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A revision of Indian *Machimus* Loew
(Diptera : Asilidae)

by

A. N. T. Joseph
P. Parui

Issued by the Director
Zoological Survey of India, Calcutta

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(Diptera : Asilidae)

A. N. T JOSEPH
Freshwater Biological Station, Hyderabad

AND

P. PARUI
Zoological Survey of India, Calcutta



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A REVISION OF INDIAN *MACHIMUS* LOEW (DIPTERA : ASILIDAE)

A. N. T. JOSEPH AND P. PAURI

Zoological Survey of India

34, Chittaranjan Avenue

Calcutta

SYNOPSIS

Machimus Loew from India is revised. It contains 32 species : 22 described previously and 10 new species, viz. *Machimus bengalensis*, *M. calicutensis*, *M. cheriani*, *M. cinchonaensis*, *M. dravidicus*, *M. indicus*, *M. keralaensis*, *M. mussooriensis*, *M. scarbroughi* and *M. smithi*. A key to all species is provided and types are designated.

Previous to this paper *Machimus* Loew was represented by twenty-two species in India. Though we have been studying Indian Asilidae for about a decade, we could not make much progress on separating species in this genus because of their close similarity; most species can be determined with certainty only by examination of the male genitalia. Through the courtesy of Mr. K.G.V. Smith of the British Museum (Natural History), London, we have received the types of twelve species, and one species each through the courtesy of Dr. Ruth Contreras-Lichtenberg of Naturhistorisches Museum, Vienna, and Professor Robert Lavigne, the University of Wyoming, Wyoming, U.S.A. We have in our own collection (National Collection of the Zoological Survey of India, Calcutta) types of seven species. The remaining one was described from specimens in the general collection of the Zoological Survey of India, as we are unable to locate type specimens. An additional ten species are described below.

Genus *Machimus* Loew

Machimus Loew, 1849, *Linn. Ent.* 4 : 1. Type species, *Asilus chrystis* Meigen, designated by Coquillett, 1910.

Machimus Loew : Oldroyd, 1975, *A Catalog of Diptera of the Oriental Region*, 2 : 144.

In 1849, Loew described *Machimus*, *Tolmerus*, *Epitriptus* and other related genera, the status of these genera changing from author to author. In 1968, Ritcher discussed and provided key to the members of *Machimus* in the Caucasus Mountains without referring neither to *Tolmerus* nor to *Epitriptus*. It was Martin (1975), who clearly defined *Machimus* and brought out the interrelationships between it and other related genera.

Machimus Loew is a difficult genus to define precisely because many of its characters are generalized with rest of the Asilini. These flies are medium to large Asilini and can be separated from the remaining genera in the tribe by the prominent facial gibbosity covered with dense bristles, two submarginal cells, most abdominal tergites with lateral bristles, female ovipositor strongly compressed laterally, composed of a moderately long eighth segment, and a short ninth segment, and male proctiger comparatively long and dorsal. One of the important characters it shares with *Eutelmus* Loew is the often produced characteristic eighth sternite of the male, which is rounded in *Machimus* Loew but tends to be excised in *Eutelmus*. Additionally the hairs of the scutellar disc are comparatively denser and longer in *Machimus*. The genus *Trichomachimus* Engel is closely related to *Machimus* but the former can be distinguished by the presence of abundant longer and softer bristles as well as hairs on the posterior half of mesonotum, scutellum and abdomen, the scutellar bristles and hairs being remarkably long and curved forward.

Key to Indian species of *Machimus* Loew

1. Eighth sternite produced 2
 Eighth sternite not produced 12
2. Scutellum with four bristles on border 3
 Scutellum with more than four bristles on border 9
3. All femora shining black 4
 All femora uniformly yellowish-brown, mystax
 black with pale yellow bristles below, male geni-
 talia upturned with short superior forceps (Fig. 6) ... *cheriani* sp. nov.
4. All tibiae black 5
 All tibiae reddish with dark apex, wings basally
 and anteriorly hyaline but with dark shading in
 the centre of cells, eighth sternite ends in two
 teeth bearing white hairs (Fig. 26) *rufipes* Ricardo

5. Fore femur with long yellow or white hairs below ... 6
 Fore femur with long black hairs and bristles below 7
6. Fore femur with long white hairs below, abdomen black, greyish-yellow tomentose, tergites 1-4 with long pale hairs laterally, superior forceps moderately stout (Fig. 2) *assamensis* Ricardo
 Fore femur with long yellow hairs below, abdomen yellowish-grey with distinct dark spots, tergites 1-3 laterally with pale yellow bristles, superior forceps linear (Fig. 17) *khasiensis* Ricardo
7. Superior forceps apically incised, wings deeply infuscated except at base, legs and abdomen blue black (Fig. 8) *coerulescens* Ricardo
 Superior forceps not apically incised 8
8. Mystax golden with a few black bristles above, mediolongitudinal stripe of thorax undivided and extending the entire length, eighth sternite narrowly prolonged with a thick tuft of black hairs *aurimystax* (Bromley)
 Mystax black above and on sides. pale in the middle, mediolongitudinal stripe of thorax extends upto middle of transverse suture and hind border, eighth sternite obtuse and fringed with black hairs (Fig. 21) *nigrinus* Ricardo
9. All femora uniformly yellowish-brown to black ... 10
 All femora black and yellowish-brown 11
10. Male genitalia bright red, eighth sternite with a fringe of black hairs apically, all femora and tibiae black (Fig. 23) *parvus* Ricardo
 Male genitalia black, eighth sternite with a mat of orange yellow hairs, all femora yellowish-brown to dark and all tibiae dull yellow (Fig. 22) ... *pallipes* Ricardo
11. Mystax black with a few pale hairs below, eighth sternite narrowly produced with pointed apex bearing long black hairs on border (Fig. 18) ... *montanus* Ricardo
 Mystax medially pale surrounded by black bristles, eighth sternite produced into a rounded broad front bearing long hairs (Fig. 11) *hirtipes* Ricardo

12. All femora wholly black 13
 All femora differently coloured 27
13. Superior forceps with apical cleft 14
 Superior forceps without apical cleft 15
14. Hypandrium produced about half the length of superior forceps, mediolongitudinal stripe extends the whole length of mesonotum, fore femur without a row of long black hairs dorsally *indicus* sp. nov.
 Hypandrium produced more than half the length of superior forceps, fore femur with a dorsal row of thin long black hairs, mesonotum without mediolongitudinal stripe *bengalensis* sp. nov.
15. Scutellum with two bristles on its margin, incisures of abdominal tergites narrowly white tomentose, hind femur with an anteroventral row of bristles *incisularis* Bromley
 Scutellum with four to eight bristles on its margin ... 16
16. Fore femur ventrally with a row of bristles 17
 Fore femur ventrally with hairs only 23
17. Mystax wholly black, scutellum with four bristles on its margin... .. 18
 Mystax mixed black and pale to yellow, scutellum with four to six bristles on its margin 19
18. Ventral bristles of fore femur decreasing in length from base to apex, wings wholly infuscated, mediolongitudinal stripe of thorax extends the entire length *calicutensis* sp. nov.
 Ventral bristles of fore femur uniform in length, wings infuscated but pale basally, mesonotum devoid of mediolongitudinal stripe *cinchonaensis* sp. nov.
19. Eighth sternite bears dense bristles. tergites 2-3 with tufts of pale hairs on sides *nicobarensis* (Schiner)
 Eighth sternite without dense bristles 20
20. Eighth sternite slightly exposed, superior forceps stout, a transverse row of stout yellow bristles near incisures of each abdominal tergite 21
 Eighth sternite not exposed, superior forceps linear, a transverse row of weak black bristles near incisures of each abdominal tergite 22

21. Distal two-thirds of hind tibia and whole basitarsus with golden-yellow pubescence posteriorly, hind border of tergites with a transverse band of golden yellow tomentum, scutellum black haired on disc *mussooriensis* sp. nov.
- Distal half of fore tibia and fore basitarsus wholly with golden yellow pubescence ventrally, abdominal tergites with lateral triangles of greyish-yellow tomentum, scutellum with pale yellow hairs on disc *scarbroughi* sp. nov.
22. Third antennal segment about one and half times of style, mid femur with anteroventral and postero-ventral rows of bristles, wings infuscated but medially hyaline... .. *keralaensis* sp. nov.
- Third antennal segment slightly longer than style, mid femur with anteroventral and ventral rows of bristles, wings fuscous but medially and basally hyaline *smithi* sp. nov.
23. Posterior branch R_5 of third vein sharply curved, superior forceps bulged below medially *angularis* (Ricardo)
- Posterior branch R_5 of third vein gently curved ... 24
24. Mystax pale yellow with one or two black bristles on each side at lower border, hypandrium of male genitalia produced less than half the length of superior forceps... .. 25
- Mystax pale yellow with black bristles above and on sides, hypandrium of male genitalia produced more than half the length of superior forceps 26
25. Wings hyaline with light shading distally which extends along hind border, eighth sternite with a few long black hairs at apex, superior forceps distinctly broader at apex than base (Fig. 10) ... *dubius* Ricardo
- Wings largely infuscated, hyaline only at base, eighth sternite without long black hairs at apex, superior forceps uniformly broad from base to apex (Fig. 12) *indianus* Ricardo
26. Superior forceps projected below at apex, each abdominal tergite on posterior border with a transverse band of grey tomentum, eighth sternite bare (Fig. 24) *punjabensis* Bromley
- Superior forceps without apical projection, abdomen uniformly greyish-yellow tomentose, eighth sternite with dense long hairs (Fig. 25) ... *ricardoi* (Bromley)

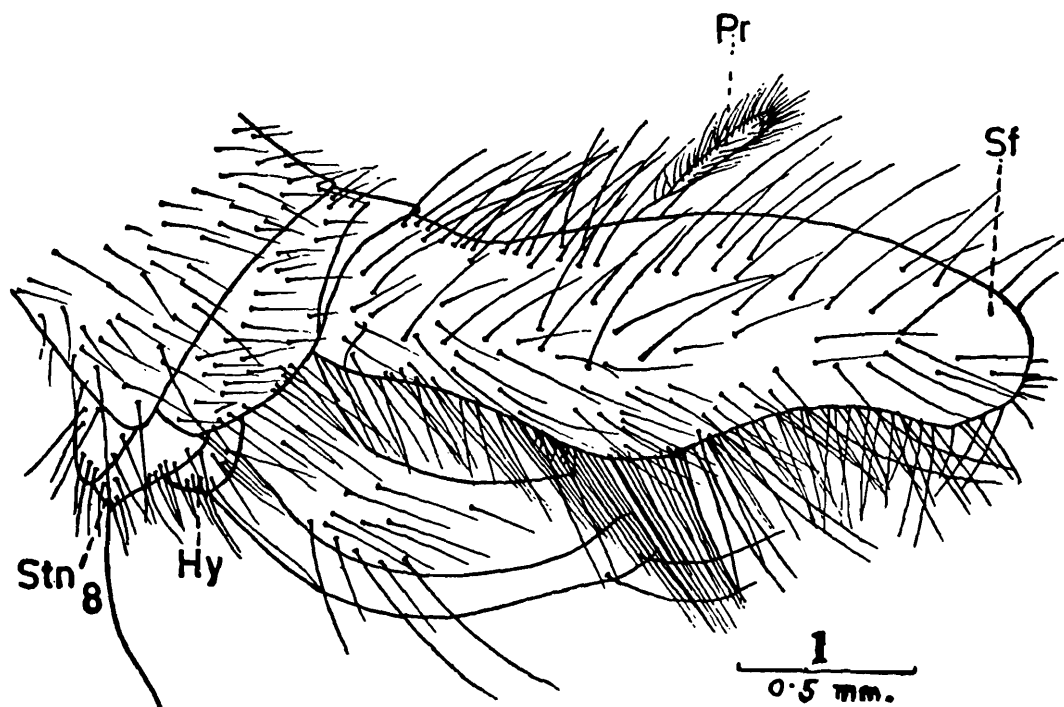
27. Fore femur black except yellowish-brown posteriorly, superior forceps black with basal yellowish-brown marks *dravidicus* sp. nov.
Colour pattern of fore femur different 28
28. Superior forceps prolonged into a process apically 29
Superior forceps without any process apically ... 30
29. Scutellum with two bristles on margin, male genitalia yellowish-brown and black, abdomen uniformly grey tomentose, tergites 1-4 with pale yellow-bristles laterally *bicolor* Joseph and Parui
Scutellum with six or more bristles on margin, male genitalia black, abdominal tergites with some pale bristles on hind border *subgenitalis* Bromley
30. All femora and tibiae reddish-yellow except for the dark brown anterior stripe on femora, male genitalia dark brown above and reddish-below, superior forceps rather short *tibialis* Ricardo
All femora and tibiae yellowish-brown and black ... 31
31. Superior forceps ending in a long slender process, eighth sternite bears dense hairs apically, mystax black with a few white bristles intermixed *inutilis* Bromley
Superior forceps gradually narrowed with truncate apex, eighth sternite bears long bristles apically, mystax black with some pale yellow bristles anteriorly *infrafemoralis* Bromley

Machimus angularis (Ricardo)

(Fig. 1)

Tolmerus angularis Ricardo, 1922, *Ann. Mag. nat. Hist.* (9) 10 : 64.

Machimus angularis (Ricardo) : Oldroyd, 1975, *A. Catalog of Diptera of the Oriental Region*, 2 : 144.



1. Lateral view of male genitalia of *Machimus angularis* (Ricardo).

A medium black species with black legs, black and yellowish-brown mystax, and distally infuscated wings, Male : length 15 mm, wing 10 mm.

Male : Head broader than thorax, black covered with grey tomentum; mystax black with some yellowish-brown bristles anteriorly, fronto-orbital bristles and ocellar bristles black, postcranium grey haired but for a few black ones above, postocular bristles black, densely grey haired below. Antennal segment 3 lost, 1 and 2 black with black bristles, the latter one-and-half times as long as the former. Palpi and proboscis black, their hairs pale.

Thorax black with grey tomentum; pronotum medially with two or three yellowish-brown bristles laterally, hairs white, which are dense laterally; mesonotum with the mediolongitudinal stripe indistinctly marked, hairs and bristles black, a few hairs on humeri pale; scutellum with black hairs on disc and a row of slender, black, marginal bristles; metapleuron and hypopleuron each bearing a transverse row of yellowish-brown bristles. Halteres yellowish-brown.

Legs uniformly black, hairs and bristles yellowish-brown and black.

Wings distally infuscated, basally lesser than half hyaline; R_5 distinctly angled.

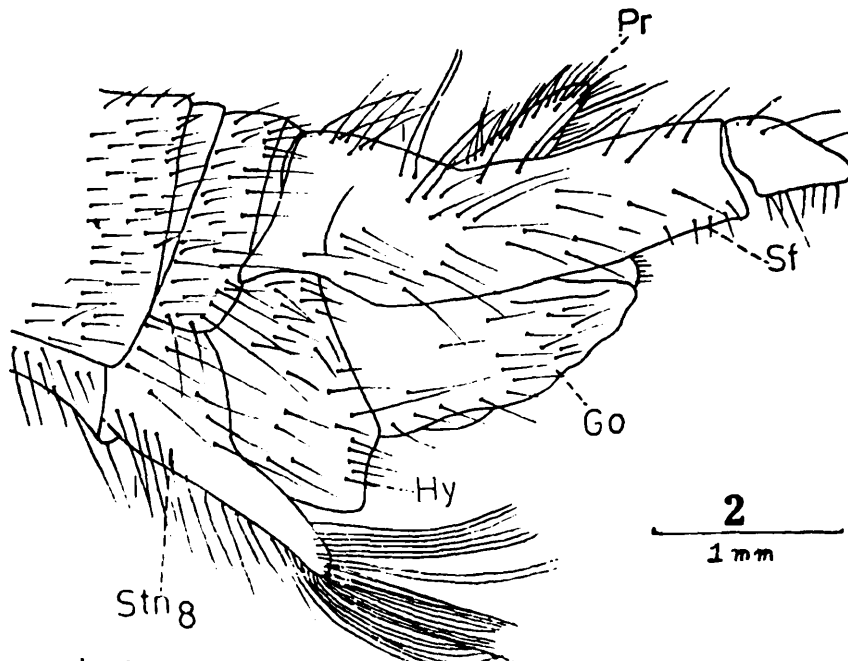
Abdomen black, tergites laterally greyish-yellow tomentose, laterally tergite 1 with a tuft of yellowish-brown bristles and with one black bristle, tergites 2-4 with yellowish-brown bristles whose size decreases from the basal to the distal segments, hairs black, some pale hairs also present laterally. Male genitalia (Fig.1) black with black and some pale hairs.

Lectotype ♂ (here designated), India : Mussoorie, x. 1907, coll. A.D.Imms, B.M.N.H.

By the distinctly angled R_5 vein together with the shape of superior forceps, this fly can be distinguished from other regional species of the genus.

Machimus assamensis Ricardo
(Fig. 2)

Machimus assamensis Ricardo 1919, *Ann. Mag. nat. Hist.* (9) 3 : 46.



2. Lateral view of male genitalia of *Machimus assamensis* Ricardo (superior forceps cracked).

A rather large black species with black legs, mystax pale or mixed pale and black; distally infuscated wings. Male : length 20 mm, wing 14 mm; female : length 20 mm; wing 14 mm.

Male : *Head* narrower than thorax. black, covered with grey tomentum; mystax pale, fronto-orbital bristles and ocellar bristles black, postcranium pale haired, postocular bristles black and confined to upper side, head with profuse fulvous hairs. Antennae missing. Palpi and proboscis black, the former with pale hairs basally and black hairs distally, the latter wholly pale haired.

Thorax black with grey and greyish-yellow tomentum; pronotum with a transverse row of pale bristles, hairs pale, dense laterally, mesonotum with a mediolongitudinal stripe divided by a narrow faint stripe of ground colour, the stripe extending from the anterior border to half the distance from the transverse suture to hind margin, lateral spots cannot be discerned as the thorax is greasy, humeri and posterolateral angles of mesonotum bearing a few pale hairs, remaining hairs and bristles black; scutellum with the disc bearing black hairs, hind margin with four black bristles; metapleuron and hypopleuron each with pale bristles. Halteres pale, brownish tinged.

Legs uniformly black; in foreleg tibia and basitarsus ventrally with a yellowish-brown mat of hairs, hind tibia and tarsi posteriorly

and ventrally bearing mat of fulvous hairs, remaining tarsal hairs white, hairs of tibia long and dense ventrally as are those posteriorly on femur, tarsal hairs black, bristles black.

Wings distally infuscated which along the hind border extends into the axillary cell.

Abdomen black with dense greyish-yellow tomentum, tergites 1 to 4 laterally bearing long, pale hairs, remaining hairs short and pale. Male genitalia (Fig. 2) black with black and pale hairs, superior forceps of one side damaged apically, eighth sternite ending in a long blunt projection which bears dense black and pale hairs.

Female : Antennae present but segment 3 lost, black, basal two segments with black bristles and hairs, segment 2 about two-thirds length of 1. Female similar to male but darker; mystax with black bristles above and pale ones below; median transverse row of bristles of pronotum black; abdomen with hairs predominantly black.

Lectotype ♂ (designated here), Assam, 1906 (1985), coll. W.F. Badgley, B.M.N.H., *Paralectotype* ♀, details as in preceding.

Machimus assamensis Ricardo and *M. dubius* Ricardo are generally similar in appearance but the male genitalia of each is distinct, besides which the eighth sternite is not produced in the latter.

***Machimus aurimystax* (Bromley)**

Asilus (Tolmerus) aurimystax Bromley, 1928. *Am. Mus. Novit*, 336 : 3

Machimus aurimystax (Bromley) : Oldroyd. 1975, *A Catalog of Diptera of the Oriental Region*, 2 : 144.

A rather large black species with grey and greyish-yellow tomentum, black legs, pale yellow and black mystax and grey wings. Abdomen damaged and apex broken off, hence length cannot be ascertained.

Female : *Head* narrower than thorax, black infuscated with dense grey and greyish-yellow tomentum; mystax golden with a few black bristles above and on sides; fronto-orbital bristles and ocellar bristles black, postcranium pale yellow haired above and black haired below, postocular bristles black, pale yellow haired below with a few yellow bristles just above them. Antennal segments 2 and 3 missing, segment 1 black with black hairs and bristles.

