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DIPTERA DANICA

PART V

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DIPTERA DANICA

GENERA AND SPECIES
OF FLIES HITHERTO FOUND IN DENMARK,

BY

WILLIAM LUNDBECK

11

PART V
LONCHOPTERIDAE, SYRPHIDAE

WITH 202 FIGURES

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(ORTHORRHAPHA BRACHYCERA.)

ACROPTERA.

Lonchopteridae.

Head a little broader than thorax, of transverse shape. Eyes broadly separated and equally separated in both sexes; vertex and frons broad; three ocelli. There are two pairs of fronto-orbital bristles, one approximated pair below, above the antennæ, and one distant pair above; two ocellar bristles; four vertical bristles just above, and a little downwards on occiput a pair of smaller, a little converging postvertical bristles; along the eye-margins a row of postocular bristles, and along the oral margin on each side a row of six to seven oral bristles, the anterior pair crossing. Eyes not large but prominent, bare. Antennæ short, six-jointed, third joint somewhat semiglobular or almost globular with a subapical, three-jointed arista, the basal joints of which are short; the two first antennal joints with small bristles, the third and the arista short-pubescent. Epistoma broad, rather low. Oral aperture circular. An oral cone developed, with the horse-shoe-shaped clypeus on the front side. Proboscis short; the mouth parts consisting of a triangular, semitubular labrum, a short, spindle-shaped, truncate hypopharynx, and maxillæ with a small, short, pointed lacinia and relatively long, one-jointed, club-shaped palpi. Thorax rectangular; pro- and metathorax small, no chitinized metasternum behind the hind coxæ. There are humeral, posthumeral, notopleural, supraalar and postalar bristles, and on the disc dorsocentral bristles, of which those of the posterior pair are very small, so that there are two small præscutellar hairs; for the rest thorax and pleura bare. Scutellum with two apical bristles. Abdomen with the first segment long; in the male there are five visible, not transformed segments, the fourth longer than the preceding, the fifth still longer, sometimes rather long; after the fifth follows the hypopygium; it is large, more or less rectangular, bent in under the venter; the side-margins are curved down and refolded on the ventral side, and on its basal part the hypopygium is roofed over; thus a ventral cavity is formed; from the

anterior ventral roof arises a complicate median organ, the penis and its sheath, which stretches somewhat backwards; to each side of it two pairs of variously shaped inner lamellæ or gonapophyses arise, the posterior (or median) and the anterior (or lateral) inner lamellæ, which stretch backwards; at the end of the hypopygium two more or less scale-like lamellæ are inserted, the outer or apical lamellæ; they are more or less connected in the middle; I think they are placed on a small apical segment. — It will be seen that the hypopygium answers well to that in the Dolichopodids, the posterior and anterior inner lamellæ or gonapophyses answering to the median and lateral inner lamellæ in the Dolichopodids, and the outer or apical lamellæ to the same in the Dolichopodids; the hypopygium otherwise being much of the same construction with a ventral cavity roofed over at the base, and the penis stretching backwards from it between the inner lamellæ; also the hypopygium is likewise bent in under the venter, but it is here not unsymmetrical. As said there seem to be five abdominal segments, but the long first abdominal segment is evidently formed by the coalescence of two, the dividing line being still visible; at the base of the hypopygium there seems to be a small segment, and perhaps one more; if so the hypopygium would in the normal way be formed of the ninth segment. — In the female abdomen has six visible segments, the first long and likewise formed of two; there are thus in reality seven segments; a very small apical (eighth) segment is also seen, and at the apex are two small lamellæ. Legs slender, simple, only the front tarsi with the four last joints somewhat dilated in the male. The femora and tibiæ have more or fewer bristles. Claws and pulvilli small. No empodium present. Wings very characteristic and with an aberrant venation; they are of elongated elliptical shape, pointed at the apex; alula and axillary lobe very small or wanting. Mediastinal and subcostal veins very short; radial vein terminating a little above the apex; the cubital vein issues quite near the base, and terminates just at the apex; it is unforked and there is thus one cubital cell; the radial and cubital veins are converging outwards; the discal vein arises apparently from the postical vein near the middle of it; it has a long fork and there are four posterior cells; the postical vein is branched quite near the base, its lower, short branch going downwards to the anal vein; this latter long, reaching about to the middle of the wing; it shows a very characteristic feature, as in the male it terminates in the posterior margin, but in the female curves upwards and terminates in the postical vein (figs. 2—3); the so-called medial cross-vein is near the base and very oblique, it goes from near the base of the cubital vein down-

wards and backwards to the second basal cell; the basal cells and the anal cell are short; no discal cell. There is no wing stigma. The venation is further remarkable by the fact, that most of the veins are convex; the mediastinal is concave as normal, likewise the subcostal vein convex, the radial vein concave and the cubital vein convex; the largest basal part of the stem of the discal fork and the inner two thirds of its upper branch are concave, the outer part of this branch, and the lower branch convex; the postical vein convex, and the so-called anal vein likewise convex, but this latter has a concave part at the base; still there is the remarkable fact that all the convex veins or parts of veins are spinulose.

The wing-venation of the Lonchopterids has been somewhat debated; Brauer has not entered into it in his work over the wings of Diptera; Adolph does not say much about it; Redtenbacher takes the discal vein to be his vein V, but he mentions it and has figured it as quite convex which is not correct. I think the best interpretation is the one given by de Meijere in his monograph cited below; this author thinks that the vein bordering the discal cell above from the medial cross-vein to the base of the fork is obliterated, and he refers to *Pipunculus omissinervis* Beck., where the facts are similar; the lower anterior part of the oblique medial cross-vein he takes as the base of the discal vein, the upper part being the real cross-vein; if this is so we get a venation somewhat similar to that in several Empids, and also in *Platypeza*, and with a normal discal cell partly bounded below by the postical vein. De Meijere lays no stress on the convexity or concavity of the veins, but I think the convex end branches of the discal vein may be considered as remnants of the vein V. The vein which above and in the descriptions is termed the anal vein, is as said convex; de Meijere thinks it nevertheless to be the anal vein, but I think, like Adolph, that it is the axillary vein; perhaps its concave basal part belongs to the anal vein; it must be remembered, that the so-called anal vein in the Dolichopodids is probably also the axillary vein.

The squamulæ are very small, the thoracal squamula only present as frenulum.

The larvæ are of a curious appearance; they are elongated elliptical, flat, only a little arched above, and here a little carinate along the middle line; the segments are well chitinized above and brown, and they look as if each was covered by a shield. The number of segments can be counted as ten, the head taken as one segment; but the metathorax is long and probably formed of this and the first abdominal segment, and the last segment is perhaps also formed of two;

if so we get twelve segments. The mouth parts consist of a labrum, small mandibles and larger maxillæ with a small palpus; there are two-jointed antennæ. On pro- and mesothorax and on the last segment are some long thread-like filaments, in all four pairs, three anterior and one posterior. The larva is amphipneustic with prothoracal spiracles, and distant posterior spiracles on last segment. — The pupa lies in the larval skin; it has small anterior spiracular tubes. At the emerging of the imago the puparium splits with a T-shaped split.

