $1\frac{1}{2}$ lines, and therefore the Fabrician text is hardly to be understood, unless he intended not to include the head. Head grey haired. Calli black. Thorax black, with golden yellow haired sides; breast sides blackish, with a golden yellow stripe under the root of wings. The transparent white part of the second segment of abdomen slopes downwards on both sides almost to the hind border, so that a black triangular spot remains. The outer border of the wings black to the apex. In the legs the knees and base of tarsi are yellowish. In the Royal Museum and also a mutilated specimen in the Fabrician collection. Wied., Auss. zweifl. Ins., i, p. 206.

In the Indian Museum coll. there is a male from Trichinopoly, S. E. India, which exactly fits the above description. The length of antennae given by Fabricius as nearly equal to that of the body must be an error.

♂. *Eyes* brown with some blackish markings. Ocelligerous tubercle very prominent, blackish. Frontal triangle black covered with grey tomentum. *Face* black covered with dense grey tomentum, in the middle below the antennae is a large shining black tubercle and a small black spot on each side, the lower part of face below also black; pubescence in lower part of face whitish. *Palpi* small, blackish, with black hairs. *Antennae* long, slender,

about as long as the head and thorax together, first joint yellowish with pale hairs, its extreme apex and the second joint are obscure reddish with darker hairs, both joints about the same length, the third joint a little longer and blackish. *Thorax* black with some golden yellow hairs on its posterior borders, and a stripe of the same coloured hairs running across the root of wings at sides; breast black with some grey tomentum. *Scutellum* black, shining. *Abdomen* black, the second segment pellucid, whitish, on its anterior border, the black posterior border produced in the middle as a triangular spot which attains the posterior border of first segment; under side yellowish on first two segments, then black. *Legs* black, the first two joints and part of the third one of middle and posterior tarsi pale yellow, all the tibiae slightly incrassate, pubescence black. *Wings* hyaline, brown at base, and a long fore border to the apex, the transverse brown band deeply incised in posterior margin, so that the fifth posterior cell is almost hyaline. Length 8 mm.

There is a female in the Brit. Mus. coll. from unknown locality very much damaged which however is no doubt a specimen of this species.

Chrysops alter, ♀, Rondani.

Ann. Mus. Civ. Genova, vii, p. 44 (1875); Ricardo, Ann. Mag. Nat. Hist. (7), ix, p. 373 (1902).

Female length 5 mm. From Sarawak, Borneo.

Antennae with the first joint reddish, the two following dusky black. Forehead in the middle narrowly greyish, with a very large anterior callus which is subrotund, shining black, taking up almost the whole width of forehead. Palpi reddish. Face shining black, at the sides narrowly and under the antennae pale pollinose. Thorax with scutellum black, the sides and the pleurae under the root of the wings yellow haired. Calyptra and halteres black. Wings with the base luteous; the costal border brown, the apex with a paler expanded brown colour; the blackish band is beyond the middle of wing, posteriorly narrower. Legs: the anterior legs blackish, with the exception of the base of femora which are pale testaceous, the intermediate femora, the extreme apex of tibiae and the tarsi pale testaceous, the tibiae blackish; the posterior legs black, with a subapical ring of the femora, the apex of the tibiae and the tarsi luteous testaceous. Rondani, Ann. Mus. Civ. Genova, vii, p. 44.

Type ♀ in Genoa Museum was seen by me. It is a small species, the *face* wholly black, shining, convex, the frontal callus black, large, reaching the eyes, a narrow grey band divides it from the vertex. *Antennae* yellow. *Abdomen* which is in a bad state appears black, the first segment yellow anteriorly, and the second segment has a yellow band on its anterior border. *Wings* with one band, and the apex narrowly dark.

Length 5½ mm.

This species must be nearly allied to *Chrysops pellucida*, with the face black, and to *Chrysops translucens*, with the first segment yellow anteriorly. Rondani omitted to describe the abdomen, which is now hard to distinguish as to colouring.

***Chrysops sinensis*, ♀ ♂, Walker.**

(Plate xv, fig. 6.)

Dipt. Saund., i, p. 453 (1856); Ricardo, Ann. Mag. Nat. Hist. (7), ix, p. 377 (1902).

In Brit. Mus. coll.

Type (female) labelled "China." Male from Haining, Chekiang, China, 1893 (Walker).

In Indian Museum coll. females from Hankow, China.

Specimens from Formosa were sent me some time ago by Dr. Kertész for identification and proved to be this species, which is distinct from any species belonging to the Palaearctic Region and so far has not been found north of the Oriental Region boundary.

A large robust-looking blackish species with the first two segments of abdomen largely yellow, and sometimes the remaining segments appear more yellow than black, with black median oblique spots, or the abdomen appears blackish with median grey triangular spots. Thorax black with distinct yellowish stripes. Wings with a cross-band and apical spot, the former irregular on its outer border becoming narrower as it approaches the fifth posterior cell. Face, legs and antennae yellowish. Length type and others 10—11 mm.

♀. *Face* yellowish, the facial callosities reaching the oral opening are shining, tawny, cheeks with a small black spot on lower part near eyes and below blackish. *Palpi* tawny, rather bare and shining. *Antennae* tawny, the third joint blackish, the first two joints about equal in length, with very few yellowish hairs, the first joint slightly incrassate, the third as long as the first two joints together. *Forehead* covered with greyish yellow tomentum, the frontal callus large, protuberant, transverse, not reaching the eyes, vertex with the three ocelli blackish. *Thorax* black, somewhat shining, with two well-marked median grey tomentose stripes, sides with greyish yellow tomentum, breast black with some grey tomentum. *Scutellum* black. *Abdomen* in this species appears variable in colouring, in the type blackish, the first two segments largely yellow, the second segment with only two chevron-like black spots not quite joining above, their bases resting on the posterior border, the remaining segments blackish with narrow yellowish or yellowish grey borders expanding in the middle to triangular spots, and with traces of a yellow spot on each side of the third segment; in another specimen the yellow colour is more greyish and on the posterior segments is more extended leaving only black spots very similar to those in the

