

FAM. BOREIDAE.

Boreidae MAC LACHLAN, Trans. Ent. Soc. London, p. 218 (1868).

Rostrum long; mandibles with several teeth at the apex internally; maxillary palpi 5-jointed, the basal joint the shortest, the apical one the longest; labial palpi very short, 2-jointed, the apical minute. Eyes large, oval; ocelli absent. Abdomen short and stout. Legs slender, cylindrical; first tarsal joint very long; two simple and slender claws, not serrate. Wings rudimentary; in the male four, slender, bristle-like and curved; the fore pair somewhat coriaceous, serrated internally and with a long and strong bristle at the apex; the hind pair membraneous and with bristles on the inner margin apically; in the female only the fore pair is present, and they have the form of a small scale-like lobe on each side of the mesothorax. First abdominal segment very short, hidden by the prolongation of the hind border of metathorax. In the male the hind margin of 9th segment is prolonged ventrally into a triangular plate (lower appendage), and dorsally the same segment is produced into an arched plate (upper appendage), the apex of which is truncate. Between these two appendages is inserted a pair of two-jointed claspers. The basal joint stout; the apical one slender and movable against the dorsum of the abdomen; its apex either deeply cleft and the branches sharply pointed, or not cleft, and then only terminating in one sharp point. In the female the 9th segment is divided into a short dorsal part and two very long, ventrally placed valves. The dorsal part of 10th segment forms together with the valves the basal part of the ovipositor, the tip of which is formed by the modified anal valves.

Only one genus is known.

Genus **BOREUS** Latr. (1825).

Boreus LATREILLE, Cuv. Règne Anim., V, p. 247 (1825). — KLUG, Abh. Königl. Akad. Wiss. Berl., p. 88 (1836). — BURMEISTER, Handb. Ent., II, p. 955 (1839). — RAMBUR, Hist. nat. Ins. Névr., p. 328 (1842). — FITCH, Amer. Journ. Agric., V, p. 278 (1847). — WALKER, Cat. Neur. Ins. Brit. Mus., p. 455 (1853). — BRAUER, Verh. zool.-bot. Ges., p. 711 (1855). — BRAUER und LÖW, Neur. austr., p. 35 (1857). — HAGEN, Syn. Neur. Ins. N. A., p. 240 (1861). — ID., Ent. Monthl. Mag., p. 132 (1866). — MAC LACHLAN, Trans. Ent. Soc. London, p. 219 (1868). — WALLENGREN, Svenska Vet. Akad. Handl., p. 73 (1871). — ROSTOCK, Neur. Germ., p. 117 (1888). — Klapálek, Rozp. Cesk. Akad. Cisare Frantis. Josefa, p. 21 (1896). — HINE, Bull. Sci. Lab. Denison Univ., XI, p. 255 (1901). — ESBEN-PETERSEN, Ent. Medd. Köbenh., p. 48 (1906). — MJÖBERG, Ent. Tidskr. Stockh., p. 162 (1909). — ENDERLEIN, Zool. Anz., XXXV, p. 389 (1910).

The species are found partly in Europe and partly in North America. The North American species may be easily separated from the European species as to the male sex by the absence of the elevations on the dorsum of 2nd and 3rd abdominal segment, and as far as I can see also by the absence of the inner tooth of the terminal segment of the claspers. It may be remarked that little attention must be paid to the differences in colour, as the colour varies immensely, according to the degree of maturity of the individual.

Type : *B. hyemalis*.

Eurasian species.

B. hyemalis L. (fig. 120).

Panorpa hyemalis LINNÉ, Syst. nat., XII, p. 915 (1767). — FABRICIUS, Syst. Ent., p. 314 (1775).

Bittacus hyemalis LATREILLE, Hist. nat. Crust. Ins., XIII, p. 20 (1805).

Boreus hyemalis LATREILLE, Cuv. Règne Anim., V, p. 247 (1825). — KLUG, Abh. Kön. Akad. Wiss. Berl., p. 107 (1839). — MAC LACHLAN, Trans. Ent. Soc. London, p. 219 (1868). — ID., *ibid.*, p. 399 (1869). — WALLENGREN, Svenska Vetensk. Akad. Handl., IX, p. 73 (1871). — SCHÖYEN, Christ Vidensk. Forh., XIII, p. 13 (sep.) (1887) (Norway). — ALBARDA, Cat. rais. syn. Névr., p. 115 (1889) (Belgique). — MONTANDON, Bull. Soc. Scienc. Bucarest, p. 679 (1906). — WEELE, Tijdschr. v. Ent., p. 127 (1907) (Holland). — LUCAS, Entomologist, XLIII, p. 188, pl. IV, fig. 4 (1910) (England).

Boreus hiemalis BURMEISTER, Handb. Ent., II, p. 955 (1839). — RAMBUR, Hist. nat. Ins. Névr., p. 328 (1842). — BRAUER, Verh. zool.-bot. Ges., V, p. 10, pl. III (1855). — BRAUER et LÖW, Neur. austr., p. 35 (1857). — HAGEN, Ent. Monthl. Mag., p. 132 (1866). — MEYER-DÜR, Mitth. Schweiz. ent. Ges., IV, p. 360 (1874). — ROSTOCK, Neur. germ., p. 117 (1888). — KLAPÁLEK, Rozp. Cesk. Akad. Cisare Frantis. Josefa, p. 21, pl. I, fig. 6 (1896). — HEYDEN, Ber. Senck. Nat. Ges. Frankf. a. M., p. 112. — ESSEN-PETERSEN, Ent. Medd. København, III, p. 48 (1906) (Denmark). — MJÖBERG, Ent. Tidskr. Stockholm, p. 162, fig. 51 (1909).

Gryllus proboscideus PANZER, Faun. Germ., XXVII, p. 18 (1796).

Ateleptera hyemalis DALMAN, Anal., p. 34 (1823).

Boreus gigas BRAUER, Die Neur. Europas, p. 17 (1876) (nom. nud.).

Head shining dark bronzy-brown; rostrum brown, tip darker. The basal half of antennae brown, the apical half blackish. Front glabrous, scattered punctuate, hardly rugose. Prothorax

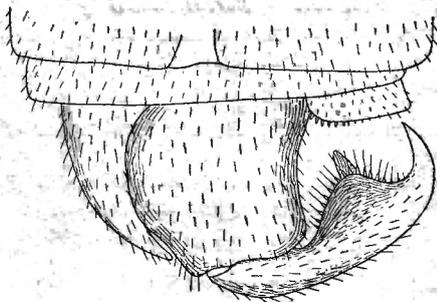


FIG. 120. — *Boreus hyemalis* ♂
Lateral view of anal appendages.
(Coll. Esben-Petersen).

dark bronzy-brown; meso- and metathorax brown. Abdomen shining dark bronzy-brown. Legs yellowish brown, their articulations blackish. Wings of male and rudiments of wings in the female brown. Ovipositor in the female and apical joint of the claspers in the male brown. In the male the dorsum of 2nd abdominal segment bears a rectangular, raised lobe, the lateral edges of which are directed outwards. On the succeeding segment is found an indication of a

similar lobe, but smaller and very indistinct. The lower appendage triangular, the sides slightly rounded, and the apex somewhat produced and elliptical. In the female the dorsal part of ninth segment is about ten times shorter than the valves.

Length of body ♂ 3-4^{mm}; ♀ (with ovipositor) 4,5-5^{mm}.

Coll. SELYS (general collection) : 1 ♂ (ex coll. GUÉRIN); 1 ♀ (ex coll. LATREILLE); 1 ♂, 2 ♀; (Belgian collection) : 2 ♂, 3 ♀. — Mus. Stockholm : 1 ♂, 3 ♀ [Mus. Payk.]; 1 ♂, 3 ♀ (no labels). — Mus. Vienna : 1 ♂ [Winthem] [*hiemalis* KLAPÁLEK] [coll. BRAUER]. — Coll. ESSEN-PETERSEN : 6 ♂, 1 ♀ Denmark; 1 ♀ Silesia; 1 ♂ Edinburgh (ex coll. MORTON).

As to *B. gigas* it may be noticed that this name is a catalogue name only, used by BRAUER, *loc. cit.*, for two specimens (♂ ♀) from Harz. I have not seen the specimens, but KLAPÁLEK has examined them, and in Rozpr. Ceske Akad., X, p. 9 (1901), he gives a description of the specimens, in which he says « Both specimens are very near, or truly identical with *B. hiemalis*. The abnormal size makes them conspicuous ».

[*B. Lokayi* Klap.] (fig. 121).

Boreus Lokayi KLAPÁLEK, Bull. Int. Acad. Sci. Bohême, p. 6, fig. 7 (1901).

? *Boreus tarnanii* NAVÁS, Revue Russe d'Entom., XI, p. 277, fig. 1 (1911) (Polonia).

Head shining bronzy-brown; rostrum and maxillary palpi yellowish brown; antennae yellowish, towards apex a little darker. Vertex punctate, front transversely rugose. Prothorax pale bronzy-brown with yellowish margins. Meso- and metathorax yellowish brown to pale bronzy-brown. Abdomen dorsally shining pale

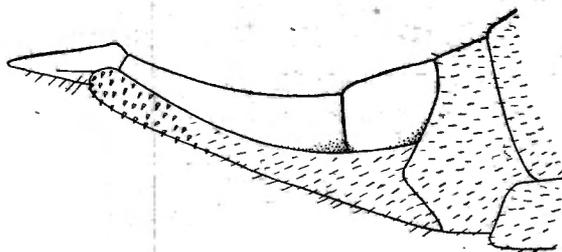


FIG. 121. — *Boreus Lokayi* ♀
Apical part of abdomen
(Coll. Klapálek).

bronzy-brown, ventrally paler. Anal appendages of male and ovipositor of female yellowish. Legs yellowish, articulations a little darker. Wings of male and rudiments of wings in female yellowish. In the male the dorsum of 2nd abdominal segment bears a transversely placed, rectangular raised lobe, the lateral edges of which are directed outwards. On the 3rd segment is found a similar, but very small one. Lower appendage triangular with straight side margins; tip truncate. In the female the dorsal part of 9th segment is 5 to 6 times shorter than the valves.

Length of body ♂ 3,5^{mm}; ♀ 4,5^{mm}.

Coll. SELYS : not present. — Coll. KLAPÁLEK : 1 ♂, 1 ♀ Buczecs, Transsylvania (LOKAY leg.).

The two specimens before me are probably small ones, as KLAPÁLEK mentions that the species is larger than *B. Westwoodi*. The species is similar to *B. Westwoodi* as to the pale colour and the rugosity of the front; the males, however, may easily be separated by the different shape of the lobes on the dorsum of 3rd abdominal segment.

It is with some hesitation that I refer *B. Tarnanii* to this species, but as NAVÁS considers it to be dissimilar to *B. Boldyrevi*, which is a synonym to *B. Westwoodi*, I think I may be right. It is quite sure that the female described as *B. Tarnanii* may be referred either to *B. Lokayi* or to *B. Westwoodi*.

B. Westwoodi Hagen (fig. 122, 123).

Boreus Westwoodi HAGEN, Ent. Monthl. Mag., III, p. 132 (1866). — MAC LACHLAN, Trans. Ent. Soc. London, p. 399, fig. 2 (1869). — ROSTOCK, Neur. germ., p. 117 (1888).
Boreus boldyrevi NAVÁS, Revue Russe d'Entom., XI, p. 278, fig. 2a, 2b, 2c (1911) (Moskwa).

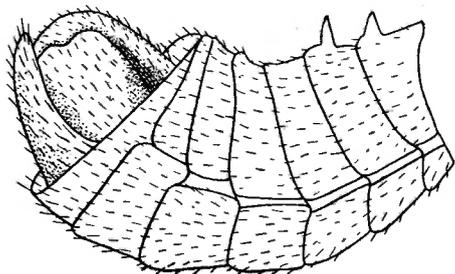


FIG. 122. — *Boreus Westwoodi* ♂
 Apical part of abdomen
 (Museum Stockholm).

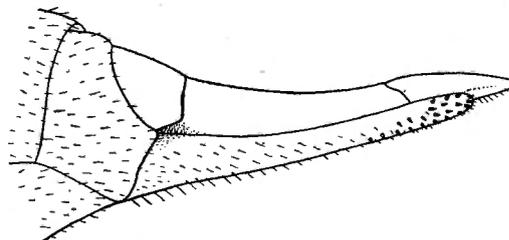


FIG. 123. — *Boreus Westwoodi* ♀
 Apical part of abdomen
 (Museum Stockholm).

Head shining bronzy-brown; rostrum yellow, the base a little darker and the tip brown; maxillary palpi yellow, tip of apical joint brownish. Antennae yellow, apical part pale brown. Vertex scattered punctate; front transversely rugose. Prothorax pale bronzy-brown, front and hind margins narrowly yellow; meso- and metathorax yellowish brown. Abdomen shining bronzy-brown. Anal appendage of male and ovipositor of female yellowish. Legs yellowish, articulations pale brown. Wings of male and rudiments of wings in female yellowish. In the male the dorsum of 2nd abdominal segment bears a transversely placed, rectangular, raised lobe, the lateral edges of which are directed outwards. On 3rd segment a lobe of the same shape and size, but hardly as long. The lower appendage of the male triangular, the sides slightly incurved, and the tip truncate.

Length of body ♂ 3-3,5^{mm}; ♀ 4-4,5^{mm}.

Coll. SELYS : 1 ♂ (ex coll. GUÉRIN). — Mus. Stockholm : 1 ♂, 1 ♀ Helsingfors (SAHLBERG leg.); 1 ♀ [Schh.]; 1 ♀ [Mus. PAYK.]. — Mus. Copenhagen : 1 ♀ [Mortensnäs, Nordvi.].

[B. Navasi Pliginsky].

Boreus Navasi PLIGINSKY, Revue Russe d'Entom., XIV, p. 364, fig. 1-8 (1914).

PLIGINSKY, *loc. cit.* :

« Dark-green, almost black, metallic shining. Rostrum yellowish, darker towards apex. First joint of palpi brownish yellow, the remainder blackish. Eyes elliptical, yellowish. Antennae 20-jointed, blackish and clothed with whitish hairs; basal joint robust, as long as broad; second joint somewhat longer than broad; third joint oblong, half as broad as second; 4th-8th cylindrical, twice as long as broad; 9th-11th somewhat stouter and shorter than 8th; 11th-19th somewhat longer than broad; 20th joint elliptical. Prothorax narrowed in front, blackish and coarsely striated transversely; in the male sex the hind part of prothorax is brownish yellow. Mesothorax broad, trapezoidal, punctuated and not so coarsely striated transversely as the prothorax; in the centre a transversely placed groove. Metathorax broader and shorter than the mesothorax, with a transversely placed groove in its centre and with a deep semi-lunar incision posteriorly. Abdomen black, greenish metallic shining and finely rugosed transversely; in the male sex the abdomen is clothed with short white hairs; in the female sex it is naked. Legs tiny, yellowish; tarsi blackish.

♂. Wings (fig. 2) yellowish, reaching the third abdominal segment. Forewing curved, darker at apex, shining, punctate, and finely rugose and haired dorsally; coarsely haired ventrally. Hindwings narrower and shorter than forewings; densely haired ventrally. Tip of the wings with a claw-like prolongation. No elevations on second and third abdominal segments. Subgenital plate brownish yellow, very thin, punctuated downwardly and finely haired. The plate narrowly incised laterally.

Length : 2,5^{mm}; breadth : 1^{mm}.

♀. Forewings (figs. 5 and 6) very small; hindwings have the shape of very small and narrow plates. All the wings yellowish coloured. Ovipositor blackish, curved (fig. 8).

Length incl. the ovipositor : 3^{mm}. breadth : 0,75^{mm}.

Das ♀ dieser Art unterscheidet sich von allen bis jetzt bekannten Arten durch die winzigen Vorderflügel und durch die Gestalt des Legerohres, welches unter einem fast geraden Winkel gekrümmt ist.

Umgegend von Sevastopol, 3 ♂ und 1 ♀ in meiner Sammlung. »

Coll. SELYS : not present.

This species as well as the two following are unknown to me, and I do not like to say anything about them. Their descriptions are given in the Russian language with a very short resumé in German. By the kind assistance of RICH. FREY, Helsingfors Museum, I have been able to give a translation of the descriptions.

[**B. chadzhi-gireji** Pliginsky].

Boreus chadzhi-gireji PLIGINSKY, Revue Russe d'Entom., XIV, p. 366, fig. 9-13 (1914).

PLIGINSKY, *loc. cit.* :

« ♀. Shining; dark greenish metallic coloured or partly purplish shining. Rostrum yellowish brown, darker at the tip. Palpi blackish. Eyes elliptical, yellowish. Head between the eyes evenly punctate. Antennae 19-jointed, blackish; 1st joint large and robust; 2nd globular, half as broad as 1st, and twice as long as broad; 3rd joint small, cylindrical, half as broad as 2nd, and twice as long as broad; 4th joint longer than 3rd; 5th-10th long, cylindrical, 11th-18th cylindrical, somewhat longer than broad; 19th joint elliptical; all the joints clothed with very short blackish and whitish hairs. Prothorax as long as broad, narrowed in front, and finely rugosed transversely. Mesothorax as broad as hind margin of prothorax, with parallel lateral margins and somewhat incised posterior margin. Metathorax broad, with a semi-lunar incision posteriorly and with a transversely placed groove in its centre. Wings yellowish; forewings (fig. 10 and 11) oblong and punctate; hindwings have the shape of small narrow plates. Abdomen evenly clothed with short whitish hairs, transversely rugose. Ovipositor almost straight (fig. 13). Legs slender, yellowish, whitish haired; tarsi somewhat darker.

Length : 3^{mm}; breadth : 0,75^{mm}.

♂. The male only differs from that of *B. Navasi* in possessing 19-jointed antennae.

Das ♀ dieser Art unterscheidet sich von den anderen Arten der Gattung durch ein ganz gerades Legerohr und durch die Gestalt der Vorderflügel, welche stark verlängert und verhältnismässig gross sind. Das ♂ unterscheidet sich von *B. Navasi* durch seine 19-gliedrigen Fühler.

Umgegend von Sevastopol und Simferopol, 2 ♀ in meiner Sammlung; Eupatoria, 5 ♂ und 14 ♀ in der Sammlung des Zoologischen Museum der Akademie der Wissenschaften und in meiner Sammlung. »

Coll. SELYS : not present

[**B. aktijari** Pliginsky].

Boreus aktijari PLIGINSKY, Revue Russe d'Entom., XIV, p. 367, fig. 14 (1914).

PLIGINSKY, *loc. cit.* :

« ♀. Bronze-coloured. Rostrum towards apex yellowish. Antennae 19-jointed. Abdomen almost smooth, not glossy, without visible rugosity, but with yellowish lateral margins. Hind margin of the abdominal segments ventrally yellowish. The posterior half part of the segments whitish haired. Forewings (fig. 14) small and with rounded apex. The species has great likeness to *B. chadzhi-gireji* ♀.

Length : 3,5^{mm}; breadth : 0,75^{mm}.

Unterscheidet sich von *B. chadzhi-gireji* durch ihren bronzefarbenen Körper, das glatte, fast ganzlich matte Abdomen ohne merkliche Querrunzelung, die abgerundeten Vorderflügel und die gelbfarbigen Seiten des Bauches.

Umgegend von Sevastopol, 1 ♀ in meiner Sammlung. »

Coll. SELYS : not present.

American species.**B. nivoriundus** Fitch (fig. 124).

Boreus nivoriundus FITCH, Am. Journ. Agr., V, p. 277 (1847). -- WALKER, Cat. Neur. Ins. Brit. Mus., p. 456 (1853). -- HAGEN, Syn. Neur. N. A., p. 240 (1861). -- HINE, Bull. Sc. Lab. Denison Univ., XI, p. 254 (1901). -- BANKS, Cat. Neur. Ins. U. S., p. 34 (1907).

Head shining bronzy-brown; rostrum yellowish brown, darker at base. Maxillary palpi yellowish brown, apical joint darker towards tip. Antennae pale brown in the basal half, darker towards apex; vertex coarsely punctate; front finely reticulated. Prothorax dark reddish brown. Abdomen shining bronzy-brown. Anal appendages of male and ovipositor of

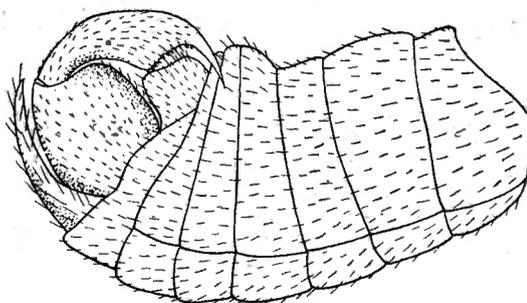


FIG. 124. — *Boreus nivoriundus* ♂
Apical part of abdomen
(Coll. Selys).

female pale brown. Legs yellowish brown; tip of tibiae and of tarsal joints brown. Wings of male and rudimentary wings of female yellowish brown to brown. Ovipositor of female short, about half as long as the abdomen. In the male the lower appendage triangular with straight lateral margins and broadly rounded apex.

Length of body : ♂ 3,5^{mm}; ♀ 4,5^{mm}.

Coll. SELYS : 3 ♂, 2 ♀. A female is labelled [*B. nivoriundus* FITCH] in the handwriting of H. A. HAGEN.

B. brumalis Fitch (plate II, fig. 24).

Boreus brumalis FITCH, Am. Journ. Agr., V, p. 278 (1847). -- WALKER, Cat. Neur. Ins. Brit. Mus., p. 456 (1853). -- HAGEN, Syn. Neur. N. A., p. 240 (1861). -- HINE, Bull. Sci. Lab. Denison Univ., XI, p. 255 (1901). -- BANKS, Cat. Neur., Ins. U. S., p. 34 (1907).

Wings shining metallic black; rostrum and maxillary palpi pitchy brown; antennae brown in the basal half, blackish brown towards apex; vertex sparingly punctate; front finely reticulate. Thorax and abdomen shining metallic black. Anal appendages of male and ovipositor of female pitchy black. Legs pitchy brown. Wings of male and rudimentary wings of female brown. Ovipositor of the female short, about half as long as the body. In the male the lower appendage is triangular with straight lateral margins, and the truncate apex deeply emarginate.

Length of body : ♂ 2,5^{mm}; ♀ 4^{mm}.

Coll. SELYS : 3 ♂, 2 ♀. A male is labelled [*B. brumalis* FITCH] in the handwriting of H. A. HAGEN. — Coll. ESBEN-PETERSEN : 2 ♂ Sea Cliff, N. Y. (ex coll. BANKS).

[*B. californicus* Pack.].

Boreus californicus PACKARD, Proc. Bost. Soc. Nat. Hist., VIII, p. 408 (1871). — HINE, Bull. Sc. Lab. Denison Univ., XI, p. 255 (1901). — BANKS, Cat. Neur. Ins. U. S., p. 34 (1907).

Head shining metallic, bluish black; middle of rostrum pitchy brown, tip and base black; maxillary palpi black; antennae dark brown to blackish brown at base, blackish towards apex; vertex sparingly punctuate. Front finely, transversely rugose. Thorax and abdomen shining metallic, bluish black. Anal appendages of male black, ovipositor of female brown, darker at the base and the tip. Legs pale brown, tip of femora, tibiae and of tarsal joints blackish, terminal joints of tarsi mostly black. Wings of male and rudimentary wings of female brown. Ovipositor rather long, much more than half as long as the abdomen. Lower appendage in male truncate at tip.

Length of body : ♂ 3,5^{mm}; ♀ 5^{mm}.

Coll. SELYS : not present. — Coll. ESBEN-PETERSEN : 1 ♂ Kaslo B. C. (ex coll. BANKS).

[*B. unicolor* Hine] (fig. 125).

Boreus unicolor HINE, Bull. Sc. Lab. Denison Univ., XI, p. 256 (1901). — BANKS, Cat. Neur. Ins. U. S., p. 34 (1907).

Head shining black; rostrum and maxillary palpi pitchy brown to black, the lateral margins of rostrum brown in the middle. Antennae pitchy brown to black. Vertex sparingly punctuate; front finely rugose and

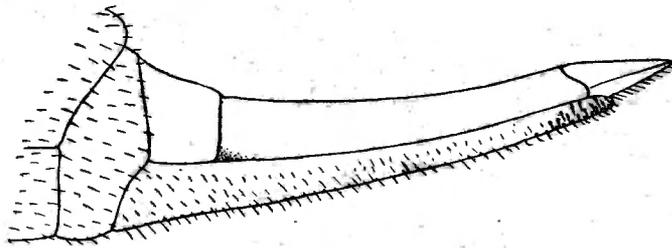


FIG. 125. — *Boreus unicolor* ♀
Apical part of abdomen.
(Coll. Esben-Petersen).

above the insertion of antennae with a few punctuations. Thorax and abdomen shining black. Anal appendages of male and ovipositor of female black. Legs pitchy black. Wings of male and rudimentary wings of female black. Ovipositor of female very long, nearly as long as the abdomen. In the male the lower appendage is triangular, the sides slightly rounded at the apex, which is truncate.

Length of body : ♂ 3^{mm}; ♀ 5^{mm}.

Coll. SELYS : not present. — Coll. ESBEN-PETERSEN : 1 ♂, 1 ♀ Montana (ex coll. BANKS).

FAM. BITTACIDAE.

ENDERLEIN, Zool. Anz., XXXV, p. 387 (1910).

This tipuliform family is easily recognized by the slenderness in all parts and especially by the modified tarsi, in which the terminal joint bears only one claw and may be folded down against the 4th.

Head small; eyes prominent; ocelli large; rostrum long and slender. Labial palpi 2-jointed, long and slender, the apical joint the longest. Maxillary palpi long and slender; 1st joint a little longer than broad; 2nd about twice as long as broad, thickened towards the tip; 3rd joint one and a half times longer than 1st and 2nd together and as long as 4th and 5th together; 4th and 5th nearly of same length; 5th the most slender. Mandible with a small

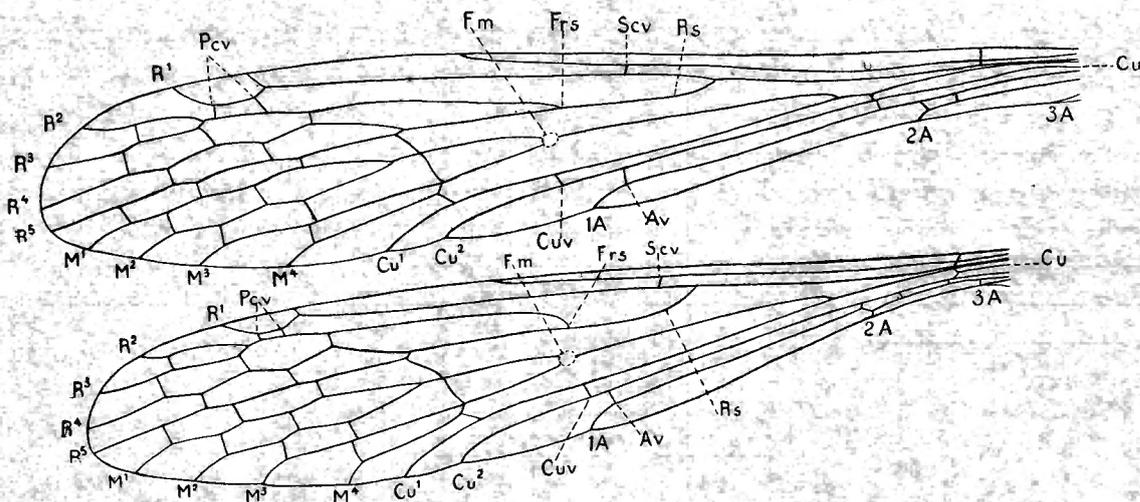


FIG. 126. — *Bittacus Banksi*
Fore-and hindwing.