The place of the *Lonchopteridae* in the system has been much debated: the earlier authors, Meigen, Macquart and Schiner placed them near *Platypeza*, *Pipunculus* and *Dolichopus*; Fallén and Zetterstedt thereagainst placed them to the *Phytomyzidae*. As the developmental stages became known they were, on account of the puparium with its T-shaped split, placed near the Stratiomyids by Lubbock and Brauer. The author who has the best fundament for judging here, is de Meijere: in his monograph over the larva he says, that it forms an interesting intermediate form between the orthorrhaphous and the cyclorrhaphous Diptera; he thinks that it is nearest the latter, and places the family as the first of the *Cyclorrhapha*. I take them here, as in the Kat. paläarkt. Dipt., as the last family of the *Orthorrhapha*. The question cannot at present be solved with certainty, and perhaps they form in reality an intermediate group. It seems to me that they are rather related to the Dolichopodids and partly to the Empids; the mouth parts of the larva are somewhat similar to those in the *Orthogenya*, the pupa is no real cyclorrhaphous pupa, and the opening of it takes place as in the *Orthorrhapha*; as to the imagines it was remarked above, that the wings have a venation probably similar to some Empids, and also it is not unlike the venation of the Dolichopodids with its small basal cells, short subcostal vein, medial cross-vein near the base, short anal cell and convex anal, or in reality probably axillary vein. The agreeing of the hypopygium with that of the Dolichopodids was mentioned above. Also the four posterior cells I find of some importance as pointing towards the *Orthorrhapha*. Finally the Lonchopterids have (as far as known) no frontal bladder, and judging from the way of opening the puparium such a one is no doubt not present, and likewise no bladder-seam nor lunula. On the other hand the head is in *Lonchoptera* more similar to that in the *Cyclorrhapha* by the bristles, and also the mouth parts are somewhat similar, but there is however a distinct maxillar lacinia. Among the *Cyclorrhapha* the family then would probably come near to the *Platypezidae* and perhaps especially to the *Phoridae* (if these belong to the *Cyclorrhapha*);

with these latter they have the bristles on the head in common, and also the puparium and its way of opening is to some degree similar, and the anterior spiracular tubes protrude probably through the second abdominal segment as in the *Phoridae*. Both in Phorids and in some Platypezids are also the anterior convex veins somewhat spinulose. — The whole question is thoroughly treated by de Meijere in his monograph over the *Lonchoptera*-larva, to which I may refer.

Our present knowledge of the family of the Lonchopterids we mainly owe to de Meijere, who has given two elaborate and valuable monographs about them, one dealing with the larva (Zool. Jahrbüch. Abtheil. für Syst. XIV, 1900, 87, Tab. V—VII), the other treating the family (Tijdschr. v. Entom. XLIX, 1906, 44, Pl. IV—V). Before this latter appeared the species were in great confusion on account of their strong varying, but de Meijere has cleared up the species in a remarkably good way. In the Kat. paläarkt. Dipt. 18 species are enumerated; after de Meijere's revision they are brought down to seven species, which thus is the number of palearctic species. In Aldrich's catalogue of North American Diptera three species are enumerated: *lutea*, *riparia* and *punctum*; if correctly determined these should be *lutea* or *furcata* or both; in the Appendix is mentioned that Baker moreover has recorded *L. lacustris* from California, and this again should be either *lutea* or *furcata*; these two common species thus also occur in North America (if they are not distinct species). De Meijere however states, that he has seen *L. furcata* from Canada, so that this species is certain as occurring in North America.

The family only includes one genus, *Lonchoptera* (the Asiatic genus *Cadrema* being doubtful).

The Lonchopterids are much infested by parasitic Hymenoptera; in the literature only little is mentioned about this; de Meijere notes in the works cited above, that he has in single cases seen a Hymenopterous larvæ in the pupa of *L. lutea*, and bred a single Hymenoptere, and according to him Lubbock has described a similar parasitic larva as the pupa of *Lonchoptera*. Mr. Schlick and I have, on the other hand, bred numerous parasites of pupæ of *L. lutea* and especially of *furcata*; when in spring flood refuse in fens is sifted, the pupæ of the named two *Lonchoptera* species may be found in great numbers, but, as mentioned below, they are always infested; only from one single pupa found so a *L. lutea* was bred, from all the others parasites were obtained; among the pupæ sifted in the said way that of *furcata* is by far the most numerous. The parasites are the following: *Pezomachus* sp.; *Alloea contracta* Hal., this is by far the most common; *Pteromalus* sp.; *Merismus* sp.; *Polycystus scapularis* Thoms. and

Cyrtogaster vulgaris Walk. Of all six parasites there is only one in each *Lonchoptera* pupa.

Lonchopterids earlier recorded from Denmark: No Lonchopterid is mentioned earlier than Zetterstedt; this author records in 1848 (Dipt. Scand. VII) five species, *lutea* Meig., *thoracica* Meig., *trilineata* Zett. (Stæg. in litteris), *riparia* Meig. and *cinerella* Zett.; these represent, as seen below, only the two species *lutea* Meig. and *furcata* Fall.¹; thus two species were then known from Denmark. In the present paper three species are enumerated.

1. **Lonchoptera** Meig.

Species of small size and of yellow colour, more or less dark striped to quite dark. Head transverse, a little broader than thorax; it is somewhat arched behind. Vertex and frons broad, the latter slightly narrowing downwards; ocellar tubercle a little prominent. There are two pairs of fronto-orbital bristles; the lower pair, just above the antennæ, approximated, the upper pair placed above, near the eye-margins; two ocellar bristles, and on the posterior side of the triangle a pair of small hairs; four vertical bristles in a transverse row, and lower down, on the middle of occiput a pair of somewhat approximated, smaller postvertical bristles. Along the oral margin is on each side a row of six to seven strong oral bristles; the anterior



Fig. 1. Antenna of *L. tristis*. $\times 100$.

pair (vibrissæ) are shortest and crossing; besides there are some hairs behind, above the mouth opening. Eyes not specially large, but prominent, circular or a little oval; they are bare; the eyes are broadly separated and equally separated in both sexes; the facets of equal size. Antennæ inserted in the middle of the head, not quite near to each other; they are short, six-jointed; first joint widening outwards,

¹ De Meijere thinks, that under *lutea* is perhaps also *fallax* de Meij. intermingled, as Zetterstedt describes the first antennal joint as yellow; I have, however, specimens of certain *lutea* with the antennæ yellow at the base.

obconical, second somewhat cyathiforme, the third semiglobular or nearly globular, bearing a long, subapical, three-jointed arista with the basal joints short¹; the arista is inserted somewhat outwards on the third joint; (when the antennæ are exsiccated the third joint is contracted and more disciforme); the first and second antennal joints have bristles at the apical margin, the third and the arista are short-pubescent, almost microscopically. Epistoma broad, as broad as the frons, but low. Jowls small, a little descending. The oral aperture large, circular. Oral cone developed, but proboscis short, slightly protruding. Clypeus incised in the anterior end, somewhat horse-shoe-shaped. Labrum short, semitubular, triangular and pointed; hypopharynx very small, much shorter than labrum, spindle-shaped and broadly cut at the end; maxillæ with a short and thin, pointed lacinia, about as long as hypopharynx; the palpi relatively large, more than twice as long as the lacinia, club-shaped, hairy and beset with short bristles. Labium with the basal part slightly chitinized, rather slender and not so long as the relatively large and broad labella, which are rounded at the base, but triangular outwards, and thus triangularly oval in shape. Thorax rectangular, a little arched above; pro- and metathorax very small; of bristles there are a humeral, two posthumeral, two notopleural², two supraalar and a postalar bristle; further three dorsocentral bristles, and behind each row of them a very small bristle, so that there are two small præscutellar bristles or hairs; there is also generally a small hair in front of the first dorsocentral bristle, and a small bristle quite in front on each side; otherwise thorax is bare; scutellum rounded triangular with two apical bristles. Pleura without bristles or hairs. Abdomen a little elongated, not broader than thorax, nearly parallel-sided or a little narrowing behind; it is somewhat flattened; the first segment is of a considerable length. In the male there are five visible, not transformed segments, the second and third short, equal in length, the fourth longer and the fifth still longer, sometimes rather much longer; at the end of the fifth segment the hypopygium is seen; the same is larger or smaller but always rather large, bent in under the venter; the two pairs of inner lamellæ or gonapophyses are more or less styliform or blade-shaped, with various dilatations or spines; the outer lamellæ are somewhat scale-like, shorter or longer, with bristles at the margin.