second segment but not converging so much towards each other, the scattered pubescence on all the specimens yellowish. *Legs* reddish yellow, knees darker, base of hind femora blackish. *Wings* with the usual band and apical spot; the shape of the former is somewhat peculiar, projecting on its outer border towards, but not attaining, the fork of the third vein; in the first posterior cell it becomes concave, then slightly convex till it reaches the fifth posterior cell, where the sinus is not very marked, and follows the fifth vein; it is narrow in width, only filling the discal cell, not encroaching on the basal cells at all, and filling the fourth posterior about half-way up; the basal cells have only dark shading at their extreme base; the apical spot is the same width throughout, only crossing the anterior branch of the third vein at its apex.

♂ Similar. *Eyes* with the upper half composed of larger facets. *Abdomen* in one specimen has the first segment almost entirely black, and the rest of abdomen reddish yellow with black oblique spots on each side, surrounding the grey triangular spots. *Wings* similar, centre of discal cell sometimes paler.

***Chrysops stimulans*, ♂, Walker.**

(Plate xv, fig. 5.)

Dipt. Saund., i, p. 73 (1850); *id.*, List. Dipt. v, Suppl. i, p. 265 (1854); Ricardo, Ann. Mag. Nat. Hist. (7), ix, p. 376 (1902).

Type (male) from East India, Saunders coll.; two males and one female from Pusa, Bengal, in Mr. Howlett's coll.

A small blackish species, the female lighter in colouring, easily distinguished by the markings of the wings, having a round clear spot in the discal cell in the middle of the dark cross-band and a narrow apical spot in the inner border of which is a clear small oblong spot reaching the anterior branch of the third vein. Male with a black abdomen, marked with three spots on each of the anterior segments, the female with the abdomen greyish and two median united spots on the second and third segments. Length of males 6—8 mm., female 8 mm.

♂ *Face* covered with grey tomentum, the facial tubercles black shining, reaching the oral opening leaving the centre of the face with a broad grey stripe, a black, narrow spot on each lower cheek reaching from the eyes to the oral opening, pubescence below pale yellow. *Palpi* yellowish brown with black pubescence. *Antennae* blackish brown, the first joint slightly incrassate with black pubescence, the second and third joints cylindrical, with less pubescence, the first two joints are about equal in length, the third a little longer than either. Frontal triangle grey, subtriangular. *Eyes* only meeting at one point beyond, vertex large with the ocelli distinct. *Thorax* blackish with grey tomentum sometimes appearing as stripes and with black pubescence.

Scutellum black. *Abdomen* black, on the second segment appears a large pale yellowish almost square spot and a minute triangular greyish spot in centre on posterior border, on third and fourth segments appear three small triangular greyish spots situated on the posterior borders of segments; under side black with yellow spots. *Legs* black, the middle tibiae yellow, black at extreme apex, pubescence of legs black. *Wings* hyaline with a dark brown base, costal border reaching to the apex, and a median band, the brown colouring at base extends beyond the middle of both basal cells, leaving a narrow hyaline band between them and the cross-band which is broad extending into the apical cell, becoming paler in the fifth posterior cell, its upper border irregular, at the base of branches of third vein it is produced, reaching towards the apical spot and thus giving rise to the clear spot or incision mentioned above; the apical spot extends over the anterior branch of third vein.

♀. Facial black tubercles are smaller. *Forehead* covered with grey tomentum, the frontal tubercle black, transverse, but small, not reaching eyes. *Thorax* grey with three very distinct black stripes. *Scutellum* identical. *Abdomen* greyish, the two black spots uniting in centre on first and second segments well marked, on third segment appears a zigzag black band on its anterior border, and on following segments a small ill-defined black spot on each side of median line; the abdomen of the only female specimen is not in very good preservation; under side greyish with black markings. *Legs* yellow, knees and tarsi blackish. *Wings* similar to those of male.

The male from Persian Gulf mentioned in Ann. Mag. Nat. Hist. (7), ix, p. 376, appears a different species, the abdomen having only median grey spots; it is probably a new species.

This Walker species bears a strong resemblance to the Palaearctic species *Chrysops punctifera*, Loew, recorded from Syria, in the wing-markings and in the abdominal markings, especially of the male, but it is distinguished by the slightly incrassate first joint of antennae, and larger frontal triangle in the male, and also in the female by the more greyish colour of the abdomen.

Chrysops indiana, ♂ ♀, Ricardo.

Ann. Mag. Nat. Hist. (7), ix, p. 379 (1902).

One male from Nilghiri Hills, 88, 112 (Hampson).

One female from Khasi Hills district, India, 96, 135 (Chennell, 1878).

A species allied to *C. dispar*, Fabr., but in the wing approaching *C. fasciatus*, Wied.; it is larger and more robust than *C. dispar*, Fabr.

Yellow, with a black bifid stripe on the second segment, enclosing a small, almost round, yellow spot, but the black does not join on the posterior border.

♂ ♀ (types). *Face* yellow, with yellow hairs on the central stripe and at the sides. *Antennae* long and slender, nearly equal in length to the head and thorax, all the joints about equal in length; yellow, the third joint darker, the first clothed with long black hairs, the second with shorter ones, the third bare. *Palpi* yellow. *Thorax* and *scutellum* brownish, with yellow pubescence, thicker at the sides, the breast the same colour. *Abdomen* light yellow, the second segment paler; the first segment with a narrow black band on the posterior border, the second with a black stripe which begins in the centre and then divides, sending out a branch on each side reaching to the hind border, and there extending outwards till it ends in a point; a small, yellow, oblong spot is thus left in the middle, surrounded by the black, excepting on its posterior border; the black stripes are continued very faintly on the third segment; the sides of abdomen have short black pubescence; the under side yellow, with three faint brown stripes on the third segment. *Legs* yellowish brown, with short black pubescence; the tibiae dilated, especially the anterior and middle pairs. *Wings* clear, with brown colouring at the extreme base only filling the basal cells one-third of their length, continued along the fore border to the apex, and as a transverse band which attains the posterior border just contiguous to the anal cell; it is a little fainter in colouring in the fifth posterior cell; its apical border is straight, also the inner one as far as the anal cell.