Thorax black, grey tomentose; pronotum with a median transverse row of black bristles, sides densely pale yellow haired; mesonotum with a mediolongitudinal black stripe extending the entire length which is not divided, sides with two large and one small black spots in a longitudinal row, hairs black but for a few pale yellow ones posterolaterally, bristles black, scutellum grey tomentose, hairs on disc black with a few pale yellow ones laterally, border with about four black bristles; metapleuron and hypopleuron each bearing pale yellow bristles. Halteres yellowish-brown.

Legs uniformly black, hairs pale yellow and black, a mat of golden yellow hairs present ventrally on distal half of tibia and tarsus, which is dense on hind leg and present ventrally as well as posteriorly on tibia and almost whole of first tarsal segment.

Wings grey distally and interior of cells along posterior border, rest hyaline.

Abdomen badly damaged and lost beyond fifth segment; black with sides and hind border of tergites grey infuscated, tergite 1 laterally with pale yellow hairs and 2 black bristles, tergites 2 and 3 similar but the hairs and bristles lesser and weaker, vestiture black and pale yellow.

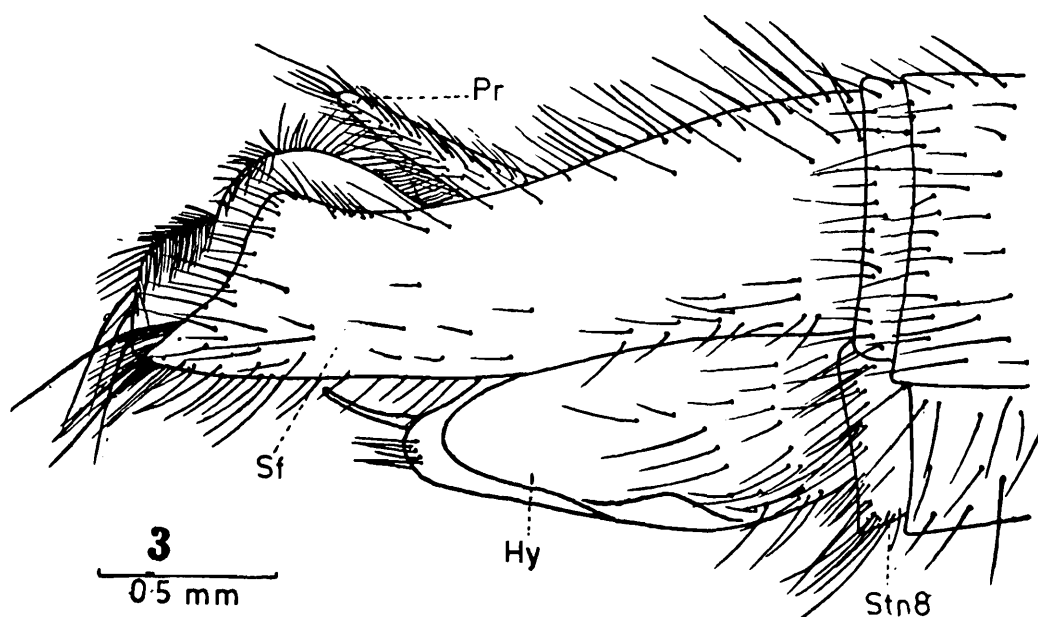
Paratype ♀ (badly damaged, antennal segments 2 and 3 lost, one fore leg missing, one mid leg separated, abdomen broken off beyond 5th segment), China : Yen-ping, 17.viii.1917, Ac 5148, Smithsonian Institution, Washington.

Male not examined. To quote the original description "genitalia shining black with hairs rather long (as long as the 6th to 8th tergites together), slender and pointed from dorsal view, from the side, the tips are slightly curved downwards. The eighth sternite is narrowly prolonged posteriorly and the process is covered with a thick tuft of black hairs"

Machimus aurimustax (Bromley) can be recognised from other regional species by the golden mystax together with the narrowly prolonged eighth sternite of male genitalia which is covered with a thick tuft of black hairs. Superficially it resembles *M. assamensis* Ricardo and *M. khasiensis* Ricardo.

Machimus bengalensis sp. nov.

(Fig. 3)



3. Lateral view of male genitalia of *Machimus bengalensis* sp. nov. A large black species with grey tomentum, black legs, pale yellow and black mystax and deeply infuscated wings. Male : length 16 mm, wing 12 mm.

Male : *Head* narrower than thorax, black with grey tomentum; mystax pale yellow surrounded by black bristles, fronto-orbital bristles and ocellar bristles black, postcranium black haired, also with some pale yellow ones, postocular bristles black, pale yellow haired below. Antennae lost. Palpi and proboscis black, former black haired distally and pale yellow haired basally, latter wholly pale yellow haired.

Thorax black, grey tomentose; pronotum medially black haired and laterally pale yellow haired, medially with a transverse row of black bristles; mesonotum lacking mediolongitudinal stripe, hairs and bristles black; scutellum damaged, metapleuron and hypopleuron each with a transverse row of pale yellow bristles, a few among them being black. Halteres brown.

Legs uniformly black, fore femur with a dorsal row of thin long black hairs, mid femur and hind femur with anteroventral and posteroventral rows of bristles, hairs pale yellow and black, bristles mostly black with some pale yellow ones intermixed, in fore tibia for about apical two-thirds and first tarsal segment wholly with golden pubescence ventrally.

Wings deeply infuscated but slightly paler medially and basally.

Abdomen (glued) black grey tomentose, tergite 1 laterally with a tuft of pale yellow bristles, a few being black, tergites 2-3 with some

pale yellow bristles laterally, hairs golden yellow and pale yellow. Male genitalia (Fig. 3) black, superior forceps elongate, hairs mostly black with some golden yellow ones.

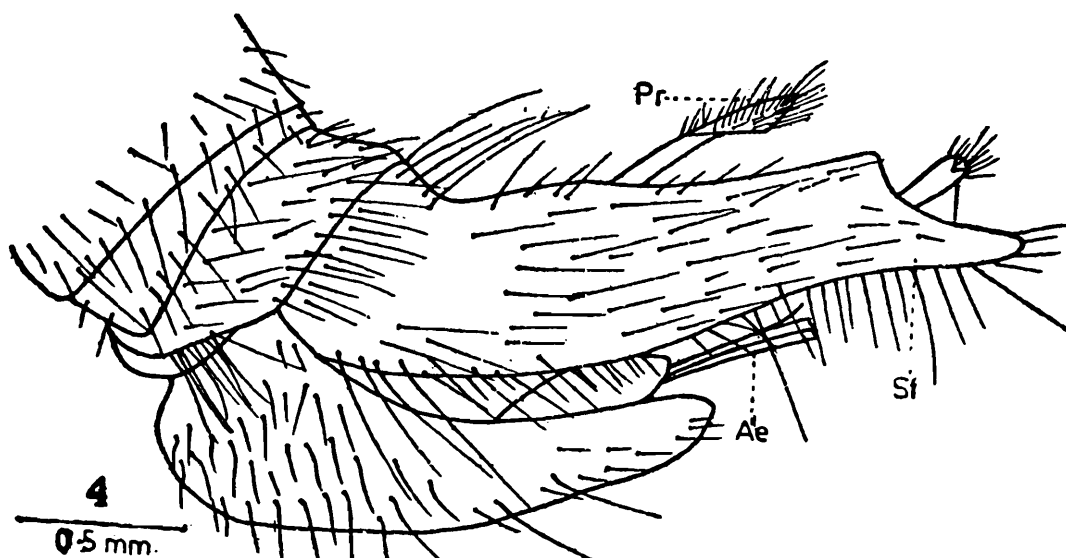
Holotype ♂, India : West Bengal : Darjeeling, vi-ix.1917, presented by E. Brunetti, B.M. 1927, 184, coll. name not given, B.M.N.H.

It superficially resembles *Machimus ricardo* (Bromley) but has quite distinctive superior forceps which bear an apical cleft.

Machimus bicolor Joseph and Parui

(Fig. 4)

Machimus bicolor Joseph and Parui, 1984, *Oriental Ins.* 18 : 63.



4. Lateral view of male genitalia of *Machimus bicolor* Joseph and Parui.

A medium sized black species with black and yellowish-brown legs and lightly infuscated wings. Male : length 11 mm, wing 8 mm.

Male : Head black, grey tomentose; mystax black with some pale yellow bristles below, fronto-orbital and ocellar bristles black, postcranium with some black hairs, postocular bristles black, densely white haired below. Antennae black except for the pedicel which is black and yellowish-brown mixed, scape long, about one-and-half times pedicel, flagellum longer than the combined length of scape, pedicel and style. Palpi and proboscis black with pale yellow hairs.

Thorax black with grey tomentum; pronotum white haired with 4 black bristles in a transverse row; mesonotum with a black mediolongitudinal stripe divided by a narrow grey stripe and extending the entire length, laterally with two black spots, hairs and bristles black other than a few pale yellow hairs on humeri and posterolaterally; scutellum with sparse, pale yellow hairs on the disc

and two black marginal bristles; pleura densely grey tomentose. Halteres yellowish-brown, stalk lighter coloured.

Legs black and yellowish-brown; coxa and trochanter black, fore and mid femora black dorsally and anteriorly, the rest yellowish-brown, in hind femur black colouration more extensive, tibia yellowish-brown basally and black distally, the latter colouration extending from base along the anterior side, tarsal segments yellowish-brown in fore and mid legs and dark brown in hind legs, hairs pale yellow and black, bristles black, femora with an antero-ventral row of bristles.

Wings apically lightly infuscated, but basally hyaline.

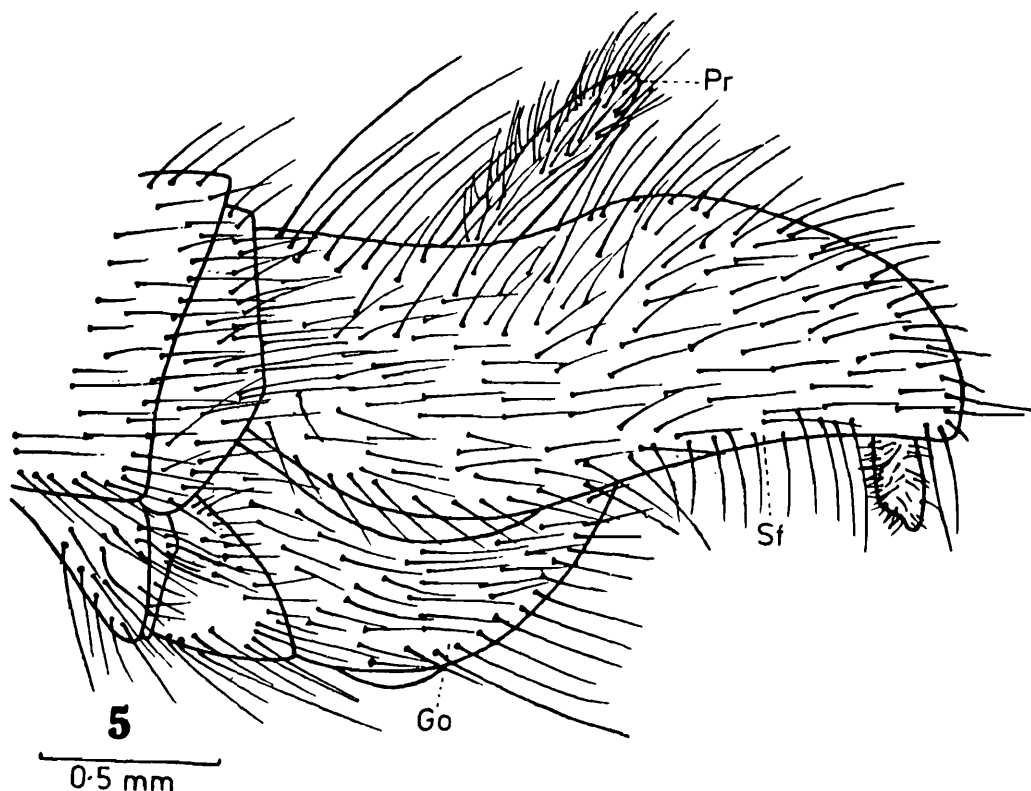
Abdomen black, densely grey tomentose, tergites 1 to 3 or 4 laterally with pale yellow bristles, hairs black and pale. Genitalia (Fig. 4) yellowish-brown and black with pale yellow and a few black hairs

Holotype ♂, India : Himachal Pradesh : Kangra district : Kulu : Dibibokri Nal : Runi Thach, 3901 m, 10.vii.1952, B.M.N.H.

Machimus bicolor Joseph and Parui is very similar to *M. subgenitalis* Bromley from N.W. India from which it can be separated by its smaller size, elongate genitalia, including superior forceps.

***Machimus calicutensis* sp. nov.**

(Fig. 5)



5. Lateral view of male genitalia of *Machimus calicutensis* sp. nov.

A medium sized black to yellowish-brown or dark brown species with similarly coloured legs, black mystax and completely infuscated wings. Male : length 14-15 mm, wing 10-11 mm.

Male : *Head* as wide as thorax, black with grey tomentum; mystax black, fronto-orbitals and ocellar bristles black, postcranium black haired, postocular bristles black, densely pale yellow haired below. Antennae wholly black or segments 1 and 2 yellowish-brown and the rest black, segment 2 more than one half to two-thirds that of 1, segment 3 equal to 1 + 2. Palpi and proboscis black, the former with black and the latter with pale hairs.

Thorax black or yellowish-brown and dark brown with grey tomentum; pronotum medially black and laterally grey tomentose, hairs pale yellow and black, medially with a transverse row of black bristles; mesonotum with the mediolongitudinal stripe extending the entire length but the narrow mediolongitudinal line dividing it discernible only from base to transverse suture, hairs and bristles black; scutellum with black hairs on disc and four or six bristles on margin; metapleuron and hypopleuron each bear a transverse row of black bristles. Halteres yellowish-brown to pale yellow.

Legs uniformly coloured, black to yellowish-brown or dark brown; fore femur with long ventral bristles decreasing in length from base to apex, fore tibia with three long posteroventral bristles; mid and hind femora with anteroventral and posteroventral black bristles. hairs black and pale yellow. bristles black.

Wings wholly infuscated.

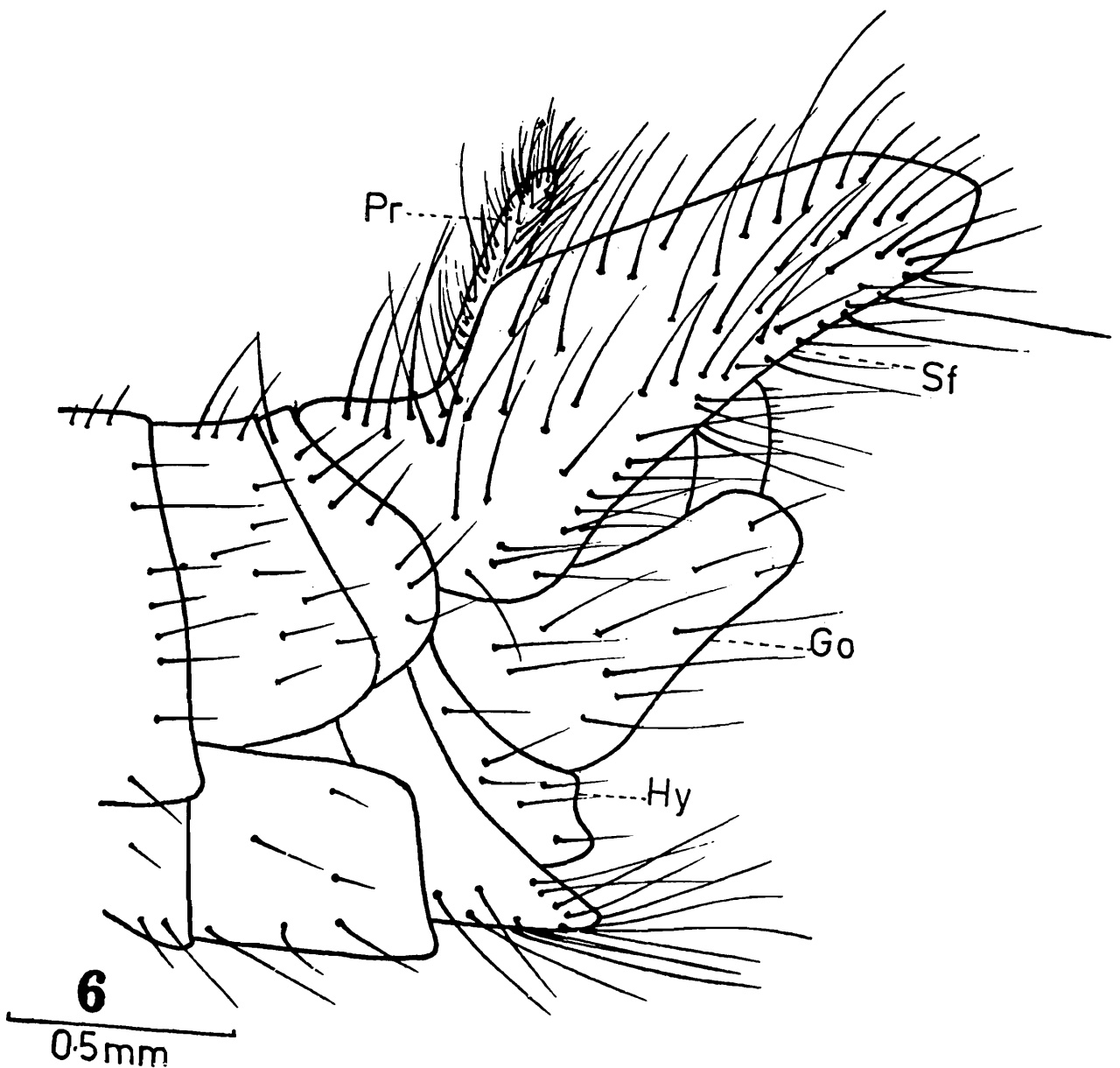
Abdomen black to yellowish-brown or dark brown, tergite 1 laterally with a tuft of pale and black bristles, tergite 2 similar but with fewer bristles, hairs black and pale. Male genitalia (Fig. 5) black or yellowish-brown with mostly black but some pale hairs.

Holotype ♂, S. India : Kerala State : Calicut District : Chembra Peak Area, 1065 m, v. 1970, coll. T.R.S. Nathan, California Univ.
Paratype ♂, same data, ZSI.

Machimus calicutensis sp. nov. is somewhat similar to *M. montanus* Ricardo from which it differs in the uniformly black to yellowish-brown or dark brown legs, wholly infuscated wings, narrower apex of superior forceps and in lacking a produced eighth sternite.

Machimus cheriani sp. nov.

(Fig. 6)



6. Lateral view of male genitalia of *Machimus cheriani* sp. nov.

A medium sized yellowish-brown and dark brown mixed species with yellowish-brown legs, black and pale yellow mystax and lightly infuscated wings. Male : length 11 mm, wing 8 mm.

Male : *Head* as wide as thorax, dark brown with grey and greyish-yellow tomentum; mystax black with pale yellow bristles below, fronto-orbital bristles and ocellar bristles black, postcranium black and pale haired, postocular bristles black, densely pale yellow haired below. Antennal segments 1 and 2 yellowish-brown, rest dark brown, lower side of segment 1 bearing some long black bristles, segment 2 more than two-thirds length of 1, segment 3 shorter than combined length 1 + 2. Palpi yellowish-brown, while proboscis dark brown, hairs pale yellow.

Thorax dark brown with grey and greyish-yellow tomentum; pronotum pale yellow haired with four black bristles in a transverse row; mesonotum with mediolongitudinal stripe indistinct, hairs black but for some pale ones on humeri, bristles black; scutellum with the disc mostly black haired except for a few pale ones laterally, border bearing four black bristles; metapleuron and hypopleuron each with a transverse row of black bristles. Halteres pale yellowish-brown.

Legs more or less uniformly yellowish-brown; fore femur ventrally with a row of bristles which is pale yellow basally and black distally, fore tibia ventrally with long black bristles, hind femur with an anteroventral row of bristles, hairs dense, pale yellow and black, bristles black.

Wings lightly infuscated, but medially hyaline.