R^1 = radius; R^2, R^3, R^4, R^5 = branches of radial sector; R_s = radial sector; M^1, M^2, M^3, M^4 = branches of media (M); Cu^1, Cu^2 = branches of cubitus; 1A, 2A, 3A = first, second and third anal vein; Frs = fork of radial sector; Fm = fork of media; Scv = apical cross vein in the subcostal area; Cuv = apical cross vein in the cubital area; Av = apical cross vein in the area between Cu^2 and 1A; Pcv = cross veins between the pterostigma and R^2 .

dent on the innerside near to the tip. Legs and abdomen long and slender. The tarsal joints of different length; the 1st-3rd and the basal half of 4th with two rows of strong bristles on their underside. The 4th somewhat curved on the upperside and with a transverse furrow on the side; the terminal joint claw-shaped and terminating in a single claw, which is short and stout on the posterior legs, longer and more slender on the fore and intermediate legs. All the tibiae with two long spines at their tip.

Of the abdominal segments the 1st, 8th and 9th are short. In the ♂ the dorsum of 9th segment is much prolonged and deeply cleft, forming two shorter or longer appendages (upper appendages), whose shape and size are of great specific value. The 9th segment bears ventrally a pair of claspers, which coalesce along their ventral side and form a hollow, in which the base of the penis is concealed. The 10th segment is very small and not visible in

dried specimens; it bears a pair of unsegmented cerci. The penis is subcylindrical, and its apex is prolonged into a long, curved and pointed titillator. The cerci and titillator as a rule visible by side view.

In the female the subgenitalplate covers for the most part all the venter of 8th and 9th segment; its side margins coalesce with the venter of the segments, and only its apical margin is free. At the apex it has an incision in the middle, whereby two short, strongly haired, lobes are formed. The median part of the subgenitalplate, especially towards the base, not chitinised; in dried specimens the subgenitalplate therefore very often looks like two plates. The very small 10th segment, hardly visible in dried insects, bears two unsegmented cerci.

In the fore- and hindwing Cu^1 coalesces for a longer distance with M, and in the hindwing the same takes place as to Cu^2 and 1A. Two or three anal veins are present. 1A joins the posterior margin far out, about in the middle of the wing; the 2A much nearer to the base, and the 3A is often absent. Rs and M furcate several times; present are R^2 , R^3 , R^4 and R^5 ; M^1 , M^2 , M^3 and M^4 . The pterostigmatal area is distinctly circumscribed by a cross vein from R^1 to the costal margin and by the curved part of R^1 beyond the cross vein. At Fm and sometimes also at Frs is found a clear spot, and in each of the two first cellules between Rs and M is found a small chitinous dot. In the costal area a cross vein is found near to the base, and sometimes one or two more are present in the apical part.

In the genus *Neobittacus* 4 or 5 cross veins are present in the costal area. As to the venation of the wings of *Bittacidae* as well as of *Panorpidae* it may always be remembered that the venation is liable to vary, and hasty conclusions should not be formed from single specimens presenting unusual characters in this respect.

Besides the ordinary pilosity on the margins of the wings a row of strong bristles is found in a number of species near the base.

In one genus, *Apterobittacus*, no wings are present.

The family is found in all parts of the world with the exception of the Northern parts of Europe, Asia and America.

TABLE OF GENERA.

1. Wings not present	APTEROBITTACUS.
Wings present	— 2.
2. Wings strongly marked with dark cross bands and dark coloured apex, falcate at the tip. Costal area with 4-5 cross veins	NEOBITTACUS.
Wings not marked with dark cross bands (sometimes an apical spot is present); not falcate at the tip. Costal area with 1-3 cross veins	— 3.
3. Eyes very large, touching each other below the antennae	PAZIUS.
Eyes wide apart below the antennae	— 4.
4. In the hindwing 1A coalesces with Cu^2 for its whole length	KALOBITTACUS.
In the hindwing 1A only coalesces with Cu^2 for a short distance	— 5.
5. Basal joint of hind tarsus of the same length as 4th or a little shorter	HARPOBITTACUS.
Basal joint of hind tarsus longer than 4th	BITTACUS.

Genus BITTACUS Latr.

LATREILLE, Hist. nat. des Crust. et des Ins., VIII, p. 20 (1805). — ID., Gen. Crust. et Ins., III, p. 189 (1807). — KLUG, Abh. Königl. Akad. Wiss. Berl., p. 97 (1836). — BURMEISTER, Handb. Ent., II, p. 955 (1839). — RAMBUR, Hist. nat. Ins. Névr., p. 326 (1842). — BRAUER, Verh. zool.-bot. Ges., V, pl. 2, p. 707 (1855). — ID., ibid., XIII, pl. 14, pp. 307-324 (1863). — ID., ibid., XXI, pl. 3, pp. 109-116 (1871). — BRAUER et LÖW, Neuropt. austr., p. 36 (1857). — FELT, N. Y. State Entomologist, Report, X, pp. 463-480, pl. 3-4; pp. 463-480 (1896). — HINE, Journ. Columb. Horticult. Soc., XII, pl. 1-2, pp. 105-116 (1898). — MAC CLENDON, Entom. News, fig. 15, p. 121 (1906). — Klapálek, Acta Soc. Ent. Bohem., VII, p. 114 (1910). — ENDERLEIN, Zool. Anz., XXXV, p. 396 (1910). — ESBEN-PETERSEN, Revue Zool. Afr., III, p. 135 (1913). — BANKS, Trans. Amer. Ent. Soc., XXXIX, p. 233 (1913). — LESTAGE, Revue Zool. Afric., V, p. 112 (1917).

Leptobittacus HINE, Journ. Columb. Horticult. Soc., XII, p. 108 (1898).

Thyridates NAVÁS, Mem. Real Acad. Cienc. Art. Barcelona, p. 412 (1908).

Diplostigma NAVÁS, Ibid., p. 413 (1908).

Haplodictyus NAVÁS, Ibid., p. 413 (1908). — ID., Revue russe d'Entom., p. 277 (1908).

Eyes wide apart below the antennae. Wings present, not falcate at the tip, and not marked with bands; in a few cases are found some small spots on the disc or a larger one at the tip. In the hindwing 1A only coalesces with Cu² for a short distance. Basal joint of hind tarsus longer than 4th.

Type : *B. italicus*.

Eurasian species.

B. italicus O. F. Müller (fig. 127).

Panorpa italica O. F. MÜLLER, Manip. Ins. Taur. ed. Allioni, Miscell. Taurin., III, p. 194 (1766).

Bittacus italicus KLUG, Abh. Königl. Akad. Wiss. Berl., p. 97 (1836). — WALKER, Cat. Neur. Ins. Brit. Mus., p. 465 (1853). — BRAUER, Verh. zool.-bot. Ges., X, pl. 12, fig. 2, p. 691 (1860). — NAVÁS, Neur. de España y Portugal, p. 149 (1908).

Panorpa tipularia FABRICIUS, Syst. Ent., p. 314 (1775). — ID., Spec. Ins., p. 401 (1781). — ID., Ent. Syst., p. 98 (1793). — SULZER, Geschichte d. Ins., p. 177, pl. 25, fig. 7-8 (1776). — VILLERS, Entom. Linn., III, p. 66, pl. 7, fig. 11 (1789). — RÖMER, Gen. Ins., pl. 25, fig. 7-8 (1798).

Bittacus tipularius LATREILLE, Hist. nat. Crust. et Ins., VIII, p. 20 (1805). — ID., Gen. Crust. et Ins., III, p. 189 (1807). — GUÉRIN, Iconogr. du Règne Animal, pl. 61, fig. 2 (1829-1844). — BURMEISTER, Handb. Ent., II, p. 955 (1839). — RAMBUR, Hist. nat. Ins. Névr., p. 326 (1842). — BRAUER, Verh. zool.-bot. Ges., V, p. 707 (1855). — ID., ibid., XIII, pl. 14, pp. 307-324 (1863). — ID., ibid., XXI, pl. 3, pp. 109-116 (1871). —

BRAUER, Verh. zool.-bot. Ges., V, p. 707 (1855). — ID., ibid., XIII, pl. 14, pp. 307-324 (1863). — ID., ibid., XXI, pl. 3, pp. 109-116 (1871). — BRAUER et LÖW, Neur. austr., p. 36 (1857). — MEYER-DÜR, Neur. d. Schweiz, p. 360 (1875) (Switzerland). — GIRARD, Traité d'entom., II, p. 407 (1876). — ROSTOCK, Neur. germ., p. 116 (1888) (Germany). ALBARDA, Cat. rais. syn. Névropt., p. 111 (1889) (Belgium). — STROBL, Mitt. nat. Ver. Steierm., p. 242 (1905) (Steiermark). — KEMPNY, Bull. Soc. Scienc. de Bucarest, p. 673 (1906) (Roumania). — MONTANDON, ibid., p. 679 (1906). — KLAPÁLEK, Acta Soc. Ent. Bohem., p. 114, fig. 1-2 (1910).

Panorpa tipuloides SCHRANK, Beitr. z. Naturgesch., p. 82 (1776). — ID., Enum. Ins., p. 317 (1781).

Head and rostrum brown; maxillary palpi brown, darker towards apex; a black spot between the ocelli. Antennae dark brown, basal joints paler. Thorax brown to blackish brown dorsally. Abdomen pale brown to dark brown. Legs yellowish brown to brown, tip of femora, tibiae and of tarsal joints darker. Wings rather broad with somewhat pointed tip. Membrane hyaline with a slight yellowish tinge; venation pale brown; cross veins in the apical part sometimes narrowly margined with brown. No apical cross vein in the costal area. Subcostal

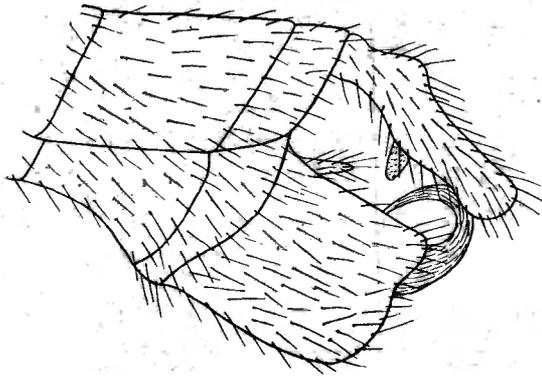


FIG. 127. — *Bittacus italicus* ♂
Lateral view of anal appendages
(Coll. Selys).

cross vein in forewing about half way between origin and fork of Rs, in hindwing nearest to the origin. Fork of Rs a little before fork of M. At the fork of M a rather large, circular, whitish spot. Cubital cross vein opposite to or a little beyond fork of M. No anal cross vein. 1A ends in forewing about half way between origin and fork of Rs, in hindwing a little beyond. Pterostigma subrectangular, two and a half times longer than broad, with yellowish colour, which passes beyond R² in aged specimen; pterostigma connected with R² by two cross veins. Black bristles on the margins far from the base of the wings. A few black bristles on the coxae. In the male the branches of upper appendage, seen from side, are rather narrow and short. In the middle of the inner margin inferiorly is a long, downwards directed dent, the apex of which is densely provided with very short black bristles. At the tip the underside is broadly produced inferiorly downwards into a broad and short, somewhat triangular flap. The tip with very short black bristles inferiorly.

Forewing : 18-20^{mm}; hindwing : 16-17^{mm}.

Coll. SELYS (general coll.) : 7 ♂, 11 ♀ (Belgian coll.) 6 spec. — Coll. ESSEN-PETERSEN : 1 ♂, 5 ♀ Spain (ex coll. NAVÁS); 3 ♂, 2 ♀ Roumania (MONTANDON leg.); 1 ♀ Bosnia:

B. Hageni Brauer (fig. 128).

Bittacus Hageni BRAUER, Abh. zool.-bot. Ges., X, p. 691, pl. XII, fig. 1 (1860) (Austria). — MAC LACHLAN, Soc. Ent. Belg., p. 9 (sep.) (1881) (Belgium). — ROSTOCK, Neur. germ., p. 116 (1888). — ALBARDA, Cat. rais. syn. Nevr., p. 112 (1889). — MAC LACHLAN, Ent. Monthl. Mag., XXXIV, p. 233 (1898) (Wallachia). — J.-L. LACROIX, La Feuille des Jeunes Naturalistes, p. 44 (1914) (France).

Head and rostrum yellowish brown; maxillary palpi dark brown, the tip of apical joint paler. A blackish spot between the ocelli. Antennae yellowish brown, darker towards the apex; the two basal joints stout. Thorax and abdomen yellowish brown; some of the abdominal segments with a narrow blackish cross band near to and along the hind margin. Legs yellowish; tip of femora and tibiae brown. Wings rather broad with broadly rounded tip. Membrane hyaline with a faint yellowish tinge. Venation pale brown; some of the cross veins in the apical

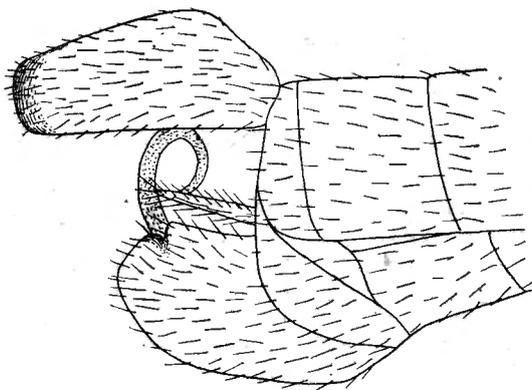


FIG. 128. — *Bittacus Hageni* ♂
Lateral view of anal appendages.
(Coll. Selys).

part narrowly margined with brown. A pale brownish spot at the place where M separates from Cu¹, at the origin and at the fork of Rs and a more indistinct one near the end of Cu². The whitish spot at the fork of M very small. No apical cross vein in the costal area. The subcostal cross vein in forewing about half way between the origin and the fork of Rs, in the hindwing nearest to the origin of Rs. Fork of Rs opposite to fork of M. Cubital cross vein before fork of M. No anal cross vein. 1A ends in forewing a little beyond the origin of Rs, in hindwing far beyond but before cubital cross vein. Pterostigma subrectangular, two and a half times longer than broad, rather indistinct, yellowish coloured, connected with R² by two cross veins. A few black bristles on the front margin of the wings close to the base, a greater number on hind margin and far outer. No bristles on the coxae. In the male the branches of upper appendage are yellowish white, rather broad; on the inner side of their upper margin in the middle and at the apex inferiorly a black thickening provided with short black bristles; in the middle of the lower margin inferiorly an inwards directed blunt dent, provided with two or three blackish bristles.

Forewing : 17-19^{mm}; hindwing : 15-16,5^{mm}.

Coll. SELYS : 1 ♂ labelled [Austria] [*Hageni*]. — Mus. Vienna : 1 ♂ labelled [Bator, ROGHF. 17.7.62]. — Mus. Copenhagen : 1 ♀ Anhalt (RÖDER leg.).

The species has much likeness to *B. italicus*, but its wings are broader, their tip more rounded, the pale brown spots are hardly visible in the latter, the white spot at the fork of M is larger, 1A is shorter, there are no bristles on the coxae, and only for a short distance the margins of the wings are provided with bristles. The anal appendages of the males are very different.

[*B. indicus* Walker] (fig. 129).

Bittacus indicus WALKER, Cat. Neur. Ins. Brit. Mus., p. 469 (1853).

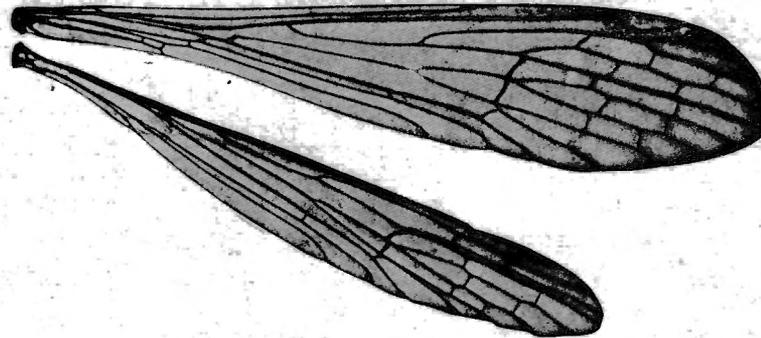


FIG. 129. — *Bittacus indicus* type-specimen (Museum London).

Head pale brown; rostrum shining brown; maxillary palpi brown; vertex black between the ocelli. Antennae yellowish brown; basal joint subcylindrical, second globular, both very stout. Thorax and basal abdominal segments brown. Legs slender, brown; tip of femora and tibiae with a narrow blackish brown band. Wings long and narrow, somewhat acute at the tip, with pale greyish brown tinge and yellowish brown venation, especially in the apical part. No apical cross vein in the costal area. Subcostal cross vein half way between origin and fork of Rs. Fork of Rs opposite to fork of M. Cubital cross vein before fork of M. No anal cross vein. 1A joins the hind margin beyond the fork of M. A few bristles on the hind margin of the wings near the base. 1A ends far outer than M and Rs furcate. No apical cross vein between Cu^2 and 1A. Pterostigma subtriangular, connected with R^2 by two cross veins, placed close together.

Forewing : 19^{mm}; hindwing : 17^{mm}.

Coll. SELYS : not present. — Brit. Mus. : 1 spec. (abdomen lost), E. India (one of WALKER's type series).

[*B. insularis* Esben-Peters.] (fig. 130).

Bittacus insularis ESBEN-PETERSEN, Ent. Medd. København, p. 234 (1915).

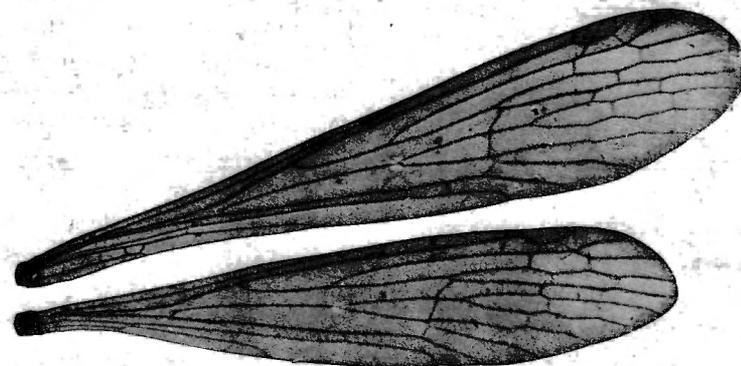


FIG. 130. — *Bittacus insularis* ♀ type-specimen (Museum London).

Head brown; rostrum pitchy brown towards the tip; vertex black between the ocelli. Antennae slender, dark brown; basal joint subcylindrical, globular, both very stout. Prothorax pitchy brown, meso- and meta-thorax reddish brown. Abdomen brown. Legs slender, brown; femora, tibiae and tarsal joints with blackish tip. Wings narrow, slender with rounded tips and with pale greyish brown tinge; apical margin shaded with pale sooty brown. Venation brown. No apical cross vein in the costal area. Subcostal cross vein in forewing half way between origin of radial sector and its fork, in hindwing nearest to the origin. Fork of radial sector

opposite to fork of M. Cubital cross vein a little beyond fork of M. No anal cross vein. 1A joins the hind margin far before fork of M and a little beyond origin of radial sector. Pterostigma subrectangular, two Pcv. A few bristles on the hind margin of wings near base.

Forewing : 15^{mm}; hindwing : 13^{mm}.

Coll. SELYS : not present. — Brit. Mus. : 1 ♀ Ceylon, 29.XI.1908.

[**B. latipennis** Gerst.] (fig. 131).

Bittacus latipennis GERSTAECKER, Mitt. nat. Ver. Neu-Vorp. Rüg., p. 120 (1885).

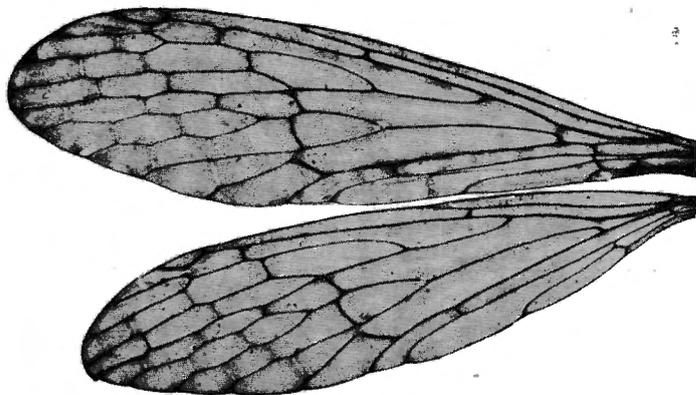


FIG. 131. — *Bittacus latipennis* type-specimen (Museum Greifswald).

Face, rostrum and vertex reddish brown; the ocelli placed in a dark circular spot. Antennae pale yellowish ventrally, pitchy brown with exception of 2nd-6th joint dorsally. Thorax reddish brown; a longitudinal darker median streak on meso- and metathorax; scutellum of meso- and metathorax dark brown and shining. Abdomen wanting. Legs brown; tip of femora and tibiae darker. Wings with yellowish brown tinge and with several more or less distinct irregular hyaline spots. Venation brown. Pterostigma small and connected with R² by one cross vein.

Forewing : 19^{mm}; hindwing : 17^{mm}.

Coll. SELYS : not present. — Mus. Greifswald : 1 specimen, Darjeeling (type).

B. sinensis Walker (fig. 132, 133).

Bittacus sinensis WALKER, Cat. Neur. Ins. Brit. Mus., p. 469 (1853). — MAC LACHLAN, Mitt. schweiz. Ent. Ges., p. 406 (1887). — MIYAKÉ, Journ. Coll. Agr. Imp. Univ. Tokyo, IV, p. 386 (1913).

Diplostigma sinense NAVÁS, Mem. Real. Acad. Cienc. Art. Barcelona, p. 413 (1908). — ID., Revue Russe d'Entom., p. 277 (1909).

Bittacus quaternipunctatus ENDERLEIN, Zool. Anz., p. 397 (1910). — MIYAKÉ, ibid., p. 387, pl. 33, fig. 6; pl. 37, fig. 10 (1913).

Bittacus strategus NAVÁS, Bull. Mus. d'Hist. nat., Paris, p. 442, fig. 2a, 2b (1913).

Head pale brown with black between the ocelli. Rostrum fuscous with paler tip. Maxillary palpi fuscous. Antennae brown, strongly haired. Thorax and abdomen pale brown. Abdomen in the male swollen at the tip. Legs reddish brown. Femora and tibiae with a narrow black band at the tip. Wings with a strong yellowish tinge and broadly rounded apex. Venation

yellowish brown, distinct. Some of the cross veins in the apical part faintly and narrowly brownish shaded. In fore- and hindwing four dark brown spots, one at M, where it separates

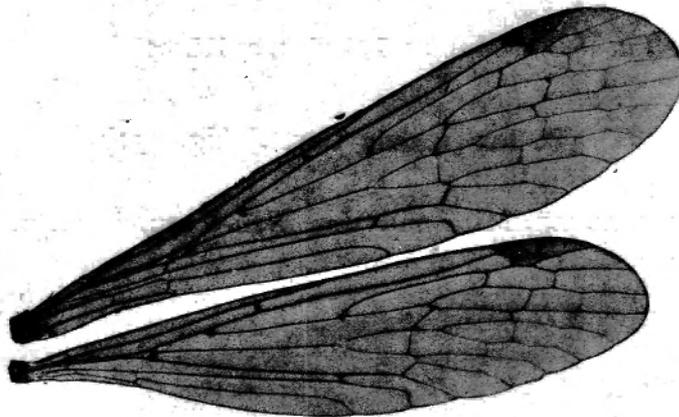


FIG. 132. — *Bittacus sinensis* ♂
(Coll. Selys).

from Cu¹, one at the base of Rs, one at Scv, and one at the first fork of Rs. Pterostigma

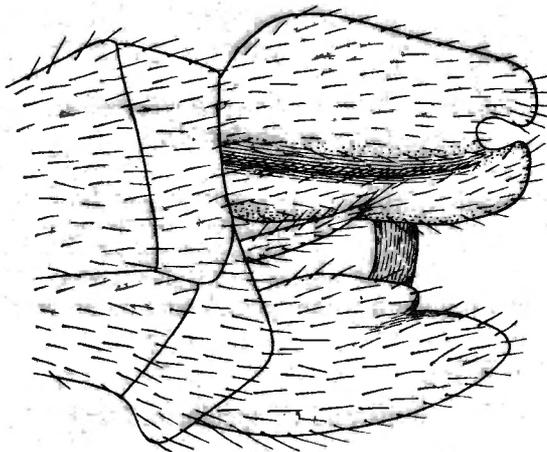


FIG. 133. — *Bittacus sinensis* ♂
Lateral view of anal appendages
(Coll. Selys).

subquadrangular, yellowish, two Pcv in the forewing. Only a basal cross vein between costa and Sc. Av as a rule present. Bristles on the margin of wings near base.

Forewing : 24^{mm}; hindwing : 21^{mm}.

Coll. SELYS : 4 ♂, 5 ♀ + 1 spec. (abdomen lost) [81] Japan (PREYER leg.). — Mus. London : 1 ♀ China (SAUNDERS 68.3); 2 ♀ Tanghai 5.99 (PHILIP DE LA GARDE 1906-88). — Mus. Paris : 1 ♀ (labelled by NAVAS, as *Diplostigma sinense*); 1 ♂ (type-specimen of *strategus*) Tokyo.

The first mentioned specimen from Mus. London belongs to the type-series of WALKER. It seems as if some of the Chinese specimens have the cross veins a little stronger shaded than

the Japanese specimens. The genus *Diplostigma* founded by NAVAS cannot hold good; the cited characters are such as are found in the greater number of species. The type-specimen of *B. strategus* is a typical specimen of *B. sinensis*.

[*B. Mastrillii* Navás] (fig. 134, 135).

Bittacus Mastrillii NAVÁS, Bull. Mus. d'Hist. nat., Paris, p. 443 (1913).