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

The female is identical.

Chrysops fasciata, ♀, Wiedemann.

(Plate xv, fig. 7.)

Dipt. exot., i, p. 103 (1821); *id.*, Auss. zweifl. Ins., i, p. 198 (1828); Doles., Natuurkund. Tijd. Nederl. Ind., xvii, p. 84 (1858); Ricardo, Ann. Mag. Nat. Hist. (7), ix, p. 375 (1902).

Thorax black; abdomen at the base white, in the middle black, with the apex ochraceous; wings at the base, costal border and band brown. $4\frac{1}{4}$ lines, ♀, from Java.

Antennae brown, the last joint deep black at apex; face golden yellow with a brownish black triangular tubercle. *Thorax* with golden yellow tomentum; breast sides with thick golden yellow silky pubescence. *Abdomen* with the first two segments white, the last one black on its posterior border, the third black with ochre-brown median and side spots, which do not attain the side border, the fourth and fifth ochre-brown with black side borders, the sixth and seventh wholly ochre-brown. *Wings* very hyaline, the usual band hardly incised in the inner border. *Legs* brown, femora darker, the tarsal joints at base very pale, the fore tibiae and tarsal joints at base blackish; the posterior tibiae fringed with black hairs. In Westermann's collection. Wiedemann, Auss. zweifl. Ins., i, p. 198.

Doleschall records this species from Amboina. In Brit. Mus. coll. a female from Malay States (H. C. Pratt), presented by London School of Tropical Medicine; and two females from Ross Island, Andaman Islands, May 1904 (Col. Bingham). In Indian Museum coll. a female from Assam and another from Sibsagar, Assam.

In London School of Tropical Medicine coll. a female from Sarawak, Borneo (A. R. Wellington).

A species with the *abdomen* pale yellow at base, black in the middle and reddish yellow at apex. *Legs* and *face* blackish. *Wings* with the dark cross-band hardly incised on inner border though sometimes paler.

Length $8\frac{1}{2}$ —12 mm.

Face yellowish or golden yellow, with the middle of face shining black having only a short yellow median stripe below the antennae, base of cheeks shining black. Beard yellow. *Palpi* yellowish red, smooth, long and pointed with some black hairs. Antennae yellowish, cylindrical, the second joint browner with thicker pubescence, the third joint black except at base, longer. *Forehead* black with a broad band of yellow or grey tomentum, the frontal callus large, reaching eyes, protuberant. *Thorax* black, with golden yellow pubescence at sides and on posterior border, and with pale yellow appressed pubescence on dorsum. *Scutellum* blackish.

Abdomen with the first two segments pale yellowish, the first segment black beneath the scutellum, the second segment with a narrow posterior black border, the third segment blackish sometimes with obscure yellowish or reddish markings, the remaining segments reddish yellow. *Legs* blackish brown, the fore tibiae black, swollen, the middle and posterior tibiae almost wholly pale yellow, the posterior femora incrassate with fringes of black hairs, pubescence of legs wholly black. *Wings* with a large broad transverse band, broadly brown on costal border to apex and at base brown, the band with almost straight borders, not incised on posterior border though sometimes paler in the fifth posterior cell, reaching to the anal cell, the apex of which it entirely fills.

Chrysops fixissima, ♀, Walker.

Proc. Linn. Soc., i, p. 112 (1856); Ricardo, Ann. Mag. Nat. Hist. (7), ix, p. 376 (1902).

Chrysops unizonatus, Rondani, Ann. Mus. Civ. Genova, vii, p. 459 (1873); Ost. Sacken, Berlin. Ent. Zeit., xxvi, p. 97 (1882).

The type is not to be found in the British Museum collection, but only the variety. Colonel Yerbury has a note on one of the specimens to the effect that the species is "*Rare.*"

Type (var., female) from Sarawak, 68, 4 (Saunders).

Two from Sandakan, Brit. N. Borneo, 98, 38 (D. Cator), and one, from same locality, 95, 134; one from Singapore, 96, 114

(Flower); one from Sarawak, 56, 14 (Saunders); two from Trincomalee, 2, 10 90—10, 9, 91 (Yerbury).

Walker describes the var. "with two bands, one black, the other brown." I should rather describe it as having one black band only, on the posterior border of the second segment. It is related to *C. fasciata*, but distinguished from it by the facial tubercle being yellowish brown, becoming black only at its upper corners; the legs are also paler. The species described by Rondani as *C. unizonatus* is a synonym of this, and not of *C. signifer*, Walker, as suggested by Osten Sacken, who states that the face in the Rondani species is yellow, which agrees with the colouring of the face of this species (see Osten Sacken, in Berlin. Ent. Zeit., xxvi, p. 97). Ricardo, Ann. Mag. Nat. Hist. (7), ix, p. 376.

Length of type 11 mm., of others 9—11½ mm.

When further material is available, this species may prove to be only a subform or identical with *Chrysops fasciata*, Wied., the abdomen with only one black band on the posterior border of second segment and the more largely yellow colouring of the face appearing the only differences.

Chrysops signifer, ♂, Walker.

Proc. Linn. Soc. London, v, p. 276, 1861; Ricardo, Ann. Mag. Nat. Hist. (7), ix, p. 376 (1902).