¹ Wandolleck (Zool. Jahrbüch. Abth. für Syst. VIII, 1895, 785) says that the arista is two-jointed and the antennæ five-jointed, but this is erroneous.

² De Meijere says one notopleural and one præsutural; perhaps he takes some of my notopleural as posthumeral and the inner posthumeral as præsutural; this latter might perhaps be correct.

In the female abdomen is pointed; it has six visible segments, the first likewise long; a very small seventh segment is also seen, and at the end there are two very small, hairy lamellæ. The probable real number of abdominal segments was mentioned under the family. Abdomen is sparingly clothed with short hairs, a little longer near the hind margin of the segments and at the sides. Legs somewhat long and slender, femora a little thickened; the four last joints on the front tarsi somewhat dilated in the male, and in this sex sometimes the hind tibiæ dilated towards the end. The legs are short-haired; the anterior coxæ have bristles, and the femora and tibiæ more or fewer, varying in the various species, and sometimes different in the two sexes; in the male there are some stronger bristles below the second and third joints on front tarsi; the hind metatarsus has bristles below at base and apex. Claws and pulvilli small. No empodium. Wings of a characteristic shape, elongated elliptical with a pointed apex; alula and axillary lobe small or nearly wanting; no discal cell; discal vein forked, apparently issuing from the postical vein; medial cross-vein quite near the base. Nearly all the veins spinulous. Squamula alaris very small, squamula thoracalis not developed, but the frenulum visible. With regard to the interpretation of the wing-venation see under the family. In rest the wings lie parallel over abdomen, one covering the other.

The developmental stages are well known. The larva (of *lutea*?) was described by Lubbock (Trans. ent. Soc. London, 3, V, 1862-64, 338); they were found below pieces of wood. Frauenfeld mentions the larva of *lutea* (*trilineata*) in 1869 (Verh. zool. bot. Gesell. Wien, XIX, 941); it was found in winter on the ground below the rosette of leaves of a *Cirsium*, and it was bred about three weeks later. Brauer mentions the exuvium of the same larva (Verh. zool. bot. Gesell. Wien, XIX, 1869, 843). De Meijere in his above cited monograph from 1900 describes and figures the larva, likewise of *lutea*; the author found the larva in January between old leaves of *Salix* on the ground in a wood, and again in April and then together with some pupæ; he also found some larvæ in autumn two of which were only half grown, while a third pupated soon after. In the monograph over *Lonchoptera* from 1906 the author further mentions a pupa found in November, and small and larger larvæ found in the middle of January in a garden on dry leaves on the ground; one of these was bred in April; on pag. 94 he mentions a pupa found on ¹²/₉, which he thinks belonged to *L. furcata*; this is also correct (see below). I have myself examined larvæ of *L. lutea* found at the roots of water plants on ¹⁴/₁₂, and larvæ and pupæ found below reeds on

the shore on $^{24}/_{11}$, and in fens in flood refuse on $^{9}/_{2}$, $^{8}/_{3}$ and $^{13}/_{4}$, one of the latter developing in April; further a pupa of *lutea* sifted from flood refuse at a pond on $^{16}/_{1}$, developing on $^{2}/_{2}$, and another found sitting on a dry leaf on the ground in a wood on $^{10}/_{4}$, it developed on $^{25}/_{4}$, and finally I have examined a pupa of *L. furcata* found on the leaf of a turnip on $^{20}/_{9}$, it developed on $^{22}/_{9}$. But besides these I have had numerous pupæ of *lutea* and especially of *furcata* found in fens in flood refuse of vegetables in spring, but only one single specimen of *lutea* was ever bred, all others were infested by various parasitic Hymenoptera. — The larva of *lutea* is yellowish brown, darker above, paler below; it is elongated elliptical, flat below, somewhat arched above or here a little carinate along the middle; the segments are well chitinized above, and the larva is of a curious appearance, as each segment is, as it were, covered by a shield, the larva therefore is not unlike a small *Oniscus*. The head and prothorax are more or less retracted, but meso- and metathorax are distinct, and then follow six abdominal segments; these eight segments have each the mentioned shield-like appearance; thus counted there would be ten segments, but de Meijere thinks, and no doubt correctly, that metathorax, which is the longest segment, is formed of metathorax and first abdominal segment; perhaps also the last segment includes two; if so, we get the normal number of twelve segments. The mouth parts I have not examined closely; according to de Meijere there is above a triangular labrum, at the sides small mandibles with a few slight teeth and larger maxillæ with a molar part, and on the outside a small palpus; below there is a lower lip. Above on each side there is a distinct, two-jointed antenna, with the apical joint short. On each side of prothorax is a thin, attenuating thread, directed forwards; at their bases outwards lies on each side the small prothoracal spiracular tubercle. On the front margin of mesothorax is at each side a similar thread as on prothorax, but a little longer, and behind them, on the side, a third pair, quite short. Each of the eight chitinized segments has the side- and hind-margins of the shield produced as a thin rim, and this rim is curiously incised with numerous, dense incisions, perpendicular on the margin, so that the margin looks as striated; the first chitinized segment, mesothorax, has the front- but not the hind-margin so ornamented; thus the margin all round and the incisures, except the first, are striated. On the side-margin is a number of small spines or papillæ, one on each side of mesothorax just behind the short filament, then four on each side of the long (double) metathorax, and two on each side of the following segments, except the last which has also four; along the side, below

the produced margin of the shield, is on each segment a very small spine or papilla with hairs; the last segment has six along the hind margin below. In the hind margin of the last segment are two long threads similar to the anterior threads; at the base outside to them are the short posterior spiracular tubes, which thus are very distant; the larva is consequently amphipneustic. On the ventral side there are some short spines or hairs. The length is 3,5 mm. — The pupa lies in the larval skin; the puparium therefore is quite similar to the larva, but it has very small, brown anterior spiracular tubes, protruding (through holes already discernible as thin-skinned spots in the larva) on each side near the front-margin of first abdominal segment (or, if this one is coalesced with metathorax, of the second abdominal segment). At the emerging of the imago the puparium opens with a T-shaped split, the transverse portion of which lies in the middle of metathorax, while the longitudinal portion stretches to the end of second abdominal segment, and here also a small transverse split is seen. — As mentioned above I have also seen a pupa of which *L. furcata* was bred, and I can confirm de Meijere's suggestion with regard to the puparium described by him as probably belonging to this species, as I find all the characters given by him agreeing with my puparium; it is of a more whitish colour than that of *lutea*; the striation or serration of the hind margins to the segments is nearly wanting; the prothoracal filaments are short; the outer mesothoracal are more than half as long as the inner; of marginal serrations there are about four between the inner filaments, and three between these and the outer; in *lutea* the outer mesothoracal filaments are about one third or fourth of the inner in length and placed near to them without marginal serrations between, and between the inner filaments are about fourteen marginal serrations; on the last segment there are in *furcata* about five to six marginal serrations between the filaments, and outwards to these latter is on each side the last marginal papilla placed on a long peduncle; in *lutea* there are about twelve marginal serrations between the filaments, and the last marginal papilla is short and placed just inwards to or below the filament; the length of the puparium of *furcata* is 3 mm, of *lutea* 3,5 mm.

According to the above mentioned the larva lives between dry or decaying leaves on the ground, especially on more or less humid places, in refuse of vegetables in fens or at the borders of water; the pupæ are found on the same places, generally attached to leaves. The larva seems to hibernate, but there are no doubt more than one brood in the year, as pupæ have been found late in the season in September and November; I think the development is quite irregular

with regard to time, and it is not improbable that also the imago may hibernate. According to de Meijere the eggs are white, oval, 0,6 mm long and 0,25 mm in diameter; the shell is structure-less.