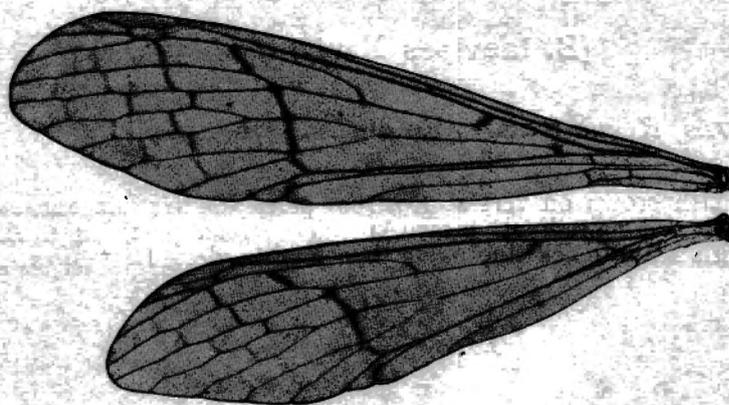


FIG. 134. — *Bittacus Mastrillii* ♂
(Museum Hamburg).

Face and rostrum pitchy brown, apex of rostrum brown. Maxillary palpi pitchy brown, apical joint brown. Vertex black. The two basal joints of antennae brown (the remainder of the antennae lost). Prothorax

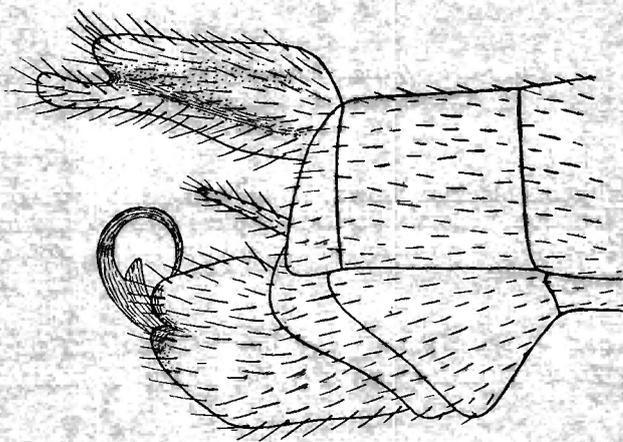


FIG. 135. — *Bittacus Mastrillii* ♂
Lateral view of anal appendages
(Museum Hamburg).

dark brown above; front part of mesothorax pitchy black with a pale brown median streak; hind part of meso- and metathorax pale brown above. Sides and venter of prothorax pale brown. Abdomen greyish brown dorsally, darker at the apex. Basal joints of the abdominal segments with narrow black hind border. Legs reddish brown; tip of femora and tibiae black; hind feet blackish brown. Appendages of male yellowish brown; upper appendage deeply cleft at tip; lower branch curved inwards and upwards; upper branch with short black bristles on the interior side. Wings with yellowish tinge, somewhat pointed at tip. Venation

brown; the cross veins in the apical part more or less brownish shaded; the first row is especially distinctly shaded. In forewing two brown spots, one at the origin of Rs and one where M separates from Cu. A few bristles one the front margin of the wings close to the base; a longer row on the hind margin near to the base.

Forewing : 23^{mm}; hindwing : 20,5^{mm}.

Coll. SELYS : not present. — Mus. Hamburg : 1 ♂, 1 ♀ Japan. — Mus. Paris : 1 ♀ (type of NAVÁS) Mount Nantai, Japan.

By the somewhat pointed apex of wings and by the pterostigma, which is rather long, the species is easily separated from the other Japanese species. The specimens described by MIYAKÉ in Journ. Coll. Agr. Imp. Univ. Tokyo, IV, p. 385, pl. 33, fig. 9; pl. 37, fig. 9 as *B. laevipes* seem to belong to this species

[*B. laevipes* Navás] (fig. 136).

Bittacus laevipes NAVÁS, Revue Russe d'Entom., p. 276 (1909).

Head rufous, blackish brown on vertex. Rostrum paler at apex. Antennae dark brown; dorsum of metathorax blackish, with a longitudinal, brown, median streak posteriorly. Abdomen brown; 2nd to 6th segments dorsally with a fine black line along their hind borders. Legs brown; tip of femora, tibiae and

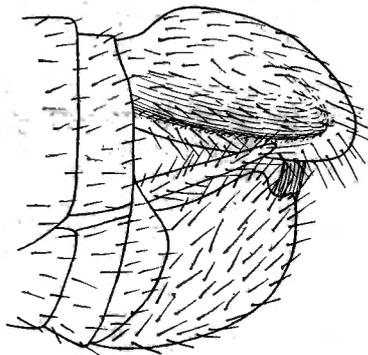


FIG. 136. — *Bittacus laevipes* ♂ type-specimen
Lateral view of anal appendages
(Museum Paris).

of intermediate and hind tarsal joints blackish brown. Wings with a strong yellowish tinge, broadened towards apex and with obtuse tip. Venation yellowish brown. Apical cross veins brownish shaded. Pterostigma yellowish, subquadrangular; two Pcv present. No apical cross vein in the costal area, and no Av.

Forewing : 20^{mm}; hindwing : 17^{mm}.

Coll. SELYS : not present. — Mus. Paris ; 1 ♂ Japan (DROUART DE LEZEY leg.) (type). — Coll. ESBEN-PETERSEN : 1 ♂, 1 ♀ Kyoto (NOHIRA leg.); 1 ♂, 1 ♀ Tokyo (NAKAHARA leg.).

B. nipponicus Navás (fig. 137, 138).

Bittacus nipponicus NAVÁS, Revue Russe d'Entom., p. 275, fig. (1909). — MIYAKÉ, Journ. Coll. Agr. Imp. Univ. Tokyo, IV, p. 383, pl. 31, fig. 3, 4; pl. 33, fig. 7 (1913).

Head brown with a darker spot enclosing the ocelli. Rostrum dark brown in its lower half. Antennae brown. Thorax and abdomen pale brown. Mesothorax dorsally castaneous. Hind border of 2nd to 6th segments narrowly blackish bordered. Legs yellowish brown; tip of

femora, tibiae and tarsal joints dark brown. Underside of posterior femora, especially in the male, with long, raised, blackish bristles. Wings with a strong yellowish tinge, broadened

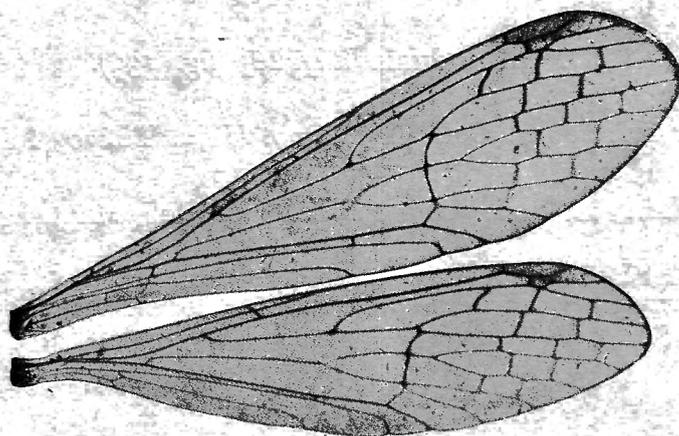


FIG. 137. — *Bittacus nipponicus* ♂
(Coll. Esben-Petersen).

towards apex and with an obtuse tip. Venation yellowish brown; the apical cross veins brownish

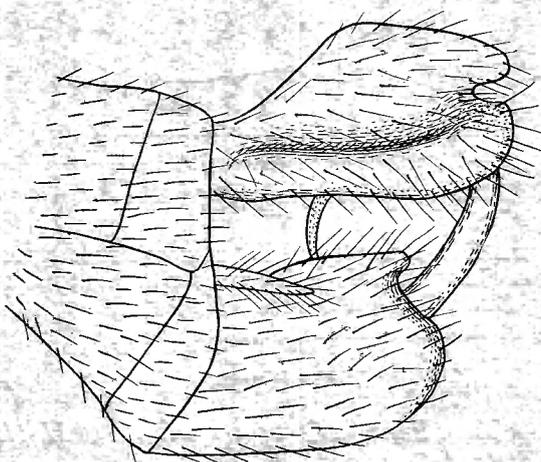


FIG. 138. — *Bittacus nipponicus* ♂
Lateral view of anal appendages
(Coll. Selys).

shaded. Pterostigma yellowish, subquadrangular; two Pcv present. No apical cross vein in the costal area; no Av present. Bristles on the margins of wings.

Forewing : 18^{mm}; hindwing : 16^{mm}.

Coll. SELYS : 1 ♂, 1 ♀ + 3 spec. (abdomen lost) [78] Japan (PREYER leg.). — Mus. Paris : 1 ♂ Nippon (LEZEY leg.) (type). — Coll. ESBEN-PETERSEN : 1 ♂, 1 ♀ Japan (ex coll. MIYAKÉ); 4 ♂, 1 ♀ Japan (ex coll. NAKAHARA)

At first sight this species has very great likeness to *B. laevipes*; but in *nipponicus* the wings are shorter, relatively broader and the tip more obtuse. The best characters to discriminate the two species are, however, the different shape of the anal appendages in the male, and the

presence or absence of the black bristles on the underside of the posterior femora. Both species have the apical margin of the wings narrowly brownish shaded.

[*B. takaoensis* Miyaké] (fig. 139).

Bittacus takaoensis MIYAKÉ, Journ. Coll. Agr. Imp. Univ. Tokyo, IV, p. 388, pl. 33, fig. 8 (1913) (Japan).

Haplodictyus polemicus NAVÁS, Bull. Mus. d'Hist. naturelle, p. 444, fig. 3 (1914).

Head and rostrum blackish brown. Antennae brown, paler towards the tip. Thorax blackish above with paler lateral margins. Abdomen dark brown above with the hind borders of the segments narrowly blackish; venter pale brown. Wings with a yellowish brown tinge; longitudinal veins brown, cross veins dark brown

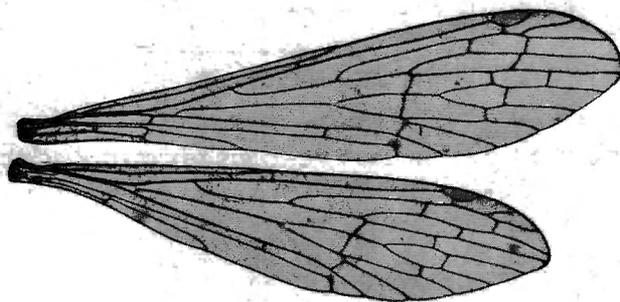


FIG. 139. — *Bittacus takaoensis* ♀
Type-specimen of *Haplodictyus polemicus*
(Museum Paris).

and narrowly bordered with brown. Near the tip of Cu^2 a brown spot. Pterostigma opaque, greyish yellow. One Pcv. Frs a little beyond Fm. Scv in the forewing nearer to Frs than to the origin of Rs, but nearest to the origin of Rs in the hindwing. Cuv a little before Fm. No Av. 1A ends a little beyond the origin of Rs. A few strong bristles on the margin of the wings at their base.

Length of forewing : 18,5^{mm}; that of hindwing : 17^{mm}.

Coll. SELYS : not present. — Mus. Paris : 1 ♀ (type-specimen of *Haplodictyus polemicus*) Kumanotaira near Karuizawa (Japan), 26.6.1911 (EDM. GALLOIS leg.).

I consider the species of NAVÁS as a synonym of that of MIYAKÉ, although I only know *B. takaoensis* from the description and the figure. The venation of the wings seems to be quite the same in both species. The only thing in which there seems to be a difference is the colour of the body. MIYAKÉ remarks that the body is totally black, but in the specimen at hand only the dorsum is blackish. I do not attach so much importance to this fact, as the colour of the body in the most species of Mecoptera is very liable to vary, especially when the degree of maturity is taken in to consideration.

[*B. marginatus* Miyaké].

Bittacus marginatus MIYAKÉ, Journ. Coll. Agr. Imp. Univ. Tokyo, p. 389, pl. 37, fig. 3; pl. 33, fig. 10; pl. 31, fig. 10a, 10b (1913) (Japan).

MIYAKÉ, *loc. cit.*

« Body testaceo-ochreous; apex of head in one specimen and ocellar triangle in the other specimen shining black; ocelli pink; eyes blackish or testaceous; antennae ochreous; rostrum in one specimen

testaceous; in one specimen prothorax except the posterior margin and in both specimens mesothorax tinged with piceous; legs fuscous yellow.

Wings pale fuscous yellow, iridescent. origin of r^1 in one specimen spotted with fuscous; the outermost cross veins bordered with fuscous; pterostigma opaque and deeply fuscous; apex of wing clouded with fuscous; veins fuscous; pterostigma jointed with the radial branch by a single cross vein (in one specimen even this single cross vein is obscure).

Abdomen ochreous in one specimen and testaceous in the other; the dorsal appendage of male very conspicuous; it is dorsally erected along the uncus, embracing the latter with its lateral lobes. Length of body: ♂ 11^{mm}, 13^{mm}. — Expanse: 33^{mm}, 35^{mm}. »

Coll. SELYS: not present.

Australian species.

[*B. microcercus* Gerst.] (fig. 140, 141).

Bittacus microcercus GERSTAECKER, Mitt. nat. Ver. Neu-Vorp. Rüg., p. 119 (1885).

Face and rostrum brown. Maxillary palpi brown. Vertex yellow; the ocelli placed in a blackish brown

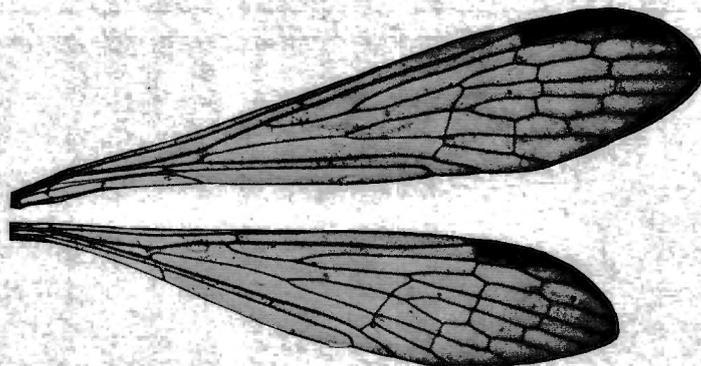


FIG. 140. — *Bittacus microcercus* ♂ type-specimen
(Museum Greifswald).

circular spot. The antennae dark brown; the two basal joints paler. Thorax pale brown. Abdomen brown.

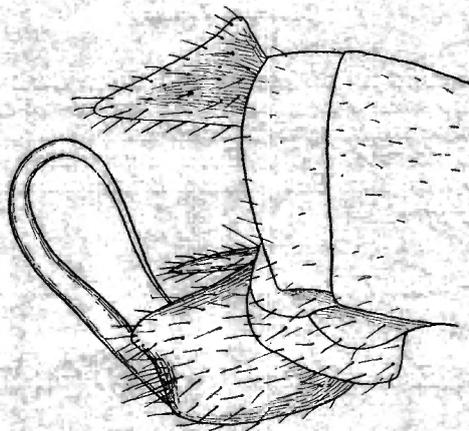


FIG. 141. — *Bittacus microcercus* ♂ type-specimen
Lateral view of anal appendage
(Museum Greifswald).

Anal appendages of male brown. Upper appendage somewhat pointed towards apex, which is bent a little

inwards. Legs brown; tip of femora and tibiae blackish. Wings with yellowish tinge, especially the pterostigma and the front border from the pterostigma to the apex. Veins brown. C blackish from the middle of the wing to apex. A distinct yellowish brown spot at the inner end of pterostigma. Between pterostigma and Rs 2 cross veins in the forewing, 1 in the hindwing.

Forewing : 18^{mm}; hindwing : 16^{mm}.

Coll. SELYS : not present. — Mus. Greifswald : 1 ♂ Peak Downs, Australia (type).

The legs of the species are very slender, and the species has nothing to do with the Australian genus *Harbobbittacus*.

African species.

[*B. africanus* Esben-Peters.] (fig. 142).

Bittacus africanus ESBEN-PETERSEN, Ent. Medd. København, p. 235 (1915).

Head, rostrum and maxillary palpi brown. A blackish spot between the ocelli. Antennae pale brown. Thorax brown with some darker spots along the lateral margins. Abdomen pale brown. Upper appendage of

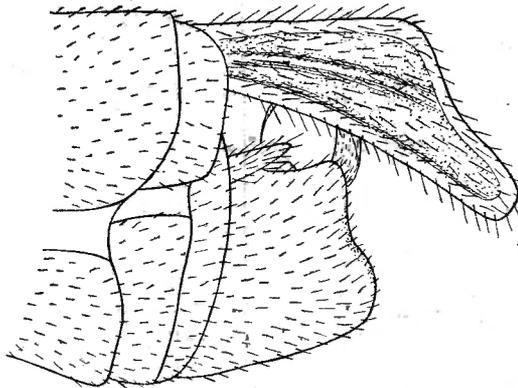


FIG. 142. — *Bittacus africanus* ♂ type-specimen
Lateral view of anal appendages
(Museum Vienna).

male yellowish. Legs yellowish brown; tip of femora and tibiae dark brown. Wings hyaline with a faint yellowish tinge; venation brown; tip somewhat acute. No apical costal cross vein. Scv in forewing nearest to origin of Rs. Frs, Fm and Cuv placed in a straight line. Av before Cuv. 1A joins the hind margin a little before Fm. At Frs a very small dark spot, and at Fm a large white spot. Pterostigma subrectangular, 3 to 3 1/2 times longer than broad, yellowish. Two Pcv present. Bristles on the margins of the wings at base.

Forewing : 19^{mm}; hindwing : 17^{mm}.

Coll. SELYS : not present. — Mus. Vienna : 1 ♂ labelled [Urwald Beni, Oct. 10, GRAUER].

B. Selysi Esben-Peters. (fig. 143) (pl. II, fig. 21).

Bittacus Selysi ESBEN-PETERSEN, Ann. South Afr. Mus., XVII, p. 187, fig. 1, 2 (1917).

Head, rostrum and maxillary palpi yellowish brown; a lateral blackish streak in the basal part of rostrum; between the ocelli a blackish spot. Antennae yellowish brown. Thorax yellowish brown; abdomen yellowish brown at base, becoming shining black at the apex. Legs

yellowish brown; femora with a rather broad blackish brown band at the tip; tibiae with a narrow dark brown band at the tip; tip of tibial joints brown. Wings long and slender with rounded apex. Membrane with shining yellowish tinge and is faintly smoky brownish shaded along the apical margin. Venation brown; cross veins in the apical part faintly shaded with yellowish brown. A rather indistinct yellowish brown spot is found at the place where M separates from Cu^1 , at the origin of Rs and at the forks of Rs and M; the yellowish brown marking at the fork of M encloses a small whitish spot. No apical cross vein in costal area.

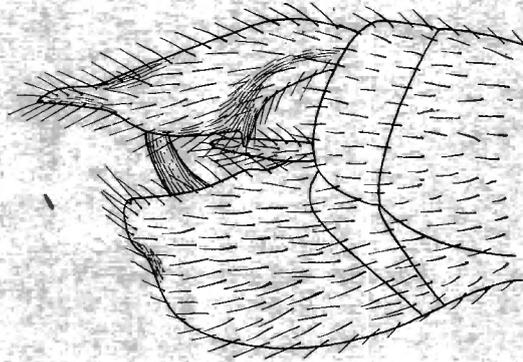


FIG. 143. — *Bittacus Selysi* ♂ type-specimen
Lateral view of anal appendages
(Coll. Selys).

Scv between origin and fork of Rs, in forewing nearest to the fork, in the hindwing nearest to the origin. Fork of Rs a little before fork of M. Cuv a little before fork of M. No Av present. 1A ends about half way between the origin and fork of Rs. Pterostigma distinctly yellowish brown; the colour extends a little beyond R; the form is subrectangular, $1\frac{1}{2}$ times longer than broad; two Pcv present. Black bristles on the margins of wings near base. In the male the branches of upper appendage are strongly pointed towards apex; on the lower margin is found a tooth; the pointed apices of the branches, seen from above, very wide apart.

Forewing : 21^{mm}; hindwing : 19^{mm}.

Coll. SELYS : 1 ♂, labelled [Port Natal] in the handwriting of H. A. HAGEN (type). — South African Museum : 1 ♂ Durban.

The species has some likeness to *B. montanus*, but the rounded apex of the wings, the shorter pterostigma and the different shape of the anal appendages are good characters in separating the two species. Also the absence of Av may be used.

[*B. montanus* Weele] (fig. 144).

Bittacus montanus WEELE, SJÖSTEDT, Kilimandjaro-Meru Expedition, Neuroptera, p. 21, fig. 4 (1909). — ESBEN-PETERSEN, Revue Zool. Afr., p. 141, fig. 6 (1913). — LESTAGE, Revue Zool. Afr., p. 113, fig. 1-3 (1917).

Head and rostrum yellowish brown; maxillary palpi brown; a black spot between the ocelli; antennae pale brown at base, darker towards tip. Thorax brown; abdomen pale brown. Legs yellowish brown; tip of femora and tibiae black; tarsi brown. Wings rather slender; their tip rounded or somewhat acute. Membrane with yellowish brown tinge; venation brown. No apical cross vein in the costal area; Scv between the origin and fork of Rs, in forewing nearest to the fork, in hindwing nearest to the origin of Rs. Fork of M a

little before fork of Rs. At the fork of M a whitish spot. Cuv opposite to fork of M. Av before Cuv. 1A ends a little before fork of M. Pterostigma yellowish brown, subrectangular, twice or thrice longer than broad;

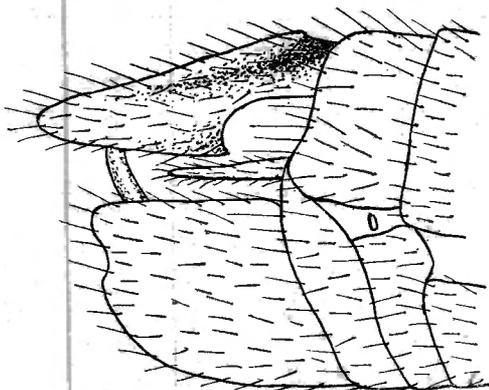


FIG. 144. — *Bittacus montanus* ♂
Lateral view of anal appendages
(Coll. Esben-Petersen).

two Pcv. Bristles on the margins of wings near base. In the female the subgenital plate provided with strong black bristles.

Forewing : 20-21^{mm}; hindwing : 18-19^{mm}.

Coll. SELYS : not present. — Mus. Congo belge : 1 ♂ collected between Beni and Lessé (Dr. MURTULA leg.). — British Mus. : 3 ♂, 2 ♀ Uganda, Lake Edward (NEAVE leg.); 1 ♂ Mt. Mlanje, Nyassaland (NEAVE leg.); 1 ♂ S. E. Katanga (NEAVE leg.); 1 ♀ Upper Kuja Valley, Brit. E. Africa (NEAVE leg.); 1 ♂ N. E. Rhodesia (NEAVE leg.); 1 ♀ Flala, Brit. E. Africa (NEAVE leg.); 1 ♀ Mt. Elgon, B. E. Africa (NEAVE leg.); 1 ♀ Salisbury, Mashonaland (MARSHALL leg.). — Coll. ESBEN-PETERSEN : 1 ♂ Nyassaland, 1 ♀ Uganda.

The figure of the male appendages, given by WEELE, is hardly quite correct; those given by LESTAGE are much better. In the series from British Museum and in the male from my own collection the dent on the underside of the upper appendages is placed nearer to the base than to the tip, but as they otherwise agree with the male specimen from Museum Congo belge and with the description given by WEELE I consider them to be the same species. The above named dent is sharply pointed and somewhat inwardly directed.

[**B. Sjöstedti** Weele].

Bittacus Sjöstedti WEELE, SJÖSTEDT, Kilimandjaro-Meru Expedition, Neuroptera, p. 22, fig. 5
(1909) (Kilimandjaro).

WEELE, *loc. cit.*

« This species, nearly of the same size and form as *montanus*, is readily distinguished from it by the dark nervation of the wings, which is fuscous, and the crossveins, which are all broadly margined with fuscous. The pterostigma is shorter and nearly semicircular, brown. The tips are angulated as in *testaceus* (Weelei ESB.-PETERS.). There is a round smoky spot at the furcation of the media in both wings. Body brown, the head black, antennae rufous, abdomen with narrow black annulations at the segments. Legs rufous brown with black annulations at femora and tibiae. Tarsi dark brown. Inner tibial spurs about 1^{mm} shorter than the outer. Hind femora thickened in both sexes. Genitalia of the ♂ characterised by the short and broad, nearly hastiform app. sup. The app. inf. are slender and short, the genitalvalve is quadrangular when seen from the under- and lateral side. The penis is of about the same form as in *montanus*, but the tip is somewhat more strongly curved.

Forewing : 20-22^{mm}; hindwing : 17-19^{mm}.

Coll. SELYS : not present.

I have not seen this species, but I am able to give some notes with regard to the venation of forewing. Wings slender, somewhat acute at tip. No apical cross vein. Scv a little before fork of Rs. Fork of M a little

before fork of Rs and with a whitish spot. Cuv a little beyond fork of M. Av much before fork of M. 1A ends a little before fork of M. Pterostigma subrectangular, two or three times longer than broad; two Pcv present. The venation of the wing of this species is quite similar to that in *B. montanus*; but the wing is more pointed at apex.

[*B. Walkeri* Esben-Peters.] (fig. 145, 146).

Bittacus Walkeri ESSEN-PETERSEN, Ent. Medd. Köbenhavn, p. 236 (1915). — Id., Annals South African Mus., p. 189, fig. 3, 4 (1917).