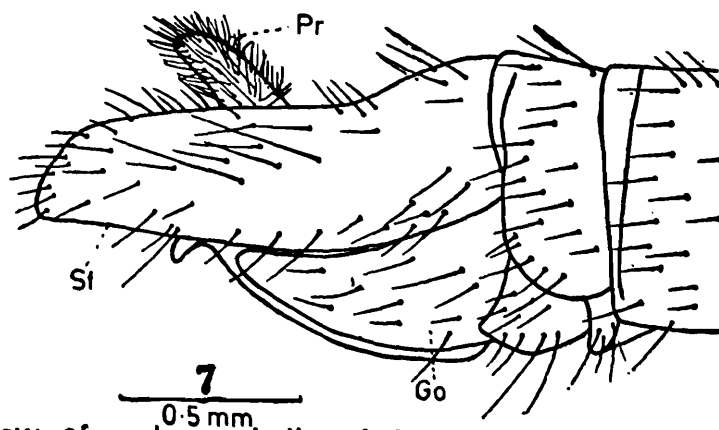
Abdomen yellowish-brown and dark brown mixed, tergite 1 laterally with pale yellow and black bristles, tergites 2-3 with a few pale yellow bristles, hairs predominantly black with some pale ones present. Male genitalia (Fig. 6) yellowish-brown, hairs both black and pale, eighth sternite produced.

Holotype ♂. India : Manipur : Southern District : Moreh Tea Plantation, 2.ii.1975, coll. P.T Cherian, Z.S.I.

Machimus cheriani sp. nov. is somewhat similar to *M. tibialis* Ricardo from which it can be distinguished by the lighter body colouration, uniformly yellowish-brown legs, shape of superior forceps and that of produced eighth sternite. This robber fly is named after the collector, Dr. P.T Cherian, who is a distinguished student of Indian Chloropidae.

***Machimus cinchonaensis* sp. nov.**

(Fig. 7)



7. Lateral view of male genitalia of *Machimus cinchonaensis* sp. nov.

A medium sized, slender, black species with black legs and mystax, and infuscated wings. Male : length 12 mm, wing 7 mm.

Male : Head as wide as thorax, black with grey and greyish-yellow tomentum; mystax black, fronto-orbital bristles and ocellar bristles black, postcranium black haired, postocular bristles black, densely pale yellow haired below. Antennae black, segment 2 longer than two-thirds length of 1, 3 subequal to segment 1 + 2. Palpi and proboscis black, the former with black and the latter with pale yellow hairs.

Thorax black with grey and greyish-yellow tomentum; pronotum pale yellow and black haired, medially with a pair of black bristles, mesonotum lacking mediolongitudinal stripe, hairs and bristles black; scutellum with black hairs on disc and four black marginal bristles; metapleuron and hypopleuron each with a transverse row of black bristles. Halteres yellowish-brown.

Legs uniformly black; fore femur with a ventral row of black bristles, mid and hind femora with anteroventral row of bristles, hairs black and pale yellow, apical part of hind tibia and hind tarsus with golden yellow matting, bristles black.

Wings wholly infuscated, but slightly pale basally.

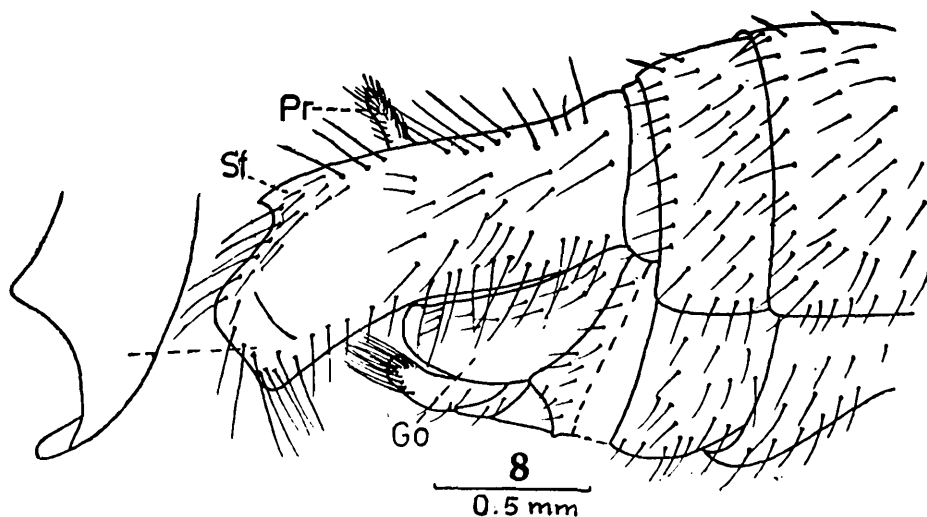
Abdomen black, tergite 1 laterally with a tuft of black and pale bristles, hairs black. Male genitalia (Fig. 7) black with both black and some pale hairs.

Holotype ♂, S. India : Anamalai Hills : Cinchona, 1065 m. v. 1966, coll. T.R.S. Nathan, California Univ.

From all the known South Indian species of *Machimus*, *M. cinchonaensis* sp. nov. can be readily distinguished by the slender abdomen, together with the shape of superior forceps;

***Machimus coerulescens* Ricardo**

Machimus coerulescens Ricardo, 1919, *Ann. Mag. nat. Hist.* (9) 3 : 47.



8. Lateral view of male genitalia of *Machimus coerulescens* Ricardo.

A medium sized black species with blue-black legs, pale yellow and black mystax, deeply infuscated wings, and shining blue-black abdomen. Male : length 17 mm, wing 11 mm.

Male : Head narrower than thorax, black covered with grey tomentum; mystax pale yellow with some black ones above and on sides, fronto-orbital bristles and ocellar bristles black, postcranium pale haired, postocular bristles black and confined to above, yellow haired below. Antennae black with black hairs, segment 2 more than half the length of 1, 3 subequal to 1 + 2, arista and 3 subequal in length. Palpi and proboscis black, former bearing black and the latter, pale yellow hairs.

Thorax black, grey tomentose; pronotum pale haired with a median, transverse row of black bristles; mesonotum with medio-longitudinal stripe, whose extension cannot be ascertained as the thorax is greasy, hairs black with some pale ones, bristles black; scutellum grey tomentose, bristles on hind border missing but presumably four as mentioned by Ricardo; metapleuron and hypopleuron each bearing a transverse row of black bristles. Halteres yellowish-brown, with some chocolate brown markings near base of knob.

Legs blue-black, mid femur somewhat stout, hairs black with some pale ones intermixed, bristles black, some short reddish-yellow pubescence present on tibiae ventrally.

Wings deeply infuscated except for base; anterior crossvein beyond the middle of discal cell, oblique.

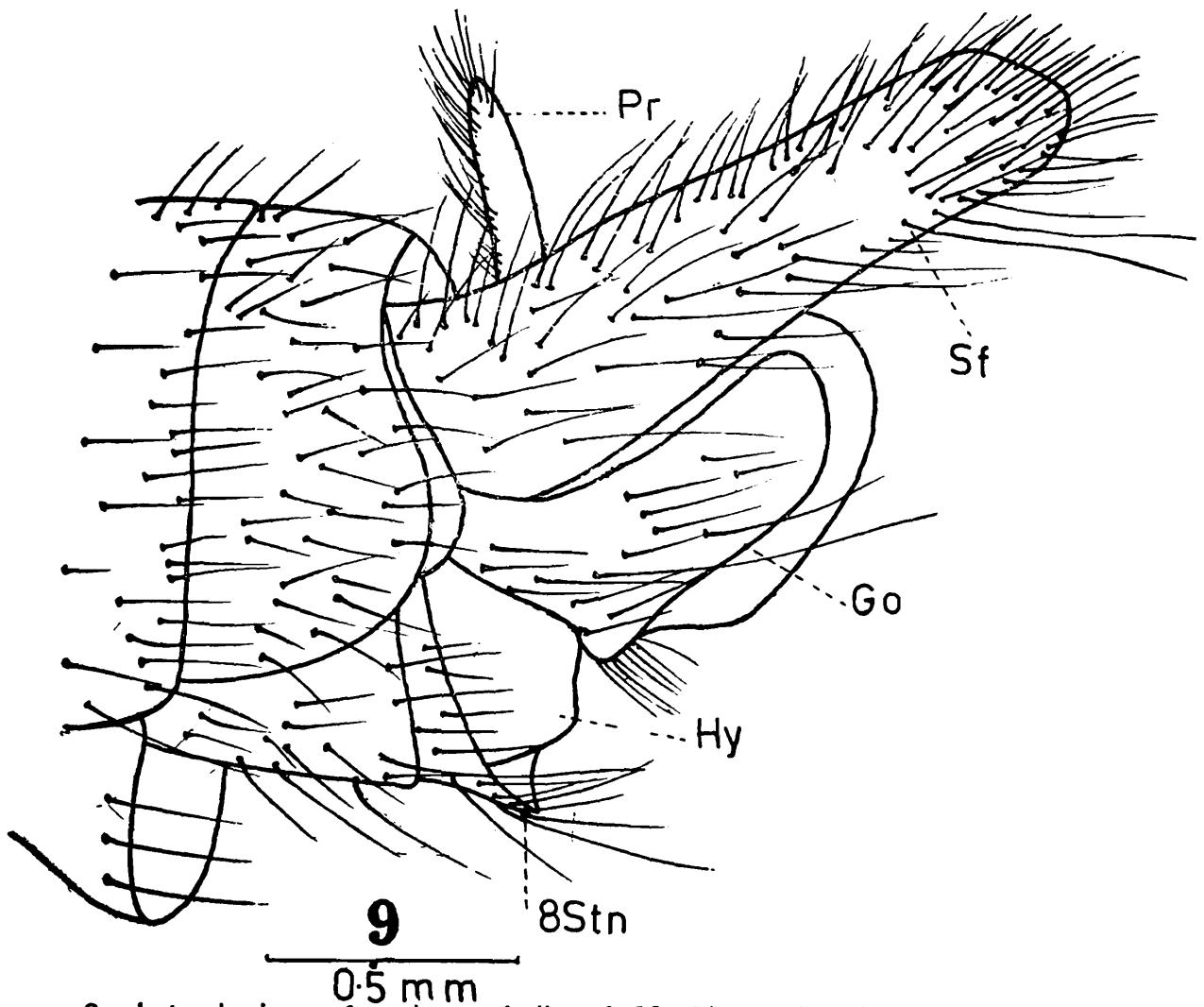
Abdomen shining blue-black with bands of grey tomentum at the posterior border of tergites; sides of tergites 1 and 2 laterally with long, black hairs, remaining hairs black with some pale ones intermixed. Male genitalia (Fig. 8) coloured like that of the rest of abdomen; superior forceps apically incised, eighth sternite broken off from base, according to Bromley it is 'produced to a short blunt point with long black hairs'

Holotype ♂, India : Uttar Pradesh : Kumaon : Bhim Tal, 14.v.1912, date of collection published is 23.v.1912 and the date given here is from the specimen label, B.M.N.H.

It has blue-black legs and abdomen, and can be separated from the remaining species of *Machimus* by its colouration and shape of the male genitalia.

***Machimus dravidicus* sp. nov.**

(Fig. 9)



9. Lateral view of male genitalia of *Machimus dravidicus* sp. nov.

A medium sized black species with black and yellowish-brown legs, black and pale yellow mystax, infuscated wings and a broken mediolongitudinal black abdominal stripe. Male : length 11-12 mm, wing 8-9 mm ; female : length 13-14 mm, wing 8-9 mm.

Male : Head wider than thorax, black with heavy grey tomentum , mystax black above and on sides, medially pale yellow, fronto-orbital bristles and ocellar bristles black, postcranium pale yellow haired with a few black ones above, postocular bristles black, pale yellow haired below. Antennae black, basal segment ventrally bearing some black bristles, segment 2 short, about half the length of 1, segment 3 subequal to segments 1+2. Palpi and proboscis black, former black haired but with some white hairs basally, latter wholly white haired.

Thorax black with greyish-yellow and grey tomentum ; pronotum pale yellow haired with a median transverse row of four pale yellow

bristles mesonotum with the mediolongitudinal stripe extending the entire length, divided by a narrow, lighter, medio-longitudinal line, hairs black medially and pale yellow laterally, bristles black, scutellum with the disc pale yellow haired, border bearing four black bristles ; metapleuron and hypopleuron each with a transverse row of pale yellow bristles. Halteres pale yellow with the knob partly brownish.

Legs black and yellowish-brown, coxa black, femur black yellowish-brown on posterior side, tibia and tarsus similarly coloured but in hind leg yellowish-brown colour extends dorsally also ; fore femur ventrally with a row of long black and pale yellow hairs, mid femur with anterior, anteroventral and posteroventral rows of bristles, which are black or pale yellow, hind femur similar but bristles wholly pale yellow, remaining hairs and bristles pale yellow and black.

Wings infuscated, but medially nearly hyaline.

Abdomen black, heavily greyish-yellow and grey tomentose leaving a broken mediolongitudinal black stripe, tergite 1 with a tuft of lateral pale yellow bristles, tergites 2-4 with three or four pale yellow lateral bristles, hairs pale yellow. Male genitalia (Fig. 9) black, superior forceps basally yellowish-brown long, eighth sternite slightly produced.

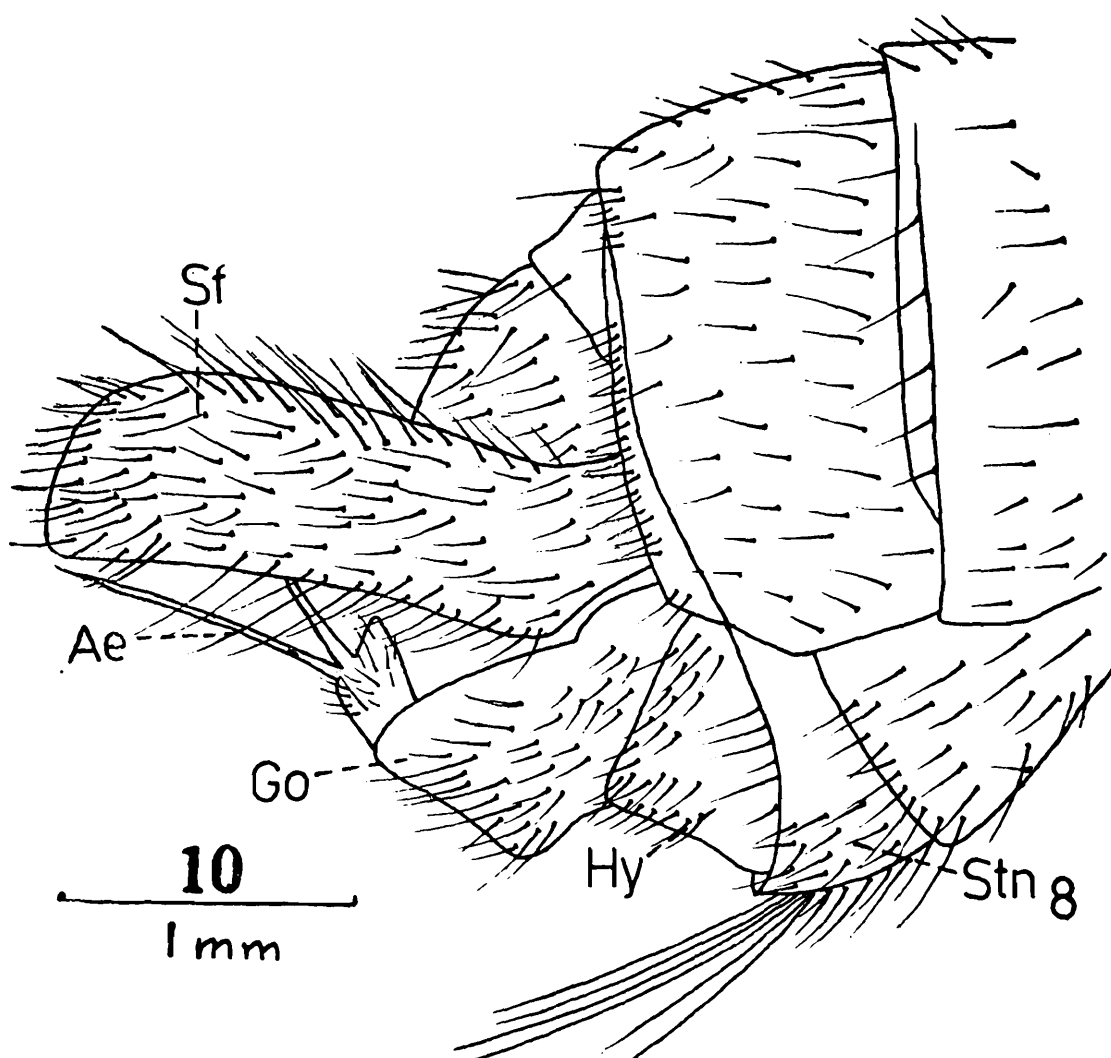
Female : Similar, but in one paratype legs lighter coloured and fore and mid femora have only an anterior dark brown stripe, remainder and tarsus yellowish-brown, hind femur and hind tarsus wholly yellowish-brown.

Holotype ♂, India : Tamil Nadu : Kodaikanal, 2450 m, 28. iii. 1936, coll. name not given, B.M.N.H. *Paratypes* : 1 ♂, 1 ♀ 24. iii. 1936, same data as holotype ; 2 ♀ ♀, same data as holotype, B.M.N.H., Z.S.I.

This robber fly can be readily recognized from all the other known species of *Machimus* from India by the distinctive shape of the superior forceps together with the broken medio-longitudinal black stripe on the abdomen.

Machimus dubius Ricardo

(Fig. 10)



10. Lateral view of male genitalia of *Machimus dubius* Ricardo.
Machimus dubius Ricardo, 1919 *Ann. Mag. nat. Hist.* (9) 3 : 47.

A rather large black species with brown to black legs, lightly shaped wings distally, and lacking a produced eighth sternite. Male : length 20 mm, wing 15 mm; female : 23 mm, wing 15 mm.

Male : Head slightly narrower than thorax, black, heavily grey to white tomentose; mystax pale with a pair of black bristles on either side of the lower border, fronto-orbital plate bearing pale hairs ocellar bristles black postcranium white haired, postocular bristles pale above and black below. Antennae black, segments 1 and 2 bearing black bristles, one or more of which on segment 1 are elongate, segment 2 about three-fourths of length of 1 segment 3 longer than 1 but shorter than the combined length of 1 and 2, style shorter than 3. Palpi brown with basal hairs pale and distal black, proboscis basally brown and distally black with white vestiture.

Thorax black, heavily grey tomentose; pronotum with a median transverse row of black bristles, covering hairs white, dense on sides; mesonotum greasy and so the mediolongitudinal stripe can be detected only with difficulty, the stripe extends the entire length, lateral spots large and more or less medially confluent, posterolateral angles of mesonotum with a few pale hairs, hairs and bristles black. scutellum with the disc pale haired except for a few black median hairs, hind border carries two pairs of black bristles; metapleuron and hypopleuron each with a transverse row of pale bristles. Halteres with the stalk pale and knob yellowish.

Legs brown, femora comparatively darker, in fore leg with long pale hairs below, tibia ventrally bearing long hairs which are black basally and pale distally, fore basitarsus with orange-red adpressed pubescence underneath, the same also present beneath hind basitarsus but lighter coloured; hairs pale, a few black ones present primarily on the distal segments of tarsi, bristles black.

Wings hyaline with light shading distally, which extends along hind border.

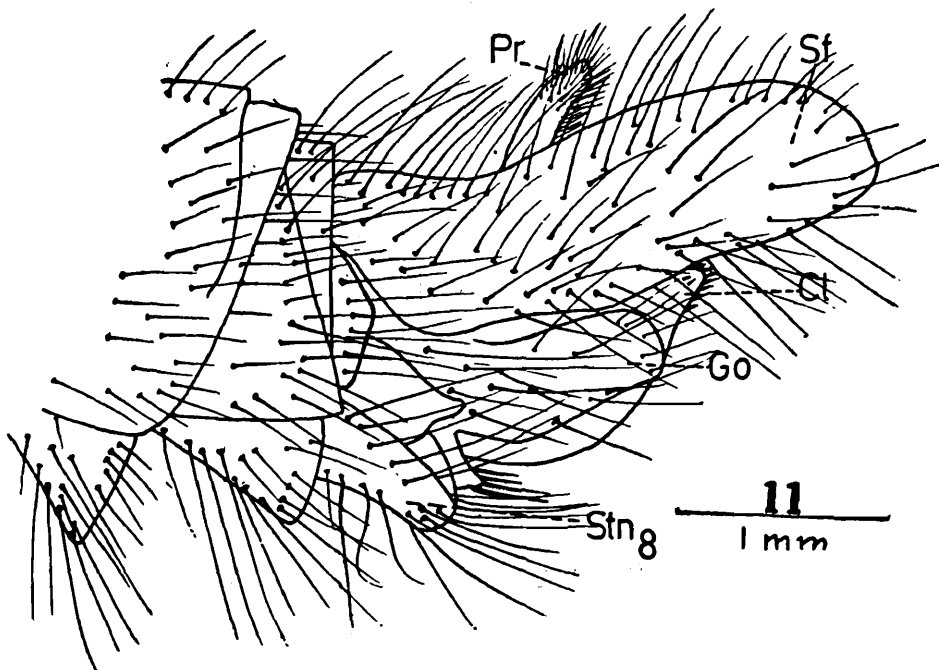
Abdomen dark brown with posterior transverse grey band on tergites, sides of tergite 1 laterally bearing a number of pale bristles and three black bristles, tergites 2-4 with gradually decreasing numbers of pale bristles, hairs both pale and black. Male genitalia (Fig. 10) yellowish-brown with pale hairs, eighth sternite not produced.