A very curious feature is found in one species, *furcata*; in this species the males are very rare; while the female is common and may be found in great numbers on the localities where it occurs, there are in all known, I think, about six males. For this reason de Meijere thinks (Tijdschr. v. Entom. XLIX, 1906, 49) that this species propagates mainly by Parthenogenesis, and he supports this opinion by the shape of the receptacula seminis; these are in *L. lutea* long, and spermatozoa are often found in them; in *furcata* on the contrary the receptacula are short, and the author never found spermatozoa in them. This fact would be rather unique among the Diptera.

The species of *Lonchoptera* are small flies, characteristic by the shape of their wings; they occur on humid places, often at borders of water and generally in great numbers.

Of the genus now 7 palæarctic species are known after de Meijere's revision; 3 have been found in Denmark.

Table of Species.

1. Front femora with only one bristle above near apex; middle femora in the male with 2—3 bristles below in the middle; wings somewhat strongly brown; rather large, always dark species 3. *tristis*.
- Front femora with three bristles above near apex; middle femora in the male without bristles below; wings only yellowish; smaller, often more or less pale species 2.
2. Vertical bristles all, or at all events the inner, nearly always black; front tibiæ without posterior bristle and middle tibiæ without ventral bristle; postocular bristles yellow; anal vein generally terminating below the base of the discal fork . . . 1. *lutea*.
- Vertical bristles all yellow; front tibiæ with a posterior bristle and middle tibiæ with a ventral bristle; some of the upper postocular bristles generally black; anal vein terminating behind the base of the discal fork 2. *furcata*.

1. *L. lutea* Panz.

1809. Panz. Faun. Germ. CVIII, 20, 21. — 1824. Meig. p. p. Syst. Besch. IV, 107. — 1848. Zett. p. p. Dipt. Scand. VII, 2802, 1. — ?1862. Schin. F. A. I, 243. — 1903. Kat. paläarkt. Dipt. p. p. II, 353. — 1906. De Meij. Tijdschr. v. Entom. XLIX, 64, 1, Pl. I, Fig. 2, 5—6, Pl. II, Fig. 20—22. — *Dipsa furcata* Fall. p. p. 1823. Dipt. Suec. Phytom. I. — *L. flavicauda* Meig. 1824. l. c. 107. — 1903. Kat. paläarkt. Dipt. II. 353. — *L. lacustris* Meig. p. p. 1824. l. c. 107. — 1903. Kat. paläarkt. Dipt. p. p. 353. — *L. riparia* Meig. p. p. ♂, 1824. l. c. 108. — 1903. Kat. paläarkt. Dipt. p. p. 353. — *L. rivalis* Meig. p. p. 1824. l. c. 108. —

L. nigrimana Meig. 1824. l. c. 108. — 1848. Zett. l. c. 2809, 8. — 1903. Kat. paläarkt. Dipt. II, 353. — *L. thoracica* Meig. 1824. l. c. 108. — 1848. Zett. l. c. 2803, 2. — 1903. Kat. paläarkt. Dipt. II, 354. — *L. palustris* Meig. 1824. l. c. 109. — 1903. Kat. paläarkt. Dipt. II, 353. — *L. punctum* Meig. 1824. l. c. 110. — 1903. Kat. paläarkt. Dipt. 353. — *L. trilineata* Zett. p. p. 1848. l. c. 2804, 3. — 1862. Schin. F. A. I, 244. — 1890. Stein, Wien. ent. Zeitg. IX, 110. — 1903. Kat. paläarkt. Dipt. II, 354.

Male. Vertex and frons yellow, shining; ocellar triangle blackish and the space around it may be more or less darkened; vertical bristles black or generally the outer yellow, very rarely one of the inner, or both, yellow. Epistoma whitish. Occiput yellow, more or less grey above. postocular bristles yellow. There are six oral bristles on each side, the hindmost yellow, the others black. Antennæ black, sometimes yellowish at the base. Thorax somewhat shining, very varying in colour; either quite yellow, or with a narrower or broader greyish black middle stripe, or with three stripes and these may be narrower or broader, and they may be confluent so that thorax is quite blackish grey; scutellum yellow, or with the thoracal middle stripe continued over it, or nearly quite dark; postscutellum yellow or generally dark. Pleura generally yellow, only in the darkest specimens more or less to quite dark. Abdomen likewise very varying in colour; in the palest specimens it is yellow with only the base more or less dark grey, and with the hypopygium yellow; then the dark part may be larger, so that only the apical parts and the sides are yellow, the hypopygium dark grey, and finally abdomen may be all dark grey; the venter varies in a similar way. The fourth abdominal segment is longer than the third. Abdomen is clothed with short, scattered, black hairs; near the hind margin of the segments is a row of a little longer hairs, longest towards the apex, and near the side margin is on each segment a longer hair; the venter has short hairs, longer on first and second segments; on the second ventral segment are on each side two to three bristles, and on the third likewise one or two smaller bristles and some strong hairs. Hypopygium with somewhat large, yellow apical lamellæ, with black bristles at the apical margin, and between these, nearer the ventral side, some which are hook-like bent at the end, and are characteristic for the species; the posterior inner lamellæ (gonapophyses) have a tooth-like process at the base on the outer side and are hook-like curved inwards at the apex; the anterior are about straight, with bristles on the inside, of which the apical one is strongly curved. Legs yellow, front tarsi often a little darkened and the last three joints more or less dark; posterior tarsi more or less darkened towards the end; the last four

joints on front tarsi a little dilated. The legs have short black hairs, front coxæ with bristles at the outer margin and apex, middle coxæ at the apex; front femora with about three bristles above on the apical half, middle femora with one bristle on the anterior side in the middle, and hind femora with about two on the antero-dorsal side; besides the femora have some bristles around the apex; the



Fig. 2. Wing of *L. lutea* ♂.

front tibiæ have two dorsal bristles, middle tibiæ two antero-dorsal and above one postero-dorsal, and the hind tibiæ have some more or less dorsal bristles and a couple of smaller ventral bristles on the apical part; besides the tibiæ have some bristles at or near the apex; the hind metatarsus has a pair of bristles below at the base and one small at the apex. Wings yellowish; the anal vein terminates below

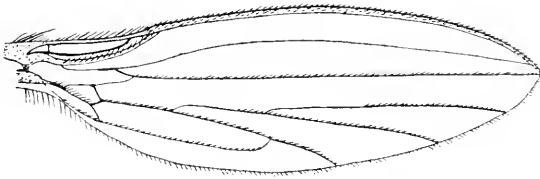


Fig. 3. Wing of *L. lutea* ♀.

the base of the discal fork, or a little before or behind it; the upper branch of the discal fork spinulose on a little more than the apical half. Halteres yellow.

Female. Quite similar to the male and varying in the same way. Venter without bristles on second and third segments. Front legs with the apical half of tibiæ and with the tarsi blackened.

Length 2,4 to about 3 mm.

As seen the species varies much, and the varieties have been described as species. The main varieties are:

v. *lutea* Meig. Thorax yellow or with a slight middle stripe; abdomen only dark at the base.

v. *flavicauda* Meig. Thorax with dark middle stripe; abdomen mainly dark above.

v. *trilineata* Zett. Thorax with three stripes; abdomen as above.

v. *palustris* Meig. The dorsal stripes on thorax broad, with only narrow yellow interstices.

v. *cinerea* de Meij. Thorax, pleura and abdomen all dark.

L. lutea is very common all over Denmark; it occurs in woods and on meadows on humid places, often at the borders of ditches and lakes, and is here found in low herbage in great numbers. It is present in the greater part of the year, my dates are $27/3$ — $19/10$. The larva has been found below reeds on Vesterfælled on $24/11$, in Dyrehaven at the roots of water plants on $14/12$, in Ruderbøgn in flood refuse at Skovrøddam on $9/2$, and likewise in Lyngby Mose and Damhusmosen on $8/3$ and $13/4$, one of the latter developed in April (Schlick, Kryger); a pupa was sifted from flood refuse at Skovrøddam on $16/1$, it developed on $2/2$; another was found sitting on a dry leaf on the ground in Ermelund on $10/4$, it developed on $25/4$ (Kryger); further the pupa has been found in flood refuse in fens on many various localities, but they were always infested with parasitic Hymenoptera. The pale forms of the species are most common with us, while the var. *trilineata*, *palustris* and *cinerea* are less common, though not rare.