Head, rostrum and maxillary palpi yellowish brown; a blackish cross band between the eyes above the insertion of antennae encloses the ocelli. Antennae blackish brown; the basal joints pale brown. Thorax pale brown; mesothorax with four black spots on its front half; metathorax with two black spots on its front

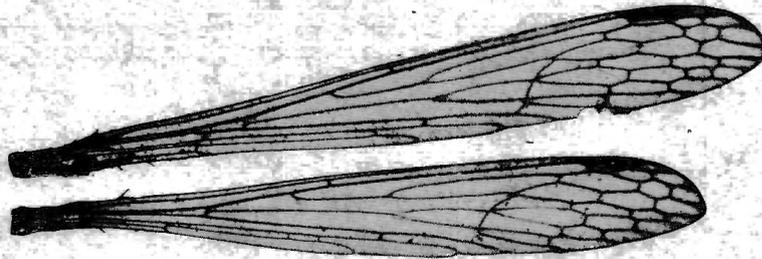


FIG. 145. — *Bittacus Walkeri* ♂ type-specimen (Museum London).

margin. Abdomen yellowish brown. Femora and tibiae yellowish brown; tip blackish; joints of fore and intermediate tarsi brown, becoming blackish brown towards the tip; joints of hind tarsi dark brown, blackish towards apex. Hind femora rather incrassate in the middle. First joint of hind tarsus as long as second and

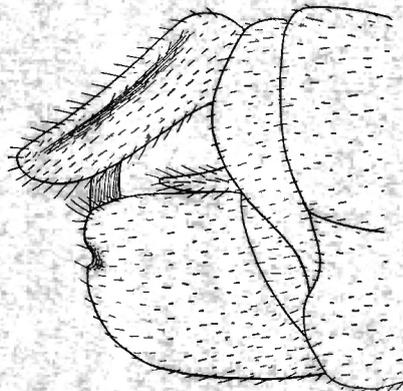


FIG. 146. — *Bittacus Walkeri* ♂ Lateral view of anal appendages (Museum London).

third joint together, which are equal; fourth joint two thirds of first; fifth joint as long as fourth; claw very small. Wings very long and slender with elliptical apex. Membrane hyaline, hardly with any yellowish tinge; venation dark brown, in the apical part of wings narrowly margined with brown. No apical cross vein in costal area. Scv between origin and fork of Rs, in forewing nearest to the fork, in hindwing nearest to origin of Rs. Fork of Rs before fork of M. Cuv opposite to fork of Rs. Av far before Cuv. 1A joins the margin a little before Cuv and fork of Rs. Pterostigma subrectangular, about 6 times longer than broad, strongly purple-brown; two Pcv present. Bristles on the margins of wings near the base.

Forewing : 24^{mm}; hindwing : 22^{mm}.

Coll. SELYS : not present. — Brit. Mus. : 1 ♂ (type-specimen) labelled [388] [Dr. SMITH S. Afr. 44-6] [One of WALKER's series so named *B. capensis*]. — South African Museum : 1 ♂ Krantzklouf, Natal (MARLEY leg.).

In the form of the wings this species has much likeness to the species of *Harpobittacus* and to *B. chlorostigma*, but the wings are relatively more slender.

***B. testaceus* Klug (fig. 147, 148).**

Bittacus testaceus KLUG, Abh. Königl. Akad. Wiss. Berl., p. 98 (1836). — WALKER, Cat., Neur. Ins. Brit. Mus., p. 466 (1853). — ENDERLEIN, Zool. Anz., p. 398 (1910). — ESBEN-PETERSEN, Rev. zool. Afr., p. 139, fig. 2 (1913). — BANKS, Trans. Ent. Soc., XXXIX, p. 234 (1913).

Head, rostrum and maxillary palpi yellowish brown; between the ocelli a black spot. Antennae brown; the two basal joints stouter and paler. Thorax brown; abdomen pale brown.

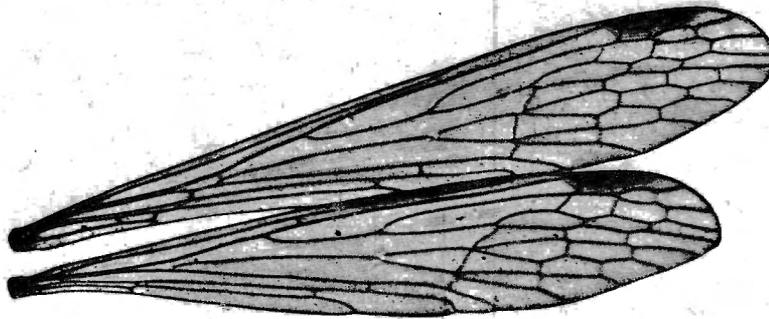


FIG. 147. — *Bittacus testaceus* ♂
(Museum Stockholm).

Legs brown; tip of tibiae and of tarsal joints a little darker. Wings long and slender with rounded tip. Membrane with faint yellowish brown tinge; venation brown. No apical cross vein

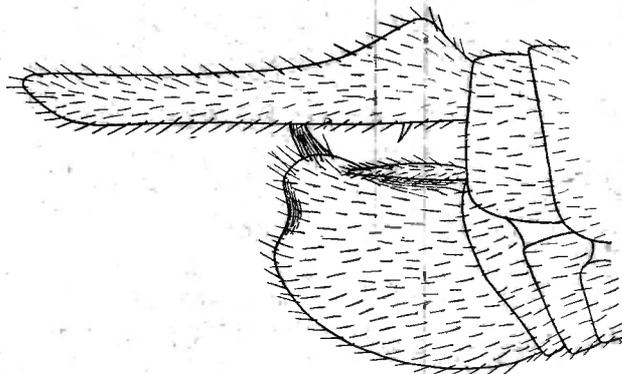


FIG. 148. — *Bittacus testaceus* ♂
Lateral view of anal appendages
(Museum Stockholm).

in costal area; Scv between origin and fork of Rs. Fork of Rs a little before fork of M. Cuv a little before fork of Rs. Av before Cuv. 1A ends opposite to Cuv or a little before. Pterostigma subquadrate, 2 1/2 times longer than broad, strongly yellowish brown; two Pcv. Bristles on the

margins of wings near base. In the male the branches of upper appendage very long and straight, almost twice as long as the claspers.

Forewing : 22-23^{mm}; hindwing : 20-21^{mm}.

Coll. SELYS : 1 spec. (abdomen lost) (Natal). — Brit. Mus. : 1 ♂ Estcourt, Natal (WROUGHTON leg.); 1 ♂ Knysna, S. Afrika. — Mus. Stockholm : 1 ♂, 1 ♀ Caffraria (WAHLBERG leg.). — South Afr. Mus. : 2 ♂ Barbenton, Transvaal (EDWARDS leg.). — Durban Mus. : 1 ♂ Amanlimtoti. — Coll. ESBEN-PETERSEN : 1 ♂ Caffraria.

In the specimen from Estcourt, Natal (Brit. Mus.) Av is not present.

[**B. Schoutedeni** Esben-Peters.] (Fig. 149).

Bittacus Schoutedeni ESBEN-PETERSEN, Rev. zool. Afr., p. 143, fig. 9, 10 (1913).

Bittacus montanus LESTAGE, Revue zool. Afr., p. 113 (1917).

Head and rostrum brown; the latter darker towards the tip; maxillary palpi brown. Between the ocelli a black spot. Antennae brown, blackish towards tip. Thorax brown; abdomen pale brown. Legs pale brown; tip of femora, tibiae and of tarsal joints blackish brown. Wings slender, tip elliptical. Membrane hyaline with

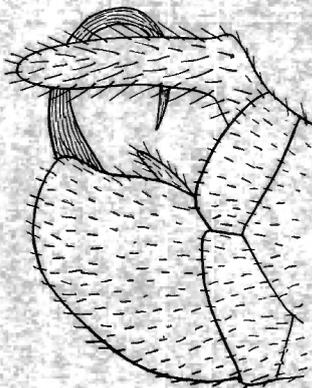


Fig. 149. — *Bittacus Schoutedeni* ♂ type-specimen
Lateral view of anal appendages
(Museum Congo belge).

faint yellowish tinge. Venation brown. No apical cross vein in costal area. Scv half way between origin and fork of Rs. Fork of M a little before fork of Rs and with a whitish spot. Cuv before fork of M. Av before Cuv; 1A ends a little before Cuv. Pterostigma subrectangular, pale greyish brown; two Pcv. Bristles on the margins of wings near base. Branches of upper appendage somewhat pointed at the apex. Claspers rounded at the apex, not incised.

Forewing : 17-19^{mm}; hindwing : 15,5-17^{mm}.

Coll. SELYS : not present. — Mus. Congo belge : 1 ♂, 1 ♀ 345 km from Kindu (Dr. Russo leg.) (types). — Coll. ESBEN-PETERSEN : 1 ♂ (immature) Mufunga (Dr. BEQUAERT leg.).

In the shape and venation of wings this species is nearly allied to *B. testaceus* KLUG; but the more pointed apex of the wings and the different anal appendages of the male separate it from the latter. In the centre of the basal part on the innerside of the upper appendages is found a strong inwardly directed dent, but it is not visible by lateral view.

B. capensis Thunb. (fig 150, 151).

Panorpa capensis THUNBERG, Nov. Sp. Ins. Diss., III, p. 67, fig. 78 (1784).

Bittacus capensis KLUG, Abh. Kön. Akad. Wiss. Berl., p. 97 (1836). — WALKER, Cat. Neur. Ins. Brit. Mus., p. 465 (1853). — ESBEN-PETERSEN, Revue zool. Afr., p. 138 (1913). — BANKS, Trans. Am. Ent. Soc., XXXIX, p. 234 (1913).

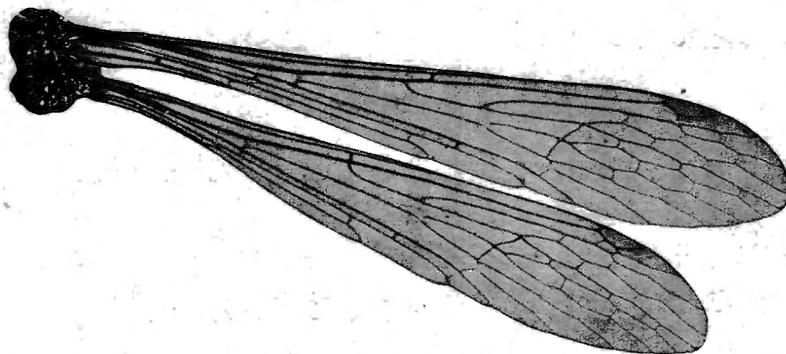


FIG. 150. — *Bittacus capensis* ♂
(Museum Vienna).

Head and rostrum brown; the apical half of rostrum and a broad streak between the eyes black; the latter encloses the ocelli and the insertion of antennae. Maxillary palpi brown; tip

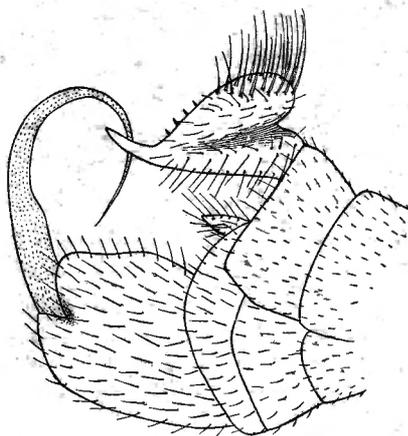


FIG. 151. — *Bittacus capensis* ♂
Lateral view of anal appendages
(Museum Vienna).

of apical joint blackish. Antennae dark brown. Thorax brown with two lateral black streaks. Abdomen brown. Legs brown; tip of femora, tibiae and 1st tarsal joint blackish; the remainder of tarsal joints blackish. Wings long and slender with elliptical tip and strong yellowish brown tinge. Venation dark brown. No apical cross vein in costal area. Scv a little beyond origin of Rs (in hindwing nearer to the origin of Rs). Fork of Rs opposite to fork of M. Cuv a little before fork of M. Av near to the tip of 1A, which joins the margin a little before Cuv. Pterostigma subtriangular, twice as long as broad, yellowish brown. As a rule two Pcv. A few bristles on the margins of the wings near base. In the male the branches of upper appendage broad at base and narrowed towards the tip, which is strongly pointed.

Forewing : 18^{mm}; hindwing : 16^{mm}.

Coll. SELYS : 1 ♂ Cape. — Mus. Vienna : 1 ♂ Algoa Bay (Dr. BRAUNS leg.). — Mus. Hamburg : 1 ♂ Algoa Bay (Dr. BRAUNS leg.).

[**B. Pobeguini** Navás] (fig. 152, 153).

Haplodictyus Pobeguini NAVÁS, Mem. Real Acad. Cienc. Art. Barcelona, p. 414, fig. 16 (1908).

Bittacus Pobeguini ESBEN-PETERSEN, Revue zool. Afr., p. 140, fig. 4, 5 (1913).

Bittacus (Haplodictyus) moschinus NAVÁS, Afrique orientale. Planipennia et Mecoptera, p. 49, fig. 25 (1914) (Kilimandjaro).

Head and rostrum brown; maxillary palpi dark brown. A black spot between the ocelli. Antennae pitchy brown; the two basal joints pale brown. Thorax brown; abdomen pale brown. Fore femora pitchy black in the apical and brown in the basal part. Intermediate and hind femora and all the tibiae brown with

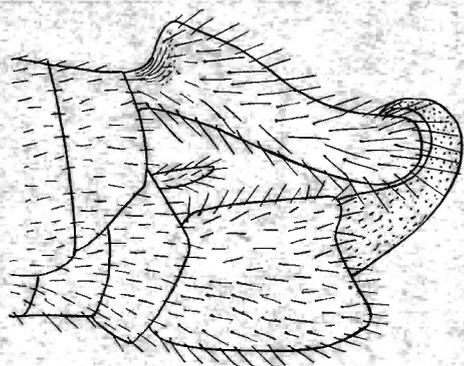


FIG. 152. — *Bittacus Pobeguini* ♂
Lateral view of anal appendages
(Museum London).

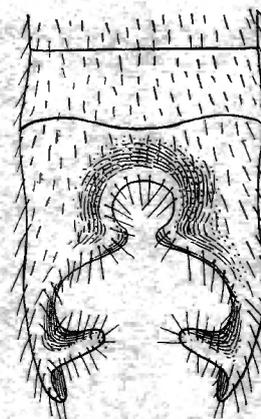


FIG. 153. — *Bittacus Pobeguini* ♂
Dorsal view of upper appendages
(Museum London).

a rather broad black band at tip. Wings with acute tip and smoky tinge, especially along the front margin and the apex. Venation dark smoky brown; the apical cross veins beyond the first row very indistinct. No apical cross vein in costal area. Scv nearer to the origin than to fork of Rs. Fork of Rs a little before fork of M. Cuv as a rule opposite to fork of M. No Av. 1A ends opposite to fork of M. No bristles on the margins of wings. Pterostigma subtriangular, 3 to 4 times longer than broad, smoky brown; one Pcv.

Forewing : 16-17^{mm}; hindwing 15-16^{mm}.

In « Revue Zool. Afr., p. 140, fig. 4 », I have given a sketch of the anal appendages of the male from a specimen in Mus. Congo belge. The anal parts of the specimen were somewhat shrivelled, and the sketch of the branches of upper appendage is on that account incorrect.

The species has been used by NAVÁS as type-species for his genus *Haplodictyus*, mainly based upon the presence of subtriangular pterostigma. It is not correct to base a new genus upon such varying character which may be a rather good specific « first sight » character but not of generic value.

[**B. Peringueyi** Esben-Peters.] (fig. 154, 155).

Bittacus Peringueyi ESBEN-PETERSEN, Revue zool. Afr., p. 144, fig. 11 (1913).

Head, rostrum and maxillary palpi yellowish brown. A black spot between the ocelli. Antennae brown, basal joints yellowish brown. Thorax brown; abdomen yellowish brown at base and becoming darker towards apex. Legs yellowish brown, tip of femora and tibiae blackish. Hind femora rather stout. Wings broad and

strongly rounded at tip, hyaline with a faint yellowish tinge. Venation yellowish brown, distinct. No apical cross vein in the costal area. Scv nearer to the origin than to the fork of Rs. Fork of Rs opposite to fork of

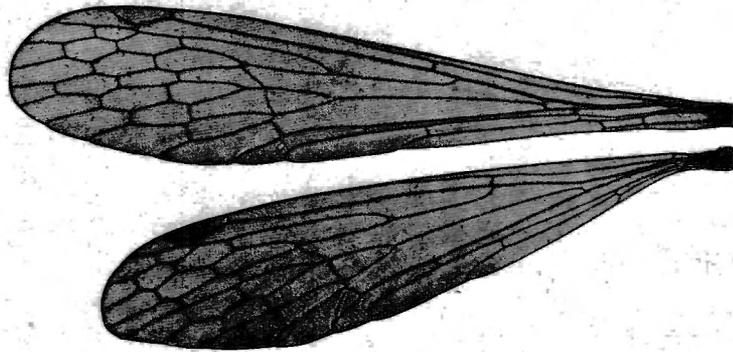


FIG. 154. — *Bittacus Peringueyi* ♂ type-specimen
(Museum South Afr., Capetown).

M. Cuv before fork of M. Av much before Cuv. 1A joins the hind margin before Cuv and fork of M. Pterostigma yellowish, subtriangular, twice to thrice longer than broad; one Pcv (sometimes there may be two).

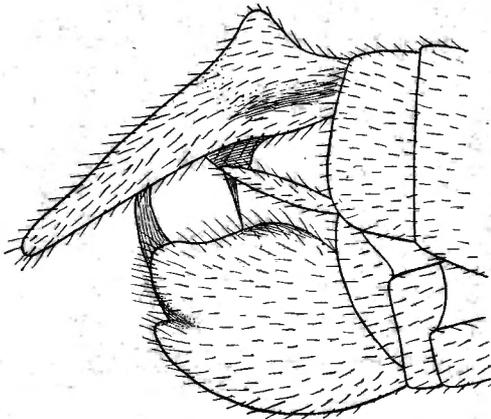


FIG. 155. — *Bittacus Peringueyi* ♂ type-specimen
Lateral view of anal appendages
(Museum South Afr., Capetown).

Bristles on the margin of the wings near base. In the male the branches of upper appendage narrowed towards base, with almost straight margins; their lower margin with a large, blunt and downwardly directed dent on the inner side.

Forewing 21-24^{mm}; hindwing : 19-22^{mm}.

Coll. SELYS : not present. — Brit. Mus. : 1 ♂, 1 ♀ Estcourt, Natal (WROUGHTON leg.); 3 ♀ Natal (CREGOE leg.). — South Afr. Mus. : 1 ♂ kg. Wm's F. Dist. St. Nathew's. Apr. 1894 (LIGHTFOOT leg.) (type).

[**B. Chevalieri** Navás] (fig. 156).

Haplodictyus Chevalieri NAVÁS, Mem. Real Acad. Cienc. Art. Barcelona, p. 414, fig. 17 (1908).
Bittacus Chevalieri ESBEN-PETERSEN, Revue zool. Afr., p. 139, fig. 3 (1913).

Head, rostrum and maxillary palpi yellowish brown; rostrum a little darker towards apex. Between the eyes an oblong, transversely placed depression, brimmed with a row of bristles. A black spot between the ocelli. Antennae pale brown at the base, dark brown towards apex. Thorax pale brown; abdomen pale greyish brown. Legs yellowish brown; tip of femora and tibiae blackish. Wings pale greyish brown; smoky

brown at the apex; longitudinal veins darker and very distinct; the cross veins paler. No apical cross veins in the costal area. Scv nearly opposite to fork of Rs; in the hindwing before the fork. In the forewing the fork of Rs opposite to fork of M, in the hindwing fork of Rs a little before fork of M. Cuv opposite to fork of M.



FIG. 156. — *Bittacus Chevalieri* ♀
(Museum Vienna).

No Av. 1A joins the hind margin a little before fork of M. Pterostigma subtriangular or subrectangular, twice as long as broad, smoky brown; one or two Pcv. Bristles on the margin of wings near base.

Forewing : 16^{mm}; hindwing : 14^{mm}.

Coll. SELYS : not present. — Mus. Paris : 1 ♀ Obok, named by NAVÁS. — Mus. Vienna : 1 ♀ Afrika.

It is the smallest species of *Bittacus* from Africa. The specimen from Mus. Paris is one of the types of NAVÁS; the pterostigma in its right forewing is connected with R² by two cross veins. In the specimen from Mus. Vienna there are two Pcv in all wings except left hindwing.

[*B. fumosus* Esben-Peters.] (fig. 157).

Bittacus fumosus ESBEN-PETERSEN, Revue zool. Afr., p. 145, fig. 12 (1913).

Head brown; rostrum darker towards tip; maxillary palpi dark brown; a blackish spot between the ocelli. Antennae brown; the two basal joints paler. Thorax and abdomen brown. Legs brown, tip of femora, tibiae and of tarsal joints blackish. Hind femora rather slender. Wings rather broad in their apical part with

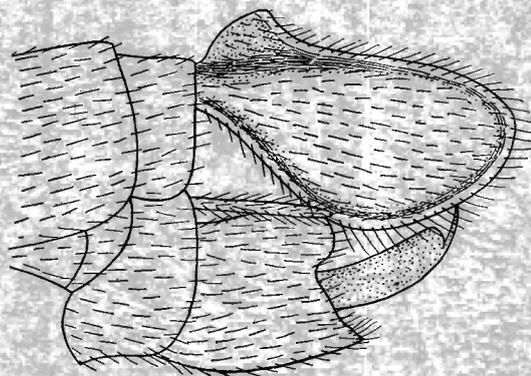


FIG. 157. — *Bittacus fumosus* ♂ type-specimen
Lateral view of anal appendages
(Museum London).

elliptical apex. Membrane hyaline yellowish with sooty brown tinge and with a slightly sooty brown shadow along the apical margin, especially in ♀. Venation blackish brown, very distinct, especially at tip. No apical cross vein in costal area. Scv in forewing beyond the fork of Rs, in the hindwing before. Fork of Rs opposite to fork of M in forewing, but a little before in hindwing. Cuv a little beyond fork of M. No Av. 1A ends in

forewing somewhat before Cuv. Pterostigma subrectangular, thrice longer than broad, sooty brown; two Pcv. Bristles on the hind margin of wings near base.

Forewing : 20-24^{mm}; hindwing : 17-21^{mm}.

Coll. SELYS : not present. — Mus. Stockholm : 1 ♀ Brit. E. Africa (LINDBLOM leg.) (type). — Brit. Mus. : 1 ♂ Kitui, Brit. E. Africa (SCHOKFIELD leg.) (type).

At first sight this species has much likeness to *B. Weelei* as to the shape of the wings and the dark venation, but its shorter pterostigma, darker membrane and the quite different shape of anal appendages in the male easily separate the two species. In the male-specimen the apex of the wings and the pterostigma are not so strongly coloured as in the female-specimen, which seems to be more aged than the male.

B. nebulosus Klug (fig. 158, 159).

Bittacus nebulosus KLUG, Abh. Königl. Akad. Wiss. Berl., p. 99 (1836). — WALKER, Cat. Neur. Ins. Brit. Mus., p. 467 (1853). — ESBEN-PETERSEN, Revue zool. Afr., p. 138, fig. 1 (1913). — BANKS, Trans. Ann. Ent. Soc., XXXIX, p. 233 (1913).

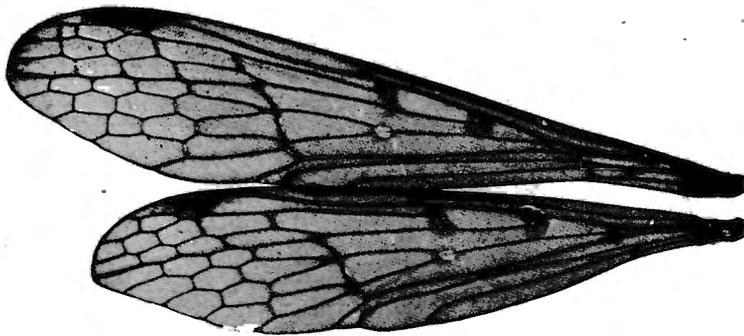


FIG. 158. — *Bittacus nebulosus* ♂
(Coll. Esben-Petersen).

Head, rostrum and maxillary palpi yellowish brown. A black spot between the ocelli. Antennae yellowish brown. Thorax brown; abdominal segments brown with narrow, dark hind

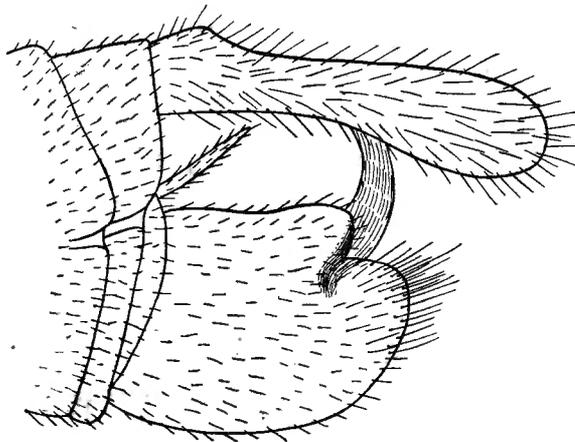


FIG. 159. — *Bittacus nebulosus* ♂
Lateral view of anal appendages
(Museum Stockholm).

border; terminal segments dark. Legs yellowish brown; tip of femora and tibiae black. Wings

rather broad, their tip rounded. Membrane with strong yellowish tinge; venation brown; cross veins in the apical part pale brownish shaded; at the origin and at the fork of Rs a pale brown spot; at the fork of M a small whitish spot. An apical cross vein in the costal area a little beyond fork of Rs, Scv far beyond. Fork of Rs opposite to fork of M; in the hindwing perhaps a little before. Cuv before fork of M. No Av. 1A ends beyond fork of M. Pterostigma strongly yellowish, subrectangular, four times longer than broad; two Pcv. Long bristles on the margin of the wings near base.

Forewing : 26-28^{mm}; hindwing : 24-25^{mm}.

Coll. SELYS : 1 ♂ Natal; 1 spec. (abdomen lost). — Mus. Stockholm : 2 ♂, 1 spec. without abdomen, Caffraria (WAHLBERG leg.). — South Afr. Mus. : 1 ♂, 1 ♀ Barberton, Transvaal (EDWARDS leg.). — Durban Mus. : 1 ♂, 1 ♀ Umbilo. — Coll. ESBEN-PETERSEN : 1 ♂ South Africa.

[**B. Weelei** ESBEN-PETERSEN] (fig. 160).

Bittacus Weelei ESBEN-PETERSEN, Revue zool. Afr., p. 142, fig. 7, 8 (1913). — LESTAGE, Revue zool. Afr., p. 112 (1917).

Bittacus testaceus WEELE, SJÖSTEDT, Kilimandjaro-Meru Expedition, Neuroptera, p. 21, fig. 3 (1909).

Bittacus negus NAVÁS, Mem. Acad. Cienc. Art. Barcelona, p. 397 (1915).

Head brown; between the ocelli a black spot. Rostrum brown at base, black at tip. Maxillary palpi brown. Antennae black; two basal joints brown. Thorax brown; abdomen yellowish brown, brown towards apex. Legs brown; tip of femora and tibiae darker. 1st joint of hind tarsus as long as 2nd and 3rd together,

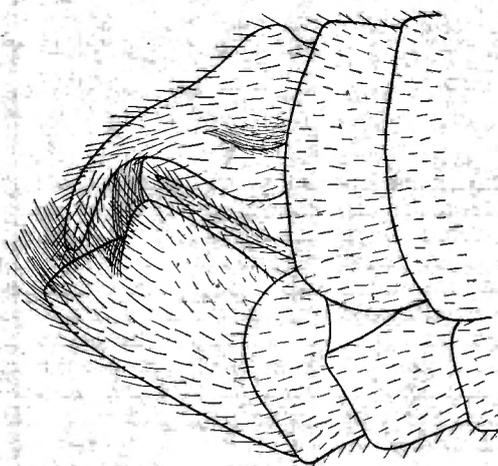


FIG. 160. — *Bittacus Weelei* ♂ type-specimen
Lateral view of anal appendages
(Museum Stockholm).

and hardly one fourth longer than 4th. Wings long and rather slender, elliptical at tip. Membrane pale smoky brown; venation dark brown. No apical cross vein in costal area. Scv near the tip of Sc, about half way between origin and fork of Rs. Fork of Rs opposite to that of M. Cuv opposite to fork of M. No Av. Pterostigma rectangular, nearly 8 times longer than broad, yellowish brown. Bristles on the margins of the wings near base.