Female : Similar but comparatively darker with the legs black, hind margin of scutellum with three pairs of black bristles, the long pubescence on the underside of the fore legs not as long as in the male.

Lectotype ♂ (here designated), 177, Kumaon : Dharmati, for Zool. Coll. 8. vi. 1912; B.M.N.H. *Paralectotype* ♀, 17, Kumaon; near Bhowali, 1737 m, date of collection not given, coll. A.D. Imms.

This fly is very similar to *Machimus indianus* Ricardo but differs in structural details of male genitalia.

Machimus hirtipes Ricardo
(Fig. 11)



11. Lateral view of male genitalia of *Machimus hirtipes* Ricardo. *Machimus hirtipes* Ricardo, 1919, *Ann. Mag. nat. Hist.* (9) 3 : 49.

A medium sized greyish-yellow species with black and pale mystax, black and yellowish-brown femora, and infuscated wings. Male : length 20 mm, wing 12 mm.

Male : Head narrower than thorax, black, covered with dense greyish-yellow tomentum ; mystax medially pale surrounded by black bristles, fronto-orbital bristles and ocellar bristles black, postcranium with pale and some black hairs, occipital and postocular bristles black. Antennae broken off beyond segment 2, black, bristles black, also with some pale ones, segment 1 about twice the length of 2. Palpi and proboscis black, the former with black bristles, and the latter with both pale and few black hairs.

Thorax black to blackish-brown with dense greyish-yellow tomentum ; pronotum pale yellow haired with a median transverse row of three black bristles ; mesonotum with the mediolongitudinal stripe extending the entire length and divided by a median stripe whose posterior extension cannot be ascertained as the specimen is damaged, lateral spots indistinctly marked, humeri pale and black haired, posterolateral sides with a few pale hairs, hairs and bristles black ; scutellum with the disc black haired except for a few pale ones laterally, hind margin bearing a row of six black bristles, metapleuron with two rows of black and pale yellow bristles, hypopleuron with a row of black and pale yellow bristles. Halteres yellowish-brown, apex of knob dark brown.

Legs black and yellowish-brown ; coxa and trochanter black, femora black dorsally, anteriorly and ventrally, and yellowish-brown posteriorly, fore tibia yellowish-brown with a black stripe postero-ventrally which is widened posteriorly, mid tibia yellowish-brown with a black longitudinal stripe ventrally which completely encircles the apex, hind tibia similarly coloured but the black colouration more extensive and covering considerable area anteriorly and somewhat posteriorly, tarsal segments basally yellowish-brown and distally black ; fore femur ventrally bearing dense, long, pale hairs, fore tibia ventrally for the distal two-thirds bearing a mat of short golden yellow hairs, hairs pale and black, bristles black.

Wings lightly infuscated for more than half their length distally, anterior cross-vein oblique.

Abdomen greyish-yellow tomentose on an indistinct black background, tergite 1 with a number of golden yellow and pale yellow long hairs laterally, some long hairs present on sides of succeeding 2-3 tergites ; hairs golden yellow to pale yellow. Male genitalia (Fig. 11) yellowish-brown to black, superior forceps yellowish-brown with the apex black, eighth sternite produced apically, broadly rounded with long, black, hairs.

Holotype ♂, India : Assam : Khasi Hills, date of collection not given, 96, 136, coll. A. Chennell, B. M. N. H.

Machimus hirtipes Ricardo, *M. montanus* Ricardo, *M. tibialis* Ricardo, *M. subgenitalis* Bromley, *M. infrafemoralis* Bromley and *M. inutilis* Bromley have yellowish-brown to orange legs with dark brown marking. From these, the species under consideration can be separated on the basis of the structure of male genitalia and the modification of the eighth sternite.

***Machimus incisularis* Bromley**

Machimus incisularis Bromley, 1935, *Rec. Indian Mus.* 37 : 220.

A small black species with grey tomentum, black legs, whitish and black mystax, apically greyish wings, and narrowly whitish tomentose incisures on the abdominal tergites. Female : length 11 mm, wing 9 mm.

Female : *Head* narrower than thorax, black, grey pollinose; mystax whitish surrounded by black bristles, fronto-orbital plate with black hairs, ocellar bristles black, postcranium pale yellow haired above and white haired below, postocular bristles black and confined to above. Antennae black, segment 1 and 2 black haired, segment 2

longer than half of 1 segment 3 subequal to combined length of segments 1 + 2. Palpi and proboscis black, both pale yellow haired.

Thorax black, grey tomentose; pronotum sparsely white haired with a median transverse row of four black bristles; mesonotum with a mediolongitudinal black stripe extending from anterior end to midway between transverse suture and hind margin, which is divided by a narrow mediolongitudinal grey stripe, mesonotum laterally with three black spots, hairs and bristles black; scutellum with the disc black haired and hind border bearing a pair of black bristles; metapleuron and hypopleuron on each with a transverse row of pale yellow bristles. Halteres yellowish-brown.

Legs uniformly black, fore femur with a ventral row of long white hairs basally, hind femur with an anteroventral row of bristles, hairs predominantly white, bristles pale yellow and black, tibia and basitarsus of fore leg with golden yellow pubescence anteriorly.

Wings greyish towards tip, remainder hyaline.

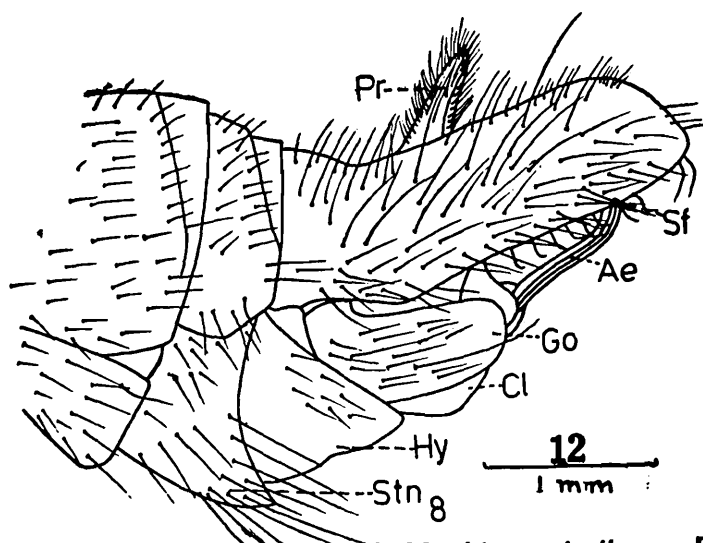
Abdomen black, grey and greyish-yellow pollinose, tergite 1 and base of 2 grey tomentose, incisures of tergites narrowly whitish pollinose which is not so distinct on the last two segments, tergite 1 laterally with pale yellow hairs and black bristles, hairs predominantly black. Ovipositor black.

Paratype ♀, India : Darjeeling District : Ghumti. 457-1524 m, coll. Carmichael, vi. 1914, Z.S.I. Reg. No. 633/H6.

The authors have only seen the paratype female. It can be readily distinguished from all other known regional species of *Machimus* on the basis that the incisures of abdominal tergites are narrowly whitish pollinose.

***Machimus indianus* Ricardo**

(Fig. 12)



12. Lateral view of male genitalia of *Machimus indianus* Ricardo.
Machimus indianus Ricardo, 1919, *Ann. Mag. nat. Hist.* (9) 3 : 50.

A rather large black species with black legs, largely infuscated wings, and abdomen bearing transverse white bands. Male : length 22 mm, wing 14 mm; female : 18 mm, wing 12 mm.

Male : Head narrower than thorax, black infuscated with dense grey tomentum; mystax pale with one black bristle on either side at the lower margin, fronto-orbital plate with pale and a few black bristles, ocellar bristles black, postcranium pale haired, postocular bristles pale yellow below and black above, dense white haired below. Antennae black, segments 1 and 2 bearing black hairs and bristles, ventral side of segment 1 with an elongate black bristle, segment 2 shorter than 1, segment 3 subequal to the combined length of segments 1 and 2, style shorter than segment 3. Palpi and proboscis black, the former with basal pale and apical black bristles, the latter completely pale haired.

Thorax black, grey tomentose; pronotum with a median transverse row of pale bristles two in middle are black, hairs white, dense laterally, mesonotum with a mediolongitudinal stripe divided by a narrow grey stripe, the stripe extending the entire length, laterally with large spots which are more or less confluent, posterolateral angles with some pale hairs, remaining hairs and bristles black; scutellum with the disc medially bearing hairs and sides bearing pale hairs, hind border with six black bristles, bristles of metapleuron and hypopleuron pale. Halteres pale with knob yellowish.

Legs uniformly black ; fore tibia and basitarsus ventrally with mat of golden hairs, hind tibia and basitarsus posteriorly and ventrally with mat of golden hairs, remaining hairs predominantly white, bristles black.

Wings largely infuscated, hyaline only at the very base extending medially for less than half of wing, axillary cell completely infuscated.

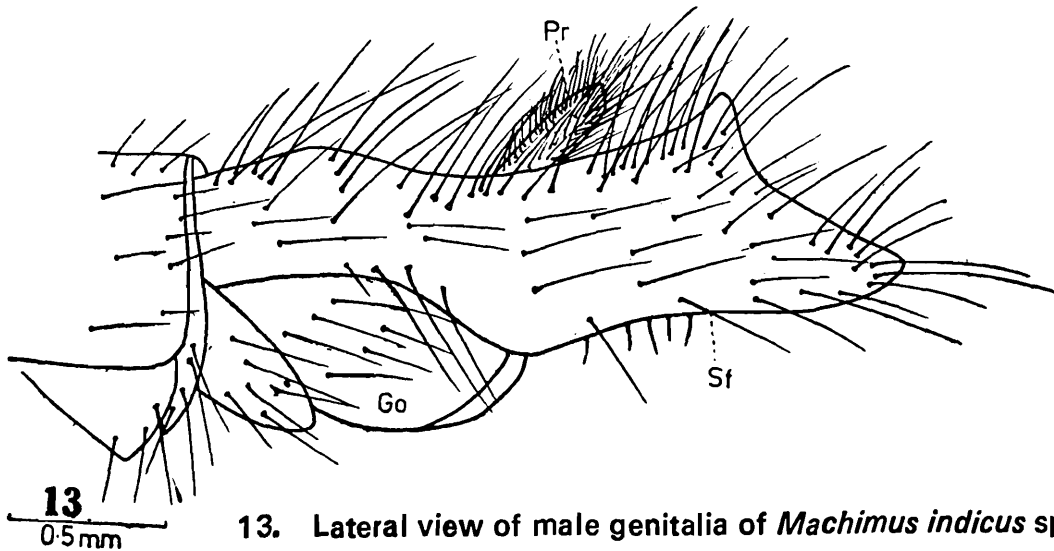
Abdomen black with transverse white bands, tergites 1 to 3 laterally with pale bristles, hairs black but white on white bands. Male genitalia (Fig. 12) black with black and pale hairs, eighth sternite not produced, apically bearing a few long black hairs

Female : Similar but with the following differences : mystax below with a pair of black bristles on either side ; a pair of elongate bristles ventrally on first antennal segment ; abdominal tergite 1 laterally with a pair of black bristles between the pale ones.

Lectotype ♂ (designated here), Kumaon : Takula, 29. v. 1912, for Zool. coll. *Paralectotype* ♀, Kumaon : Shamkhet, 15. v. 1919, For Zool. Coll. B. M. N. H.

This fly and *Machimus dubius* Ricardo are closely related and the affinities are discussed under the latter species.

***Machimus indicus* sp. nov.**
(Fig. 13)



13. Lateral view of male genitalia of *Machimus indicus* sp. nov.

A large black species with black legs, black and pale yellow mystax and infuscated wings. Male : length 16-20 mm ; wing 11-13 mm.

Male : Head narrower than thorax, black with grey and greyish-yellow tomentum ; mystax black with pale yellow bristles in middle, fronto-orbital bristles and ocellar bristles black, postcranium pale yellow and black haired, postocular bristles black, pale yellow haired below. Antennae black, segments 1 and 2 black haired, the former with some well developed bristles ventrally, segment 2 more than two-thirds length of 1, segment 3 shorter than combined length of 1+2. Palpi and proboscis black with pale yellow hairs.

Thorax black with grey and greyish-yellow tomentum, pronotum pale yellow haired, medially with a pair of pale yellow bristles ; mesonotum with mediolongitudinal stripe extending the entire length, the narrow mediolongitudinal line dividing it extending from anterior border to half way between transverse suture and hind border, hairs black with or without some pale hairs on humeri, bristles black ; scutellum with hairs on disc black and pale yellow or wholly pale yellow, two or four black or pale yellow bristles present on hind border ; metapleuron and hypopleuron each with transverse row of pale yellow bristles or sometimes bristles on former black and latter pale yellow. Halteres yellowish-brown.

Legs uniformly black, fore femur with a ventral row of pale bristles, mid femur with anteroventral and posteroventral rows of pale yellow bristles, hind femur with anterior, anteroventral and posteroventral rows of pale bristles, hairs pale yellow and black, bristles mostly black with a few pale ones also.

Wings wholly infuscated, but lighter basally.

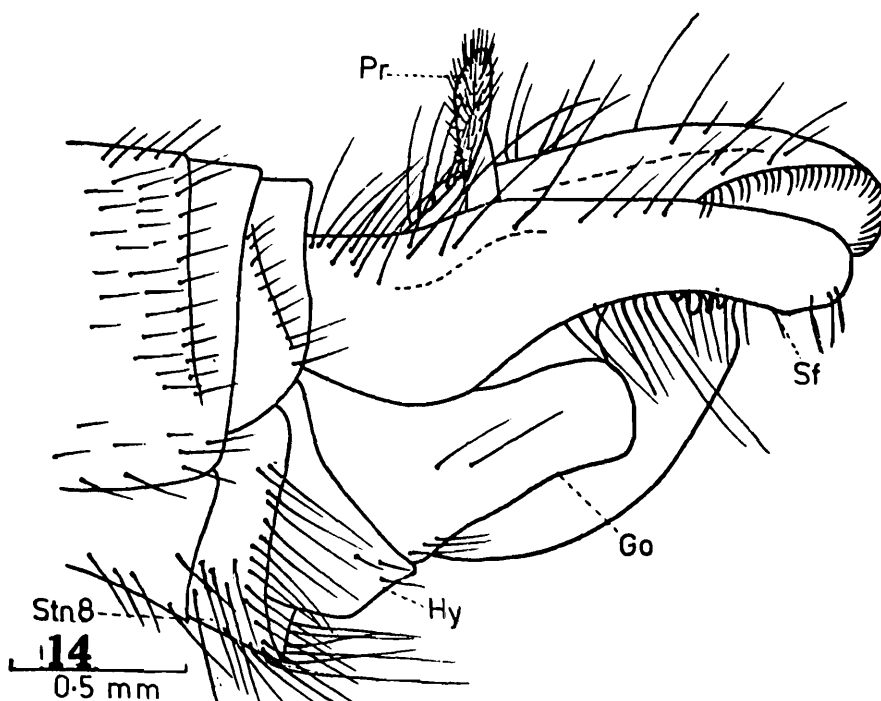
Abdomen black, tergite 1 laterally with pale yellow and black bristles, tergites 2-3 or more laterally with a few pale yellow bristles, hairs predominantly black with some pale ones. Male genitalia (Fig. 13) black, hairs black and pale. superior forceps with apical cleft

Holotype ♂ India : Uttar Pradesh : Kumaon Hills : Kapkot, 1067 m, 26. ix. 1973, coll. Girish, Z.S.I. *Paratypes* ; 1 ♂, coll. Gupta, rest of data as in holotype ; 1 ♂, 10. x. 1973, coll. Ghorpade, remaining details as in holotype ; 2 ♂♂, Ranikhet, 1830 m, 13. x. 1973, coll. Ghorpade, rest of details as in holotype , 2 ♂♂, Uttar Pradesh : Nainital : Bhowali, 1700 m, 7 x. 1974, coll. P. K. Maity and party, Z. S. I.

This species can easily be distinguished from all other known regional species of the genus *Machimus* on the basis of the distinctive superior forceps having an apical cleft and its lower lobe being well produced.

Machimus infraformalis Bromley

(Fig. 14)



14. Lateral view of male genitalia of *Machimus infraformalis* Bromley.
Machimus infraformalis Bromley, 1935. *Rec. Indian Mus* 37 : 221.

A medium black species with grey and greyish-brown pollinosity, yellowish-brown and black legs, black and pale yellow mystax, and nearly hyaline wings. Male : length 15 mm, wing 11 mm ; female : 15 mm, wing 11 mm.

Male : Head broader than thorax, black covered with grey tomentum, mystax black with some pale yellow bristles anteriorly, fronto-orbital plate with black hairs, ocellar bristles black, post-cranium pale yellow and black haired, postocular bristles black, pale yellow haired below. Antennae black except for the apex of segment 2 which is yellowish-brown, segments 1 and 2 black haired, also with a few ventral bristles on the former, segment 2 longer than half of 1, segment 3 longer than the combined length of 1 + 2. Palpi and proboscis black, the former black haired while the latter pale yellow and black haired.

Thorax black with greyish-brown and grey tomentum ; pronotum pale yellow haired with a median transverse row of black bristles ; mesonotum with a mediolongitudinal black stripe extending the entire length, the narrow mediolongitudinal stripe dividing it faintly marked, laterally with three spots in a longitudinal row, hairs black with a few pale yellow ones on humeri and posterolaterally, bristles black ; scutellum with the disc black haired but for a few ones on sides being pale yellow, hind border bearing four black bristles ; metapleuron and hypopleuron each with a transverse row of black and pale yellow bristles. Halteres yellowish-brown.

Legs yellowish-brown but femora black anteriorly and ventrally, and apex of tibia and tarsal segments dark brown, fore femur ventrally with pale yellow hairs, mid femur with an anteroventral row of bristles, hind femur with anterodorsal and posteroventral rows of bristles, hairs yellowish-white, bristles black and pale yellow, in fore and mid legs about two-thirds of tibia and basitarsus ventrally bearing golden yellow pubescence.

Wings nearly hyaline.

Abdomen black, greyish-brown and grey pollinose, tergite 1 laterally with a tuft of pale yellow hairs and some bristles, tergites 2 and 3 laterally with some pale yellow hairs and bristles, hairs black. Male genitalia (Fig 14) yellowish-brown with dark brown and a few pale yellow hairs, eighth sternite slightly produced with long bristles.

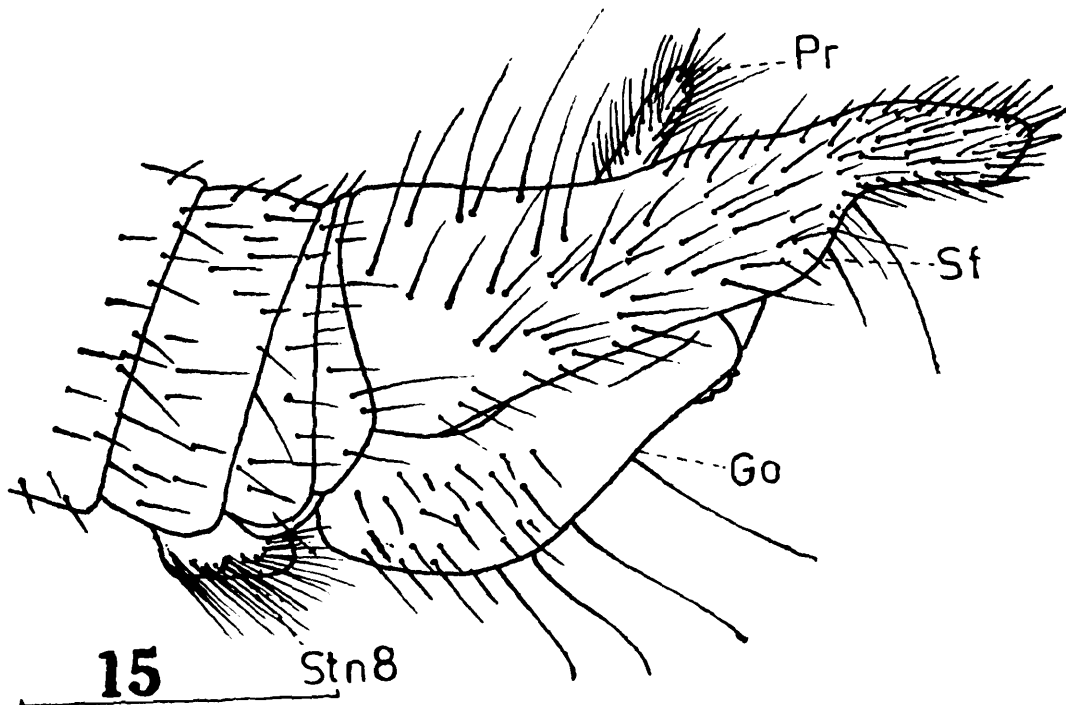
Female: Similar, but hind border of scutellum with six black bristles.