There is only the type, a male, in Brit. Mus. coll. from Batchian, but Osten Sacken records males and females from the Philippines and states they vary very much in size. Ost. Sacken, Berlin. Ent. Zeit., xxvi, p. 97, 1882.

The species is distinguished from *Chrysops fixissima* and *fasciata* by the shape of the second band on the third segment, which is not present in *Chrysops fixissima* and *Chrysops fasciata*, in this species it is concave in the middle, neither of the bands reach the sides, but the third and fourth segments are bordered with a narrow black stripe. Legs in the type are yellowish brown, the hind pair darker, tibiae slightly incrassate. Wings as in *Chrysops fasciata*.

Length of type 9½ mm.

Chrysops cincta, Bigot.

Mem. Soc. Zool. France, v, p. 602 (1892); Ricardo, Ann. Mag. Nat. Hist. (7), ix, p. 378 (1902).

? *Chrysops clavicrus*, Thomson, Eugen. Resa, Dipt., p. 452 (1868); Ricardo, Ann. Mag. Nat. Hist. (7), ix, p. 373 (1902).

Antennae as long as the head and thorax together, black, the first segment (joint) pale yellow, the second the same length, palpi whitish yellow; face and forehead covered with a yellowish tomentum, under the antennae a heart-shaped spot, an oval callus at base of forehead, another transverse one at vertex, all shining black; thorax black, a little yellowish down at the sides;

scutellum black; abdomen black, the segments very narrowly bordered with yellowish white, a large band of the same colour at base of second segment; coxae black, femora reddish, the posterior ones black exteriorly, tibiae dilated, reddish, blackish exteriorly, tarsi reddish with the apex blackish; squamae greyish, club of halteres brown; wings whitish, blackish exteriorly, from the base to the apex included, with a large median cross-band of the same colour. Philippine Islands. One specimen. Bigot, Mem. Soc. Zool. France, v, p. 602.

I have examined the type (female) from the Philippines lent me by Mr. Verrall; it is darker than the three other species with black bands, and the yellow colour of the abdomen is not diaphanous; it is nearly allied to *C. fasciatus*, Wied., and *C. signifer*, Wlk., but the abdomen is darker and the black bands broader.

I believe it to be the same as *C. clavicrus*, Thomson, from Malacca; and if this proves to be correct, Bigot's name must be sunk.

The original description may be amended thus:—

Face black, yellow at the sides, and with a central short yellow stripe. *Abdomen* with the first segment pale yellow and a narrow black posterior border; the second is pale yellow on its anterior border; the black band posteriorly is nearly equal in width to the yellow colour; the third segment is almost wholly black, with only a narrow yellow border anteriorly; the two black bands join at the sides, but the second band is entirely straight on its posterior border, thus differing from *C. signifer*, Wlk., which is deeply indented in the centre; the fourth, fifth, sixth and seventh segments are reddish yellow, with obscure black square spots in the centre of the fourth and fifth. The *wings* are clear, dark at the base and along the fore border to the apex, and with the usual transverse band which extends to the posterior border. Ricardo, Ann. Mag. Nat. Hist. (7), ix, p. 378.

Black. Antennae, head and palpi yellow, legs brown, anterior femora and tarsi testaceous, anterior tibiae club-shaped, fusiform; wings hyaline, with the marginal border and an oblique median band brown. Abdomen at apex brownish, at base honey-yellow, pellucid, with black median band.

♀. Length 10 mm. Malacca.

Related to *Chrysops rufitarsis*, Macquart, Dipt. exot. Suppl. iii, p. 174, with the anterior tibiae club-shaped, but in the colouring of the abdomen and with the median band of wing not incised, distinct. Head almost hemispherical, the width of thorax, the large eyes bare, ocelli placed on a triangular callus, forehead golden haired, with a large shining callus above the antennae; face golden haired, the facial tubercle sub-protuberant, heart-shaped, shining, the cheeks golden haired, proboscis deflexed, length of the head brown-black; palpi yellowish, deflexed, conical, awl-shaped. Antennae as long as the head and thorax, porrect, filiform, with very short black hairs, separated at the base, black,

the first joint yellow, the second equal in length, lineal, the third one and a half longer than the second, 5 ringed. Thorax subglabrous, golden haired at sides and beneath wings; black, at the base above scutellum golden haired, scutellum large, transverse-triangular. Halteres dull yellow, the large club black. Wings with the fore border widely brown, and the band brown, narrower before the base, elsewhere wide, transverse, passing behind the middle of discal cell.

Abdomen with fine yellow pubescence, subopaque, the first segment pellucid yellow with a narrow band before the apex, the second yellow, denuded, posteriorly black, the third with the black part wider, with a narrow yellow basal part, fourth, fifth and sixth brown, the fourth with an obsolete discal brown spot; under side brown, at the base yellow, the fourth segment with a brown median spot. Breast black, a little shining, with fine scanty pubescence. Legs with fine short brown pubescence, anterior coxae dull testaceous, brown at apex, the posterior ones black, femora brown, the anterior pair dull testaceous, anterior tibiae stout, club-shaped, brown, the intermediate ones less stout, dull testaceous, brown in the middle, posterior femora brown, tarsi yellow with the apex brown. Thomson, Eugen. Resa, *Diptera*, p. 452.

This latter description is given here with a few unnecessary particulars omitted, as I believe it to be the same species as Bigot described.

Chrysops flavocincta, ♀, Ricardo.

(Plate xv, fig. 4.)

Ann. Mag. Nat. Hist. (7), ix, p. 380 (1902).

Type (female) and another female from Khasi Hills, Assam, 97, 82 (Heyne); two females from North Khasi Hills, lower ranges, 96, 135 (1878, Chennell); one female from Sarawak, 56, 44 (Wallace); one female from Trincomalee, 54 (Yerbury).

Black. Abdomen with a yellow band on the anterior half of the second segment.