Geographical distribution:— All Europe, towards the north towards northern Sweden; probably it also occurs in North America.

2. *L. furcata* Fall.

1823. Fall. Dipt. Suec. Phytom. 1, p. p. (*Dipsa*). — 1906. De Meij. Tijdschr. v. Entom. XLIX, 72, 2, Pl. IV, Fig. 3, 7—9, Pl. V, Fig. 23—25. — *L. lutea* 1824. Meig. p. p. Syst. Besch. IV, 107. — 1862. Schin. p. p. F. A. 1, 243. — 1890. Stein, Wien. ent. Zeitg. IX, 110. — 1903. Kat. paläarkt. Dipt. p. p. II, 353. — *L. lacustris* Meig. p. p. ♀, 1824. l. c. 107. — 1903. Kat. paläarkt. Dipt. p. p. II, 353. — *L. riparia* Meig. p. p. ♀, 1824. l. c. 108. — 1848. Zett. Dipt. Scand. VII, 2807, 5. — 1903. Kat. paläarkt. Dipt. p. p. II, 353. — *L. rivalis* Meig. p. p. ♀, 1824. l. c. 108. — *L. trilineata* Zett. p. p. 1848, l. c. 2804, 3. — 1903. Kat. paläarkt. Dipt. p. p. II, 354. — *L. impicta* Zett. 1848. l. c. 2806, 4. — 1903. Kat. paläarkt. Dipt. II, 353. — *L. cinerella* Zett. 1838. Ins. Lapp. 792, 2 et 1848. l. c. VII, 2808, 6. — 1903. Kat. paläarkt. Dipt. II, 352.

Of this species I only know the female. It is very similar to *lutea* and varies in the same way. Vertex and frons yellow, whitish pruinose, dull; the ocellar space dark and sometimes somewhat darkened around it; vertical bristles yellow. Occiput more excavated above than in *lutea*, yellow, sometimes grey just above, or more grey; post-ocular bristles yellow, often some of the upper black. Of the oral bristles the four anterior are black, the two posterior yellow; sometimes also the fifth is black. Antennæ black with the base yellow.

Thorax varying about as in *lutea*, from almost quite yellow, through forms with one or three stripes to such with thorax quite dark grey; but when there are three stripes these are always broad and confluent on the front part, so that distinctly three-striped forms do not occur; scutellum yellow with dark middle stripe, sometimes more dark; postscutellum generally grey. Pleura yellow or more or less dark. Abdomen yellow with a middle stripe, which is sometimes rather narrow; the stripe may then widen more and more, until abdomen is quite dark grey; abdomen is thus never dark in front, yellow behind as in varieties of *lutea*. Legs yellow, tarsi darkened towards the end; front tarsi most darkened, but the tibiæ not dark on the apical part as in *lutea*; the chaetotaxy of the legs is somewhat differing from that in *lutea*; the coxæ have similar bristles; the front femora have likewise three bristles above on the apical part, middle femora one on the anterior side in the middle, and hind femora two on the antero-dorsal side, besides the bristles around the apex; the front tibiæ have two dorsal bristles and one posterior above the middle, middle tibiæ two antero-dorsal, one postero-dorsal above the middle and one ventral near the apex; hind tibiæ have as in *lutea* about four more or less dorsal and a couple of small ventral bristles

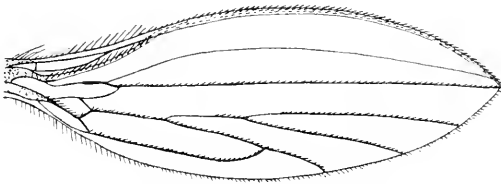


Fig. 4. Wing of *L. furcata* ♀.

on the apical part; besides the tibiæ have apical or subapical bristles; hind metatarsus has two ventral bristles at the base and one at the apex; the bristles on tibiæ are smaller than in *lutea*. Wings slightly yellowish; anal vein terminating behind the base of the discal fork; the upper branch of the discal fork spinulose to near the base. Halteres yellow.

According to de Meijere the male is similar; abdomen has the last segment twice as long as the preceding; the hypopygium is small, the apical lamellæ considerably longer than broad, with bristles at the margin, also at the inner margin; the posterior inner lamellæ (gonapophyses) are large, reaching to the end of the apical lamellæ, somewhat lobe-shaped; the anterior are short lobes.

Length 2,3—2,5 mm.

As seen this species is similar to the preceding and varies in the same way; it is however known without difficulty; the male will be known by the hypopygium, and both sexes nearly always by the colour of the vertical bristles, the generally dark upper postocular bristles, and the bristles on the anterior tibiæ; besides the female has not the front tibiæ darkened on the apical part.

The varieties are:

v. *furcata* Fall. Occiput yellow; thorax yellow or with a narrow stripe; abdomen with a generally narrow stripe.

v. *riralis* Meig. Occiput somewhat darkened above; thorax with a broader middle stripe; abdomen nearly quite dark.

v. *lacustris* Meig. Thorax much darker, only narrow yellow side stripes present.

v. *cinerella* Zett. Body nearly all grey, also the pleura.

L. furcata is like the preceding common in Denmark, and occurring everywhere and on similar localities, often together with it, but the male has never been taken here. My dates are $27/3$ — $19/10$. A pupa was found sitting on the leaf of a turnip at Lyngby on $20/3$, it developed on $22/3$ (O. Rostrup); further the pupa has been sifted in very great number from flood refuse in fens on various localities, but they were always infested by parasitic Hymenoptera. The pale and darker forms of the species seem to be about equally common in Denmark.

Geographical distribution:— All Europe, towards the north to northern Sweden, and also in North America.

3. *L. tristis* Meig.

1824. Meig. Syst. Besch. IV. 110, Tab. XXXVI, Fig. 11. — 1862. Schin. F. A. I. 244. — 1903. Kat. paläarkt. Dipt. II, 354. — 1906. De Meij. Tijdschr. v. Entom. XLIX, 78, 3, Pl. IV, Fig. 1, 10—12. — *L. grisea* Gimmerth. 1842. Bull. Soc. Imp. Nat. Mosc. XV, 671. — 1903. Kat. paläarkt. Dipt. II, 353. — *L. fuscipennis* Bohem. 1851. K. Vet. Akad. Handl. 1851, 207. — 1855. Zett. Dipt. Scand. XII, 4818, 9. — 1899. Bezzi, Bull. Soc. Ent. Ital. XXX, 161. — 1903. Kat. paläarkt. Dipt. II, 353.