Holotype ♂, India: West Bengal: Darjeeling District: Kalimpong, 183-1372 m, 24. iv -10. v. 1915, coll. F. H. Gravely, Z. S. I Reg. No. 639/H6. *Paratype* ♀, Reg. No. 640/H6, same data.

The other five species from India with contrasting yellowish-brown and black femur are *Machimus subgenitalis* Bromley, *M. montanus* Ricardo, *M. hirtipes* Ricardo, *M. dravidicus* sp. nov. and *M. bicolor* Joseph and Parui from which *M. infrafemoralis* Bromley differs in having yellowish-brown male genitalia and in shape of superior forceps.

Machimus inutilis Bromley

(Fig. 15)



1 mm 15. Lateral view of male genitalia of *Machimus inutilis* Bromley. *Machimus inutilis* Bromley, 1935, *Rec. Indian Mus.* 37 : 222.

A medium, black, densely grey pollinose species with yellowish-brown and dark brown legs, mystax black with a few white bristles intermingled, apically infuscated wings and superior forceps ending in a long slender process. Male: length 12 mm, wing 9 mm.

Male: *Head* broader than thorax, black covered with grey tomentum; mystax black with a few white bristles intermingled, fronto-orbital plate with black hairs, ocellar bristles pale yellow and black, postcranium predominantly pale yellow haired with a

few black hairs, postocular bristles black and confined to above. Antennae with the basal two segments grey, remainder black, segments 1 and 2 with pale yellow hairs and a few black ones, the former bears a few ventral black bristles, segment 2 longer than two-thirds length of 1, segment 3 slightly longer than combined length of 1+2, Palpi and proboscis black, the former with black and pale yellow hairs whereas the latter wholly pale yellow haired.

Thorax black with dense grey tomentum ; mesonotum pale yellow haired with a pair of median pale yellow bristles , mesonotum with a mediolongitudinal black stripe divided by a narrow grey stripe, the posterior extension of the stripes cannot be ascertained as that region is damaged, laterally with the usual three black spots in a longitudinal row, hairs black except for a few pale yellow ones on humeri and posterolaterally, bristles black ; scutellum with the disc pale yellow haired, hind border bearing four black bristles ; metapleuron with two transverse rows of black and pale yellow bristles. Halteres yellowish-brown and pale yellow.

Legs yellowish-brown and dark brown, femur dark brown anteriorly and ventrally and remainder yellowish-brown, but in fore femur apex wholly yellowish-brown, fore tibia more or less uniformly yellowish-brown, mid tibia anteriorly darker and rest yellowish-brown, hind tibia dark brown anteriorly while remainder yellowish-brown, tarsal segments dark yellowish-brown, fore femur ventrally with long thin hairs which are pale yellow on basal two-thirds and black on remainder, mid and hind femora with antero-ventral and posteroventral rows of bristles, the latter also with an anterior row of bristles, in front and hind legs tibia and basitarsus anteriorly with golden yellow pubescence.

Wings at apex fuscous, remainder hyaline.

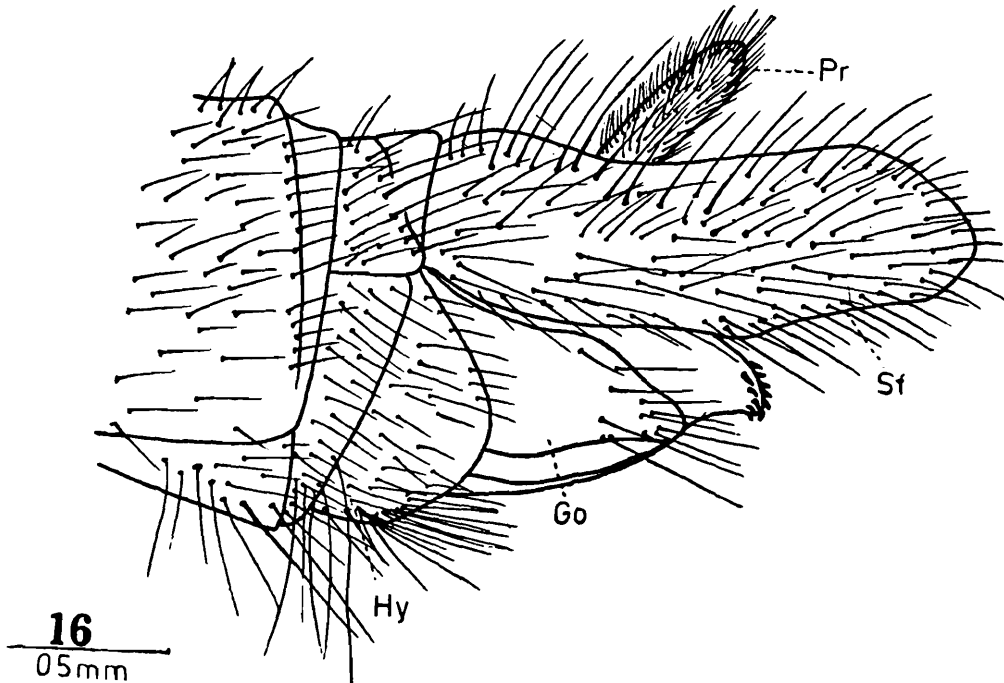
Abdomen black with grey and greyish-brown tomentum, the tomentum form an anterior and a posterior band in tergite 2 while in succeeding tergites only the posterior band present, laterally tergite 1 with pale yellow hairs and bristles, posterolaterally on tergites 2 and 3 with about three pale yellow bristles, hairs predominantly black with some pale yellow ones also. Male genitalia (Fig. 15) dark brown and yellowish-brown with black and pale yellow hairs, superior forceps terminating in a long slender process which is directed backwards, eighth sternite with dense hairs.

Holotype ♂, Himachal Pradesh : Dalhousie, date of collection not given, coll. S. L. Hora, Z. S. I. Reg. No 641/H6.

It can be recognised from all the other known Indian species of *Machimus* in possessing a poorly contrasting bicoloured femur, together with the long slender process of superior forceps.

Machimus keralaensis sp. nov.

(Fig. 16)



16. Lateral view of male genitalia of *Machimus keralaensis* sp. nov.

A medium sized black species with black legs, black and pale yellow mystax and infuscated wings. Male : length 12-15 mm, wing 7-10 mm; female : length 14-16 mm, wing 9-11 mm.

Male : *Head* narrower than thorax, black with grey or greyish-yellowish tomentum ; mystax black above and pale below, fronto-orbital bristles and ocellar bristles black, postcranium black haired, postocular bristles black, densely pale yellow haired below. Antennae wholly black or segments 1 and 3 black and 2 yellowish-brown and black, segment 2 subequal to 1 3 longer than combined length of 1 and 2. Palpi and proboscis black, the former with black and the latter with pale yellow hairs.

Thorax black with grey tomentum ; pronotum medially black and laterally grey tomentose, hairs pale yellow and black, medially with a transverse row of black bristles ; mesonotum greasy and only in one male paratype the mediolongitudinal stripe discernible, which extends the entire length but the narrow median line dividing

it indistinct, laterally with three black spots in a longitudinal row, hairs and bristles black; scutellum with black hairs on disc and with four black bristles on border; metapleuron and hypopleuron each bearing a transverse row of black bristles. Halteres pale yellow.

Legs uniformly black, in a few examples hind tibia and tarsus yellowish-brown; fore femur with a ventral row of black bristles, hind femur with an anteroventral row of short, black bristles and posteroventral row of long black bristles; hairs black and pale yellow, bristles black.

Wings infuscated, but medially hyaline.

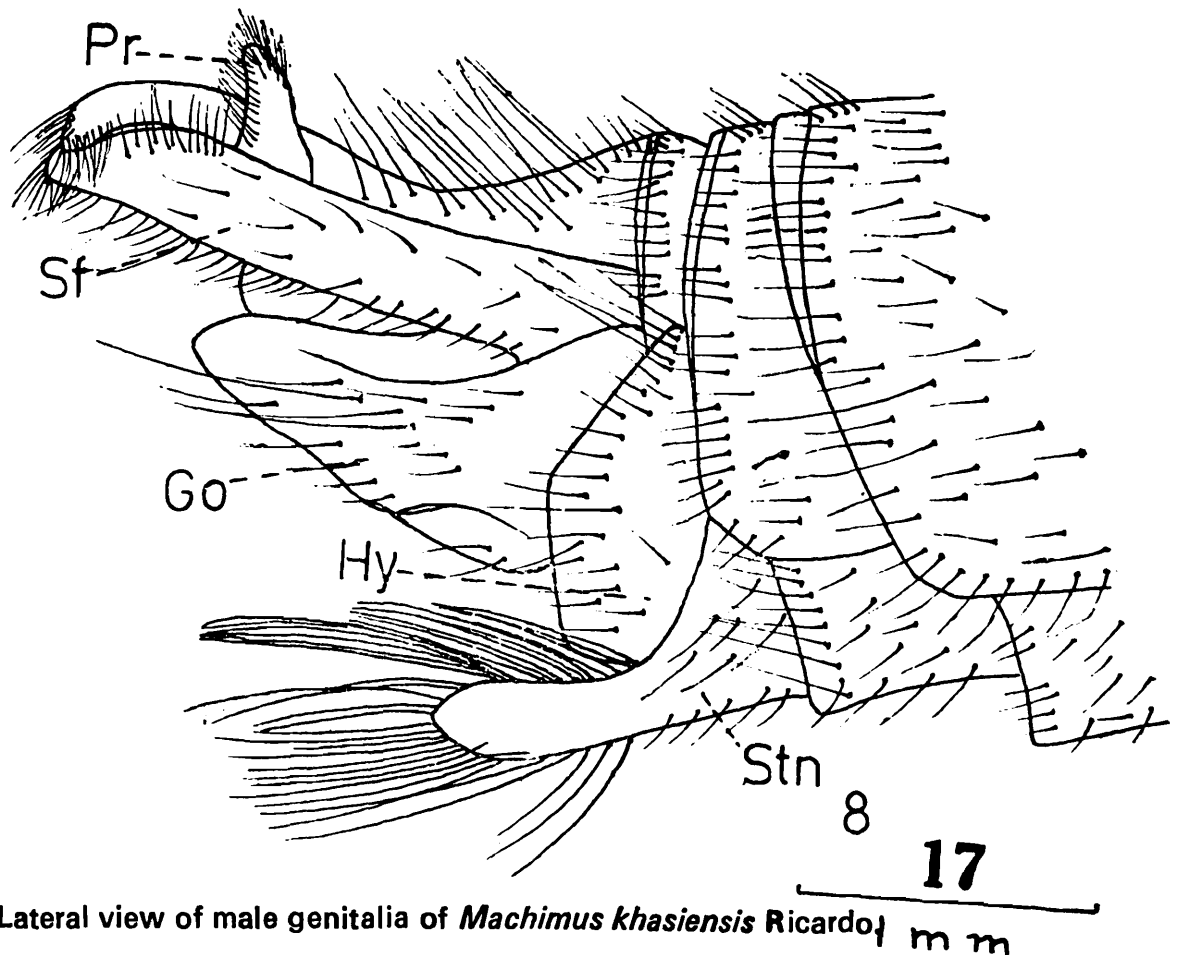
Abdomen black with grey and greyish-yellow tomentum, tergite 1 laterally with a tuft of pale hairs and black bristles, tergites 2-4 laterally with decreasing number of black bristles, hairs black and with some pale ones also. Male genitalia (Fig. 16) black and dark brown with black and pale yellow hairs.

Females: Similar.

Holotype ♂, S. India: Kerala: Annamalai Hills: Cinchona, 1065 m. v. 1969, coll. T. R. S. Nathan, California Univ. *Paratypes*: 1 ♀ v. 1964, rest of data as in holotype; 4 ♂♂, 1 ♀, data as in holotype; 1 ♂, 1 ♀, iv. 1969, coll. P. S. Nathan, rest of details as in holotype; California Univ. and Z. S. I.

The other two known South Indian species of the genus are *Machimus montanus* Ricardo and *M. parvus* Ricardo from which *M. keralaensis* sp. nov. differs in colouration: from the former in the uniformly black legs and from the latter by the black male genitalia. *M. keralaensis* sp. nov. can also be readily distinguished from the other two by the shape of the male genitalia, especially that of the superior forceps and in lacking produced eighth sternite.

Machimus khasiensis Ricardo
(Fig. 17)



17. Lateral view of male genitalia of *Machimus khasiensis* Ricardo | m m

Machimus khasiensis Ricardo, 1919, *Ann. Mag. nat. Hist.* (9) 3 : 51.

A medium black species with black legs, distally shaded wings and thickly greyish-yellow infuscated abdomen. Male : length 17 mm, wing 13 mm ; female : 18 mm, wing 13 mm.

Male : *Head* nearly as wide as thorax, black infuscated with grey tomentum ; mystax black above and along the sides ; middle and lower with pale bristles, fronto-orbital bristles and ocellar bristles black, postcranium pale haired, postocular bristles black and confined to above. Antennae black, segments 1 and 2 bearing black bristles, segment 2 about two-thirds length of 1, segment 3 subequal to the combined length of 1 and 2, style shorter than 3. Palpi and proboscis black with pale hairs.

Thorax black, grey tomentose ; pronotum with a median transverse row of black bristles, hairs pale which are dense on sides, mesonotum with a mediolongitudinal stripe extending the entire length, but much narrower posteriorly, the stripe divided medially by a narrow stripe of ground colour, the lateral spots large and medially confluent, humeri with some pale hairs, hairs and bristles black ; scutellum with the disc black haired, hind border bearing two pairs of black bristles ; metapleuron and hypopleuron each with a transverse row of pale bristles. Halteres brownish.

Legs black, femur ventrally bearing dense pale hairs, tibia and basitarsus of fore and hind legs ventrally with rufous adpressed hairs, hairs pale with some black ones also, especially on tarsus, bristles black.

Wings distally shaded, shading extends along the posterior border into the axillary cell.

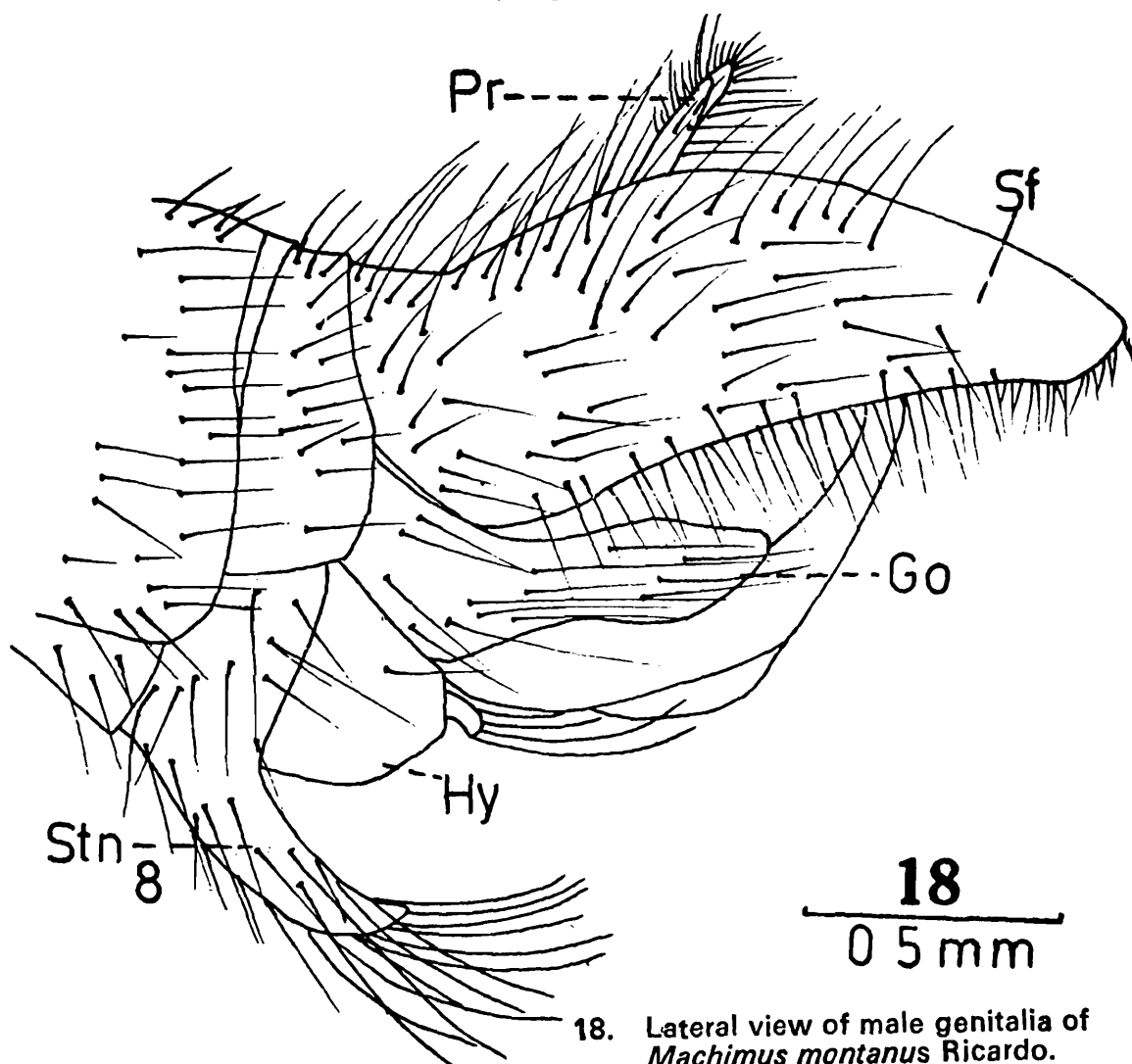
Abdomen greyish-yellow with the dark spot indistinct, tergites 1 to 3 laterally with pale bristles which are dense on tergum 1, hairs pale. Male genitalia (Fig. 17) black with black and some pale hairs, eighth sternite produced bearing long hairs, outer hairs black and inner ones yellow.

Female : Similar but the transverse row of bristles of pronotum pale, wing shading deeper, and the dark spot comparatively well marked.

Lectotype ♂ (here designated), Assam : N. Khasi Hills : Lower ranges, 1878, coll. A. Channel, B. M. N. H. *Paralectotype* ♀, details as in the preceding.

The only certain means of separating this species from other members of the genus is by examining the distinctive male genitalia.

***Machimus montanus* Ricardo**
(Fig. 18)



18. Lateral view of male genitalia of *Machimus montanus* Ricardo.

A small black species with heavily infuscated grey tomentum, legs black and yellowish-brown and wings infuscated distally along the hind border leaving a median hyaline area. Male : length 12 mm, wing 9 mm ; female : length 15 mm, wing 10 mm.

Male : Head as broad as thorax, black covered with dense grey tomentum ; mystax black with a few pale hairs below. fronto-orbital bristles and ocellar bristles black, postcranium pale haired, postocular bristles black. Antennae black but for the brown apex of segment 2, segments 1 and 2 with black bristles and pale hairs, segment 2 about two-thirds length of 1, segment 3 shorter than the combined length of 1 and 2, style subequal to segment 3. Palpi and proboscis black, the former with black and some pale hairs while *vice versa* in the latter.