Face black, shining, with a grey tomentose stripe just below the antennae and an obscure yellowish spot where the usual stripe begins; a line of grey tomentum divides the cheeks from the upper part of the face; *forehead* with the usual black tubercles, which are large, a narrow band of grey tomentum divides them. *Antennae* rather long, yellow, the second and third joints darker; the first two joints pubescent, the third bare. *Palpi* yellow. *Thorax* black and shining, with traces of a broad grey stripe, some white pubescence on the dorsum and on the posterior border, and yellow hairs at the sides. *Scutellum* black. *Abdomen* black, with some white pubescence, with a yellow band on the anterior half of the first two segments; that on the second is widest and

concave in the middle, becoming broader at the sides; the under side yellow at the base and black on the apex. *Legs* black, the anterior and middle femora and the middle and posterior tarsi yellow. *Wings* clear, the dark colouring hardly perceptible at the extreme base; along the fore border it is narrow and only reaches the band, the apex being quite clear; the band hardly attains the hind border and becomes paler in the fourth posterior cell, only just continuing into the fifth; in some of the specimens it does not reach beyond the fourth and never attains the anal cell; it is straight on both its borders.

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

One of the specimens from Borneo does not measure more than $6\frac{1}{2}$ mm. Ricardo, *Ann. Mag. Nat. Hist.* (7), ix, p. 380.

In Indian Museum coll. are females of this pretty little species from Pallode, 20 miles N. E. of Trivandrum; Maddathorai, west base of W Ghats, all in Travancore. The greyish stripe or band below the antennae and a narrow border between the eyes and the facial tubercles are in some of these specimens almost golden yellow. The species is easily recognized by the long cylindrical antennae, all the joints about equal in length, the black shining face, and the attenuated band of wings usually not attaining the fifth posterior cell, its outer border is rather concave in these specimens.

[This species, which is very common on the west side of the W. Ghats in Travancore in November, resembles *C. dispar* (p. 382) in habits.—N. ANNANDALE.]

Chrysops flaviventris, ♀, Macquart.

Dipt. exot. Suppl. i, p. 172 (1845); Ricardo, *Ann. Mag. Nat. Hist.* (7), ix, p. 373 (1902).

Thorax black. Abdomen yellow with a spot and the apex black. *Legs* red. *Wings* with margin and band brown. Length $3\frac{1}{2}$ lines, ♀

Related to *C. translucens*. Face shining black, the upper part fawn coloured. Forehead brownish black, shining. Antennae wanting. Thorax shining black, with a large spot of fawn-coloured tomentum in front of the wings and prolonged below; scutellum black, bordered with testaceous colour. Abdomen pale yellow, the second segment with a blackish chevron, the last one black. Posterior femora brown. *Wings* on posterior border and the cross incised band brownish. From India. M. Bigot's collection. Macquart, *Dipt. exot.* i, p. 172.

This type is unknown to me. From the description it is not clear whether an apical spot is present on the wing, but as it is said to be related to *C. translucens*, Fabr., which possesses one, it may be assumed to have one. From the description it might possibly be a specimen of *Chrysops dispar*, Fabr., with the black stripe almost obsolete. It is not included in the table.

***Chrysops flavipes*, Meig.**

Klass., i, p. 159, pl. ix, fig. 13 (1804); Villen, Ann. Soc. Entom. France, lxxiv, p. 310 (1905).

Chrysops perspicillaris, Loew, Neue Beitr., iv, p. 25 (1856); *id.*, Verh. zool-bot. Ges. Wien, viii, p. 633 (1858); Schiner, Fauna Aust. Dipt., i, p. 41 (1862); Gobert, Mem. Soc. Linn. Nord France, 1881, p. 48 (1881); Pand., Revue d'Entom., ii, p. 226 (1883); Griff., Boll. Mus. Zool. et Anat. comp. Torino, x, No. 218 (1895); Ricardo, Ann. Mag. Nat. Hist. (7), ix, pp. 426, 430 (1902).

One female from Baluchistan in Indian Museum coll. rather pale in colouring but identical with the species described by Loew, now stated by Villen to be identical with the Meigen type of *C. flavipes* seen by him in the Paris Museum. The species is widely distributed, being recorded from Central and South Europe, N. Africa and Asia Minor.

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IX. CONTRIBUTIONS TO THE FAUNA OF
YUNNAN BASED ON COLLECTIONS
MADE BY J COGGIN BROWN,
B Sc , 1909—1910 ¹

PART VII.—TABANIDAE.

By GERTRUDE RICARDO.

The Tabanidae sent me for identification by Dr. Annandale are few in number, comprising the following species:—

TABANUS, Linné

Tabanus orientis, Walker. Two females from Man Hsien.

Tabanus monotaeniatus, Bigot. Two females from the same locality, rather smaller in size than usual, the abdomen being narrower, and reddish in colour.

HAEMATOPOTA, Meigen.

Haematopota lata, Ricardo. Four females from Man Hsien.

CHRYSOPS, Meigen.

Chrysops mlokosiewiczi, Bigot (*Chrysops striatus*, Wulp). A series of females from between Tengyueh and Tali Fu (J Coggin Brown). The frontal callus is reddish yellow, not black. This species has a wide distribution in the Palaearctic and Oriental Regions, being recorded from China, Japan and Persia.

Chrysops designata, Ricardo (p. 383, *antea*). One female.

For references to these species see *Rec. Ind. Mus.*, vol. iv, No. vi, 1911, containing a revision of the species of *Tabanus* from the Oriental Region, and the same publication, vol. iv, No. viii, for species of *Chrysops* and other genera of Tabanidae.

¹ The previous papers of this series appeared in *Rec. Ind. Mus.*, v, p. 193 (1910), and vi, pp. 13 and 215 (1911).

EXPLANATION OF PLATE XV.