Forewing : 24-30^{mm}; hindwing : 20-26^{mm}.

Coll. SELYS : not present. — Mus. Stockholm : 1 ♂, 1 ♀ Kilimandjaro (SJÖSTEDT leg.) (types); 1 ♀ Congo (DANNFELT leg.). — Mus. Congo belge : 1 ♂, 1 ♀ Katanga (BUTTGEBACH leg.). — Brit. Mus. :

2 ♂, 1 ♀ Uganda (NEAVE leg.); 1 ♀ Nyassaland (NEAVE leg.). — Mus. Vienna : 1 ♀ Tanganika Lake (GRAUER leg.). — Coll. ESSEN-PETERSEN : 1 ♀ Congo belge.

It is a good and distinct species, easily recognized by its dark wings, long and narrow pterostigma and the anal appendages of the male.

[**B. oreinus** Navás].

Bittacus oreinus NAVÁS, Mem. Pontif. Accad. Rom., p. 89, fig. 6 (1914). Aethiopia merid.

NAVÁS, *loc. cit.* :

« Similis *montano* WEELE. Testaceus. Caput macula nigra inter ocellos; prostomate stria longitudinali laterali ad apicem confluente, nigra; palpis maxillaribus fuscis, labialibus ferrugineis. Thorax superne testaceo-ferrugineus. Prothorax margine antico rotundato, fusco. Abdomen testaceum, apicem versus obscurus. Pedes gracilis, apice femorum, tibiaram et articularum tarsorum fusco. Alae (fig. 6) membrana leviter fulvo tincta, ad stigma et pone stigma obscurius; reticulatione ferruginea; thyridio pallido, lato; pupillis solum sub lente visibilibus; stigmatate duabus venulis cum ramo anteriore sectoris radii conjuncto; vena axillari prima (fig. 6, ax. 1) ad marginem ante vel ad primam furcam sectoris radii et thyridium veniente, apice fere ad $\frac{3}{4}$ inter apicem axillaris secundae et postcubiti; area postcubitali 3 venulis, 2 ante medium, tertia prope apicem venae axillaris; vena axillari secunda una venula cum praecedente conjuncta, ad apicem.

Long. corp. : ♀ 16,5^{mm}; al. ant. : 20,5^{mm}; al. post. : 19,3^{mm}. »

Coll. SELYS : not present.

I do not know this species, which seems to be closely allied to or probably the same as *B. montanus*. By the kindness of Mr. LESTAGE I have had the pleasure of seeing a photo of the right forewing of the type specimen (Mus. Paris), and the only difference I can find between the two species as to the venation is the absence of the basal (second) cross vein between 1A and 2A in the wing of *B. oreinus*.

[**B. Alluaudi** Navás].

Bittacus Alluaudi NAVÁS, Voyage de ALLUAUD et JEANNEL en Afr. Orient., *Planipennia* et *Mecoptera*, p. 45, fig. 20 (1914). (Afrique Orientale Anglaise et Allemande.)

NAVÁS, *loc. cit.* :

« Testaceus. Caput subtotum fuscum, ocellis prominulis; prosostomate leviter arcuato, basi testaceo; occipite testaceo; oculis fuscis; antennis fuscis. Thorax testaceus, superne stria longitudinali laterali fusca ad mesonotum. Abdomen testaceum, primis segmentis apice fusco marginatis; cercis ♂ grandibus, subquadrangularibus, oblongis, flavidis, apice fusco marginatis; copulatore elongato, exerto, flavido; lamina subgenitali a latere visa ad apicem externe, superne ad basim emarginata, inferne convexa. Pedes testacei, femoribus anticis in tertio basilari testaceis; in reliquo fuscis; ceteris et tibiis apice fuscis; calcaribus testaceis, tarsis ferrugineis, posterioribus apicem versus fuscis. Alae membrana fulvo tincta, obscurius ad apicem, seu ab apice ad stigma inclusive; reticulatione ferruginea; stigmatate oblongo, pentagonali, postice duabus venulis cum ramo sectoris radii conjuncto; thyridio pallido, anguloso; pupillis pallidis, solum sub lente visibilibus; vena axillari prima ad marginem veniente ante thyridium et bifurcationem sectoris, fere ad $\frac{3}{5}$ inter apicem axillaris secundae et postcubiti.

Long. corp. : ♂ 18^{mm}; long. al. ant. : 21,5^{mm}; long. al. post. : 19^{mm}. »

Coll. SELYS : not present.

[**B. Jeanneli** Navás].

Bittacus Jeanneli NAVÁS, Voyage de ALLUAUD et JEANNEL en Afr. Orient., *Planipennia* et *Mecoptera*, p. 46, fig. 21 (1914) (Afr. Orientale Anglaise).

NAVÁS, *loc. cit.* :

« Testaceus. Similis *Alluaudi* NAV., minor, pallidior. Caput vertice fornicato, macula fusca inter ocellos; prosostomate superne ferrugineo, nitido; palpis maxillaribus ferrugineis; oculis fuscis; antennis testaceis, apicem versus ferrugineis. Thorax testaceus, haud fusco striatus. Abdomen testaceo-flavum, primis

segmentis superne linea angusta fusca in margine postico et stria laterali longitudinali ferruginea parum definita; cercis superioribus ♂ laminaribus, quadrangularibus, flavidis, margine superiore recto, inferiore leviter convexo, apice oblique truncato, fusco leviter marginato; lamina subgenitali convexa, apice acuta, a latere visa postice emarginata, margine superiore subrecto; copulatore exerto, cylindrico. Pedes graciles, testacei, apice femorum et tiliarum fusco; tarsi ferrugineis, articulo primo posteriorum ceteris simul sumptis longitudine aequali aut eis longiore. Alae membrana leviter fulvo tincta, ad marginem apicalem et externum distinctius reticulatione; fuscescente; thyridio albo, elliptico; pupillis parum sensibilibus; area postcubitali una venula ad medium; vena axillari prima ad marginem veniente ante furcam sectoris radii et thyridium, fere ad $\frac{3}{5}$ inter apicem axillaris secundae et postcubiti.

Long. corp. : ♂ 14^{mm}; long. al. ant. : 16,5^{mm}; long. al. post. : 14^{mm}. »

Coll. SELYS : not present.

I do not know these two East African species; but it seems to me that they may be good and distinct species. The two figures, showing the anal appendages of the males in lateral view, are very remarkable. Between the branches of the upper appendage is seen a long and erected prolongation. I do not understand what it is, and NAVÁS does not give any description of it. I have not seen anything like that in the Bittacidae.

[**B. aequalis** Navás].

Bittacus aequalis NAVÁS, Voyage de ALLUAUD et JEANNEL en Afr. Orient., *Planipennia et Mecoptera*, p. 47, fig. 22a, 22b (1914) (Afr. Orient. Anglaise).

NAVÁS. *loc. cit.* :

« Testaceus. Caput macula inter ocellos et oculis fuscis; palpis maxillaribus fortibus, prosostoma excedentibus; prosostomate mediocri, vix arcuato, attenuato. Abdomen ♂ cercis cylindrico-conicis, dente infero prope basim longo; lamina subgenitali grandi, convexa. Alae membrana leviter fulvo tincta, ad apicem, maxime ad marginem, leviter fusco suffusa; reticulatione fusca, venulis plerumque pallidioribus; stigmati pentagonali, 2 venulis cum ramo sectoris radii connexo, fuscescente; thyridio pallido, mediocri; pupillis fuscis, distincte visibilibus; vena axillari prima longe a thyridio ad marginem veniente, in ala anteriore propius ad apicem axillaris secundae quam ad apicem postcubiti, in ala posteriore vice versa, paulo propius ad apicem postcubiti quam axillaris secundae; 2 venulis postcubitalibus in ala anteriore, ad medium et prope basim venae axillaris.

Long. corp. : ♂ 17^{mm}; long. al. ant. : 19^{mm}; long. al. post. : 17^{mm}. »

Coll. SELYS : not present.

[**B. discors** Navás].

Bittacus discors NAVÁS, Voyage de ALLUAUD et JEANNEL en Afr. Orient., *Planipennia et Mecoptera*, p. 47, fig. 23a, 23b (1914) (Afr. Orient. Anglaise).

NAVÁS *loc. cit.* :

« Testaceus. Caput oculis fuscis; prosostomate ad apicem et palpis maxillaribus fuscis; antennis fuscis; vertice inter ocellos et ocellis fuscis. Thorax superne testaceo-ferrugineus. Abdomen apicem versus superne fuscescens; cercis ♂ elongatis, angustis, leviter deorsum arcuatis, a basi ad apicem leviter dilatatis, in tertio basilari inferne dente obtuso, apice truncatis; lamina subgenitali dilatata convexa, apice truncata. Alae membrana fulvo tincta, ad apicem obscurius, maxime juxta venas; stigmati subquadrangulati, oblongo, parum fuscato, duplici venula postice cum ramo sectoris radii conjuncto; area postcubitali nulla venula ad apicem venae axillaris primae; reticulatione fusca. Ala anterior vena axillari prima paulo ante primam bifurcationem sectoris radii et thyridium ad marginem veniente, inter apicem axillaris secundae et postcubiti. Ala posterior vena axillari prima paulo post primam bifurcationem sectoris et thyridium ad marginem veniente, duplo distante ab apice axillaris secundae quam ab apice postcubiti.

Long. corp. : ♂ 22^{mm}; ♀ 20,5^{mm}; long. al. ant. : ♂ 25^{mm}, ♀ 24^{mm}; long. al. post. : ♂ 22^{mm}, ♀ 21,5^{mm}. »

Coll. SELYS : not present.

[*B. lineatus* Navás].

Bittacus lineatus (♀) NAVAS, Voyage de ALLUAUD et JEANNEL en Afr. Orient., *Planipennia* et *Mecoptera*, p. 48, fig. 24 (1914) (Afr. Orient. Anglaise).

NAVÁS, *loc. cit.* :

« Ferrugineus. Caput oculis palpisque fuscis, prosostomate leviter arcuato, tenui, acuto; antennis gracilibus, testaceis. Pedes testacei, apice femorum, tibiarum et articularum tarsorum fusco; calcaribus testaceis, anterioribus medium primi articuli tarsorum haud attingentibus, posterioribus longe superantibus; tarsis articulo primo ceteris simul sumptis aequilongo. Alae post medium ampliatae, apice parabolicae; membrana leviter fulvo tincta; stigmati, quadrangulari, duabus venulis cum sectore radii conjuncto, ferrugineo; thyridio pallido, fusco annulato; reticulatione forti, fusca, venulis multis angustissime fusco limbatis, distinctius ad axillas sectoris radii et primae ejus furcae, ad ortum procubiti; vena axillari prima ante thyridium et primam bifurcationem sectoris radii ad marginem veniente, fere ad $\frac{3}{4}$ inter apicem venae axillaris secundae et postcubiti; duabus venulis cum postcubito connexa, externa ad apicem, interna in tertis basilari.

Long. corp. : 15,5^{mm}; long. al. ant. : 23,5^{mm}; long. al. post. : 21^{mm}. »

Coll. SELYS : not present.

I do not know *aequalis*, *discors* and *lineatus*, but it seems to me that *discors* may be a distinct species.

American species.

[*B. chlorostigma* Mac Lachl.] (fig. 161, 162).

Bittacus chlorostigma MAC LACHLAN, Ent. Monthl. Mag., p. 36, fig. (1881). — ID., Ent. Nachr., XIX, p. 317 (1893). — HINE, Journ. Col. Hort. Soc., XVIII, p. 110, pl. I, fig. 8; pl. II, fig. 3, 4 (1898). — ID., Bull. Sc. Lab. Den. Univ., p. 258, pl. LXI, fig. 37 (1901). — BANKS, Cat. Neur. Ins. U. S., p. 34 (1907).

Head dark reddish brown above; a black spot between the ocelli; front and rostrum blackish. Maxillary palpi reddish brown and blackish haired. Antennae blackish; the two basal joints reddish brown. Thorax

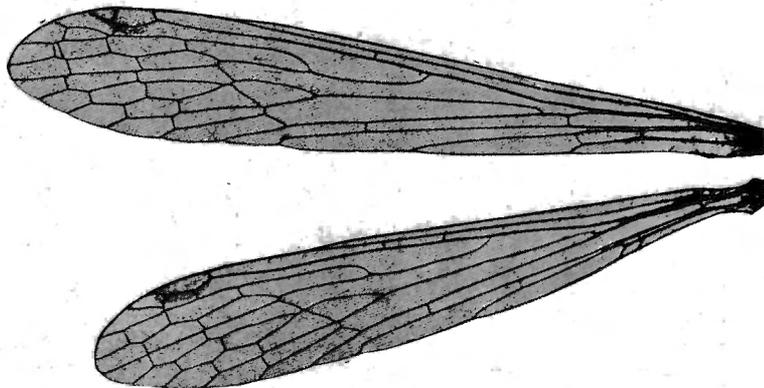


FIG. 161. — *Bittacus chlorostigma* ♂
(Coll. Banks).

pitchy brown, darker at the wing-roots. Abdomen pitchy brown, darker towards apex. Thorax and underside of abdomen basely with scattered spinose hairs. Front margin of prothorax with three inconspicuous ones on each side. Legs dark reddish brown. Apex of femora, tibiae and of tarsal joints with a blackish ring. Basal joint of hind tarsus the longest, nearly as long as 2nd and 3rd joint together, which are equal in length; 4th joint a little longer than 3rd, but much shorter than 1st. Hind femora thick and stout. Upper appendage

twice as long as the claspers, exteriorly with thickened edges and with a slight keel from base nearly to apex parallel with the upper margin. Interiorly the appendage is concave, the edges equally thickened; a broad triangular inner tooth above the most dilated portion of the lower edge. Penis and upper appendage reddish brown, the latter darker at apex. Cerci and claspers brownish testaceous. Wings long and very

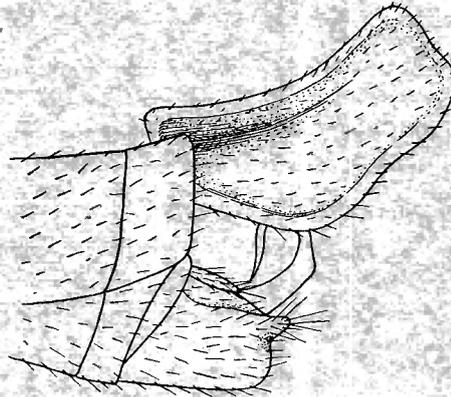


FIG. 162 — *Bittacus chlorostigma* ♂
Lateral view of anal appendages
(Coll. Banks).

narrow, scarcely dilated, hyaline. Pterostigma conspicuous, greenish-yellow. Venation black (except that part of R which touches the pterostigma). Costal area comparatively broad and very long, a basal cross vein present. 1A joins the hind much before fork of M. No Av. 2A half the length of 1A. The hind margin of the forewing almost straight.

Forewing : 27^{mm}; hindwing : 24^{mm}.

Coll. SELYS : not present. — Coll. BANKS : 1 ♂ California.

[**B. Banksi** Esben-Peters.] (fig. 126, 163).

Bittacus Banksi ESSEN-PETERSEN, Ent. Medd. Köbenhavn, p. 238 (1915).

Head yellowish brown; rostrum yellowish brown with darker lateral margins; maxillary palpi blackish brown. A black spot between the ocelli. Antennae brown. Thorax and abdomen brown. Legs yellowish

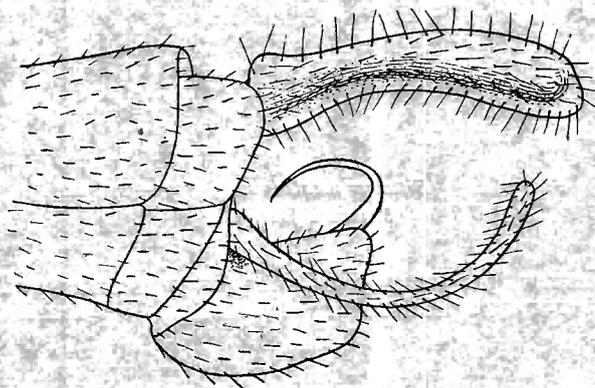


FIG. 163. — *Bittacus Banksi* ♂ type specimen
Lateral view of anal appendages
(Coll. Esben-Petersen).

brown; hind tarsi dark brown; tip of femora, tibiae and of tarsal joints blackish brown. Wings gradually broadened towards apex, which is rounded. Membrane yellowish brown; venation brown to dark brown.

Pterostigma twice longer than broad; two Pcv. Sc joins the costa beyond fork of Rs. No costal cross veins. Scv between origin and fork of Rs. Fork of Rs a little before fork of M. Cuv opposite to fork of M. Av before Cuv. 1A ends opposite to or a little before fork of Rs. Bristles on the margins of wings near base. In the male the branches of upper appendage very long; their ventral margins somewhat emarginate. Setae almost as long as upper appendage, slender, cylindrical, curved downwards in their middle.

Forewing : 23^{mm}; hindwing : 21^{mm}.

Coll. SELYS : not present. — Brit. Mus. : 2 ♂, 3 ♀ Guerrero, Mexico (SMITH leg.); 3 ♂ S. Geronimo, Guatemala (CHAMPION leg.); 1 spec. San Blas, Jalisco (SCHUMANN leg.); 1 ♀ Temax, N. Yucatan (GAUMER leg.). — Mus. Hamburg : 1 ♂, 1 ♀, 1 spec. (abdomen lost) La Union, Salvador (R. PAESSLER leg.). — Coll. ESBEN-PETERSEN : 1 ♂ Guadalajara, Mexico (ex coll. BANKS) (type).

In the shape of wings this species has some likeness to *B. mexicanus* KLUG, but there are several good and distinct characters. In *B. Banksi* the pterostigma is shorter, 1A joins the margin opposite to fork of Rs, and Av is present. In *B. mexicanus* 1A joins the margin far before fork of Rs; no Av. In the male of *B. mexicanus* the branches of upper appendage are pointed towards apex, their apical part being bent downwards.

[*B. mexicanus* Klug] (fig. 164).

Bittacus mexicanus KLUG, Abh. Königl. Akad. Wiss. Berl., p. 99 (1836). — WALKER, Cat. Neur. Ins. Brit. Mus., p. 466 (1853). — HAGEN, Syn. Neur. N. A., p. 246 (1861).

KLUG, *loc. cit.* :

« Von Mexico; aus den Sendungen der Herren GERHOLD und DEPPE.

Sehr ähnlich dem *B. italicus*, nur etwas grösser. Auch findet sich, wie beim *B. testaceus* vom Kap, in der Mitte des Kopfs ein schwärzlicher Fleck. Die Schenkel sind vor der Spitze mehr oder weniger deutlich schwärzlich. Dasselbe ist mehrentheils auch hinsichtlich der Schienen der Fall. Die Flügel sind schwach

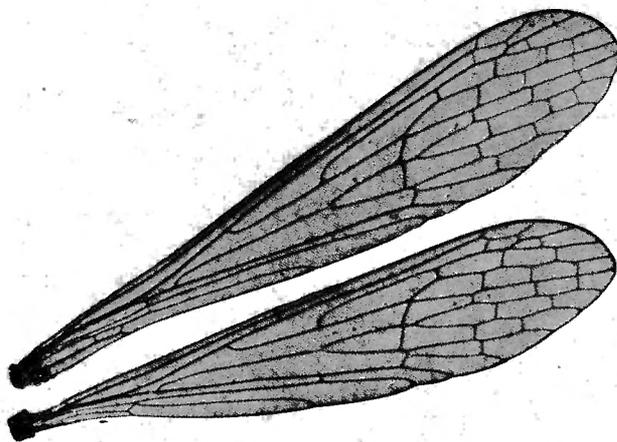


FIG. 164. — *Bittacus mexicanus* ♂ type-specimen (Museum Berlin).

gelblich, fast wasserhell, die Nerven, besonders die Queernerven, stärker und dunkler. Die Schaamzangen der Männchen sind länger, dünner und zugleich mehr gekrümmt, als bei den übrigen bekannten Arten.»

Coll. SELYS : not present.

I have only seen the type-specimens (2 ♂) when visiting the Mus. Berlin. No apical cross veins in the costal area. One cross vein in subcostal area before fork of Rs. Fork of Rs opposite to fork of M. Cuv a little before fork of M. Pterostigma thrice longer than broad; two Pcv. Bristles on the margins of wings near base. In the male the branches of upper appendage, seen from side, are broad at base becoming narrow and slender in the apical part, which is curved downwards; seen from above they are also rather broad at base and narrowed towards apex. Setae long and slender, but not so long as the upper appendage.

[*B. texanus* Banks].

Bittacus texanus BANKS, Trans. Am. Ent. Soc., XXXIV, p. 261 (1908) (Texas).

BANKS, *loc. cit.* :

« Rather reddish-yellow, ocelli on black, hind tarsus brown; wings more rufous-brown than in other species; in color similar to *B. mexicanus* (= *B. Banksi*), the costal apex of the wings being darkened as in that species; legs immaculate. Antennae minutely pubescent; hind femora swollen on basal part as much as in *B. occidentis*, but the joint is much longer. Male genitalia on the plan of *B. stigmatarius*, but the superior appendages are twice as long as the tenth ventral segment, the tip rounded, hairy, the upper edge barely concave, humped at base, the slender lower appendages (harpes) are longer than the tenth ventral segment, and a little more than one-half as long as the upper appendages. »

Coll. SELYS : not present.

I have not seen specimens of this species (type in coll. BANKS). Below I add some supplementary notes kindly forwarded to me by N. BANKS. No costal cross vein; Scv half way between origin and fork of Rs, the latter a little before fork of M. Cuv a little before the fork of M. No Av. In the forewing 1A joins the hind margin a little before Cuv, in the hindwing a little beyond Cuv. Pterostigma twice as long as broad; two Pcv. The anal appendages on the same plan as in *B. Banksi*, but the branches of upper appendage are not so long, the setae are not so slender and hardly reach two thirds the way to the tip of upper branches.

[*B. occidentis* Walker] (fig. 165).

Bittacus occidentis WALKER, Cat. Neur. Ins. Brit. Mus., p. 469 (1853). — HAGEN, Syn. Neur. Ins. N. A., p. 247 (1861). — HINE, Journ. Col. Hort. Soc., XVIII, p. 112, pl. II, fig. 11, 12 (1898). — ID., Bull. Sc. Lab. Den. Univ., p. 259, pl. LXI, fig. 35, (1901). — BANKS, Cat. Neur. Ins. U. S., p. 34 (1907).

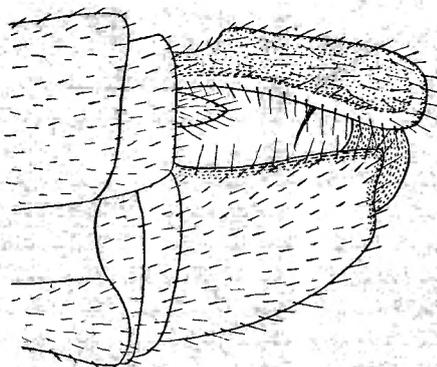


FIG. 165. — *Bittacus occidentis* ♂
Lateral view of anal appendages
(Coll. Esben-Petersen).

Head and thorax brown; a darker spot between the ocelli. Antennae brown; the two basal joints a little paler. Thorax and abdomen brown; prothorax paler. Legs brown; tip of tibiae and of tarsal joints darker. Hind femora rather stout. Wings slender, gradually broadened towards apex, which is somewhat acute; the front margin of apical part of wing much more rounded than the hind margin, which is nearly straight. Membrane brownish yellow; venation a little darker; the apical margin of forewing faintly brownish shaded. No costal cross vein; Scv beyond fork of Rs, which is before Fm; Cuv nearly opposite to Fm; no Av; 1A joins the hind margin before Frs. Pterostigma subrectangular, $2\frac{1}{2}$ times longer than broad; two Pcv. Bristles on the hind margins of wings near base. In the male the tip of the branches of upper appendage with short, black bristles.

Forewing : 21^{mm}; hindwing : 18^{mm}.

Coll. SELYS : not present. — Mus. Stockholm : 3 ♂, 3 ♀ Texas (BELFRAGE leg.). — Coll. ESBEN-PETERSEN : 1 ♂ East Falls Church (ex coll. BANKS).

The species has some likeness to *B. stigmaterus* but its wings are darker, more slender and with more acute tips; pterostigma longer. The anal appendages of males are quite different; in *B. stigmaterus* the setae are very long and slender; in *occidentis* short and conical.

[***B. punctiger*** Westw.] (fig. 166).

Bittacus punctiger WESTWOOD, Trans. Ent. Soc. London, IV, p. 195 (1846). — WALKER, Cat. Neur. Ins. Brit. Mus., p. 468 (1853). — HAGEN, Syn. Neur. N. A., p. 247 (1861). — ID., Stett. Ent. Zeit., XXIV, p. 377 (1863). — HINE, Journ. Coll. Hort. Soc., XVIII, p. 113, pl. II, fig. 9, 10 (1898). — ID., Bull. Sc. Lab. Den. Univ., p. 258, pl. IX, fig. 19 (1901). — BANKS, Cat. Neur. Ins. U. S., p. 34 (1907).

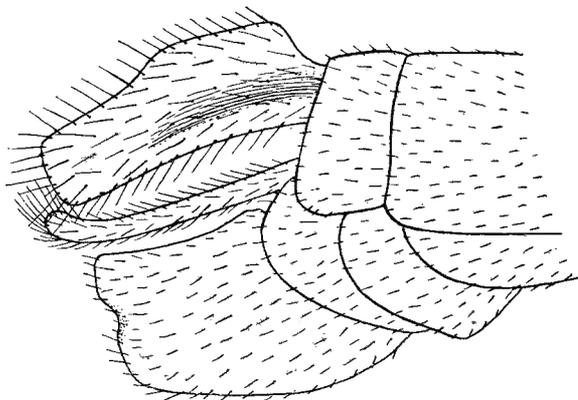


FIG. 166. — *Bittacus punctiger* ♂
Lateral view of anal appendages
(Coll. Esben-Petersen).