Thorax black with heavy grey or greyish-yellow tomentum; pronotum with a median transverse row of pale or black bristles. hairs white which are dense on sides; mesonotum with a mediolontitudinal stripe divided by a faint narrow stripe of ground colour, the stripe extending the entire length, sides with two longitudinal black spots which are more or less confluent, humeri and posterolateral sides of mesonotum with some pale hairs, hairs and bristles black; scutellum with the disc medially bearing black hairs while the rest pale haired, hind border with five or six black bristles; metapleuron and hypopleuron each with a transverse row of black and pale bristles. Halteres yellowish-brown, stalks pale

Legs black and yellowish-brown, coxa black, femur anteriorly and ventrally black while the rest yellowish-brown, tibia yellowish-brown with an anterior black stripe which is gradually becoming prominent from the fore to the hind legs, tarsus yellowish-brown with the apex darkened, hairs pale and black, bristles black.

Wings distally infuscated, basally and medially hyaline, infuscation along the border extending into the fifth posterior cell.

Abdomen black with grey tomentum, the hind border of tergites distinctly marked grey, sides of tergite 1 bearing white bristles in between which also with some black bristles, the bristles less in subsequent segments, vestiture pale and black. Male genitalia (Fig. 18) black and yellowish-brown with pale and black hairs. eighth sternite produced with its border bearing long black hairs.

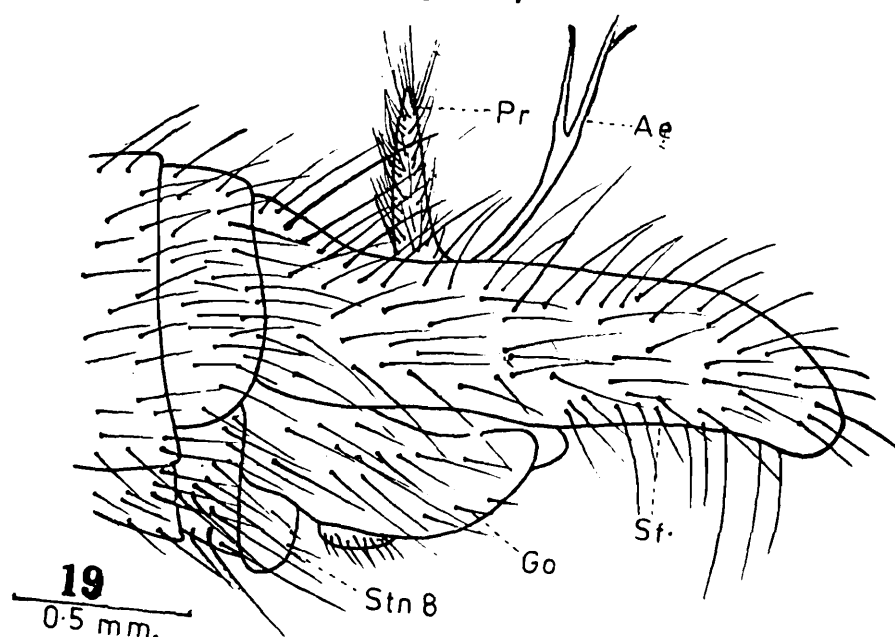
Female : Similar but darker, mystax wholly black; bristles on the sides of abdominal segment 2 and subsequent ones black.

Lectotype ♂ (here designated), Kotagiri, 1829 m, coll. F.M.Cragg. date of collection not given, B.M.N.H. *Paralectotype* ♀ S. India : Kotagiri, 1829 m, coll. F.M. Cragg, date of collection not given.

Machimus montanus Ricardo, *M. tibialis* Ricardo, *M. subgenitalis* Bromley, *M. infrafemoralis* Bromley and *M. inutilis* Bromley all have yellowish-brown to orange legs with dark brown markings but all can be distinguished by examining the male genitalia.

***Machimus mussooriensis* sp. nov.**

(Fig. 19)



19. Lateral view of male genitalia of *Machimus mussooriensis* sp. nov.

A large black species with greyish-yellow and grey tomentum, black legs, pale yellow and black mystax and infuscated wings. Male : length 17 mm, wing 12 mm.

Male : *Head* as wide as thorax, black greyish-yellow and grey tomentose ; mystax pale yellow with a few black bristles above and on sides, fronto-orbital bristles and ocellar bristles black, postcranium behind the compound eyes pale yellow and black haired, postocular bristles black, pale yellow haired below. Antennae broken off from segment 3 onwards, remainder black, segment 1 with a few long black bristles ventrally, segment 2 longer than half of 1 Palpi and proboscis black, the former black haired while the latter pale yellow haired.

Thorax black, greyish-yellow and grey tomentose; pronotum pale yellow haired with a median transverse row of black bristles, mesonotum greasy but the mediolongitudinal stripe discernible anteriorly, vestiture black but for some pale hairs posterolaterally, bristles black; scutellum with the disc black haired, border bearing six black bristles;

metapleuron and hypopleuron each bearing a transverse row of pale yellow bristles. Halteres yellowish-brown.

Legs uniformly black, fore femur with a ventral row of black bristles mid femur with an anterior row of three bristles and anteroventral row of basal bristles, also with a ventral row of pale yellow bristles, hind femur with anterodorsal, anteroventral and posteroventral rows of bristles, hairs black and pale yellow, bristles black and pale yellow, distal two-thirds of hind tibia and first segment of the hind tarsus posteriorly with golden yellow pubescence.

Wings fuscous, but medially and basally lighter.

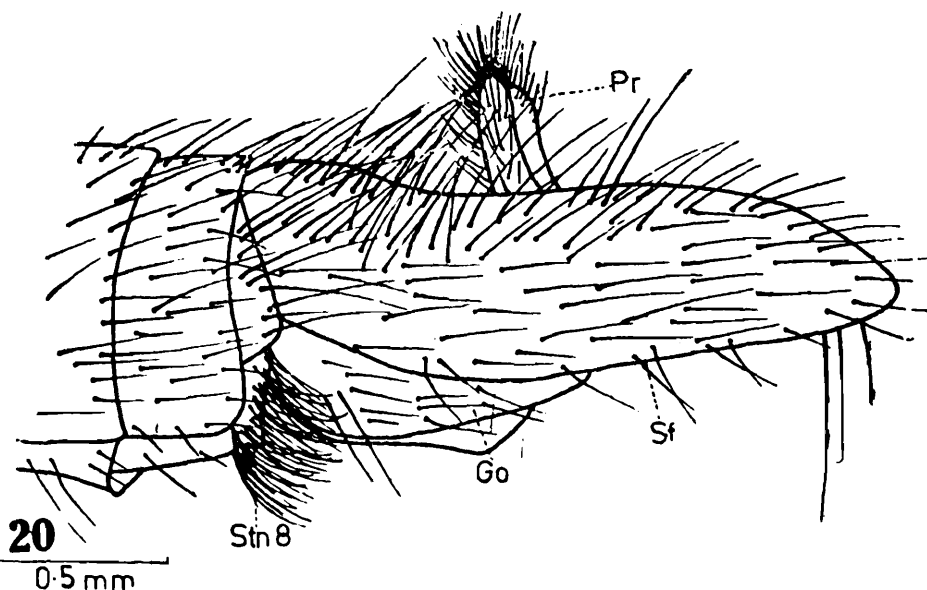
Abdomen black, densely tomentose, tomentum on hind border of tergites form more or less a transverse band, tergite 1 with a bunch of pale yellow and some black bristles, sides of succeeding tergites with a few pale yellow bristles. Male genitalia (Fig. 19) black with black and some pale yellow hairs.

Holotype ♂, India : Uttar Pradesh : Mussoorie, 2450 m, 20-24. vi. 1905, coll. Brunetti, B.M.N.H.

It is a large black, greyish-yellow and grey species which can be distinguished from other generally similar species by the golden yellow pubescence on distal two-thirds of the hind tibia and first segment of hind tarsus together with the shape of superior forceps.

Machimus nicobarensis (Schiner)

(Fig. 20)



20. Lateral view of male genitalia of *Machimus nicobarensis* (Schiner).

Tolmerus nicobarensis Schiner, 1868, in *Reise der Osterreichischen Fregatte Novara*, Dip. 192.

Machimus nicobarensis (Schiner) : Oldroyd, 1975, *A Catalog of Diptera of the Oriental Region*, 2 : 145.

A small black species with black legs, uniformly infuscated wings and the eighth sternite not produced. Male : length 13 mm. wing 8 mm.

Male : Head slightly wider than thorax, black, heavily grey or greyish-yellow tomentose; mystax black with some pale bristles on the lower side, fronto-orbital bristles and ocellar bristles black, postcranium pale haired, postocular bristles black. Antennae black, segments 1 and 2 bearing black bristles, segment 2 slightly longer than half of preceding, segment 3 subequal to style. Palpi and proboscis black, the former with black and the latter with white hairs.

Thorax black with grey and greyish-yellow tomentum ; pronotum with a median transverse row of black bristles, some black hairs present posterolaterally, hairs white, sparse ; mesonotum with a broad, black, mediolongitudinal stripe extending from the anterior border to well beyond the middle of transverse suture, which is not divided medially, sides black but not being separated into spots, hairs and bristles black, scutellum with sparse black hairs, hind border with two pairs of black bristles, metapleuron and hypopleuron each with a transverse row of black bristles. Halteres light brown.

Legs black, fore femur with 4 or 5 long black hairs ventrally on the basal half, mid femur bearing anterolateral and posterolateral rows of black bristles extending from base to well beyond middle, hind femur similar to preceding but the rows extending still farther ; in hind leg distal part of tibia and whole of basitarsus on sides as well as ventrally with adpressed yellow pubescence ; hairs black with some pale ones also.

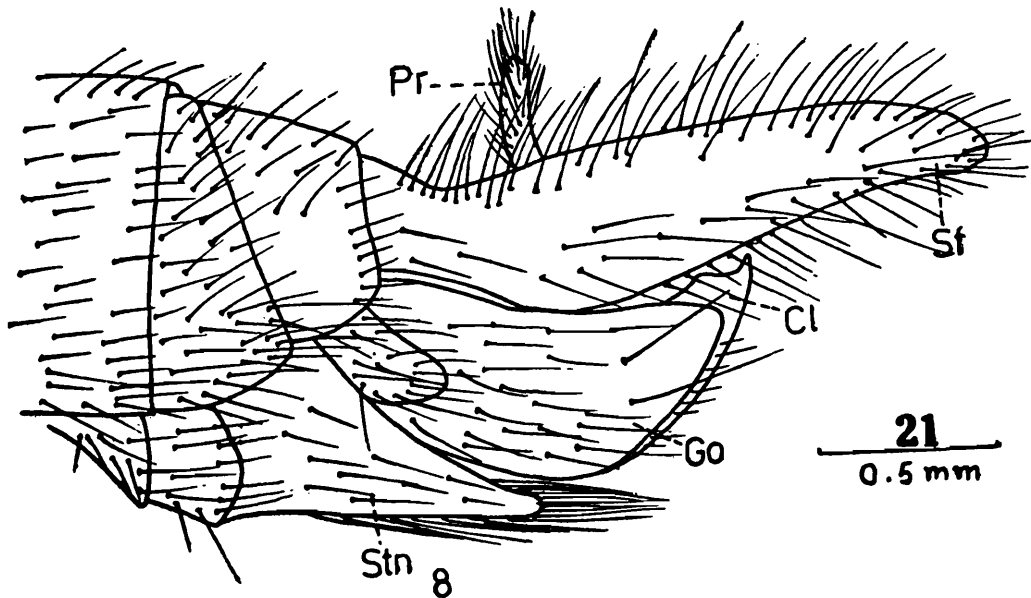
Wings wholly infuscated but mediobasally comparatively lighter.

Abdomen black with the hind border of tergites grey, sides of tergum 1 with a tuft of pale hairs and also with some black bristles, tergites 2-3 with tufts of pale hairs only, hairs black with pale ones on sides. Male genitalia (Fig. 20) black with black hairs, eighth sternite not produced but bearing dense bristles.

Type ♂, Nicobar, date of collection and collector's name not given but species label bears 'Alte Sammlung', Naturhistorisches Museum, Vienna.

It can be distinguished from the other species by the shape of the superior forceps of the male genitalia, and eighth sternite with dense bristles and by the presence of adpressed yellow bristles on the distal part of hind tibia and complete hind basitarsus.

Machimus nigrinus Ricardo
(Fig. 21)



21. Lateral view of male genitalia of *Machimus nigrinus* Ricardo.

Machimus nigrinus Ricardo, 1919, *Ann. Mag. nat. Hist.* (9) 3 : 53.

A small black species with black and grey abdomen, wholly black legs, and infuscated wings. Male : length 14 mm, wing 9 mm ; female : 17 mm, wing 10 mm,

Male : *Head* nearly as broad as thorax, heavily grey to greyish-yellow tomentose ; tubercle large, mystax black above and on sides, in the middle pale, fronto-orbital bristles and ocellar bristles black, postcranium pale haired, postocular bristles present. Antennae black, bristles and hairs on segments 1 and 2 black, segment 2 longer than half of 1, 3 longer than the combined length of 1 and 2, arista about two-thirds length of segment 3. Palpi and proboscis black, the former with black bristles and the latter bearing pale hairs

Thorax black with grey and greyish-yellow tomentum ; pronotum pale haired with a transverse row of black bristles ; mesonotum with the mediolongitudinal stripe extending from anterior end to the middle between transverse suture and hind border, the stripe divided by a narrow median stripe throughout, which is faint posteriorly, outer to the stripe with the usual dark brown spots, hairs black but for a few pale ones posterolaterally ; scutellum with the disc black haired and hind border bearing four black bristles ; metapleuron and hypopleuron each with a transverse row of pale hairs. Halteres pale yellow with brownish marking.

Legs uniformly black, fore and hind legs ventrally with short rufous pubescence.

Wings infuscated but clear medially.

Abdomen black and grey, tergite 1 nearly wholly grey, 2 medially black and both anteriorly and posteriorly grey, 3 and subsequent tergites anteriorly black and posteriorly grey, sides of tergites bearing pale bristles which decrease in number in posterior ones. Male genitalia (Fig. 21) large, black with chiefly black hairs, eighth sternite considerably produced, apex obtuse and fringed with black hairs.

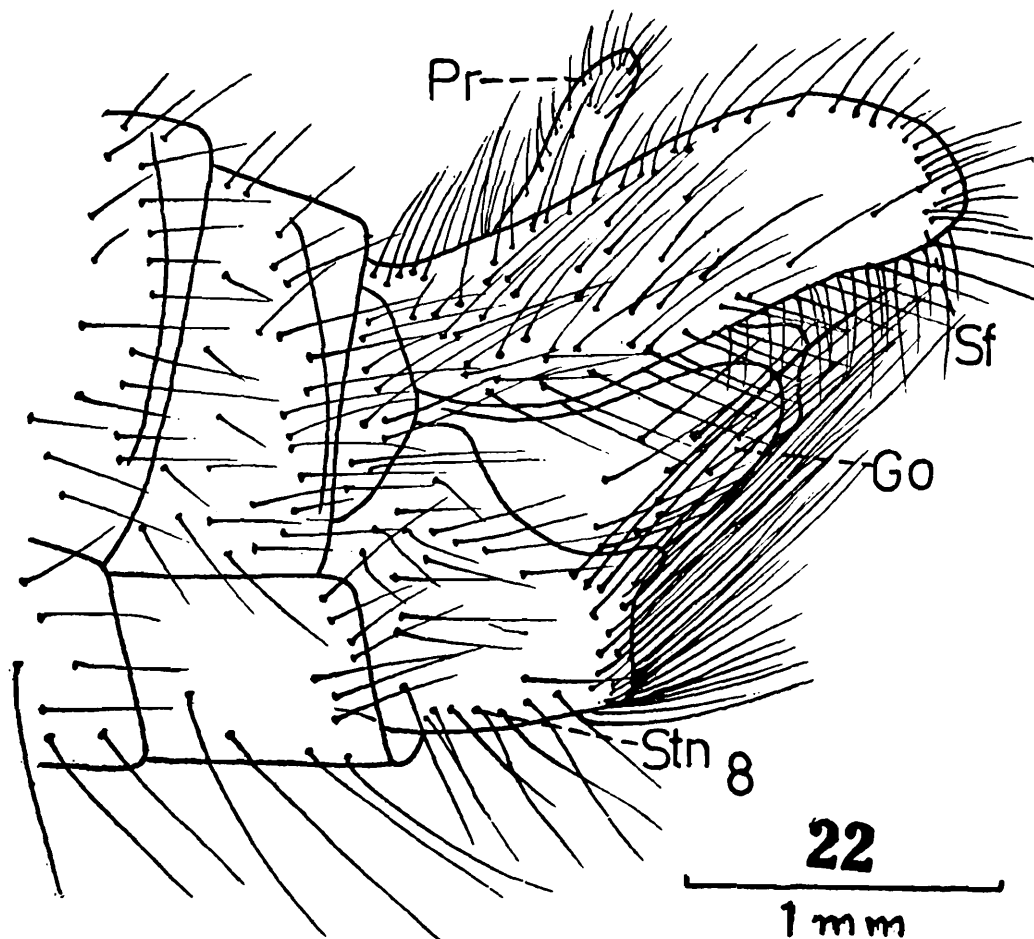
Female : Similar to male ; female genitalia black.

Lectotype ♂ (here designated), India : Kumaon : Takula, 27 v.1912, coll. name not given (160), B.M.N.H. *Paralectotype* ♀. India : Kumaon : Binsar, 28 v.1912, coll. name not given (148).

It is similar to *Machimus indianus* Ricardo in abdominal colouration but each has a distinct male genitalia. The male genitalia of *M. nigrinus* resembles that of *M. assamensis* Ricardo.

***Machimus pallipes* Ricardo**

(fig. 22)



22. Lateral view of male genitalia of *Machimus pallipes* Ricardo.

Machimus pallipes Ricardo 1922, *Ann. Mag. nat. Hist.* (9) 10 65.

A medium dark brown species with bright yellow abdomen, dull yellowish and dark brown legs, and infuscated wings, Male : length 17 mm, wing 14 mm, female : length 18 mm, wing 15 mm.

Male : Head broader than thorax, heavily greyish-yellow or grey tomentose; tubercle large, mystax black above and pale yellow below, fronto-orbital bristles and ocellar bristles black, postcranium pale haired, postocular bristles black. Antennae broken off beyond segment 2, yellowish-brown, both segments with black ventral bristles and in segment 1 a few pale ones also present, segment 2 longer than half of 1. Palpi dark brown with pale and black bristles, proboscis black with pale hairs.

Thorax dark brown with some lighter areas, grey tomentose; pronotum pale haired with a transverse row of four black bristles; mesonotum with the mediolongitudinal stripe extending the entire length the stripe divided by a narrow median stripe outer to the stripe with the usual dark brown spots, hairs black with a few on sides pale; scutellum with the disc pale haired and hind border bearing a row of long black bristles; metapleuron and hypopleuron each with a transverse row of long pale hairs and the former also with a tuft of them. Halteres brownish.

Legs dull yellowish and yellowish-brown to dark brown, femora yellowish-brown to dark brown, tibiae and tarsi dull yellowish, long yellow hairs present ventrally on femora, under side of basitarsi with many short black bristles, hairs pale, bristles black with a few pale ones also.

Wings infuscated with hyaline in middle; anterior crossvein beyond the middle of discal cell.

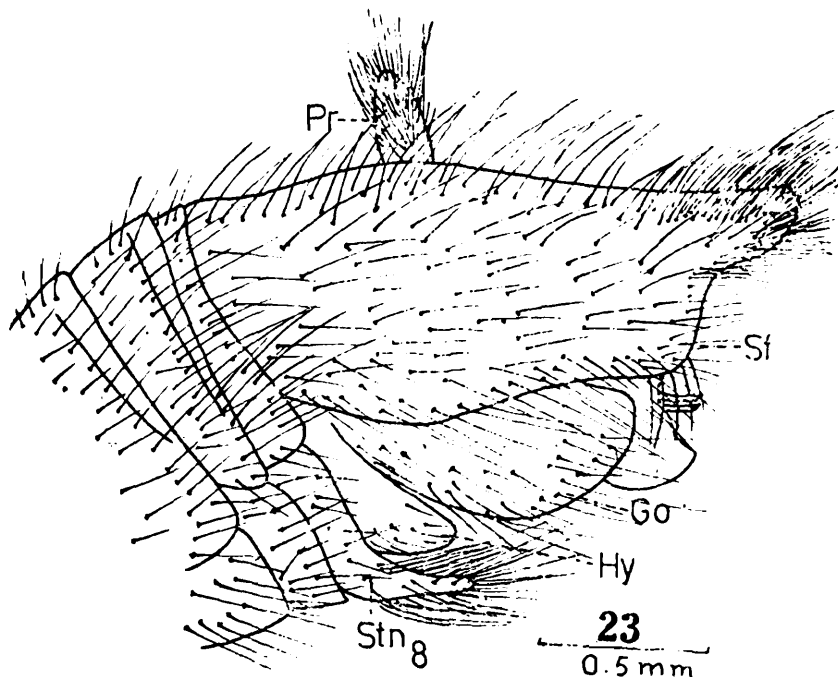
Abdomen dense bright yellow tomentose on dark brown background, hind border brighter than the rest, tergite 1 laterally with dense pale hairs, hairs yellow. Male genitalia (Fig. 22) black, eighth sternite broadly produced which apically bears a mat of orange yellow hairs, hairs yellow.