- FIG.** 1.—*Chrysops designata*.
” 2.— ” *pellucida*.
” 3.— ” *dispar*.
” 4.— ” *flavocincta*.
” 5.— ” *stimulans*.
” 6.— ” *sinensis*.
” 7.— ” *fasciata*.



Fig. 1.



Fig. 2.



Fig. 3.

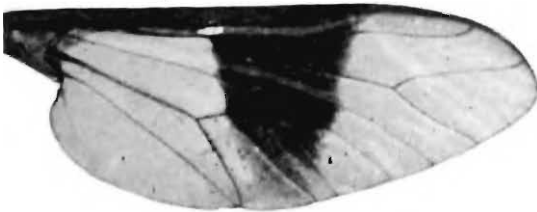


Fig. 4.



Fig. 5.



Fig. 6.



Fig. 7.

CHRYSOPS

EXPLANATION OF PLATE XVI.

- FIG. 8.—*Udenocera brunnea*.
,, 9.—*Gastroxides ater*.
,, 10.—*Haematopota latifascia*.
,, 11.— ,, *atomaria*.
,, 12.— ,, *unizonata*, ♂.
,, 13.— ,, *unizonata*, ♀.
,, 14.— ,, *tessellata*.
,, 15.— ,, *cingalensis*.
,, 16.— ,, *brevis*.

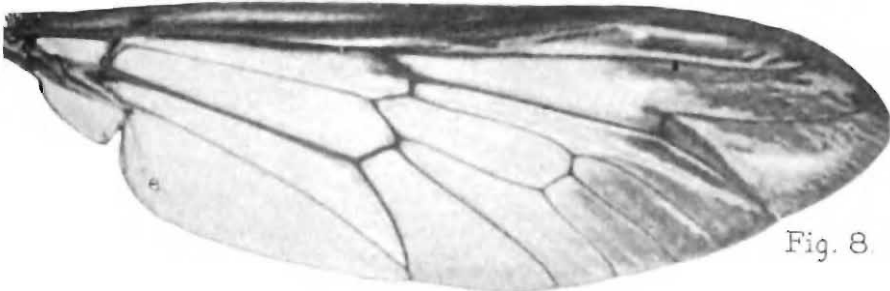


Fig. 8.

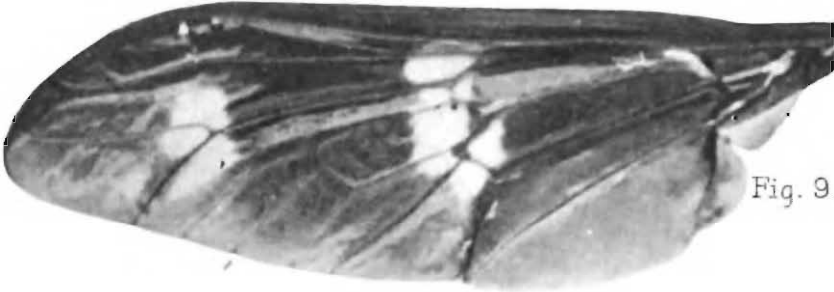


Fig. 9.

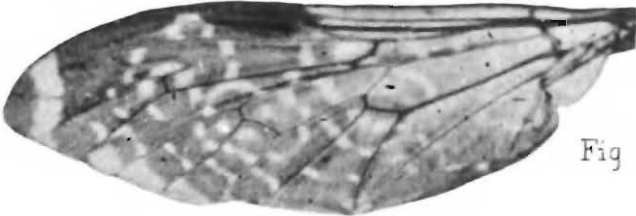


Fig. 10.



Fig. 11.



Fig. 12.



Fig. 13.



Fig. 14.



Fig. 15.



Fig. 16.

EXPLANATION OF PLATE XVII.

- FIG. 17.—*Haematopota fuscifrons*.
,, 18.— ,, *rubida*.
,, 19.— ,, *indiana*.
,, 20.— ,, *punctifera*.
,, 21.— ,, *annandalei*.
,, 22.— ,, *dissimilis*.
,, 23.— ,, *validicornis*.
,, 24.— ,, *roralis*.
,, 25.— ,, *javana*.
,, 26.— ,, *lata*.



Fig. 17.



Fig. 18.

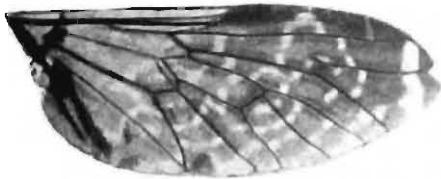


Fig. 19.



Fig. 20.

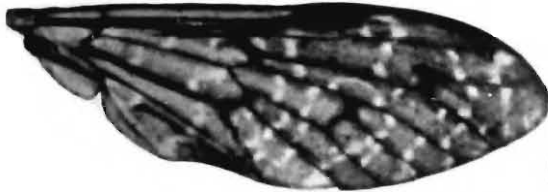


Fig. 21.



Fig. 22.

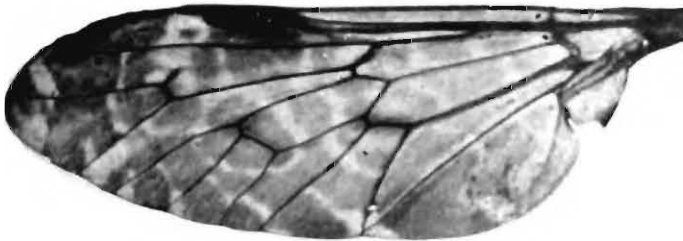


Fig. 23.

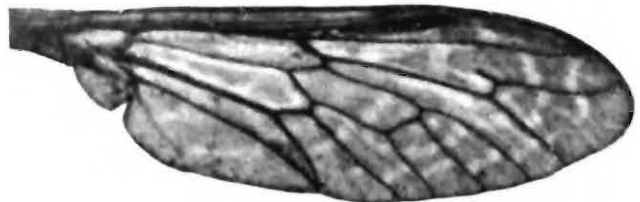


Fig. 24.