Male. Vertex and frons blackish grey, shining; the inner vertical bristles black, the outer dark yellow; epistoma grey. Occiput quite grey, postocular bristles yellow. The oral bristles black, only the seventh, quite behind the aperture, yellow. Antennæ black. Thorax dark greyish brown or grey, slightly shining, generally a little paler just at the humeri and in front of scutellum; scutellum dark with the margin yellow; postscutellum dark grey. Pleura dark greyish brown, a little paler in front and at the sutures. Abdomen dark grey,

slightly shining, pale just at the apical margin or here with a larger spot, and sometimes the hind margins of the segments narrowly pale; the fourth segment a little longer than the third, the last long; abdomen has short, black hairs, a little longer at the hind margins, longest on the last segments, and at the sides a long hair on each segment. Venter yellowish or darker brown, with short hairs, longer on first and second segments; on the second ventral segment a pair of somewhat strong bristles on each side. Hypopygium large, grey, with short, yellow apical lamellæ with the inner corner somewhat drawn out, and with small bristles at the margin; the posterior inner lamellæ (gonapophyses) have a roundish appendage on the outer side near the base and are otherwise pointed; the anterior lamellæ are rather short, curved at the base, dilated outwards towards the outer side and terminating into a spine-shaped apex, directed inwards. Legs yellow or dark yellow, tarsi more or less dark towards the end; front tarsi with the last joints distinctly dilated; middle tibiæ curved above the middle, the convexity of the curve behind, the concavity in front; hind tibiæ rather thickened towards the end and club-shaped; the legs have short, black hairs, anterior coxæ with bristles on the outer side and at apex; front femora with an anterior bristle behind the middle and a posterior near the apex, but with none above except the apical; middle femora with an anterior bristle in the middle, and with two or three below in the middle, of which only the anterior is long; hind femora with two dorsal bristles on the apical part and with one anterior near the apex; besides the femora have apical and subapical bristles; front tibiæ with only one dorsal bristle, middle tibiæ with two dorsal or antero-dorsal bristles, one in the middle and one near the apex, hind tibiæ as usual with three or four more or less dorsal bristles and two smaller ventral below the middle; the bristles are rather long; besides the tibiæ have apical and subapical bristles; hind metatarsus with the usual two bristles below at base and one at apex. Wings strongly brownish grey or almost blackish; anal vein generally terminating below the base of the discal fork. Halteres yellow.

Female. Quite similar to the male; venter without bristles on second segment; front tarsi not dilated; middle tibiæ not (or not distinctly) curved, and hind tibiæ less dilated than in the male; front tibiæ with two dorsal bristles and a very short postero-ventral bristle above the middle; middle femora without bristles below, middle tibiæ besides the dorsal bristles also with a small posterior bristle above the middle.¹

¹ De Meijere gives the bristle as present in both sexes, but it is not found in any of my numerous males.

Length 3.2—3.5 mm.

This species is very characteristic and does not vary; it cannot be confounded with any of the two other Danish species.

L. tristis is much less common in Denmark than the other two, but where it occurs it may be numerous; it was not known as Danish until 1908; at Fure Sø and Faxø Ladeplads; on Langeland at Lohals, and in Jutland in Vejle Nørreskov and at Hald near Viborg (the author). My dates are $24\frac{1}{6}$ — $5\frac{5}{8}$; at Lohals I once took it in very great numbers on a shaded, humid road in a wood, where it sat on the ground; at Fure Sø I have taken it swarming low over the water surface together with species of *Hilara*, and both sexes swarmed.

Geographical distribution:— Europe down into Italy; towards the north to southern Sweden.

CYCLORRHAPHA.

ASCHIZA.

SYRPHOIDEA.

Syrphidae.

Head generally more or less semiglobular, short or somewhat longer; it is as a rule a little broader than high, as broad as, or generally a little broader than thorax; behind it is somewhat excavated, or it may be flat. The eyes are generally touching in the male for a shorter or longer distance; sometimes they only meet in a point, or they are not touching, only more or less approximated, but always nearer to each other than in the female, in which sex they are well separated. Vertex somewhat prominent, bearing three ocelli; in the males with touching eyes it is triangular or more or less elongated, sometimes long and narrow; in the females and in the males with separated eyes the vertex and frons are evenly widening downwards, in some cases the borders are almost or quite parallel, and often in the male the upper part has parallel borders, and below the middle a more rapidly widening begins. The vertex is more or less hairy, but there are no individualised bristles (though in the bristle-bearing species of *Chilosia* there may be some bristly hairs). Frons generally more or less prominent, sometimes slightly or not at

all; in a few cases it is prolonged to a shorter or longer to very long, styliform part, bearing the antennæ (quite strictly this part should be considered as formed partly of the frons, partly of epistoma); in the males with touching eyes the frons is triangular, in the females and in the males with separated eyes it is broad, more or less square. The frons is more or less hairy, sometimes bare. The eyes are large, oval, or in the males of a more or less reniform shape; they are generally unicolorous, but in some cases they have dark spots, or longitudinal or transverse bands; they are bare or more or less hairy, from almost imperceptibly to densely and long-hairy; sometimes they show bands of denser hairs; in some cases they are hairy in the male, bare or almost so in the female. In the male the facets are generally more or less enlarged on the upper part, sometimes slightly or almost not; in a few cases the enlarged facets form a distinctly bordered area. The antennæ are inserted more or less near to each other, sometimes with a little distance, sometimes quite close: they are inserted on (or more strictly just below) the frontal prominence, in the middle of the head or more or less above; more rarely they are placed below the middle. The antennæ are, I think always, six-jointed, the three last joints forming a three-jointed arista. The shape of the antennæ are somewhat varying; the usual form belongs to the disc and arista-type; the basal joints are then more or less short, the second somewhat compressed and with the apical margin prolonged a little forwards on both sides, especially on the inside (somewhat after the fashion in the Dolichopodids); the third joint in disciform, roundish or more or less elongated oval, sometimes somewhat square, and more or less compressed; it bears on the dorsal side near the base a shorter or longer, three-jointed arista, the basal joints of which are quite small, generally only to be seen under the microscope and after special preparation, as they are often more or less hidden in a hollow in the third antennal joint, this is especially the case with the first joint. From the mentioned shape the antennæ may then vary to being longer, with the basal joints and especially the third joint longer, and they may be rather long, with all three joints more or less linear, and then the last joints slightly or not compressed, and in a single case the two last joints form a spindle-shaped body; the arista may be placed more outwards on the third joint, and in extreme cases be terminal and take the shape of a style. The basal antennal joints have small hairs and generally bristles at the apical margin, especially above and below; the third joint is microscopically hairy; in most cases the arista is likewise microscopically hairy, but it may also be more or less distinctly short-plumose and in some

cases it is long-plumose with long rays above and below. The antennæ are not rarely larger in the female than in the male, very rarely on the contrary largest in the male (*Liogaster*). Epistoma as a rule rather broad, rarely narrower; it varies otherwise considerably in shape; generally it is more or less hollowed below the antennal prominence, then raised to a smaller or larger central knob, below which it is again hollowed with a prominent upper mouth edge; often it is, however, only retreating below the central knob, not being raised again at the mouth edge; the whole lower part of the epistoma with the central knob may be more or less protruding; in other cases the epistoma goes straight or almost so from the antennæ to the mouth edge, only being a little arched or sometimes keel-shaped; in a few cases the central knob and the upper mouth edge are fused together and prominent, sometimes very much prominent forming a protruding bec. The epistoma may be more or less descending, from not, or almost not, to rather strongly, and in the latter case it is generally pointed below. The oral aperture is generally elongated, only when the epistoma is straight, not at all protruding below, the aperture is more or less roundish; on the other hand it is long and narrow when epistoma is strongly protruding; it has otherwise generally a special shape on account of the shape of the oral margin; this margin goes, forming the side mouth edges, from behind straight forwards, or when epistoma is descending, downwards; the side mouth edges end in front on each side with a more or less angular and often more or less drooping point, the lateral angles; between these the anterior margin, the front mouth edge, forms a curve which goes forwards and generally more or less upwards; this characteristic shape may be more or less pronounced, depending especially on the more or less drooping lateral angles, but is always present when the oral aperture is not short and roundish. Epistoma is most often more or less hairy, sometimes rather densely, and it may be hairy all over or only at the sides; sometimes it is very slightly hairy, and not rarely it is quite bare; the colour is either quite yellow or with a more or less complete black middle stripe, and also often with the lower side-parts black; or it is of black or æneous colour; the colour and hairiness of the epistoma is to some degree of systematic value; the black epistoma may often be more or less pale pruinose. The jowls are broader or narrower, in a few cases very narrow; they are generally only slightly descending, but sometimes rather strongly especially when the epistoma is descending; they are more or less separated from epistoma, either there is a pit in front of them, or there is a more or less complete dividing furrow; this furrow stretches