Female : Generally similar but darker in colouration and femora entirely black, fore femur ventrally bears a few black bristles also, tibiae and tarsi bright red, bristles black, short black bristles on the ventral side of basitarsi much more in number; tomentum on abdomen not dense; ovipositor black, short.

Lectotype ♂ (here designated), India : Kumaon : Dharmoti, 9.vi.1912, coll. name not given, (99), B.M.N.H. *Paralectotype* ♀, India : Kumaon : Bhowali, 7.vii.1912, coll. name not given.

Machimus pallipes Ricardo can be readily separated from other Indian species by the bright yellow tomentose abdomen together with the short superior forceps and the nearly truncate eighth sternite. The only other Indian species with yellow tomentose abdomen is *M ricardo* (Bromley).

Machimus parvus Ricardo
(Fig. 23)



23. Lateral view of male genitalia of *Machimus parvus* Ricardo.

Machimus parvus Ricardo, 1919, *Ann. Mag. nat. Hist.* (9) 3 54.

A small black species with bright red male genitalia, uniformly black legs and lightly infuscated wings. Male : length 10 mm, wing 7 mm ; female : length 11 mm, wing 8 mm.

Male : Head nearly as broad as thorax, heavily grey tomentose, mystax black but for a few pale ones near the lower margin, fronto-orbital bristles and ocellar bristles black, postcranium white haired below and black haired above, postocular bristles black. Antennae broken off beyond segment 2, black with black bristles below, segment 2 about two-thirds length of 1. Palpi and proboscis dark brown, the former black haired and the latter pale haired.

Thorax black, grey tomentose ; pronotum pale haired with a transverse row of black bristles ; mesonotum with the mediolongitudinal stripe extending the entire length, the narrow mediolongitudinal stripe dividing it terminates at half way between the transverse suture and hind border, hairs and bristles black ; scutellum with

the disc black haired and hind border bearing a row of black bristles ; metapleuron and hypopleuron each with a transverse row of black bristles. Halteres pale.

Legs black, fore femur with long ventral pale hairs and some black bristles, mid femur without long hairs and with only two or three basal ventral black bristles, vestiture pale hairs with some black ones.

Wings lightly infuscated, basally hyaline ; anterior cross-vein beyond the middle of discal cell.

Abdomen black with the hind border of tergites shining grey, tergites 1 to 2 and even 3 laterally with a tuft of black hairs; hairs and bristles black. Male genitalia (Fig. 23) bright red ; eighth sternite produced with a fringe of black hairs.

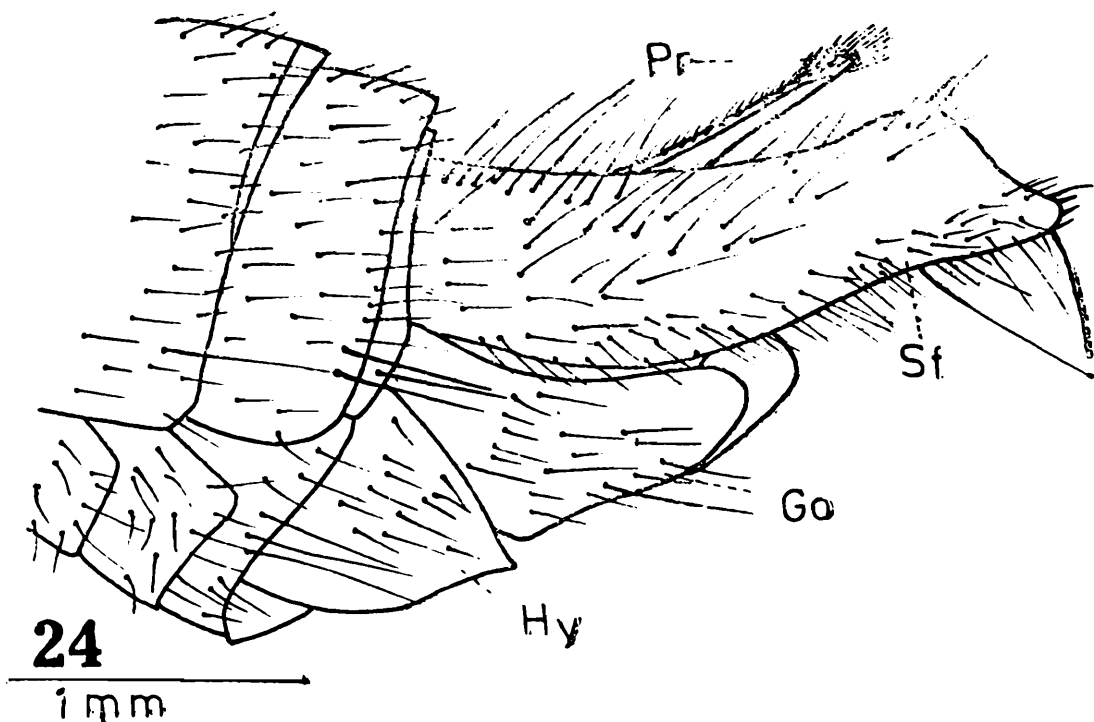
Female : Similar, ovipositor black.

Lectotype ♂ (here designated), S. India : Kotagiri, 1829 m, no other data, coll. F.M.Cragg, B.M N.H. *Paralectotype* ♀, details as in holotype.

It can be easily distinguished from other regional species by the bright red male genitalia together with the shape of superior forceps.

Machimus punjabensis Bromley

(Fig. 24)



24. Lateral view of male genitalia of *Machimus punjabensis* Bromley.

Machimus punjabensis Bromley, 1935, *Rec. Indian Mus.* 37: 220.

A rather large black species with grey tomentum, similarly coloured legs, mystax pale yellow with a few black bristles also, and distally infuscated wings. Female : length 20 mm, wing 13 mm.

Female Head narrower than thorax, black covered with grey tomentum ; mystax pale yellow with a few black bristles also, fronto-orbital bristles pale yellow and black, ocellar bristles black, postcranium predominantly pale yellow haired and also with a few black hairs, postocular bristles black above and pale yellow below. Antennae lost from segment 3 onwards, segments 1 and 2 black with black and pale yellow hairs, segment 1 ventrally bears a few black bristles also, segment 2 longer than half of 1. Palpi and proboscis black, the former with black and pale yellow hairs while the latter wholly pale yellow haired.

Thorax black with grey tomentum ; pronotal hairs pale yellow, medially with a transverse row of four black bristles ; mesonotum with a mediolongitudinal black stripe extending the entire length which is divided anteriorly by a narrow grey stripe, being greasy lateral spots indistinct, hairs black but for some pale ones on humeri and posterolaterally, bristles black ; scutellar disc medially bearing black hairs and laterally pale yellow hairs, hind border with six black bristles ; metapleuron with two rows and hypopleuron with one row of pale yellow bristles. Haltere chocolate brown with pale yellow tinge.

Legs uniformly black ; fore femur ventrally with a row of long pale yellow hairs, mid femur with anteroventral and ventral rows of bristles, hind femur with anterior, anteroventral and ventral rows of bristles, clothing hairs whitish with some black ones also, bristles black, in fore leg anteriorly and in hind leg posteriorly tibia and basitarsus with golden pubescence.

Wings infuscated distally, medially and basally hyaline.

Abdomen black, sparsely grey tomentose, tomentum form transverse band on anterior and posterior borders in tergite 2, in succeeding tergites restricted to hind border, tergite 1 laterally with a tuft of pale yellow hairs and a few black bristles, tergites 2 and 3 with about four pale yellow bristles posterolaterally, vestiture black.

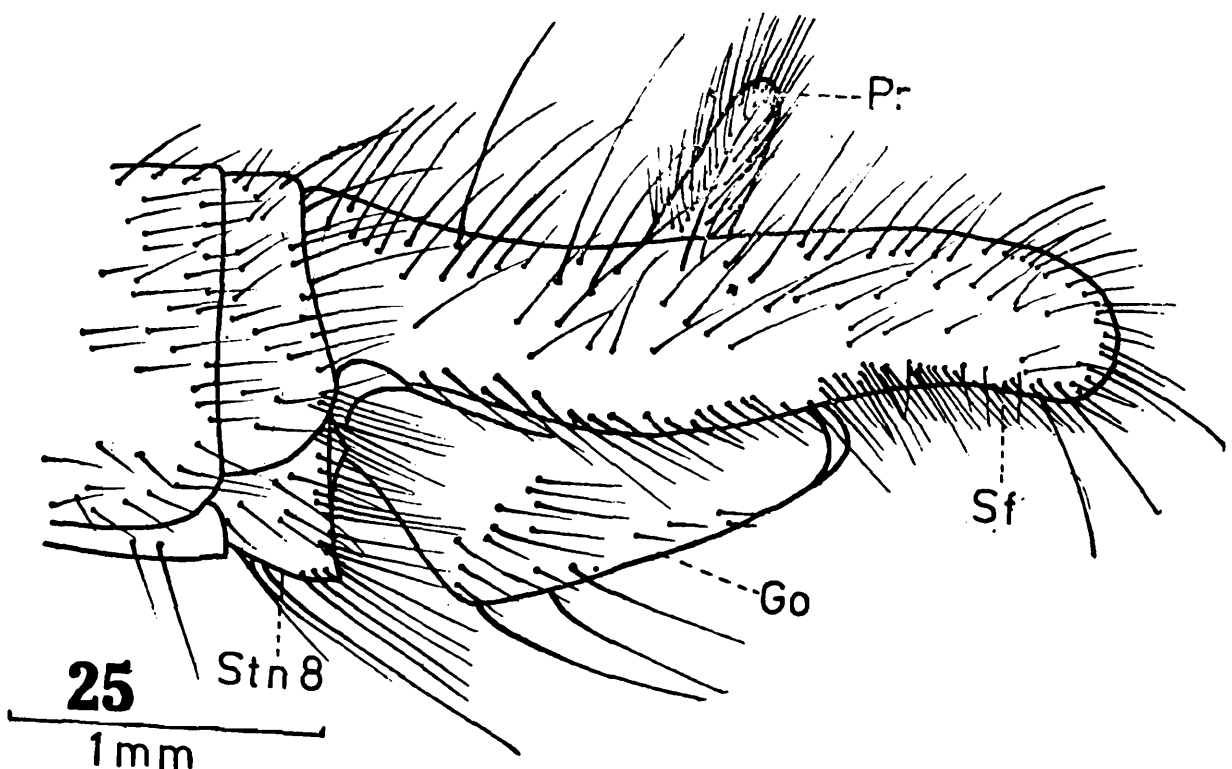
Holotype ♀, India : Himachal Pradesh : Binnu Khad : below dak bunglow at Baijnath, 914 m, 10.vi.1926, coll. S.L.Hora, Z.S.I. Reg. No. 631/H6.

The male genitalia is figured from a specimen from Mussoorie, Uttar Pradesh, vi.1905, presented by E. Brunetti to B.M. 1927-184. It resembles the female but with the following differences : mediolongitudinal black stripe of mesonotum extending only upto midway, the grey bands on tergites not so distinct and lateral hairs and bristles yellowish-brown. Male genitalia (Fig. 24) black with black and pale yellow hairs, superior forceps apically prolonged, eighth sternite not produced.

Machimus punjabensis Bromley, *M. subgenitalis* Bromley and *M. bicolor* Joseph and Parui have their superior forceps apically prolonged. *M. punjabensis* Bromley can be recognised from the other two by its uniformly black femur and the differences in the structural details of male genitalia.

***Machimus ricardo* (Bromley)**

(Fig. 25)



25. Lateral view of male genitalia of *Machimus ricardo* (Bromley).

Asilus ricardo Bromley, 1935, *Rec. Indian Mus.* 37 : 219.

Machimus ricardo (Bromley) : Oldroyd, 1975, *A Catalog of Diptera of the Oriental Region*, 2 : 145.

A rather large black species with greyish-yellow tomentum, black legs, mystax pale yellow and black, and infuscated wings. Male : length 18-20 mm, wing 14 mm.

Male : *Head* narrower than thorax, black, greyish-yellow tomentose ; *mystax* pale yellow with some black bristles above, fronto-orbital bristles and ocellar bristles black, postcranium pale yellow haired, postocular bristles black and confined to above. Antennae black, segments 1 and 2 with black hairs and the former also with a few black bristles ventrally, segment 2 longer than half of 1, segment 3 only slightly longer than combined length of 1+2. Palpi and proboscis black with pale yellow hairs.

Thorax black, greyish-yellow pollinose ; pronotum pale yellow haired with a median transverse row of black bristles ; mesonotum with a black mediolongitudinal stripe extending the entire length but devoid of the narrow median dividing stripe, laterally the spots fused together to form a black stripe, hairs and bristles black, scutellar disc black haired but for a few pale yellow ones on sides, hind border bears six pale yellow and black bristles ; metapleuron and hypopleuron each with a transverse row of pale yellow bristles. Haltere yellowish-brown.

Legs uniformly black ; femora ventrally with a row of elongate pale yellow hairs which decrease in length from base to apex, hind femur also with dense pale yellow bristles posteriorly, hairs predominantly pale yellow with some black ones also, bristles black, in fore and hind legs tibia and basitarsus with golden yellow pubescence, in the former anteroventrally and in the latter posteriorly.

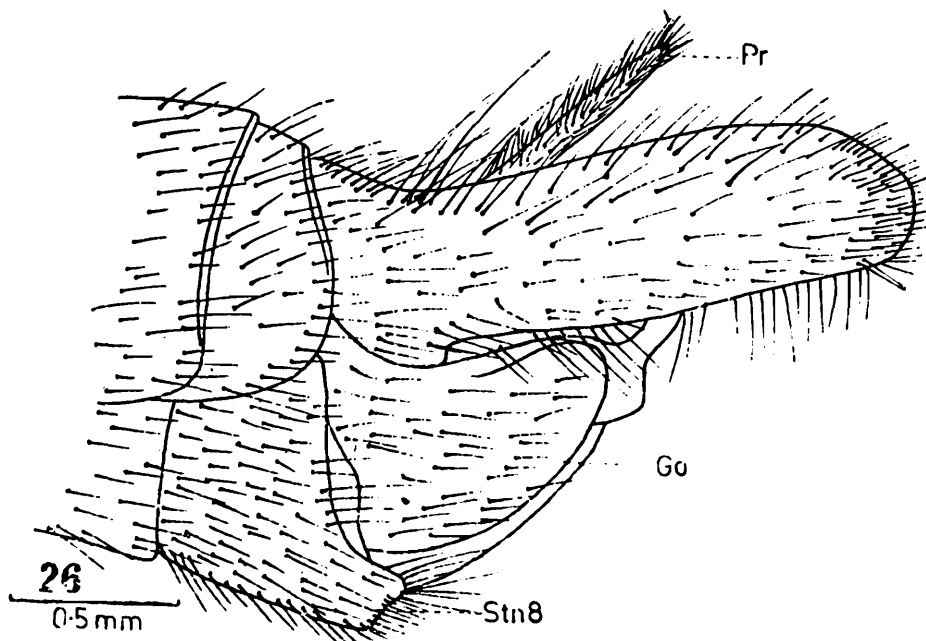
Wings wholly infuscated.

Abdomen black with greyish-yellow pubescence, tergite 1 on sides with yellowish-brown hairs and bristles, succeeding tergites laterally with yellowish-brown hairs and posterolaterally with a few yellowish-brown bristles. Male genitalia (Fig. 25) black with black hairs, eighth sternite bears dense long hairs, not produced.

Holotype ♂, India : Himachal Pradesh : Simla, in jungle, viii-ix.1925, coll. B.N.Chopra, Z.S.I. Reg. No. 625/H6. *Paratype* ♂, same data, Reg. No. 629/H6.

There are a number of species of *Machimus* having uniformly black legs all of which can be separated by the structural details of male genitalia, especially that of the superior forceps and gonopods.

Machimus rufipes Ricardo
(Fig. 26)



26. Lateral view of male genitalia of *Machimus rufipes* Ricardo.

Machimus rufipes Ricardo, 1922, *Ann. Mag. nat. Hist.* (9) 10 69.

A large black species with grey tomentum, black and reddish legs pale yellow and black mystax, and dark shaded wings. Male : length 18-20 mm, wing 11-12 mm ; female : length 19-22 mm, wing 13-14 mm.

Male : *Head* as broad as thorax, black, grey tomentose ; mystax pale yellow with black bristles near oral opening and rarely laterally also, fronto-orbital bristles and ocellar bristles black, postcranium pale yellow haired with a few black hairs above, postocular bristles black. Antennae black, segments 1 and 2 with black and a few pale yellow hairs, the former also bears a few black ventral bristles, segment 2 longer than two-thirds length of 3, segment 3 shorter than or equal to combined length of segments 1 + 2. Palpi and proboscis black, former black haired while the latter pale yellow haired.

Thorax black, grey tomentose ; pronotum pale yellow haired with a median transverse row of black bristles ; mesonotal stripe indistinct in males as the specimens are flood damaged but in female the black mediolongitudinal stripe extending from anterior end to well beyond transverse suture and is divided by a mediolongitudinal narrow grey stripe, lateral spots cannot be ascertained as the specimens are flood damaged, hairs black but for a few pale yellow ones on humeri and posterolaterally, bristles black ; scutellum with the disc black haired, hind border bears four black bristles ; metapleuron and hypopleuron each with a row of pale yellow bristles. Halteres yellowish-brown,

Legs black and reddish, femora shining black, tibia reddish with dark apex and at times anteriorly also somewhat dark, tarsi reddish with apex of segments dark. fore femur ventrally bearing long pale yellow hairs, hind femur anteriorly, anteroventrally and posteroventrally with rows of bristles, hairs predominantly pale yellow, bristles black and pale yellow, tibia and basitarsus with golden yellow pubescence ventrally in fore leg and posteriorly in hind leg.

Wings with dark shading in the centre of cell, but medially and anterobasally almost hyaline.

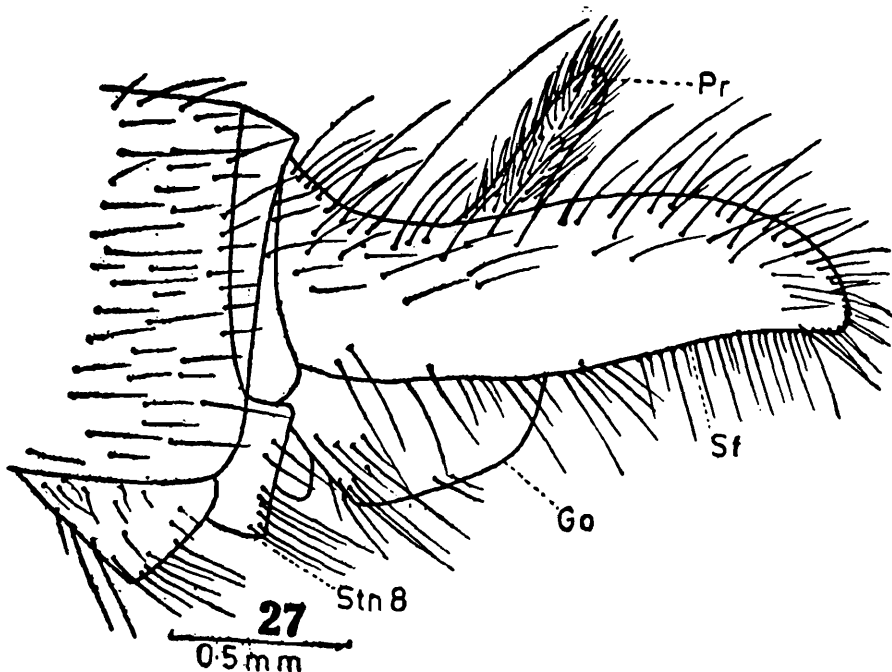
Abdomen black with grey and greyish-yellow pollinose, tergite 2 grey tomentose on sides leaving a median greyish-yellow area, in succeeding tergites laterally and posteriorly grey while the rest greyish-yellow, tergite 1 laterally with pale yellow hairs, and pale yellow and black bristles, tergites 2 and 3 with about five posterolateral bristles, hairs black. Male genitalia (Fig. 26) black with concolourous and pale yellow hairs, superior forceps at apex broadly obtuse, eighth sternite produced, laterally with obtuse teeth from which are projecting long white hairs.