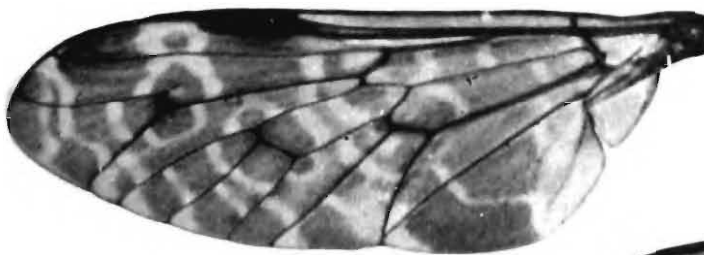


Fig. 25

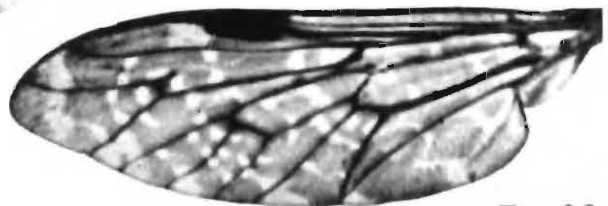


Fig. 26.

EXPLANATION OF PLATE XVIII.

- FIG. 27.—*Haematopota singularis*.
,, 28.— ,, *sinensis*.
,, 29.— ,, *assamensis*.
,, 30.— ,, *irrorata*.
,, 31.— ,, *inconspicua*.
,, 32.— ,, *marginata*.
,, 33.— ,, *immaculata*.
,, 34.— ,, *bilineata*.

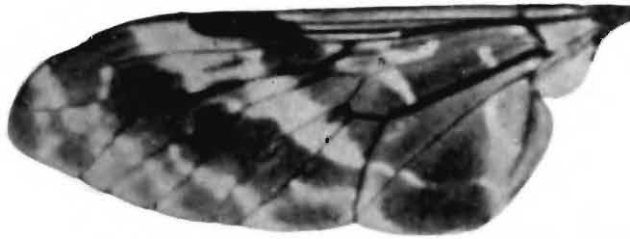


Fig. 27.

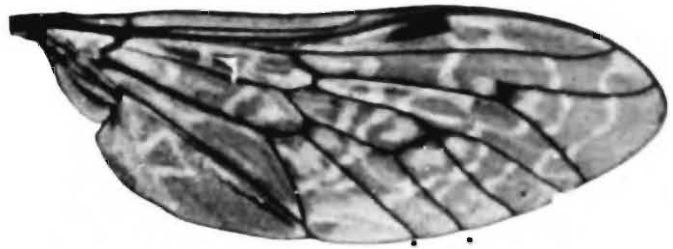


Fig. 28.



Fig. 29.

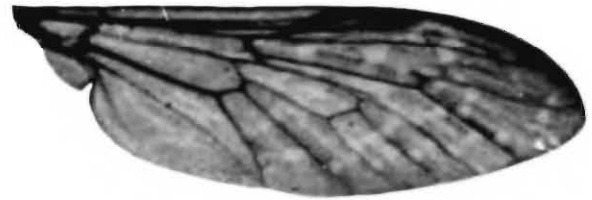


Fig. 30.



Fig. 31.

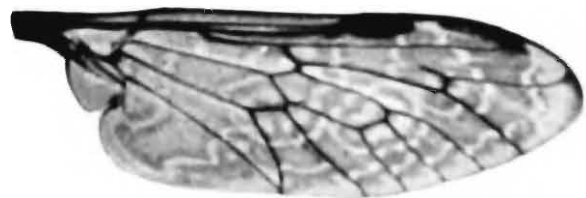


Fig. 32.

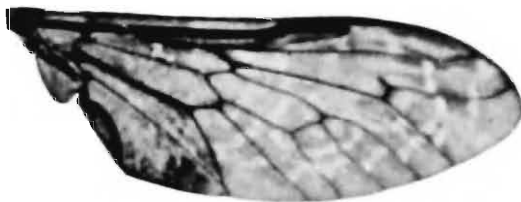


Fig. 33.

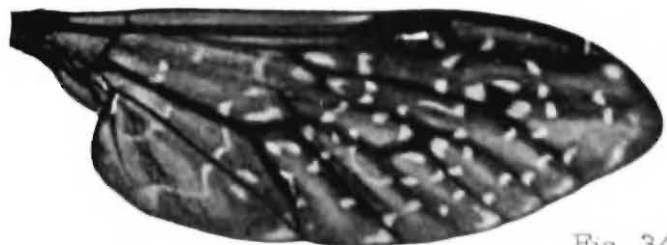


Fig. 34.

RECORDS

of the

INDIAN MUSEUM

Vol. I, 1907.

Part I.—Contributions to the Fauna of the Arabian Sea. Hemiptera and Hymenoptera from the Himalayas. Indian Freshwater Entomostraca. The Fauna of Brackish Ponds at Port Canning, Lower Bengal, I—III. A Sporozoon from the heart of a Cow. *Miscellanea* :—The appendicular skeleton of the Dugong. An egg laid in captivity by a Goshawk. Melanic specimens of *Barbus ticto*. Two barnacles new to Indian seas. Mosquitoes of the genus *Anopheles* from Port Canning. *Anopheles* larvae in brackish water. Mosquitoes from Kumaon. Peculiar habit of an earthworm.