Head and rostrum yellowish brown. A blackish spot between the ocelli. Antennae blackish brown, paler at the base. Thorax and abdomen brown; the abdominal segments with narrow blackish hind margin. Legs yellowish brown; tip of femora, tibiae and of tarsal joints blackish brown. Hind femora rather stout and with a few small black spots. Wings strongly broadened towards apex, which is broadly rounded. Membrane with a yellowish tinge; yellowish brown venation; the cross veins are broadly margined with brown; the basal parts of the wings with a few brownish spots. Pterostigma distinct, only a little longer than broad, yellowish brown; two Pcv. No costal cross vein. Scv between origin and fork of Rs, the latter a little before Fm. Cuv opposite to Fm. Av as a rule present. 1A joins the margin before Fm. Bristles on the margins of the wings near base.

Forewing : 18^{mm}; hindwing : 16^{mm}.

Coll. SELYS : 1 ♀ Georgia (MORRISON leg.). — Mus. Stockholm : 1 ♂, 1 ♀, Texas (BELFRAGE leg.); 1 ♂, 2 ♀ Illinois (BELFRAGE leg.). — Coll. ESBEN-PETERSEN : 1 ♂, 3 ♀ Glen-carlyn, Virg. (ex coll. BANKS).

[***B. arizonicus*** Banks].

Bittacus arizonicus BANKS, Trans. Am. Ent. Soc., p. 350, pl. XI, fig. 11, 12 (1911) (Arizona).

BANKS, *loc. cit.* :

« Closely related to *B. occidentis*, of same color, thickened femora, etc. But the male genitalia are more scabrous at tip, the superior pieces are more pointed, and narrower at tip and the inferior median piece has an apical tooth that can be seen in side view. The size is the same. »

Coll. SELYS : not present.

I have not seen specimens of this species (type in coll. BANKS); below I add some supplementary notes, kindly forwarded to me by N. BANKS :

No costal cross vein. In forewing Scv is beyond Frs, but before Fm, which is far beyond Frs. In hindwing Scv is just before Frs, which is opposite to Fm. No Av. In forewing 1A ends before Frs, in hindwing before Cuv. Pterostigma twice as long as broad, two Pcv.

[*B. stigmaterus* Say] (fig. 167).

Bittacus stigmaterus SAY, West. Quart. Rept., p. 164 (1823). — HAGEN, Syn. Neur. N. A., p. 247 (1861). — ID., Stett. Ent. Zeit., XXIV, p. 377 (1863). — HINE, Journ. Col. Hort. Soc., XVIII, p. 114, pl. I, fig. 7; pl. II, fig. 7,8 (1898). — ID., Bull. Sc. Lab. Den. Univ., p. 260, pl. LX, fig. 20 (1901). — BANKS, Cat. Neur. Ins. U. S., p. 34 (1907).

Bittacus pallidipennis WESTWOOD, Trans. Ent. Soc. London, IV, p. 195 (1846). — WALKER, Cat. Neur. Ins. Brit. Mus., p. 468 (1853).

Bittacus mexicanus HINE, Journ. Col. Hort. Soc., XVIII, p. 111, pl. II, fig. 17, 18 (1898). (nec KLUG).

Head yellowish brown; rostrum dark brown; maxillary palpi blackish; between the ocelli a blackish spot. Antennae yellowish. Thorax and abdomen brown. Legs yellowish brown; tip of tibiae and of tarsal joints brown; hind femora slender. Wings broadened towards apex except their basal fourth, which is narrow;

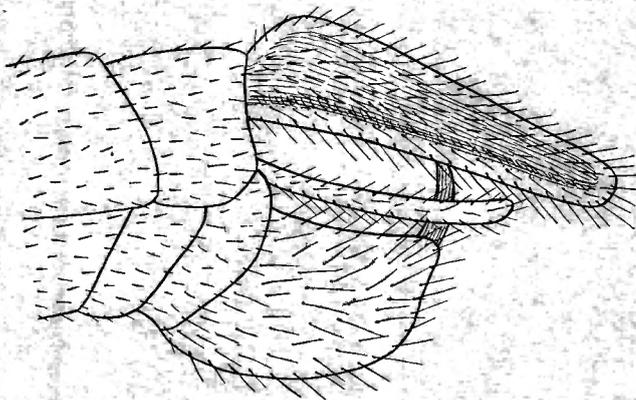


FIG. 167. — *Bittacus stigmaterus* ♂
Lateral view of anal appendages
(Coll. Esben-Petersen).

apex rounded. Membrane with faint yellowish tinge; venation only a little darker. Pterostigma very distinct, yellowish brown, only a little longer than broad; two Pcv. Sc joins the costa nearly opposite to Frs. No costal cross vein. Scv before Frs. Frs and Fm forking almost at same distance from base. Cuv opposite to Frs and Fm. No Av. 1A joins the hind margin before Frs and Fm, but beyond origin of Rs. Bristles on the margin of wings near base. In the male the branches of upper appendage have a triangular production one third from base on their inner side of dorsal margin.

Forewing : 16-20^{mm}; hindwing : 15-18^{mm}.

Coll. SELYS : not present. — Mus. Hamburg : 1 ♂, 1 ♀, 1 spec. (abdomen lost) Dallas, Texas (J. BALL leg.). — Mus. Stockholm : 2 ♂, 2 ♀ Wisconsin (BELFRAGE leg.). — Coll. ESBEN-PETERSEN : 2 ♂, 2 ♀ Glencarlyn, Virg. (ex coll. BANKS).

B. strigosus Hag. (fig. 168, 169).

Bittacus strigosus HAGEN, Syn. Neur. N. A., p. 246 (1861). — HINE, Journ. Col. Hort. Soc., XVIII, p. 115, pl. I, fig. 1-6, 9-11; pl. II, fig. 5, 6 (1898). — ID., Bull. Sc. Lab. Den. Univ., p. 262, pl. LIX, fig. 9 (1901). — BANKS, Cat. Neur. Ins. U. S., p. 34 (1907).

Head and rostrum yellowish brown; a blackish spot between the ocelli, which are yellowish with short pile. Thorax brown; abdomen greyish brown; in the male the anal appen-

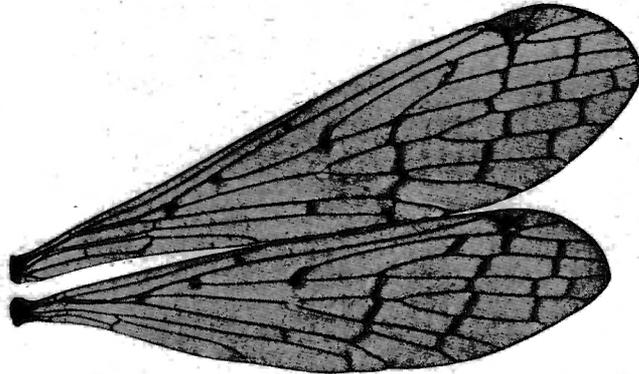


FIG. 168. — *Bittacus strigosus* ♂
(Coll. Esben-Petersen).

dages are yellowish. Legs yellowish, tip of femora, tibiae and of tarsal joints brown. Hind femora slender, Wings rather short and very broad; the tip rounded. Membrane pale, hardly

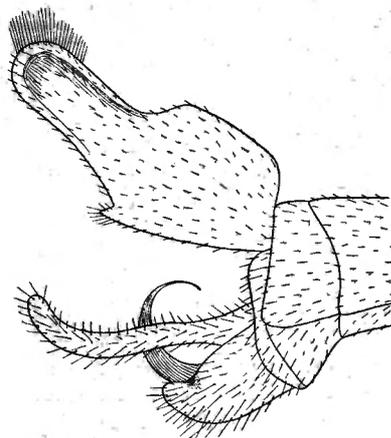


FIG. 169. — *Bittacus strigosus* ♂
Lateral view of anal appendages
(Coll. Esben-Petersen).

with any yellowish tinge. Venation brown; the cross veins brownish margined. At the origin of Rs a brown spot. Pterostigma yellowish, $1 \frac{1}{2}$ times as long as broad; two Pcv. No costal cross veins. Scv about half way between origin and fork of Rs, the latter opposite to that of M, Cuv a little before Fm. No Av. 1A joins the hind margin before Cuv. No bristles on the margins of the wings near base. In the male the dorsal margins of the branches of upper appendage are running parallel in their basal half; in their apical half they are curved outwards and strongly pilose.

Forewing : 19^{mm}; hindwing : 18^{mm}.

Coll. SELYS : 1 ♂ Chicago (OSTEN-SACKEN leg.); 1 ♂, 1 ♀ Illinois. — Mus. Stockholm : 1 ♂, 6 ♀ Illinois (BELFRAGE leg.). — Coll. ESBEN-PETERSEN : 1 ♂ Glencarlyn, Virg. (ex coll. BANKS).

The species is closely related to *B. pilicornis*, from which it may easily be separated by its paler wings with broadly rounded apex, the shorter pile on the antennae and the different shape of anal appendages in the males.

***B. pilicornis* Westw. (fig. 170).**

Bittacus pilicornis WESTWOOD, Trans. Ent. Soc. London, p. 196 (1846). — WALKER, Cat. Neur. Ins. Brit. Mus., p. 468 (1853). — HAGEN, Syn. Neur. N. A., p. 246 (1861). — HINE, Journ. Col. Hort. Soc., XVIII, p. 113, pl. II, fig. 15, 16 (1898). — ID., Bull. Sc. Lab. Den. Univ., p. 261, pl. LX, fig. 17 (1901). — BANKS, Cat. Neur. Ins. U. S., p. 34 (1907).

Head and thorax yellowish brown; a dark brown spot between the ocelli. Antennae brown with long pile. Thorax and abdomen brown. Legs yellowish brown; tip of femora, tibiae and of tarsal joints darker. Hind femora slender. Wings much broadened towards apex, which

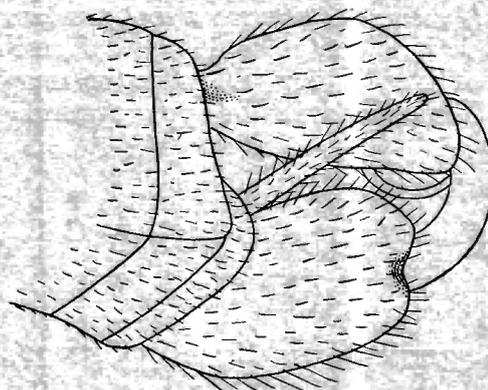


FIG. 170. — *Bittacus pilicornis* ♂
Lateral view of anal appendages
(Coll. Esben-Petersen).

is rounded. Membrane with yellowish tinge, brown longitudinal veins and dark brown cross veins, which mostly are brownish shaded. No costal cross vein; Scv before Frs; Fm before Frs; Cuv a little before Fm. As a rule one cross vein at the end of 1A, which is short and joins the hind margin much before Fm. The origin of Rs and M strongly dark brown. Pterostigma subrectangular, about thrice as long as broad; two Pcv. The oblique row of cross veins distinctly dark brown. No bristles on the margins of the wings near base.

Forewing : 18-21^{mm}; hindwing : 16-18^{mm}.

Coll. SELYS : 1 ♂, 6 ♀ Georgia (MORRISON leg.); 1 ♀ Trenton Falls (OSTEN-SACKEN leg.). — Coll. ESBEN-PETERSEN : 2 ♂, 1 ♀ Great Falls, Virg. (ex coll. BANKS).

B. apicalis Hag. (fig. 171).

Bittacus apicalis HAGEN, Syn. Neur. N. A., p. 248 (1861). — HINE, Journ. Col. Hort. Soc., XVIII, pl. II, fig. 13, 14, (1898). — ID., Bull. Sc. Lab. Den. Univ., XVIII, p. 255, pl. LX, fig. 15 (1901). — BANKS, Cat. Neur. Ins. U. S., p. 34 (1907).

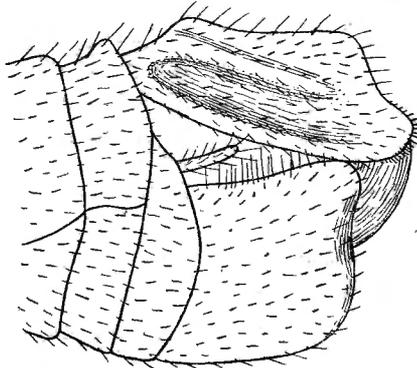


FIG. 171. — *Bittacus apicalis* ♂
Lateral view of anal appendages
(Coll. Esben-Petersen).

Head and rostrum yellowish; thorax and abdomen greyish brown to pitchy black. Ocelli blackish. Antennae yellowish. Legs yellowish brown; tip of tibiae and of tarsal joints blackish. Hind femora rather stout. Wings rather slender, tip somewhat pointed. Membrane with a faint yellowish tinge, venation brown, apex with a narrow sooty brown band. Pterostigma yellowish brown, subtriangular; one Pcv. Sc joins the costa a little before Frs. No costal cross vein; Scv before Frs, which is opposite to Fm. No Av. 1A joins the margin far before Fm. Bristles on the margin of wings near base. Tip of branches of upper appendage black and with short black bristles on its inner side.

Forewing : 15-16^{mm}; hindwing : 13-14^{mm}.

Coll. SELYS : 1 ♀ N. Carolina (MORRISON leg.). — Coll. ESBEN-PETERSEN : 1 ♂ Bloomington, Ill., 15.VII.1893 (ex coll. BANKS).

[**B. geniculatus** Erichs.] (fig. 172).

Bittacus geniculatus ERICHSON, Schomburgk, Britisch Guyana, III, p. 586 (1848).

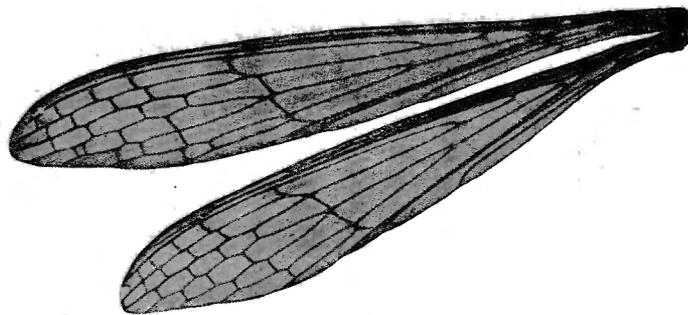


FIG. 172. — *Bittacus geniculatus* ♂ type-specimen
(Museum Berlin).

ERICHSON, *loc. cit.* :

« Von der Grösse *B. brasiliensis* KL., hell gelbbraun. Die letzten Hinterleibsringe etwas dunkler, die Spitze der Schenkel und Schienen dunkel braun. Die Flügel sind schmal, ohne Randmal, alle Queradern

braun getrübt. Am nächsten steht diese Art den *B. flavescens* KL., welcher aber ein braunlichgelber Randmal hat ».

Coll. SELYS : not present.

I have seen the type, ♂, in Mus. Berlin. Two apical cross veins in the costal area, one in the subcostal area near tip of Sc. Frs before Fm. Cuv near the end of Cu². No Av. 1A joins the hind margin a little beyond Fm. Pterostigma very long and narrow. No bristles on the margins of the wings near base. Branches of upper appendage, seen from side, straight, held in same direction as the abdomen, with parallel margins and rounded tips; seen from above they are narrowed towards the tips, which are curved a little outwards.

[*B. flavescens* Klug] (fig. 173, 174).

Bittacus flavescens KLUG, Abh. Königl. Akad. Wiss. Berl., p. 99 (1836). — WALKER, Cat. Neur. Ins. Brit. Mus., p. 166 (1853).

Bittacus affinis WESTWOOD, Trans. Ent. Soc. London, IV, p. 196 (1846). — WALKER, *loc. cit.*, p. 468 (1853).

Head, rostrum and maxillary palpi yellowish brown. Between the very large ocelli a blackish spot. Antennae pale brown. Thorax and abdomen yellowish brown; terminal segments of abdomen dark brown.

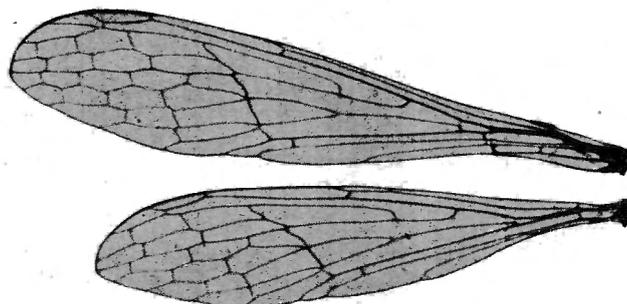


FIG. 173. — *Bittacus flavescens* ♂ type-specimen (Museum Berlin).

Legs yellowish brown; hind tarsi brown. Wings with rounded apex, hyaline with a faint yellowish tinge; venation yellowish brown; in adult specimens the cross veins slightly shaded with yellowish brown. One

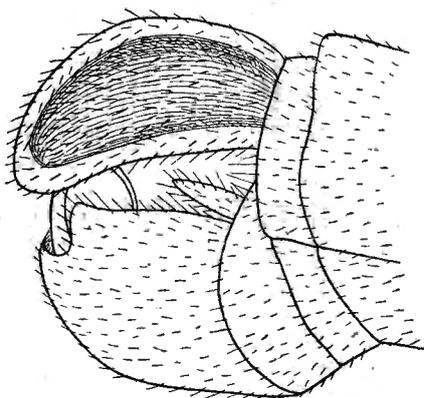


FIG. 174. — *Bittacus flavescens* ♂
Lateral view of anal appendages
(Museum Vienna).

apical cross vein in the costal area, and one in the subcostal area near the tip of Sc; both cross veins beyond Frs, which is opposite to Fm. Cuv beyond Fm. No Av. 1A joins the margin nearly opposite to Fm. Ptero-

stigma four times as long as broad, strongly yellowish brown; one or two Pcv; the apical part of the pterostigma sometimes divided by a cross vein. Bristles on the posterior margins of the wings near base.

Forewing : 20-23^{mm}; hindwing : 18-20^{mm}.

Coll. SELYS : not present. — Mus. Copenhagen : 1 ♀ Lagoa Santa (REINHARD leg.). — Mus. Hamburg : 1 ♂ Santa Cruz, Rio Grande do Sul (STIEGLMAYR leg.); 1 spec. (abdomen lost) Puerto Cabello (W. SIEVERS leg.). — Mus. Vienna : 1 ♂ Pao d'Alto (PENTER leg.); 1 spec. (terminal segments lost) Esperito Santo, Brazil.

[**B. brasiliensis** Klug] (fig. 175).

Bittacus brasiliensis KLUG, Abh. Königl. Akad. Wiss. Berl., p. 98 (1836) (Brazil). — WALKER, Cat. Neur. Ins. Brit. Mus., p. 466 (1853).

KLUG, *loc. cit.* :

« Von SELLOW in Brasilien in der Gegend von Cassapava gefangen.

Diese Art stimmt in Gestalt und Grösse mit dem *B. italicus* fast ganz überein, nur dass die Flügel im Verhältnis etwas länger sind. Die allgemeine Färbung ist etwas dunkler. Die Flügel sind schwach gelblich,

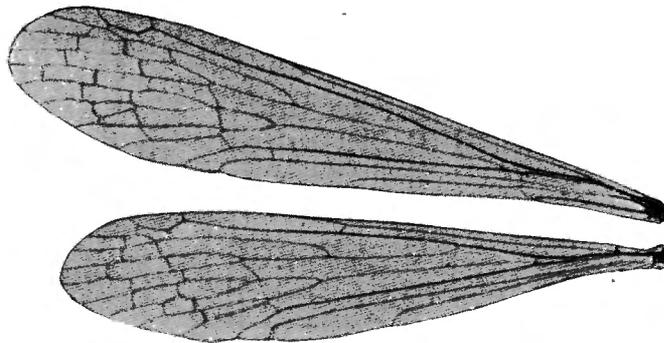


FIG. 175. — *Bittacus brasiliensis* ♀ type-specimen (Museum Berlin).

fast wasserhell durchscheinend mit blassbräunlichen Nerven und Randmal. Die Mitte des Kopfs, die Fühler vom ersten Gelenk an, die Spitzen der Schienen und die Fussglieder sind etwas, doch kaum merklich, dunkler, als die übrige Körper ».

Col. SELYS : not present.

I have seen the three type-specimens (♀) in the Mus. Berlin. No apical cross vein in the costal area; the cross vein in the subcostal area near the tip of Sc and opposite to Frs. Fm opposite to Cuv, but beyond Frs. No Av. 1A joins the hind margin before Frs. No bristles on the margins of the wings near base.

[**B. femoralis** Klug] (fig. 176).

Bittacus femoralis KLUG, Abh. Königl. Akad. Wiss. Berl., p. 98 (1836). — WALKER, Cat. Neur. Ins. Brit. Mus., p. 466 (1853).

KLUG, *loc. cit.* :

« Sehr ähnlich der vorhergehenden Art (*B. brasiliensis*), doch hinreichend dadurch unterschieden, dass ausser dem dunklen Fleck in der Mitte des Kopfs und den schwärzlichen Fühlern die Schenkel der vordern Beine, fast bis zur Wurzel hin, die der hintersten Beine an der Spitze, die Spitzen der Schienen und die Fussglieder eben so dunkel gefärbt sind. Die Flügel sind fast wasserhell mit bräunlichen Nerven. Das Randmal ist nicht deutlich gefärbt.

Coll. SELYS : not present.

I have seen the two type-specimens (Mus. Berlin), which have lost their terminal segments of the abdomen. One apical cross vein in the costal area; one cross vein in the subcostal area near the tip of Sc, far

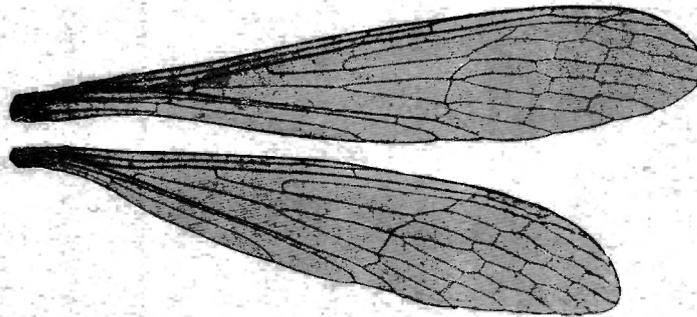


FIG. 176. — *Bittacus femoralis* type-specimen (Museum Berlin).

beyond Frs. One cubital cross vein far beyond Fm. No Av. 1A ends opposite to Fm and Frs. Pterostigma very long and narrow; two Pcv.

B. chilensis Klug (fig. 177, 178) (plate II, fig. 22).

Bittacus chilensis KLUG, Abh. Königl. Akad. Wiss. Berl., p. 100, pl., fig. 6 (1836). — WALKER, Cat. Neur. Ins. Brit. Mus., p. 467 (1853). — MAC LACHLAN, Ent. Monthl. Mag., XXX, p. 39 (1894).

Thyridates chilensis NAVÁS, Mem. Real Akad. Cienc. Barcelona, p. 412 (1908).

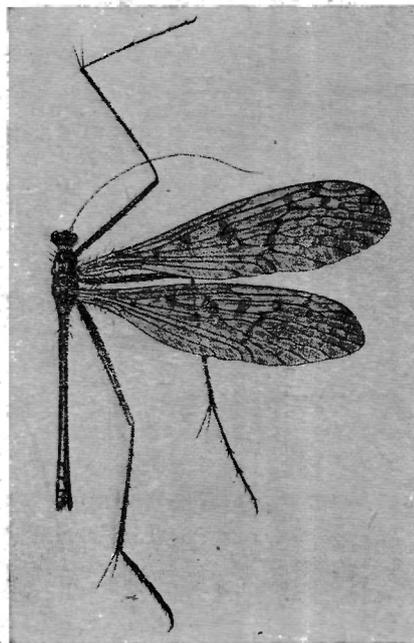


FIG. 177. — *Bittacus chilensis*

Head, rostrum and maxillary palpi yellowish. On vertex a brownish black spot enclosing the ocelli. Antennae testaceous; the two basal joints stout. Thorax and abdomen testaceous

with brownish spots at the root of the wings. Legs greyish testaceous; tip of tibiae and of tarsal joints darker. Wings rather broad and with rounded tip. Membrane hyaline with a very faint tinge of yellowish brown, especially along the front margins; venation pale brown; the cross veins in the apical part broadly shaded with pale sooty brown. Sooty brown spots are also found

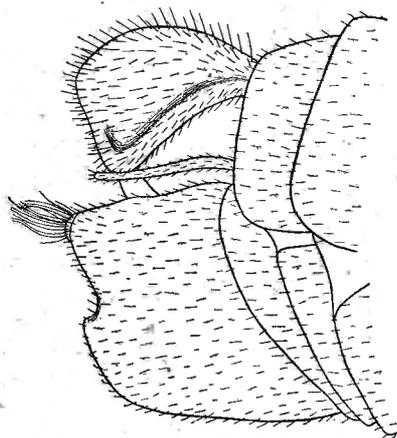


FIG. 178. — *Bittacus chilensis* ♂
Lateral view of anal appendages
(Coll. Selys).

at the origin of Rs, at Frs, at Fm (this spot encloses a small whitish one) and at the place where M separates from Cu¹. Pterostigma indistinctly coloured, about thrice as long as broad; two or three Pcv. In the costal area one or two apical cross veins. Scv near tip of Sc. Frs a little before Fm. Cuv a little beyond Fm. No Av near tip of 1A, which joins the hind margin opposite to Fm. 2A short, only $\frac{1}{3}$ as long as 1A. 3A present. Bristles on the margins of the wings near base.

Forewing : 34^{mm}; hindwing : 31^{mm}.

Coll. SELYS : 1 ♂ Chile. — Coll. LACROIX : 1 ♂ Chile.

The genus *Thyridates*, erected by NAVÁS for this species, must be transferred to the list of synonyms. The main character, the presence of two cross veins near the tip of the costal area, varies very much. In the specimen before me are two cross veins in the left fore- and hindwing; in the right fore- and hindwing only one is present. The other generic characters mentioned by NAVÁS are found in a great number of species.

Genus **NEOBITTACUS** Esben-Petersen.

ESBEN-PETERSEN, Ent. Medd. København, p. 130 (1914).

Eyes wide apart below the antennae. Wings long and slender with falcate apex, strongly decorated with bands and dots. Costal area with about 5 cross veins. In the subcostal area the apical cross vein is placed at the end of the Sc. 1A joins the hind margin far beyond Fm. Cubital area very narrow. Subgenital plate in the ♀ large, strongly haired. Basal joint of hind tarsus a little longer than 2nd and 3rd united; 3rd a little shorter than 2nd; 4th one and a half times shorter than 1st. 3A present in the forewing.

Habitat of the genus is South America.

Type : *N. Blancheti* PICT.