generally a little upwards at the inner eye-margin below, so that short and narrow eye-margins — rudiments of cheeks — are formed, and in a few genera, especially in *Chilosia*, the furrow stretches up towards the antennæ, separating off the cheeks as narrower or broader eye-margins on each side. The oral cone is always well developed, it and the proboscis are of various length, from rather short to considerably long, but generally of medium length; they are longest in forms with a strongly protruding epistoma and elongated oral aperture as *Rhingia*. The clypeus is shorter or longer; it is deeply incised in the anterior part and thus elongated horse-shoe-shaped; the basal part is shorter or longer, and at its upper end is a small piece which is somewhat separated or indistinctly jointed, so that it is able to be angularly bent against the other part and acts as a hinge when the proboscis is laid up; this small upper part is situated just towards the front mouth edge in the bottom of the mentioned incurving. The mouth parts are shorter or longer according to the length of the proboscis, and they are characteristic for the family. There are always maxillæ present. Labrum somewhat strong and strongly semitubular; its apex is of a characteristic shape; it is always divided into five processes; the median process is cleft, generally to the base, each part of it is pointed and generally bears spines or emergences on the margin and especially at the apex; the upper lateral processes are generally very delicate, pointed, sometimes broader at the base, attenuated towards the apex, and they have sometimes some emergences or are a little serrated at the margin; the lower lateral processes are broad, much broader than the others, and they are broad at the apex, nearly always with the lower or outer corner rounded, the upper or inner more angular or drawn a little out; sometimes the shape is a little altered; the labrum has on each side below a lateral row of small papillæ or warts. Hypopharynx about of the length of labrum, forming a more or less slender, blade-shaped organ with parallel sides; it is attenuated at the apex, but the apex itself is nearly always rounded; the hypopharynx is semitubular with the margins curved upwards; the salivary duct is always distinct. The maxillæ have a characteristic, slightly curved, knife-shaped lacinia which is shorter than hypopharynx, in a few cases rather short; it is always densely beset with very small, microscopical spines which are arranged somewhat in longitudinal rows and are most distinct at the apex; the maxillary palpi are one-jointed; they are shorter or longer, from very short to being of a considerable length; they are thread-like, sometimes a little clubbed, and they are densely beset with microscopical hairs and bear some bristles at the apex or in the whole

length. Labium highly semitubular; it has the basal part well chitinized and of the length of, or shorter or longer than the labella; these latter are generally oval, sometimes broadly oval or on the contrary long and narrow; they are able to be spread out to a more or less disciform part. The labium has a somewhat long basal connecting membrane. Thorax rectangular or quadrate; pro- and metathorax small; there is no chitinized metasternum behind the hind coxæ, except in single cases (*Sphegina* and *Neoascia*), and also here I think the chitinization is in reality the meeting metaepimera; these latter are characteristic; they send a process up on each side of the base of abdomen behind the halteres (somewhat recalling the facts in the Dolichopodids); this process stands sometimes out on each side of the base of abdomen as a pointed protuberance f. inst. in *Neoascia* and *Xylota*. The first abdominal spiracle is placed quite close to this process and often more or less imbedded in it, so that it may look as if the spiracle was lying in the epimeron. Scutellum is either yellow or yellowish, often translucent, and sometimes partly black, or it is black or æneous, concolorous with the thorax; this colour of the scutellum is of some systematic value; scutellum is either bare below the margin, or it has here a more or less distinct fringe of downwards directed hairs; in a single genus (*Microdon*) it has two small marginal spines or processes, in other cases the margin is serrated (*Eumerus*). Metapleura (Osten Sacken) densely clothed with short hairs, sometimes a little longer towards the hind margin. There are generally no thoracal or scutellar bristles; such are only present in few cases (*Chilosia*, *Vollucellinae*, *Ferdinandea*), and are then notopleural, supraalar and postalar bristles and scutellar marginal bristles; generally also mesopleural bristles are then present, and sometimes a row in front of scutellum; in *Ferdinandea* there are also post-humeral bristles. Abdomen rather varying in shape; in most cases it is elongated oval or more parallel sided, but it may vary from rather short ovate to very long and narrow, and in the latter case it is generally more or less constricted about the base and club-shaped. The first segment is small or somewhat small. The number of not transformed segments is somewhat varying, and is to some degree characteristic for the groups. In the males the number of dorsal segments varies from four to five; the last is often small, but sometimes as large as the others; the number of not transformed ventral segments is generally the same as for the dorsal, but in some cases (*Paragus*, *Chrysotoxum*) there is one ventral segment less than there are dorsal, and sometimes the last ventral segment is small and more or less hidden under the genitalia even if not really transformed.

After the segments not transformed follow those which are transformed and constitute the exterior genitalia; the number of these segments is, according to the above, four or five, as the last is always the ninth. The exterior genitalia are of a shape characteristic for the family; they are unsymmetrical, turned from the left to the right, and they are lying below the apex of abdomen; from above generally only the eighth segment is seen as a smaller or larger knob at the apex (and hence it is in descriptions often termed the fifth or sixth); below generally all the segments may be seen, or only the first of them is hidden under the last not transformed ventral segment (figs. 5 and 6). The transformed segments are small, forced over in the

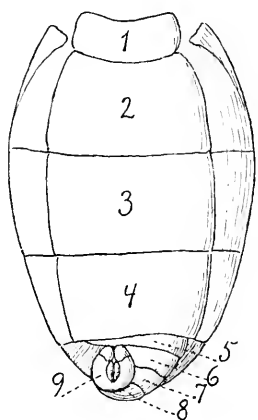


Fig. 5. *Syrphus ribesii*.

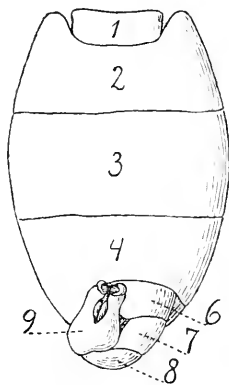


Fig. 6. *Pipiza quadrimaculata*.

Abdomen from the ventral side, showing the hypopygium. 1—8 the eight segments, 9 the hypopygium; in fig. 6 the fifth segment is hidden.

left side; the first of them is sometimes present in the whole breadth, but short and more or less unsymmetrical, the others are narrow, only occupying the left side; the tergites are quite hidden under the last normal dorsal segment, and the segments are unsymmetrical in shape; the genital segments curve over towards the right, so that the eighth is lying just at the apex of abdomen, this segment is not divided into tergite and sternite; after the eighth segment follows the ninth, the real hypopygium, lying in the right side and sometimes partly hidden under the last normal ventral segment; the hypopygium may be of various shape and shorter or longer; it bears at the end below (when in normal position) a pair of claws, very varying in size and shape, symmetrical or unsymmetrical, and from its base above arises a large, very complicated and very variously shaped

organ, curving down between the claws or on the contrary curving upwards (the penis or penis-sheath); below, between the claws, the hypopygium is more or less incised, generally deeply, and from here arise two smaller or larger, always hairy lamellæ of various shape (I think placed on a small tenth segment): in a single case (*Sphaerophoria*) the incision for these lamellæ is very deep and closed again outwards, so that the lamellæ are here sitting in the middle of the lower surface of the hypopygium. I am inclined to think that the down-turned side of the ninth segment is in reality the dorsal side.¹ In some genera (*Sphaerophoria*, *Tropidia*) the genitalia may look as if they were symmetrical, especially when seen from above, and these genera have been considered as exceptions from the rule; this is, however, only apparently, the genitalia are always unsymmetrical and of principally the same construction. In the female abdomen is more pointed than in the male; its number of visible segments is likewise varying, from four (*Triglyphus*) to six, but the border between transformed and not transformed segments is here less sharp, sometimes a seventh or eighth small segment may be seen; the small posterior segments are otherwise generally hidden, the last terminates with two small lamellæ. The ventral segments are generally well chitinized, but in some cases they are rather delicate and slightly chitinized. Abdomen has no bristles of any kind. Legs more or less long, in most cases of rather simple shape, but they may sometimes be more or less specially formed; thus the posterior or only the hind coxæ or trochanters may bear spines or processes in the male, the hind femora may be thickened and more or less curved, often at the same time armed with a tooth or with rows of spines, either in both sexes or only in the male; also the hind tibiæ may be thickened, compressed and more or less curved, and they have always a more or less pronounced incurvation near the apex on the posterior side; hind metatarsus is not rarely more or less thickened. The legs are always haired in principally the same way, the anterior femora more or less long-haired on the posterior side and below, the hind femora on the anterior side and below, sometimes also above; for the rest the hairs are short; sometimes also the femora are rather short-