Females : Similar.

Material : 2 ♂♂, 3 ♀♀, India : Darjeeling District : Singla, 457 m, iv. 1913, coll. Carmichael, Z. S. I, Colln.

It can be separated from all other regional species by the bicoloured legs with black femur together with the distinctive eighth sternite bearing laterally two obtuse teeth with long white hairs.

Machimus scarbroughi sp. nov.
(Fig. 27)



27. Lateral view of male genitalia of *Machimus scarbroughi* sp. nov.

A large black species with greyish-yellow and grey tomentum, uniformly black legs, black and pale yellow mystax and distally infuscated wings. Male : length 17 mm, wing 12 mm ; female : length 18 mm, wing 13 mm.

Male : *Head* as wide as thorax, black greyish-yellow and grey tomentose ; mystax black above and on sides and pale yellow below, fronto-orbital bristles and ocellar bristles black, postcranium pale yellow haired, postocular bristles black and confined to above. Antennae black, segment 1 with a few long bristles ventrally, segment 2 longer than two-thirds length of 1, segment 3 subequal to the combined length of segments 1+2, Palpi and proboscis black, former black haired with some pale yellow hairs basally, latter wholly pale yellow haired.

Thorax black, greyish-yellow and grey tomentose ; pronotum pale yellow haired with a transverse row of pale yellow and black or completely black bristles ; mesonotum with the mediolongitudinal stripe extending from anterior end to halfway between transverse suture and hind border, which is divided by a narrow mediolongitudinal line, hairs black with a few pale yellow ones posterolaterally, bristles black ; scutellum with the disc pale yellow haired, hind border bearing six pale yellow or black bristles ; metapleuron and hypopleuron each with a transverse row of pale yellow bristles. Halteres yellowish-brown or brown.

Legs black, fore femur with a ventral row of pale yellow and black bristles, mid femur with anteroventral rows of bristles, also with a ventral row of pale yellow bristles, hind femur with anterodorsal, anteroventral and posteroventral rows of bristles, hairs pale yellow and black, in fore leg tibia for more than half distally and first tarsal segment completely with golden yellow pubescence ventrally.

Wings distally infuscated, basally and medially hyaline.

Abdomen black, densely greyish-yellow and grey tomentose, tomentum on tergites 2-7 laterally arranged in triangular shape, tergite 1 laterally with a bunch of pale yellow and a few black bristles, succeeding tergites laterally with a few pale yellow bristles, vestiture pale yellow and black. Male genitalia (Fig. 27) black with pale yellow and black hairs.

Female : Similar, but hairs on disc of scutellum black,

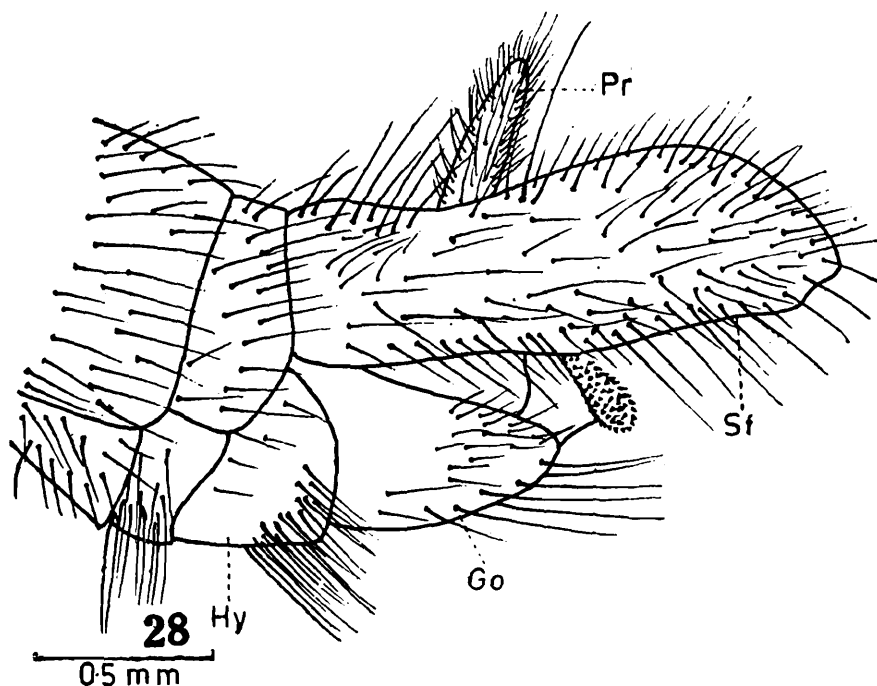
Holotype ♂, India : Uttar Pradesh : Mussoorie, vi. 1905, presented by E. Brunetti, B.M. 1927, 184, B.M.N.H. *Paratypes* : 1 ♂,

vi. 1909, Brunetti coll. B.M. 1927, 184; 1 ♀, data same as holotype, B.M.N.H., Z.S.I.

It resembles *Machimus mussooriensis* sp. nov. but differs in the triangular markings of the tomentum on the abdominal tergites and shape of superior forceps. It is named after Dr. A. G. Scarbrough, Towson State University, Maryland, U.S.A., who is a well known asilid ecologist.

***Machimus smithi* sp. nov.**

(Fig. 28)



28. Lateral view of male genitalia of *Machimus smithi* sp. nov.

A medium sized black species with black legs, black and pale yellow mystax and infuscated wings. Male : length 13 mm, wing 10 mm ; female : length 15-16 mm, wing 10 mm.

Male : *Head* as wide as thorax, black with grey and greyish-yellow tomentum ; mystax black with a few pale yellow bristles below, fronto-orbital bristles and ocellar bristles black, postcranium black haired, postocular bristles black and confined to above, pale yellow haired below. Antennae black, basal segment ventrally bearing a few long black bristles, segment 2 subequal to 1, segment 3 and combined length of segments 1+2 nearly equal. Palpi and proboscis black; the former black haired while the latter pale yellow haired.

Thorax black, greyish-yellow and grey tomentose ; pronotum black and pale yellow haired, medially with a transverse row of black bristles ; mesonotum greasy and so the mediolongitudinal stripe cannot be made out, but in female it extends the entire length and is divided by a narrow mediolongitudinal line, vestiture black but for a few pale yellow hairs on humeri and posterolaterally, bristles black ; scutellum with the disc black haired, border with four black bristles ; metapleuron and hypopleuron each with a transverse row of black bristles. Halteres yellowish-brown, stalk lighter coloured.

Legs uniformly black, fore femur with a ventral row of black bristles, mid and hind femora with anteroventral and ventral rows of bristles, fore tibia with about three elongate postero-ventral bristles, hairs black and pale yellow, bristles black, short reddish-yellow pubescence present ventrally and posteriorly on tibia and first tarsal segment of fore and hind legs.

Wings fuscous, but medially and basally hyaline.

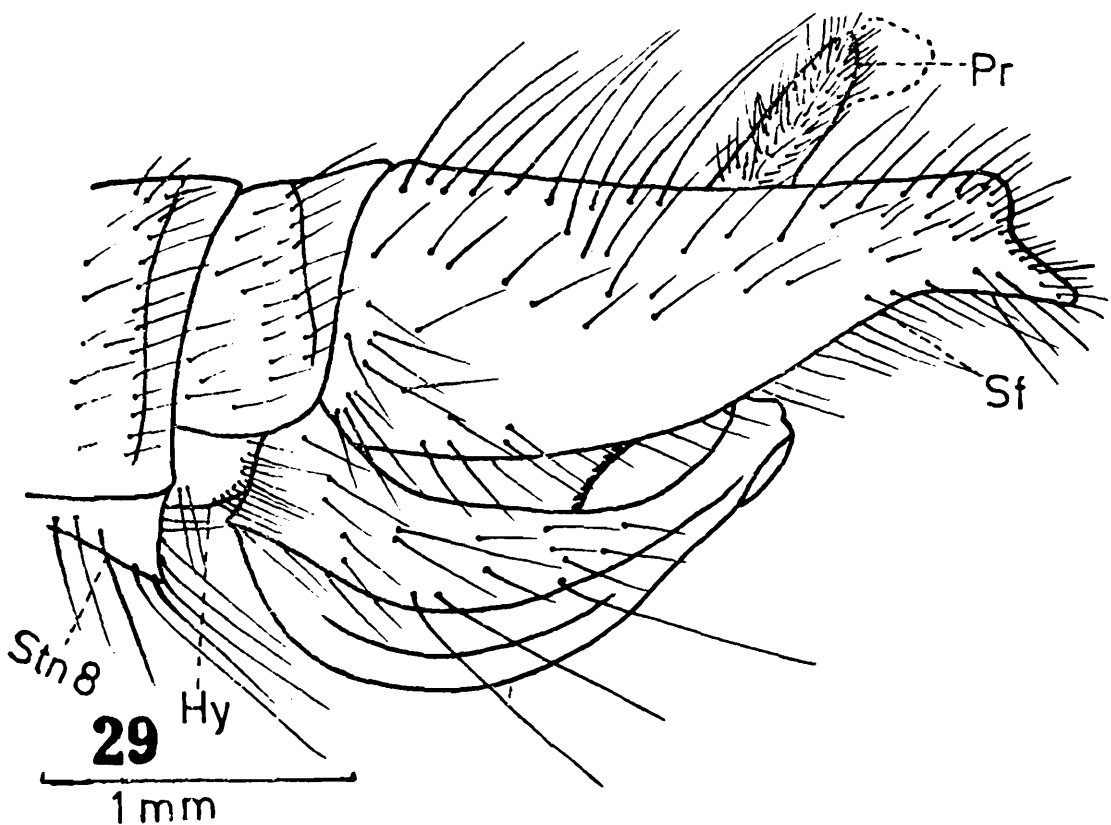
Abdomen black with greyish-yellow and grey tomentum, the latter forming more or less a transverse band on hind part of tergites, tergite 1 with a tuft of black bristles on sides, vestiture black with some pale yellow ones laterally. Male genitalia (Fig. 28) black with black and some pale hairs.

Females : Similar, but in one paratype mystax is wholly black.

Holotype ♂, India : Tamil Nadu : Coimbatore District : Muthikolam, 915 m, 23-26.ix.1938, coll. name not given, B.M.N.H
Paratypes 2 ♀ ♀, data as in holotype. B.M.N.H.

It is similar to *Machimus coerulescens* Ricardo but differs in the predominantly black abdomen, black legs, shape of superior foreceps and lacking a produced eighth sternite of male genitalia. This species is named in honour of Mr. K.G.V. Smith who has loaned us considerable material for our study.

Machimus subgenitalis Bromley
(Fig. 29)



29. Lateral view of male genitalia of *Machimus subgenitalis* Bromley.

Machimus subgenitalis Bromley, 1935, *Rec. Indian Mus.* 37 : 221.

A medium black hirsute species with greyish-brown and grey tomentum, black and reddish-brown legs, black and pale yellow mystax, and brownish tinged wings. Male : length 15 mm, wing 12 mm ; female : length 16 mm, wing 11 mm.

Male : *Head* as broad as thorax, black grey tomentose ; mystax black with pale yellow bristles medially, fronto-orbital plate pale yellow and black haired, ocellar bristles black, postcranium predominantly yellow haired but for a few being black, postocular bristles black, yellowish-white haired below. Antennae black, segments 1 and 2 black and pale yellow haired, the former ventrally also bearing a few black bristles, segment 2 slightly shorter than 1, 3 longer than the combined length of 1+2. Palpi and proboscis black, former black haired whereas the latter pale yellow haired.

Thorax black, grey and greyish-brown tomentose ; pronotal hairs pale yellow, medially with a mediolongitudinal black stripe extending from anterior end to well beyond transverse suture, being greasy the

extend of narrow stripe dividing it cannot be ascertained, lateral spots also indistinct being greasy, vestiture black with a few pale yellow hairs on humeri and posterolaterally, bristles black; scutellum with the disc pale yellow haired, hind border bearing about six black bristles. Halteres yellowish-brown and dark brown.

Legs black and reddish-brown, coxa and trochanter black, femur black dorsally and anteriorly while remainder reddish-brown, hind tibia anteriorly black and remainder reddish-brown, distal tarsal segments dark brown and basal ones reddish-brown, fore femur ventrally with dense pale yellow hairs, mid femur with an anteroventral row of bristles, hind femur with anterodorsal, anteroventral and posteroventral rows of bristles, hairs yellowish-white, bristles black and pale yellow, in fore and hind legs distal two-thirds of tibia and basitarsus posteriorly with golden yellow pubescence.

Wings brownish tinged apically, remainder almost hyaline.

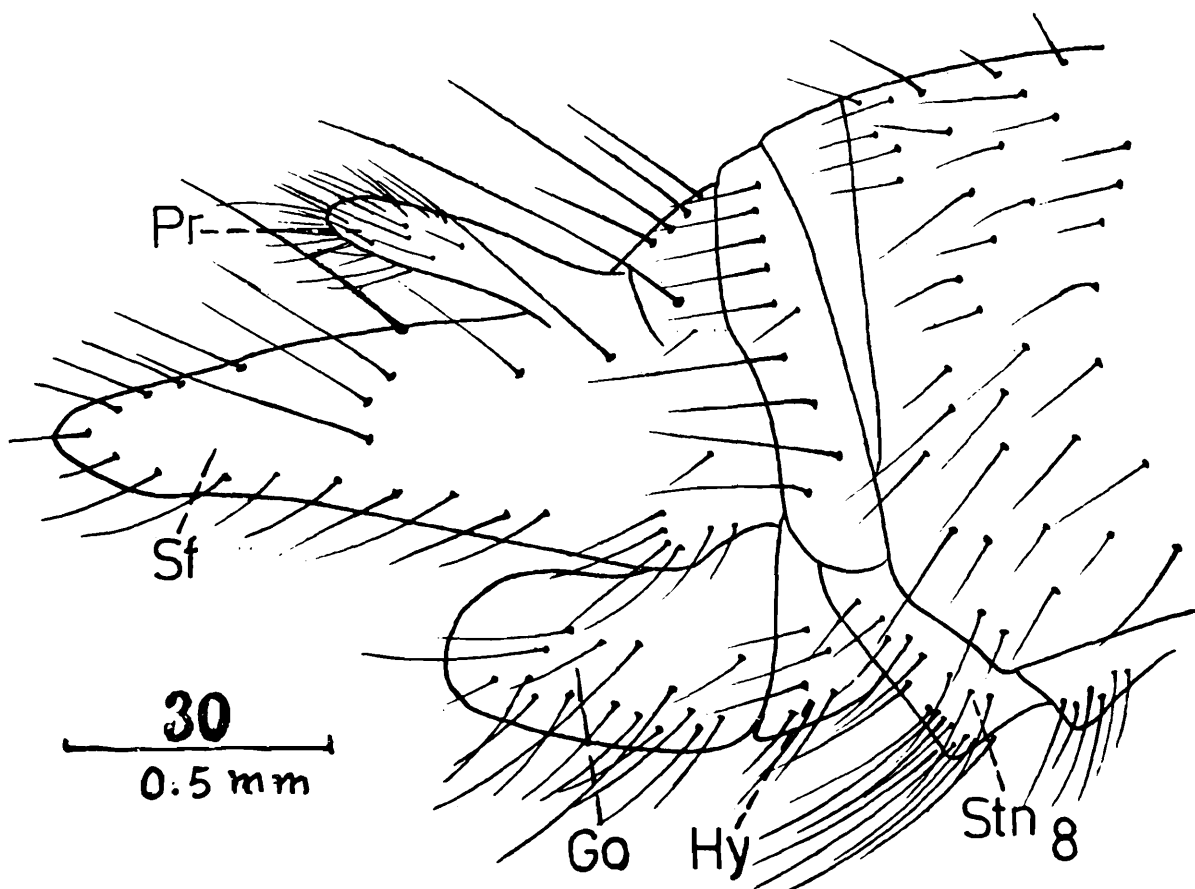
Abdomen black, greyish-brown and grey pollinose, tergite 2 on anterior border with a transverse stripe of tomentum, this and succeeding tergites on hind border with a narrow stripe of grey tomentum, tergite 1 laterally with a tuft of pale yellow hairs and a few pale yellow bristles, succeeding tergites on hind border with about four pale yellow bristles, vestiture black. Male genitalia (Fig. 29) black with black and a few pale yellow hairs, tips of superior forceps prolonged into a downward projecting process, eighth sternite bears long hairs.

Female: Similar.

Holotype ♂, India : Himachal Pradesh : Dalhousie coll. S.L Hora, Z.S.I. Reg. No. 637/H6, no other data, *Paratype* ♀, 638/H6, same data.

Machimus subgenitalis Bromley, *M. infrafemoralis* Bromley, *M. montanus* Ricardo, *M. bicolor* Joseph and Parui and *M. dravidicus* sp. nov. are the six known Indian species with contrasting yellowish-brown and black femora. Of these *M. subgenitalis* Bromley and *M. bicolor* Joseph and Parui have their superior forceps apically produced into a process but the former can be distinguished by its larger size and short superior forceps with apical process projecting downwards.

Machimus tibialis Ricardo
(Fig. 30)



30. Lateral view of male genitalia of *Machimus tibialis* Ricardo.

Machimus tibialis Ricardo, 1919, *Ann. Mag. Nat. Hist.* (9) 3 : 55.

A small pale and black species with heavy grey tomentum; femora reddish-yellow bearing anterior brown streaks, tibiae reddish-yellow, and wings lightly infuscated. Male : length 13 mm, wing 10 mm ; female : length 16 mm, wing 11 mm.

Male : Head broader than thorax, black, covered with heavy grey tomentum ; mystax black above and on sides, pale below, fronto-orbital bristles and ocellar bristles black, postcranium pale haired, postocular bristles black and confined to above. Antennal segment 1 grey tomentose, segment 2 yellowish-brown, 3 dark brown, segment 1 below bearing some black bristles, segment 2 about half the length of 1, 3 about the combined length of segments 1 and 2, arista shorter than 3. Palpi dark brown with black bristles, proboscis black with pale hairs.

Thorax pale and black, heavily infuscated with grey tomentum ; pronotum pale yellow haired ; mesonotum with the mediolongitudinal stripe extending the entire length but medially damaged and so the details cannot be ascertained, humeri and posterolateral sides pale haired, hairs and bristles black ; scutellum with the disc pale haired,

also with two or three black hairs, hind border bearing a row of black and pale bristles; metapleuron and hypopleuron each with a transverse row of pale bristles. Halteres pale with the knobs brownish tinged.

Legs with the femora reddish-yellow having dark brown stripe anteriorly, tibia reddish-yellow, tarsus pale with the apex of segment 2 onwards dark brown, vestiture pale with some black hairs also, bristles black but for a few a pale ones.

Wings lightly infuscated, still lighter posteriorly, medially clear ; anterior cross-vein beyond the middle of discal cell.

Abdomen dark brown, grey tomentose, tergite 1 on hind border bearing transverse pale bands, tergites 1 and 2 bearing tuft of hairs laterally ; vestiture pale with some black hairs also. Male genitalia (Fig. 30) dark brown above and reddish below ; eighth sternite very slightly produced and fringed with long black hairs.

Female : Similar, comparatively darker coloured with the leg colouration quite distinct ; only four bristles present on hind border of scutellum ; ovipositor black.

Lectotype ♂ (here designated), India : Uttar Pradesh Dehra Dum, 3. iv.1912 (216), coll. name not given, B M.N.H. *Paralectotype* ♀, India : Uttar Pradesh : Dehra Dum, 1.iv.1912 (218), coll. name not given.

This species can be recognised at once by the leg colouration together with the shape of male genitalia.

Abbreviations used in text-figures

Ae, aedeagus ; Cl clasper ; Go, gonopod (gonocoxite) ; Hy, hypandrium ; Sf, superior forceps (epandrium) ; Pr, proctiger ; Stn₈, eighth sternite.

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