N. Blancheti Pictet (fig. 179).

Bittacus Blancheti PICTET, Mém. Soc. Phys. et d'Hist. nat. Genève, VII, p. 7, pl. 1, fig. 3 (1836). — KLUG, Abh. Königl. Akad. Wiss., p. 100 (1836). — RAMBUR, Hist. nat. Ins. Névropt., p. 327, pl. 8, fig. 6 (1842). — WALKER, Cat. Neur. Ins. Brit. Mus., p. 467 (1853). — BRAUER, Verh. zool.-bot. Ges., X, pp. 691-696 (1860).

Neobittacus Blancheti ESSEN-PETERSEN, Ent. Medd. Köbenhavn, p. 131 (1914).

Head, thorax and abdomen dark brown. The two basal joints of antennae stout, a little longer than broad; the following joints cylindrical, long, very slender and strongly pilose. Thorax dorsally with some ill-defined dark spots, laterally with some black ones. Abdomen a little paler towards the apex. Fore femora black with a broad reddish brown band a little before

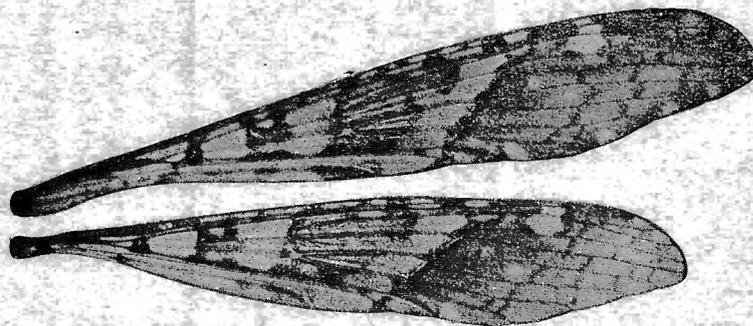


FIG. 179. — *Neobittacus Blancheti* ♀
(Museum Hamburg).

apex; intermediate and hind femora and all the tibiae reddish brown with a black band at the tip. Tarsi reddish brown. Wings dark brown with three hyaline cross bands, which do not reach the anterior margin, and of which the two basal ones are connected along the posterior margin. Along the margins of wings several hyaline spots of different size are present. A larger one is found just before the pterostigma, and sometimes several ill-defined are present in the middle of the apical part of the wing. Where M and Cu¹ separate is found a large blackish brown spot, and a smaller one is present in the posterior part of the hyaline median band, enclosing a cross vein between Cu¹ and Cu². At Fm is found a large hyaline spot, and two smaller ones enclose each one of the chitinous dots in the disc of wing. Frs opposite to Fm and far before Cuv. 1A joins the hind margin far beyond Fm. No Av. Pterostigma about 4 times as long as broad. Bristles on the hind margin of wings near the base.

Forewing : 31^{mm}; hindwing : 28^{mm}.

Coll. SELYS : 1 specimen (abd. lost). — Mus. Hamburg : 1 ♀ Espirito Santo. — Mus. Copenhagen : 1 specimen (apex of abd. lost), Brazil (LUND, leg.).

In one of the specimens before me (Mus. Hamburg) there is a subcostal cross vein a little before the apical one, and in the same specimen is found an oblique cross vein between the hind branch of M and Cu¹, far before the ordinary one.

Genus **HARPOBITTACUS** Gerst.

Harpobittacus GERSTAECKER, Mittheil. naturw. Vereins f. Neuvorp. u. Rügen, XVI, p. 119 (1885). — MAC LACHLAN, Ent. Nachr., XIX, p. 316 (1893). — HINE, Journ. Col. Hor., Soc., XIII, p. 4 (1898). — ENDERLEIN, Zool. Anz., XXXV, p. 398 (1910). — NAVÁS, Broteria Serie Zool., XI, p. 45 (1913).

Abdomen stout. The subgenital plate in the female very short. The hind femora strong and thick. 1st joint of hind tarsi of the same length as 4th, in the male a little longer. Wings long and narrow; hind border near to the base conspicuously curved inwards. As a rule 1A joins the hind margin opposite to Fm. 2A hardly half as long as 1A. Pterostigma very distinct and well marked.

The genus is restricted to Australia and Tasmania.

Type: *H. australis* KLUG.

H. australis Klug (fig. 180, 181).

Bittacus australis KLUG, Abh. Königl. Akad. Wiss., p. 100, fig. 7 (1836). — WALKER, Cat. Neur. Ins. Brit. Mus., p. 467 (1853). — SELYS, Ann. Soc. Ent. Belg., XI (Compt. Rend., pp. 77-78) (1867-1868). — FROGGATT, Proc. Linn. Soc. N. S. Wales, p. 359 (1902).

Harpobittacus australis GERSTAECKER, Mittheil. naturw. Verein f. Neuvorp. u. Rügen, XVI, p. 119 (1885). — WEELE, Die Fauna Sydwest-Australiens, p. 255 (1907). — ENDERLEIN, Zool. Anz., XXXV, p. 398 (1910).

Bittacus corethrius RAMBUR, Hist. nat. Ins. Névr., p. 327 (1842)

Bittacus intermedius (♀) SELYS, *loc. cit.*

Harpobittacus intermedius GERSTAECKER, *loc. cit.*

Head yellowish brown, vertex black; the two apical thirds of rostrum black. Labial and maxillary palpi black. Antennae black; the two basal joints stout; the 2nd shorter than the 1st and almost globular. Thorax reddish brown; the dorsum of prothorax and the front half part of the dorsum of mesothorax brownish black or black. Abdomen reddish brown. In the ♂ the hind border of 2nd-5th segments is narrowly blackish above; 6th and 7th quite black above; 8th and 9th reddish brown; in the ♀ the hind border of 2nd-4th segments is narrowly blackish above, 5th to 7th and front part of 8th totally black above, apical part of 8th and the whole 9th reddish brown above. Fore and intermediate legs black; femora with a broad reddish brown band at their base; hind legs reddish brown, the tip of femora and tibiae with a broad black band; the base of tibiae with a narrower one; tarsi and spines blackish.

Wings hyaline with smoky brown tinge, yellowish at the base. Venation blackish brown; yellowish brown towards the base with the exception of the radius, which is blackish brown nearly to the base, especially in the forewing. Pterostigma dark brown, 3 or 4 times as long as broad and with two Pcv. Where M separates from Cu¹ is sometimes found a small brown dot, touching the curved part of the stalk of M. No apical cross vein in the costal area. Scv in the forewing half the way between the origin of Rs and Frs; in the hindwing nearest to the origin of Rs. Frs before Fm. Cuv beyond Frs but before Fm. Av beyond the origin of Rs but before Frs. 1A joins the hind margin of the wing beyond the Frs or sometimes opposite to Fm. Bristles on the margins of the wings near to the base.

Upper appendage of ♂, seen from side, thrice as long as broad; the apical third curved upwards, narrowed at the tip. The apex with short black bristles on the interior side; the lower margin about in the middle with a stout tooth interiorly. The hind border of 9th segment above

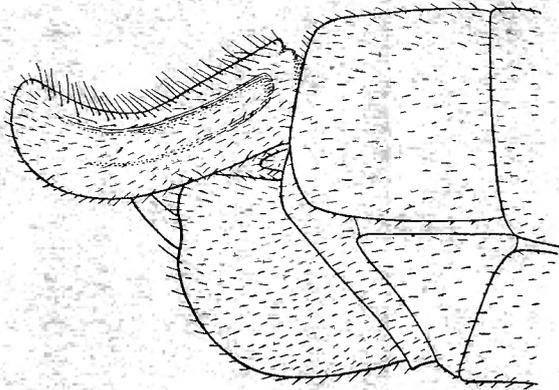


FIG. 180. — *Harpobittacus australis* ♂
Lateral view of anal appendages
(Coll. Selys).

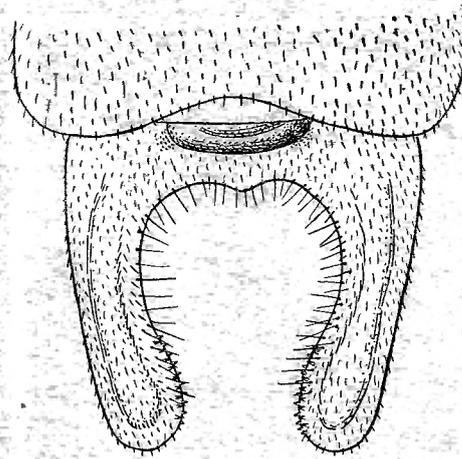


FIG. 181. — *Harpobittacus australis* ♂
Dorsal view of anal appendages
(Coll. Selys).

hardly produced. Claspers, seen from side, short and very broad; ventral margin strongly rounded, the tip incised; all the anal appendages yellowish brown.

Coll. SELYS : 3 ♂, 4 ♀ Australia; 2 ♀ Queensland; 1 ♂, 1 ♀ Tasmania; 2 specimens (without abdomen), Australia. — Mus. Copenhagen : 1 ♂, 1 ♀ Australia. — Coll. Froggatt : 1 ♀ N. S. Wales. — Mus. Hamburg : 1 ♀ Brunswick (Hamb. S.-W. Austr. Exped. 1905).

Amongst the materiel in the Selysian collection is present the type-specimen, ♂, of *Bittacus corethrarius* RAMBUR and 2 ♀, labelled *Bittacus intermedius* SELYS. As to the two specimens there is no difference between them and *australis*.

H. Tillyardi Esben-Peters. (fig. 182, 183).

Harpobittacus Tillyardi ESSEN-PETERSEN, Ent. Medd. Köbenhavn, p. 240 (1915).

Head yellowish brown, vertex black; the two apical thirds of rostrum black; labial and maxillary palpi black. Antennae black; the two basal joints stout. Thorax yellowish brown; the dorsum of prothorax and of the front half of mesothorax brownish black or black. Abdomen reddish brown. In the ♂ the hind border of 2nd-6th segments is narrowly blackish above; 7th quite black above; 8th and 9th yellowish brown above. In the ♀ the hind border of 2nd to 5th segments is narrowly blackish above; 6th, 7th and partly the 8th totally black above; 9th reddish brown. Femora pale reddish brown; the apical half of fore and intermediate and the tip of hind femora black; fore and intermediate tibiae brown, hind tibiae yellowish brown, the base of tibiae with a narrow and the tip with a broad black band; tarsi and spines black.

Wings hyaline with smoky brown tinge, yellowish at the base. Venation blackish brown; yellowish towards the base with the exception of the radius, which is blackish brown nearly to the base, especially in the forewing. Pterostigma dark brown; twice to thrice as long as broad and with two Pcv. Where M separates from Cu¹ is sometimes found a small brown dot, touching the curved part of the stalk of M. No apical cross vein in the costal area. Scv in the

forewing half the way between origin of Rs and Frs; in the hindwing near to or almost at the origin of Rs. Frs before Fm. Cuv opposite to Fm. Av beyond origin of Rs but before Frs. rA joins the hind margin opposite to or a little before Frs. Bristles on the margins of wings near to the base.

Upper appendages of ♂, seen from side, twice as long as broad; the upper margin, somewhat emarginated and the tip rounded. The apex with strong black and short bristles and

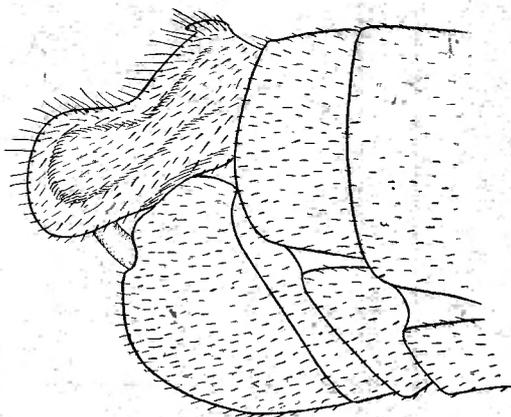


FIG. 182. — *Harpobittacus Tillyardi* ♂ type-specimen
Lateral view of anal appendages
(Coll. Selys).

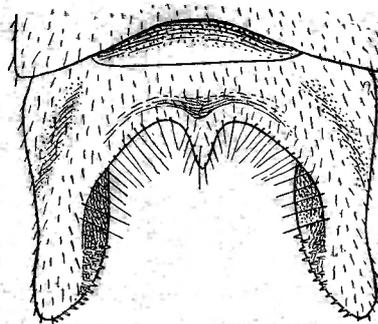


FIG. 183. — *Harpobittacus Tillyardi* ♂ type-specimen
Dorsal view of anal appendages
(Coll. Selys).

a tooth on the inner side. The hind border of 9th segment above produced into a triangular and somewhat raised prolongation. Claspers, seen from side, with rounded lower margin and deeply incised apical margin.

Forewing : 24-26^{mm}; hindwing : 21-23^{mm}.

Coll. SELYS : 1 ♂ N. Holland (type); 1 ♂ without label. — Mus. Hamburg : 2 ♂ Australia (ex Mus. Godeffroy); 4 ♂, 2 ♀ Australia (SCHRADER leg.). — Coll. Froggatt : 1 ♀ Sydney; 1 ♀ N. S. Wales, 4.11.03. — Mus. Stockholm : 1 ♂, 1 ♀ Australia. — Coll. ESSEN-PETERSEN : 3 ♂, 2 ♀ Hornsby, 2.11.12 (TILLYARD leg.).

This species has hitherto been overlooked on account of its great likeness to *australis*, from which it may be separated by the shape of appendages of ♂ and by the colour of abdominal segments and of fore and intermediate tibiae. There are also some small differences between the two species as to the venation of the wings.

H. nigriceps Selys (fig. 184) (plate II, fig. 23).

Bittacus nigriceps SELYS, Ann. Soc. Ent. Belg., XI (Compt. Rend., pp. 77-78) (1867-1868).

Harpobittacus nigriceps GERSTACKER, Mittheil. naturw. Verein Neuvorp. und Rügen, XVI, p. 119 (1885).

Bittacus intermedius (♂) SELYS, loc. cit.

Head black, the rostrum at the apex faintly brownish. Labial and maxillary palpi black. Antennae black; the two basal joints large; the 2nd the shortest and nearly globular. Prothorax and the front half of mesothorax dorsally black; the hind part of mesothorax together with metathorax dorsally reddish brown. The sides and the venter of thorax reddish brown. Abdomen

stout, totally black with the exception of the upper appendages of ♂, which are testaceous. The legs yellowish brown, the fore and intermediate tibiae a little darker. The apical three fifths of fore femora, the apical half part of intermediate femora and a broad band at the apex of hind femora black. A narrow band at the base and a broader one at the tip of all the tibiae black. Tarsi black.

Wings and the pterostigma as in *australis*. No apical cross vein to the costal area. Scv between the origin of Rs and Frs. Frs opposite to Fm. Cuv¹ a little before Fm. No Av. 1A

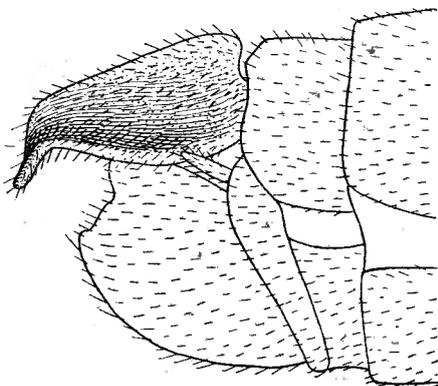


FIG. 184. — *Harpobittacus nigriceps* ♂
Lateral view of anal appendages.
(Coll. Selys).

joins the hind margin a little before Frs and Fm. Bristles on the margins of wings near to the base.

The upper appendages of the ♂, seen from side, broad with straight margins, rounded apex and with a longitudinal median cavity. The claspers, seen from side, with rounded margins and deeply incised at apex.

Forewing : 21^{mm}; hindwing : 19^{mm}5.

Coll. SELYS : 2 ♂, 8 ♀ Queensland.

The species is easily recognized by the absence of Av, by the shape of anal appendages in the male and by the dark colouration of the abdomen.

Genus **KALOBITTACUS** Esben-Petersen.

ESBEN-PETERSEN, Ent. Medd. København, p. 131 (1914).

In the forewing 1A is very short, hardly half as long as Cu². 2A also short, two thirds of the length of 1A. 3A not present. In the hindwing 1A coalesces with Cu² for its whole length, and it joins the hind margin a little beyond the place, where M and Cu¹ separate. 2A short, one third of the length of 1A. 3A not present. Eyes as far apart in front as the breadth of rostrum at base. Basal joint of hind tarsus a little longer than 2nd and 3rd united, which are equal; 4th two thirds of 1st; 5th a little longer than 3rd.

At first sight this genus is quite similar to *Bittacus*, but the coalescence of Cu² and 1A in the hindwing is a good generic character, only present in *Kalobittacus* and *Pazius*. From the latter it may easily be separated by the broad basal part of the wings and by the larger distance between the eyes.

Habitat : Mexico.

Type ; *K. bimaculatus*.

[*K. bimaculatus* Esben-Peters.] (fig. 185, 186).

Kalobittacus bimaculatus ESSEN-PETERSEN, Ent. Medd, København, p. 131 (1914).

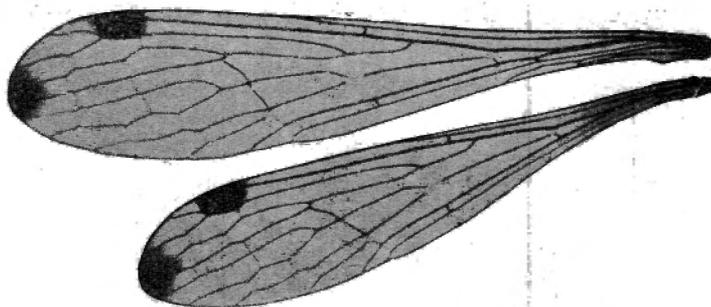


FIG. 185. — *Kalobittacus bimaculatus* ♂ type-specimen
(Museum London).

Head, rostrum and maxillary palpi yellowish brown. On vertex a black spot, enclosing the ocelli. Antennae yellowish brown; the two basal joints stout; 2nd joint as stout as 1st, globular. Thorax and abdomen brown. Legs brown; tip of femora, tibiae and of tarsal joints brownish black; hind femora rather stout-built,

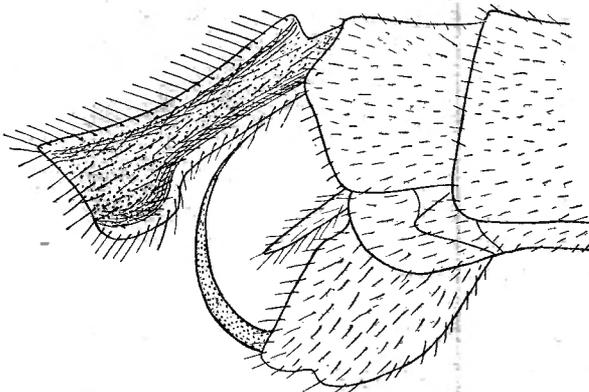


FIG. 186. — *Kalobittacus bimaculatus* ♂ type-specimen
Lateral view of anal appendages
(Museum London).

incrassate in the middle. Wings rather slender and with elliptical apex. Membrane shining and with yellowish tinge; venation brownish. Pterostigma one and a half times as long as broad, strongly brownish black coloured; the colouration passes beyond R; two Pcv. A brownish black spot at the extreme tip of wings. No apical cross veins in the costal area. Scv between the origin of Rs and Frs. Frs opposite to Fm. Cuv a little before Fm. Av present in the forewing, placed near the tip of 1A. Bristles on the margins of wings near the base.

Length of body : 14^{mm}; forewing : 14^{mm}; hindwing : 13^{mm}.

Coll. SELYS : not present. — Brit. Mus. : 1 ♂ Teapa, Tabasco, Mexico (H. H. SMITH leg.).

Genus PAZIUS Navás

Pazius NAVÁS, Broteria, Ser. Zool., XI, p. 45, fig. 8a, (1913).

Eyes large, touching each other below the antennae. Vertex raised. Wings long and slender, very narrow in the basal fourth. In the forewing 1A is very short and joins the hind margin before the place, where M and Cu' separate; in the hindwing 1A fuses with Cu² for its

whole length, and it joins the hind margin almost as far from base as in the forewing. 2A is free and distinct in the forewing, but in the hindwing it coalesces basally with the hind margin. Basal joint of hind tarsi long, longer than 2nd and 3rd united, which are equal; 4th half as long as the 1st; 5th shorter than 4th. It is a very distinct genus. In the forewing Cu^2 and 1A are running close to each other, but a very narrow membrane space is left. In the hindwing, however, Cu^2 and 1A coalesce for the whole length of 1A, and at some distance from base the coalescing veins are running so close to the hind margin that the terminating of 1A in the posterior margin is visible only when greatly magnified.

Type : *P. gracilis* NAV.

[*P. gracilis* Navás] (fig. 187, 188).

Bittacus gracilis NAVÁS, Mem. Real Acad. Cienc. Art. Barcelona, p. 413, fig. 15 (1908).

Fazius gracilis NAVÁS, Broteria, Serie Zool., XI, p. 45, fig. 8a (1913).

Head and rostrum brown; rostrum yellowish at base. Maxillary palpi dark brown. Antennae brown; the two basal joints stout and yellow. Thorax castaneous above. Sides castaneous with two oblique yellowish

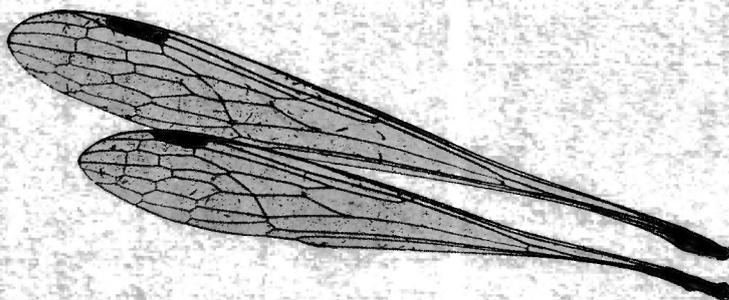


FIG. 187. — *Paxius gracilis* ♂
(Museum London).

streaks. Abdomen brown; the hind border of the segments narrowly blackish brown; terminal segment darker. Femora cylindrical brown; brownish black in their apical third part; the blackish space divided by a

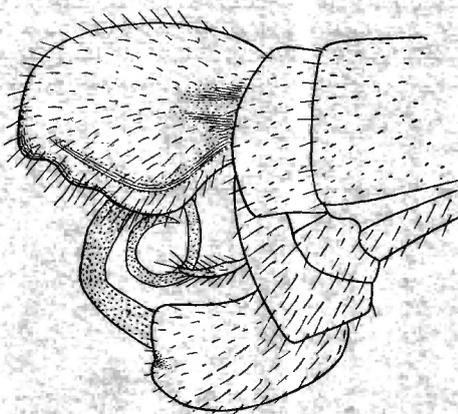


FIG. 188. — *Paxius gracilis* ♂
Lateral view of anal appendages
(Museum London).

broad, clear yellowish band. Tibiae brown becoming brownish black towards apex; the extreme tip with a broad, clear yellowish band. Fore tarsi yellowish brown; intermediate and hind tarsi blackish brown.

Wings long and slender, very narrowed in their basal fourth and with elliptical apex. Membrane iridescent, with faint yellowish tinge and with brown venation. Pterostigma four times longer than broad, rectangular, distinctly dark brown coloured; the colouration pass beyond R. Two Pcv. No apical cross vein in the costal area. Scv in the forewing at the origin of Rs, in the hindwing a little before. Fm before Frs. Cuv before the origin of Rs. The fork of M and of Rs very acute at base. No bristles on the margins of the wings.

In the ♂ the upper appendages, seen from side, are very broad; their lower margin inferiorly with acute dents. In the ♀ the terminal segments, especially the 7th, very incrassate.

Length of body: 23^{mm}; forewing: 18^{mm}; hindwing: 16^{mm}.

Coll. SELYS: not present. — Brit. Mus.: 1 ♂, 1 ♀ Bugaba, 800-1,500 ft (CHAMPION leg.).

Genus **APTEROBITTACUS** Mac Lachlan.

Apterobittacus MAC LACHLAN, Ent. Nachr., XIX, p. 317 (1893). — HINE, Journ. Columb. Hort. Soc., XIII, p. 108 (1898). — ENDERLEIN, Zool. Anz., XXXV, p. 398 (1910). — BANKS, Trans. Am. Ent. Soc., XXXIX, p. 231 (1913).

Both sexes wingless. The three thoracic segments nearly equal. Legs stout. 1st basal joint of hind tarsi as long as the 2nd and 3rd united, longer than 4th. The claw on hind tarsi slender, long and strongly jointed. The subgenital plate in the ♀ short, rounded at the tip.

Type: *A. apterus* MAC LACHLAN.

[*Apt. apterus* Mac Lachl.].

Bittacus apterus MAC LACHLAN, Ent. Monthl. Mag., VIII, p. 100 (1871) (California). — OSTEN-SACKEN, Wien. Ent. Zeitschr., I, p. 123 (1882). — HINE, Journ. Columb. Hort. Soc., XIII, p. 110 (1898). — ID., Bull. Sc. Lab. Denison Univ., XI, p. 257 (1901). — BANKS, Cat. Neur. Ins. U. S., p. 34 (1907).

Apterobittacus apterus MAC LACHLAN, Ent. Nachr., XIX, p. 317 (1893).

Head pale brown. Antennae brown, short; the two basal joints stout. Thorax and abdomen brown; the anterior and posterior margin of prothorax with black spines, placed on small tubercles. Abdomen clothed with very fine yellowish grey pubescence. Legs paler than the body; apex of hind tibiae and of the hind tarsal joints darker. Upper appendages, seen from side, slightly concave with superior distal angle produced, distal margin truncate, inferior distal angle prominent, inferior margin slightly concave to basal third, from thence oblique to the base. The claspers, seen from side, with superior and inferior margin nearly parallel and with rounded apex.

Length of body: 21-22^{mm}.

Coll. SELYS: not present. — Coll. ESBEN-PETERSEN: 1 ♀ California (ex coll. BANKS).

ERRATA

Pag. 52, Fig. 55, read Ventral view instead of Dorsal view.

— 53, — 57, — —

— 54, — 58, — —

— 56, — 64, — —

— 85, 11 lines from bottom, read **Ritsemæ** instead of **Ritsemai**.

SYSTEMATIC LIST

(The names of the species not represented in Selys' Collection are placed between [].
The asterisk indicates that the Type is in the said collection).