Part II.—Revision of the Oriental Stratiomyidae. An Oligochaete Worm allied to *Chaetogaster*. The Fauna of Brackish Ponds at Port Canning, Lower Bengal, IV. A Polyzoon from the Himalayas. Batrachia, Reptiles and Fish from Nepal and the Western Himalayas. The Fauna of Brackish Ponds at Port Canning, Lower Bengal, V. Oriental Diptera, I and II. *Miscellanea* :—*Gecko verticillatus* in Calcutta. The distribution of *Kachuga sylhetensis*. The distribution of *Bufo andersoni*. Note on *Rutilia nitens*. Some Indian Cerambycidae. Some Indian Hemiptera. A preoccupied specific name in *Macrothrix*. An enemy of certain Pearl Oysters in the Persian Gulf. The distribution in India of the African snail, *Achatina fulica*. Statoblasts from the surface of a Himalayan pond. Notes on *Hislopia lacustris*.

Part III.—Marine Polyzoa in the Indian Museum. The Fauna of Brackish Ponds at Port Canning, Lower Bengal, VI. Earwigs (Dermaptera) in the Indian Museum. Oriental Diptera, III. A new snake from Nepal. Marketable fish from Akyab. Freshwater Oligochaete Worms from the Punjab. Phosphorescence in Marine Animals. The rats of Dacca, Eastern Bengal. Freshwater Sponges, I—V. *Miscellanea* :—The original home of *Mus decumanus*. Colour change in *Hylobates hoolock*. Eggs of *Tylototriton verrucosus*. The hosts of *Tachaea spongillicola*. A second species of *Dichelaspis* from *Bathynomus giganteus*.

Part IV.—*Nudiclava monocanthi*, the type of a new genus of Hydroids parasitic on Fish. Three new Nycteribiidae from India. Annotated Catalogue of Oriental Culicidae. Oriental Diptera, IV. Freshwater Sponges, VI, VII. A new Cyprinid Fish of the genus *Danio* from Upper Burma. *Miscellanea* :—A colour variety of *Typhlops braminus*. Reptiles and a Batrachian from an island in the Chilka Lake, Orissa.

Vol. II, 1908-1909.

Part I.—Retirement of Lieut.-Col. Alcock. The Fauna of Brackish Ponds at Port Canning, Lower Bengal, VII. A new Dictyonine Sponge from the Indian Ocean. Freshwater Sponges, VIII. Remarkable cases of variation, I. A new species of Lizard of the genus *Salea*, from Assam. The Fauna of Brackish Ponds at Port Canning, Lower Bengal, VIII. A new Cavernicolous Phasgonurid from Lower Siam. New species of Marine and Freshwater Shells in the Indian Museum. Oriental Syrphidae, I. A new variety of *Spongilla loricata*. Oriental Diptera, V. *Miscellanea* :—Remarks on *Simoteps splendidus*. Corrections to No. IV of "Notes on Oriental Diptera." The Isopod genus *Tachaea*. The habits of the Amphipod, *Quadrivisio bengalensis*. New varieties of *Nanina berlangeri* and *Corbicula fluminalis*. Recent additions to the Entozoa in the Indian Museum. A sub-fossil polyzoon from Calcutta. Corrections as to the identity of Indian Phylactolaemata. A peculiar form of *Euglena*.

Part II.—Gardiens du Musée Indien. The Fauna of Brackish Ponds at Port Canning, Lower Bengal, IX. A new species of *Danio* from Lower Burma. Rhynchota Malayana, I. *Cimex rotundatus*, Signoret. Freshwater Sponges, IX. Fruit Bats inhabiting the Andaman and Nicobar Archipelagos. A new species of Sun-Bird obtained near Darjiling. Three Indian Phylactolaemata. Two new species of Eagle-Rays (Myliobatidae). A new species of the genus *Sesarma*, Say., from the Andaman Islands. New species of Land, Marine, and Freshwater Shells from the Andaman Islands.

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Part V.—Revision of the Oriental Leptidae. Revised and annotated Catalogue of Oriental Bombylidae.

Vol. III, 1909.

Part I.—The races of Indian rats.

Part II.—Freshwater Sponges, X. Aquatic animals from Tibet, II. Some amphibious Cockroaches. Quelques nouvelles Cécidomyies des Indes. New land and marine shells from Ceylon and S. India. Two new species of *Caranx* from the Bay of Bengal. Some little known Indian Ophidia. Some forms of *Dipsadomorphus*. A pelagic Sea-Anemone without tentacles. Rhynchota Malayana, II.

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Vol. IV, 1910-1911.

No. I.—Second report on the collection of Culicidae in the Indian Museum.

Nos. II and III.—The Indian species of Papataci Fly (*Phlebotomus*). Taxonomic values in Culicidae.

No. IV.—Revision of the Oriental blood-sucking Muscidae.

No. V.—A new arrangement of the Indian Anophelinae.

No. VI.—A revision of the species of *Tabanus* from the Oriental Region, including notes on species from surrounding countries.

No. VII.—New Oriental Nematocera. *Miscellanea* :—Synonymy in Corethrinae. Indian *Phlebotomi*.

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Vol. VI, 1911.

Part I.—A Rhizocephalous Crustacean from fresh water and on some specimens of the order from Indian seas. Decapoda in the Indian Museum, II. Contributions to the fauna of Yunnan, Parts II to V. Pedipalpi in the Indian Museum, I and II. Six new species of shells from Bengal and Madras. *Miscellanea* :—Fleas from India and China. Flies found associated with cattle in the neighbourhood of Calcutta. Mosquito sucked by a midge. Large egg laid by a beetle.

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Part IV.—Indian Isopods. Systematic notes on the Ctenostomatous Polyzoa of fresh water. Some aquatic Oligochaeta in the Indian Museum. Contributions to the fauna of Yunnan, Part VI. Asiatic species of Crustacea Anostraca in the Indian Museum. Freshwater sponges, XIII. *Miscellanea* :—Synonymy in Corethrinae. The distribution of the different forms of the genus *Ibla*.

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Aids to the identification of Rats connected with Plague in India. By W. C. Hossack, M.D.	0 8	Echinoderma of the Indian Museum, Part VI: An account of the Shallow-water Asteroidea. By R. Koehler	20 0
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