	Page		Page
Familia : PANORPIDAE	11	[striata] Miyaké	38
Subfamilia : PANORPINAE	11	[hakusanensis] Miyaké	39
Panorpa Linné	13	Preyeri Mac Lachlan	39
communis Linné	14	[bicornuta] Mac Lachlan	41
nigrirostris Mac Lachlan	16	[leucoptera] Uhler	42
[rufostigma] Westwood	17	japonica Thunberg	43
[hybrida] Mac Lachlan	18	nipponensis Navás	45
[clavigera] Klapálek	19	ochraceopennis Miyaké	46
germanica Linné	19	Klugi Mac Lachlan	47
[deceptor] Esben-Petersen	21	[obscura] Miyaké	49
*cognata Rambur	22	trizonata Miyaké	49
*meridionalis Rambur	23	[Lewisi] Mac Lachlan	50
*annexa Mac Lachlan	24	[sachalinensis] Matsumura	51
[Ghilianii] Mac Lachlan	25	[orientalis] Mac Lachlan	51
picta Hagen	26	[approximata] Esben-Petersen	52
*Selysi Esben-Petersen	26	[amurensis] Mac Lachlan	53
*connexa Mac Lachlan	27	[Takenouchii] Miyaké	54
[similis] Esben-Petersen	28	[cornigera] Mac Lachlan	55
[Davidi] Navás	29	[gakaensis] Miyaké	57
[sibirica] Esben-Petersen	30	[Galloisi] Miyaké	57
[stigmalis] Navás	31	[arakavae] Miyaké	58
[concolor] Esben-Petersen	32	rufa Gray	58
[guttata] Navás	32	lugubris Swederus	59
arcuata Navás	33	nuptialis Gerstaecker	60
*alpina Rambur	34	nebulosa Westwood	61
[pura] Klapálek	35	[maculosa] Hagen	62
*caucasica Mac Lachlan	35	[longipennis] Banks	62
[diceras] Mac Lachlan	36	[Banksi] Hine	63
Wormaldi Mac Lachlan	37	[latipennis] Hine	63
multifasciaria Miyaké	38	rufescens Rambur	63
		confusa Westwood	64

	Page		Page
[americana] Swederus	65	[apicalis] Miyaké	93
[subfurcata] Westwood	66	[naevia] Navás	94
venosa Westwood	66	[decorata] Mac Lachlan	95
canadensis Banks	67	*oregonensis Mac Lachlan	96
[signifer] Banks	68	[carolinensis] Banks	96
[carolinensis] Banks	69	Subfamilia : CHORISTINAE	97
[virginica] Banks	70	Chorista Klug	98
[claripennis] Hine	70	[australis] Klug	98
[terminata] Klug	71	ruficeps Newman	99
[punctata] Klug	71	Taeniochorista Esben-Petersen	100
[immaculata] Esben-Petersen	72	[pallida] Esben-Petersen	100
[mexicana] Banks	73	Subfamilia : NANNOCHORISTINAE	101
Neopanorpa Weele	73	Nannochorista Tillyard	102
[angustipennis] Westwood	74	[dipteroïdes] Tillyard	102
[hyalinata] Esben-Petersen	75	[holostigma] Tillyard	103
[Mülleri] Weele	75	[maculipennis] Tillyard	103
[lemniscata] Enderlein	76	[eboraca] Tillyard	104
[cingulata] Enderlein	76	Choristella Tillyard	104
[Sauteri] Esben-Petersen	76	[Philpotti] Tillyard	104
[formosana] Navás	77	Familia : MEROPIDAE	105
[ophthalmica] Navás	77	Merope Newman	105
[cornuta] Esben-Petersen	79	tuber Newman	105
[zebrata] Esben-Petersen	80	Familia : NOTIOTHAUMIDAE	106
[appendiculata] Westwood	80	Notiothauma Mac Lachlan	106
[flava] Esben-Petersen	81	[Reedi] Mac Lachlan	106
[nipalica] Navás	82	Familia : BOREIDAE	108
[ocellaris] Navás	82	Boreus Latreille	108
[Cavaleriei] Navás	83	hyemalis Linné	109
[Harmandi] Navás	84	[Lokayi] Klapálek	110
[fenestrata] Needham	84	*Westwoodi Hagen	111
[sordida] Needham	85	[Navasi] Pliginsky	111
Leptopanorpa Mac Lachlan	85	[chadzhi-gireji] Pliginsky	112
[Ritsemae] Mac Lachlan	85	[aktijari] Pliginsky	112
[Sieboldi] Mac Lachlan	86	nivoriundus Fitch	113
[furcata] Hardwicke	86	brumalis Fitch	113
[Charpentieri] Burmeister	87	[californicus] Packard	114
[longicauda] Weele	88	[unicolor] Hine	114
[tubifera] Enderlein	88	Familia : BITTACIDAE	115
[Jacobsoni] Weele	89	Bittacus Latreille	117
javanica Westwood	89	italicus O. F. Müller	117
[pi] Weele	91	Hageni Brauer	119
[effusa] Navás	91		
Panorpodes Mac Lachlan	92		
paradoxa Mac Lachlan	92		

SYSTEMATIC LIST OF THE MECOPTERA

167

	Page		Page
[indicus] Walker	120	[chlorostigma] Mac Lachlan	154
[insularis] Esben-Petersen	120	[Banksi] Esben-Petersen	155
[latipennis] Gerstaecker	121	[mexicanus] Klug	156
sinensis Walker	121	[texanus] Banks	145
[Mastrillii] Navás	123	[occidentis] Walker	145
[laevipes] Navás	124	punctiger Westwood	146
nipponicus Navás	124	[arizonicus] Banks	146
[takaoensis] Miyaké	126	[stigmaterus] Say	147
[marginatus] Miyaké	126	strigosus Hagen	148
[microcercus] Gerstaecker	127	pilicornis Westwood	149
[africanus] Esben-Petersen	128	apicalis Hagen	150
*Selysi Esben-Petersen	128	[geniculatus] Erichson	150
[montanus] Weele	139	[flavescens] Klug	151
[Sjöstedti] Weele	140	[brasiliensis] Klug	152
[Walkeri] Esben-Petersen	140	[femoralis] Klug	152
testaceus Klug	141	chilensis Klug	153
[Schoutedeni] Esben-Petersen	142	Neobittacus Esben-Petersen	154
capensis Klug	143	Blancheti Pictet	155
[Pobeguini] Esben-Petersen	144	Harpobittacus Gerstaecker	156
[Peringueyi] Esben-Petersen	145	australis Gerstaecker	156
[Chevalieri] Esben-Petersen	146	*Tillyardi Esben-Petersen	157
[fumosus] Esben-Petersen	147	*nigriceps Selys	158
nebulosus Klug	148	Kalobittacus Esben-Petersen	159
[Weelei] Esben-Petersen	149	[bimaculatus] Esben-Petersen	160
[oreinus] Navás	150	Pazius Navás	160
[Alluaudi] Navás	150	[gracilis] Navás	161
[Jeanneli] Navás	151	Apterobittacus Mac Lachlan	162
[aequalis] Navás	152	[apterus] Mac Lachlan	162
[discors] Navás	152		
[lineatus] Navás	153		

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Main body of vertical text in the left column, appearing to be a list or series of entries.

Vertical text on the right side of the page, possibly a page number or title.

Main body of vertical text in the right column, appearing to be a list or series of entries.

ALPHABETICAL INDEX

	Page		Page
<i>æqualis</i>	141	Bittacidae	10, 115
<i>affinis</i> (<i>Panorpa</i>)	20, 63	Bittacus	59, 109, 116, 117
<i>affinis</i> (<i>Bittacus</i>)	151	<i>Blancheti</i>	154, 155
<i>africanus</i>	128	<i>boldyrevi</i>	110, 111
<i>aktijari</i>	112	<i>borealis</i>	20, 21
<i>alpina</i>	14, 22, 34	Boreidae	10, 108
<i>Allaudi</i>	140	Boreus	108, 109, 110, 111, 112
<i>americana</i>	58, 59, 65	<i>Bouvieri</i>	40
<i>amurensis</i>	36, 53	<i>brachypennis</i>	45
<i>angustipennis</i>	74, 78	<i>brasiliensis</i>	150, 152
<i>angustipenne</i>	74	<i>brumalis</i>	113
<i>annexa</i>	12, 14, 24, 25	<i>californicus</i>	114
<i>apicalis</i> (<i>Panorpa</i>)	20	Campodetecnum	73, 74, 75, 76, 77, 89, 91
<i>apicalis</i> (<i>Panorpodes</i>)	93	<i>canadensis</i>	58, 67
<i>apicalis</i> (<i>Bittacus</i>)	150	<i>capensis</i>	132, 134
<i>appendiculata</i>	80	<i>carolinensis</i> (<i>Panorpa</i>)	58, 69
<i>approximata</i>	36, 52	<i>carolinensis</i> (<i>Panorpodes</i>)	96
Apterobittacus	116, 162	<i>caucasica</i>	14, 35
<i>apterus</i>	162	<i>Cavaleriei</i>	83
<i>arakavae</i>	36, 58	<i>chadzhi-gireji</i>	112
<i>arcuata</i>	14, 33	<i>Charpentieri</i>	87
<i>arizonicus</i>	146	<i>Chevalieri</i>	136
Ateleptera	109	<i>chilensis</i>	153
Aulops	13, 84	<i>chlorostigma</i>	132, 142
<i>australis</i> (<i>Chorista</i>)	98, 99	Chorista	97, 98
<i>australis</i> (<i>Harpobittacus</i>).	156, 157, 158	Choristella	102, 104
<i>Banksi</i> (<i>Bittacus</i>)	115, 143, 144, 145	Choristinae	11, 97, 101
<i>Banksi</i> (<i>Panorpa</i>)	58, 63	<i>chuzenjiensis</i>	50
<i>bicornuta</i>	36, 39, 41	<i>cingulata</i>	76
<i>bimaculatus</i>	159, 160	<i>cingulatum</i>	76

	Page		Page
claripennis	58, 70	fumosus	137
clavigera	13, 19	furcata	86
cognata	13, 22, 24	Galloisi	36, 55, 57
communis	13, 14	geniculatus	150
concolor	14, 32	germanica	13, 19, 21, 22
confusa (Panorpa)	58, 64	Ghilianii	14, 25
confusa (Panorpodes)	95	gibberosa	20, 21
connexa	14, 27, 29	gigas	109, 110
corethrarius	156, 157	gokaensis	36, 56
cornigera	36, 55, 56, 57	gracilis	161
cornuta	79	Gryllus	109
Davidi	14, 29, 32, 33	guttata	14, 32, 33
debilis	63	Hageni (Bittacus)	119
deceptor	13, 21	Hageni (Panorpa)	43, 45
decorata	95	hakusanensis	36, 39
dentata	45	Haplodictyus	117, 126, 135, 136
diceras	14, 36	Harmandi	84
diffinis	14	Harpobittacus	114, 128, 132, 156
Diplostigma	117, 122, 123	hiemalis	109, 110
dipteroïdes	102, 103, 104	Himanturella	85, 87, 88
discors	141	holostigma	103
Drouarti	47, 49	hyalinata	75
dyscola	43, 44, 45, 47	hybrida	13, 18
eboraca	104	hyemalis	108, 109
effusa	91	immaculata	13, 72
effusum	91	indicus	120
Estenalla	13, 33	insularis	120
Euphania	98, 101	intermedius	156, 157, 158
Eusthenia	101	interrupta	43, 45
falcatum	75	irregularis	43, 45
fasciata	58, 59, 65, 67, 68	italica	117
femoralis	152	italicus	117, 119, 144, 152
fenestrata	23, 24, 84	Jacobsoni	89
flava	81	japonica	36, 43, 44, 47, 49, 57, 60
flavescens	151	javanica	89, 90
formosana	77	javanicum	89
formosanum	77	Jeanelli	140
fulvicaudaria	57		

	Page		Page
Kalobittacus	116, 159	naevia	93, 94
Klugi	13, 36, 45, 46, 47	Nannochorista	102
laevipes	124, 125	Nannochoristinae	11, 101
latipennis (Bittacus)	121	Navasi	111, 112
latipennis (Panorpa)	58, 63	nebulosa	58, 61, 62
lemniscata	76	nebulosus	138
lemniscatum	76	negus	139
Leptobittacus	117	nematogaster	87
Leptopanorpa	12, 82, 85, 86, 88, 89, 91, 92	Neobittacus	116, 154
leucoptera	36, 39, 40, 42	Neopanorpa	12, 73, 74, 75, 79, 80, 81, 85, 87
leucothyria	42, 43, 44, 45	nigra	45, 46
Lewisi	13, 36, 50	nigriceps	158
limbata	95	nigrirostris	13, 16
lineatus	142	nikkoënsis	42
linguata	92	nipalica	82
Lokayi	110	niphonensis	43
longicauda	88	nipponensis	36, 45, 46
longipennis	58, 62	nipponicus	124, 125
lugubris	58, 59, 60	nivoriundus	113
luteola	98, 99	notata	95
macrogaster	42, 43, 45, 51	Notiothauma	106
maculata	45	Notiothaumidae	10, 106
maculipennis	103	nuptialis	58, 60
maculosa	58, 61, 62, 63	obscura	36, 49
magnicauda	41	occidentis	145
major	39	ocellaris	82
marginatus	126	ochracea	47
Mastrillii	123	ochraceopennis	36, 46
Mecaptera	19	ophthalmica	77
Mecoptera	9, 101, 106	ophthalmicum	77
melania	51	oregonensis	96
meridionalis	14, 23, 24, 25	oreinus	140
Merope	105	orientalis	36, 51, 53
Meropidae	10, 105	pallida	100
mexicana	73	pallidipennis	147
mexicanus	144, 147	Panorpa	12, 13, 26, 80, 82, 83, 85, 86, 87, 89, 91, 94, 95, 99, 109, 134
microcercus	127	Panorpatea	9
montana	20	Panorpidea	10, 11, 45
montanus	129, 130, 133, 140	Panorpinae	11, 101
moschinus	135	Panorpodes	12, 92, 95, 96, 102
Mülleri	75	paradoxa	92
multifasciaria	36, 38		

	Page		Page
Pazius	116, 160	Sjöstedti	130
Peringueyi	135	sordida	85
Philpotti	104	spectabilis	101
pi	91	stigmalis	14, 31
picea	45, 46	stigmaterus	146, 147
picta	14, 16, 25	stigmatica	92
pilicornis	149	strategus	121, 122, 123
Pobeguini	135	striata	36, 38
polemius	126	strigosus	148
Preyeri	36, 39	subfurcata	58, 66
proboscideus	109	suffusa	82
pulchra	43, 45	Taeniochorista	97, 100
punctata	13, 71	takaoensis	126
punctiger	146	Takenouchii	37, 54
pura	14, 35	Tarnanii	110
quadrimaculata	45	terminata	13, 71
quaternipunctatus	121	testaceus	132, 133, 139, 144
rectifasciata	43, 45	texanus	145
Reedi	106	Thyridates	117, 153, 154
Ritsemæ	85	Tillyardi	157
rufa	58	tipularia	117
rufostigma	13, 17	tipularius	117
rufescens	58, 63	tipuloides	118
ruficeps	99	tresignata	47, 49
sachalinensis	36, 51	trizonata	37, 49
Sauteri	76	tuber	105
Schoutedeni	133	tubifera	88, 89
scorpio	59, 60	unicolor	114
Selysi (Bittacus)	128	Valignanii	45, 46
Selysi (Panorpa)	14, 26	variabilis	34
sibirica	14, 30	venosa	58, 66
Sieboldi	86	virginica	58, 69, 70
signifer	58, 68	Walkeri	131
similis	14, 28	Weelei	138, 139
sinanoensis	43	Westwoodi	110, 111
sinense	121	Wormaldi	36, 37
sinensis	121, 122, 123	zebrata	80
singularis	95		

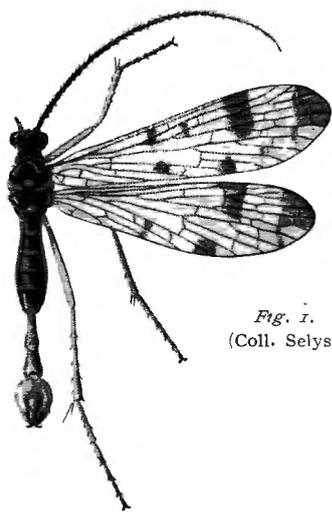


Fig. 1.
(Coll. Selys)

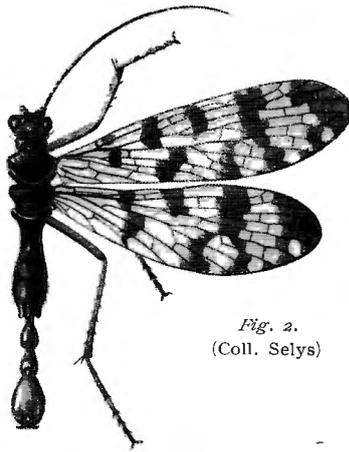


Fig. 2.
(Coll. Selys)

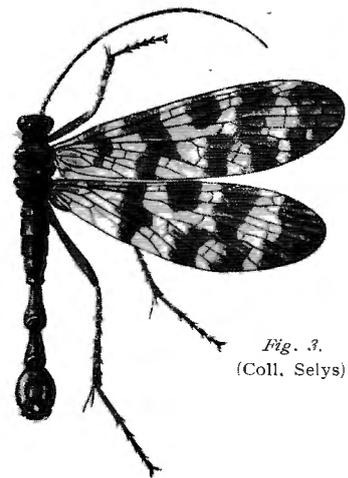


Fig. 3.
(Coll. Selys)

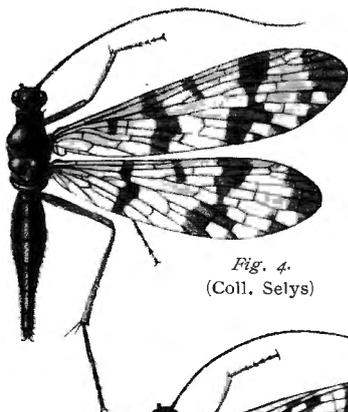


Fig. 4.
(Coll. Selys)

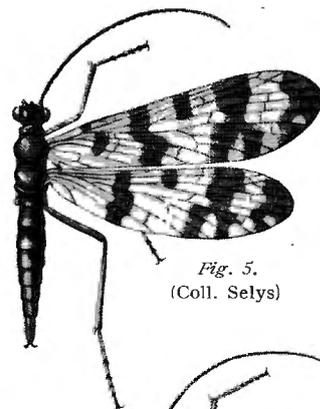


Fig. 5.
(Coll. Selys)

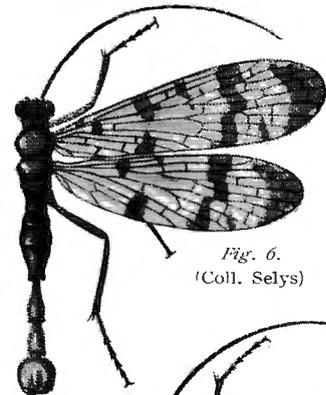


Fig. 6.
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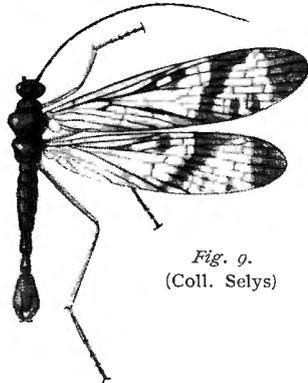


Fig. 9.
(Coll. Selys)

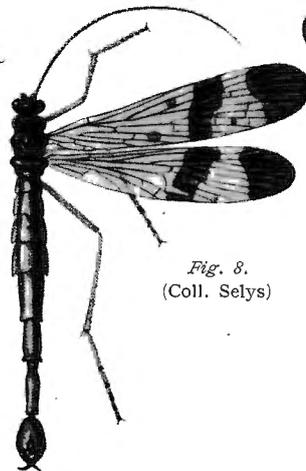


Fig. 8.
(Coll. Selys)

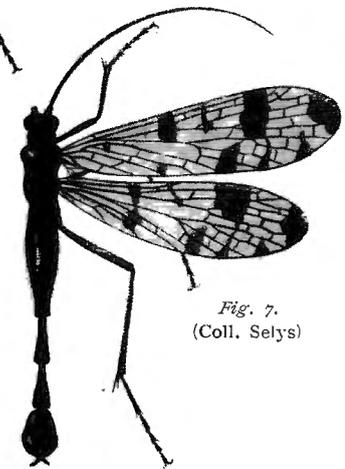


Fig. 7.
(Coll. Selys)

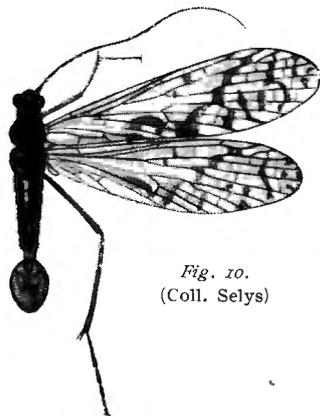


Fig. 10.
(Coll. Selys)

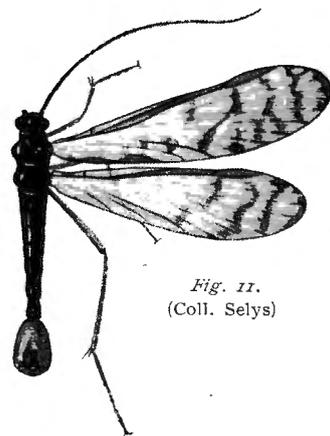


Fig. 11.
(Coll. Selys)

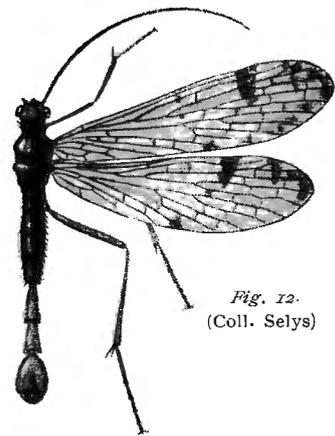


Fig. 12.
(Coll. Selys)

Fig. 1. *Panorpa connexa* MAC LACHLAN

Fig. 2. *Panorpa meridionalis* RAMBUR

Fig. 3. *Panorpa picta* HAGEN

Fig. 4. *Panorpa nigrirostris* MAC LACHLAN

Fig. 5. *Panorpa Selysi* ESBEN-PETERSEN

Fig. 6. *Panorpa rufescens* RAMBUR

Fig. 7. *Panorpa caucasica* MAC LACHLAN

Fig. 8. *Panorpa Klugi* MAC LACHLAN

Fig. 9. *Panorpa Preyeri* MAC LACHLAN

Fig. 10. *Panorpa multifasciaria* MIYAKÉ

Fig. 11. *Panorpa Wormaldi* MAC LACHLAN

Fig. 12. *Panorpa arcuata* NAVAS

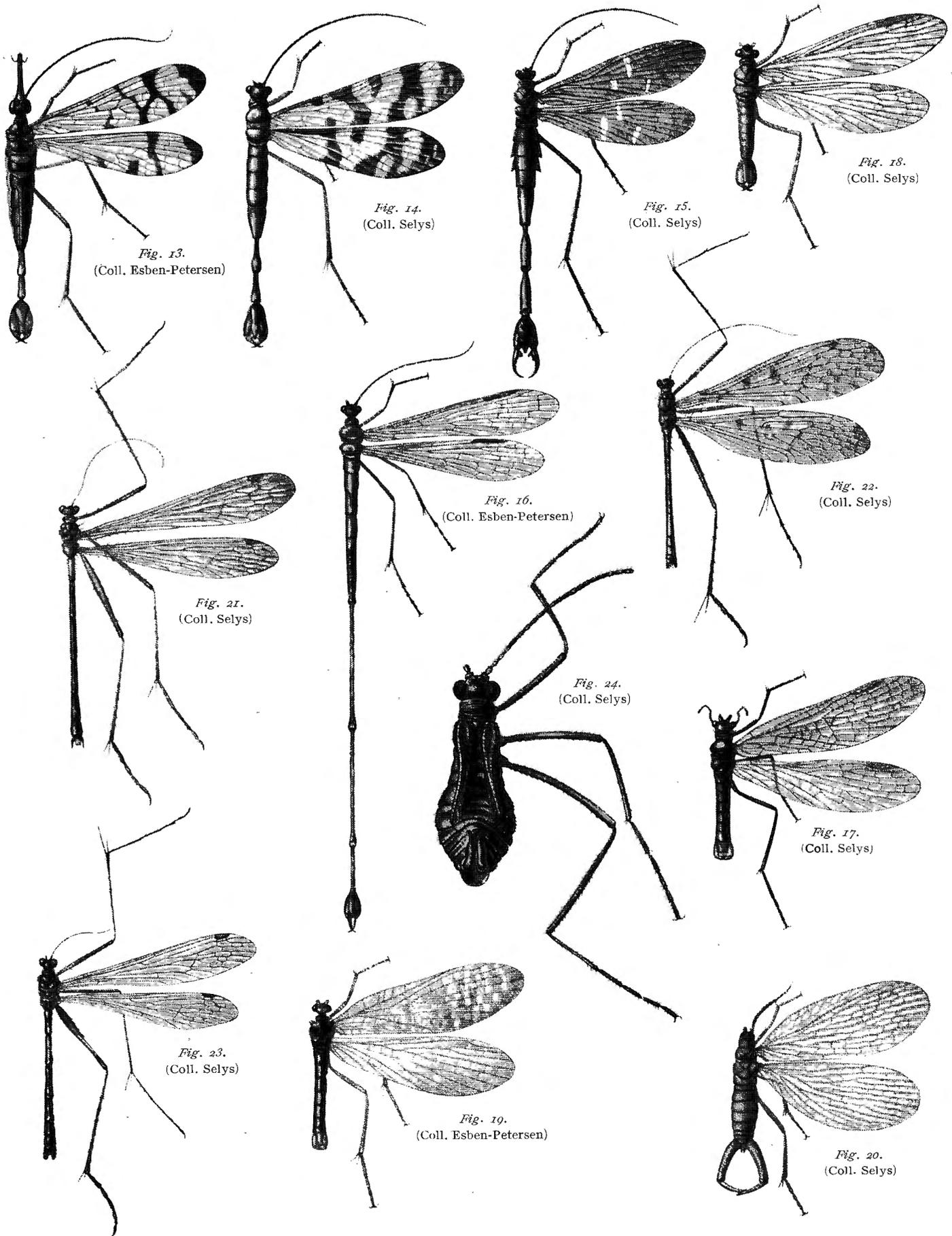


Fig. 13. *Neopanorpa Sauteri* ESSEN-PETERSEN
 Fig. 14. *Panorpa rufa* GRAY
 Fig. 15. *Panorpa lugubris* SWEDERUS
 Fig. 16. *Leptopanorpa longicauda* WEELE

Fig. 17. *Chorista ruficeps* NEWMAN
 Fig. 18. *Panorhodes paradoxa* MAC LACHLAN
 Fig. 19. *Taeniochorista pallida* ESSEN-PETERSEN
 Fig. 20. *Merope tuber* NEWMAN

Fig. 21. *Bittacus Selysi* ESSEN-PETERSEN
 Fig. 22. *Bittacus chilensis* KLUG
 Fig. 23. *Harpobittacus nigriceps* SELYS
 Fig. 24. *Boreus brumalis* FITCH