¹ I think the exterior genitalia are rather homologous to those in the Dolichopodids; like those they are unsymmetrical and bent round, but here not from the dorsal to the ventral side but from the left to the right, the ninth segment, however, perhaps bent such, that its real dorsal side is turned downwards; as in the Dolichopodids the eighth segment is not divided into tergite and sternite; the claws I think answer to the inner lamellæ in the Dolichopodids, and the hairy lamellæ to the outer lamellæ.

haired, and the hind femora may be quite short-haired; in some cases the tibiæ may be a little fringed, especially the hind tibiæ; the hind femora are in some genera more or less setulose below; otherwise the legs have no bristles, only two exceptions occur; *Volucella inanis* has bristles on the anterior tibiæ, and in the genus *Ferdinandea* there are a few bristles on middle femora and on the tibiæ. The front and hind tibiæ and tarsi have a curious, short, adpressed, generally yellow or reddish pubescence, on the front legs present on the apical half of tibiæ on the anterior and ventral side, and below the basal part of the tarsi, on the hind legs on posterior and ventral side of tibiæ and base of tarsi. In all (or nearly all) genera the trochanters have a special, solitary long hair or bristle above, sometimes most distinct on the anterior legs, and sometimes it does not seem to be present; likewise there is, I think always, a curious, more or less circular, scabrous patch on the anterior side of the femora at the base; this patch is formed of short, more or less squamose hairs; in some groups it is specially distinct (as in the *Eristalinae*) and then it is formed of quite short, distinctly squamose hairs, while in other cases it is only slightly pronounced, the hairs forming it being less squamose, but differing from the other clothing by being quite short.¹ While the legs are in most cases equal in both sexes or only a little different, they show in a few genera (*Platychirus*, *Pyrophaena*) secondary sexual characters generally to a great degree: in the male then the front tibiæ and tarsi, or only the tarsi, are dilated in various ways and generally specially coloured, and also the middle tibiæ are generally specially shaped; at the same time the front femora and generally also tibiæ, and also often middle femora and tibiæ are specially haired. There are two well developed claws and pulvilli, and a bristle- or spine-shaped, generally short empodium with small hairs. Wings of usual shape, only rarely a little elongated or on the contrary short. Costa continued to the end of the cubital vein; the

¹ These two characters are rather curious and interesting; the solitary hair on the trochanters is mentioned by Verrall as a character for *Helophilus lineatus*, but the hair is, I think always, present; in the descriptions of the genera I have not always mentioned it; it may be shorter or longer and sometimes represented by a pair of hairs; in some cases it is not easily detected when the hairs of the common clothing are long and dense, so that it may be more or less hidden; sometimes it is rather short, and it is often most easily seen on the anterior trochanters. The patch of squamose hairs has been mentioned by Verrall especially for the *Eristalinae*, and it is distinctly seen in some of his figures; in this subfamily it is also specially distinct, but it is likewise no doubt always present, but very varying in development, the hairs being more or less squamose but always different from the common clothing around it.

subcostal cell is open, or in some groups closed; cubital vein unforked and thus only one cubital cell; the vein is either straight or nearly so, or it is curved more or less evenly down in the first posterior cell, or in some groups it is strongly looped; instead of this loop there may in a few cases be a veinlet stretching down in the first posterior cell, sometimes issuing from an angular bend of the vein; the medial cross-vein is placed above the discal cell in the middle or nearer the base or apex; the discal vein is always bent upwards at the end (a branch) and ending in the cubital vein, the first posterior cell thus always closed; a discal cell always present and always bordered below by the upper branch of the postical vein, thus including the fourth posterior cell; it is closed apically by a vein which I take to be a branch from the discal vein; the two veins closing apically the first posterior cell and the discal cell I term in the descriptions the upper and lower marginal cross-veins (the latter in the Dolichopodids termed the posterior cross-vein). Anal cell always long, stretching near to the margin but always closed; axillary vein shorter or longer, but generally weak. Between the cubital and discal veins runs a vein, characteristic for the family, the vena spuria; it is not in connection with the other veins neither at base nor at end; it begins below the base of the radial vein, runs obliquely downwards through the medial cross-vein and terminates at the lower apical corner of first posterior cell; sometimes it is abbreviated at or a little behind the medial cross-vein; below the base of the cubital vein it shows a more or less pronounced thickening or a curious interruption; the vena spuria varies much in strength and is sometimes very weak, but in all Danish genera it is present; in a few foreign genera (as *Graptomyza*) it may be quite wanting. The basal part of the radial vein bears, at all events in most cases, fine bristles; they are sometimes quite distinct, but are often so fine as to be detected only with difficulty or under the microscope, and they are sometimes only few in number.¹ A real stigma never present, but the apical part of the mediastinal cell may be more or less darkened to black or there may here be a darkened part; sometimes the darkened part begins below the apex of the mediastinal vein with a more or less distinct transverse vein between the mediastinal and subcostal veins, termed the stigmatical cross-vein. The axillary lobe generally well developed

¹ My studies tend to show that these bristles are almost always present, except in the *Pipiza*-group, in the species of which I never have detected them; they are, however, often imperceptible, few, or only present near the base; in the descriptions of the genera I have mentioned them only when they are somewhat distinct.

and the alula large, more or less tongue-shaped, but in some genera both lobe and alula are small or almost wanting. The wing-membrane is nearly always microscopically hairy, only in *Eristalis* it is bare, as already noted by Meigen. The squamulæ are of a shape characteristic for the family; they are both developed, generally large, sometimes smaller; they may be of equal size or unequal; at the angulus they are somewhat bladderly; the thoracal squamulæ have a fringe of generally long to very long hairs which are more or less richly branched or furcately divided; the alar squamulæ are likewise fringed, but the hairs are generally shorter, sometimes quite short, they are sometimes simple but most often they are curiously flattened; the squamulæ are short-haired on the surfaces, but in some cases they have long hairs on at all events a part of the surface. The upper edge of the pteropleura below the wing-root is prolonged backwards into a shorter or longer, thread-like filament, the plumula; it is more or less long-haired with plumose or simple hairs; in a few cases it is rudimentary or wanting; this organ is otherwise characteristic for the family (though indications of a similar prolongation are found in some Dolichopodids [*Neurigona*] and Empidids). The wings are in rest borne parallel over the abdomen, one covering the other, or they are held more or less open; for the various genera a various way of bearing the wings at rest has been stated, but this is, I think, not possible; as far as I have observed all (or nearly all) genera are able to close the wings over abdomen, some do always so at rest, while others often hold the wings half spread but also sometimes close them.

As seen the venation of the wings is rather uniform, and it is rather like the common Muscid-type, but differs by the invariably closed first posterior cell and the long anal cell, the vena spuria and other characters. In spite of the uniformity of the venation it exhibits many characters of value in its special formation, thus by the place of the medial cross-vein, the straight or more or less curved or looped course of the cubital vein, the open or closed subcostal cell, the marginal cross-veins lying near the margin and parallel with it or more retracted and perpendicular or recurrent with the lower corners angular or rounded and the upper angles acute or rectangular, the strength of the vena spuria and finally also the presence or want of alula. Verrall thinks the bristles on the basal part of the radial vein characteristic for certain groups, but as said above these bristles are nearly always present. Girschner has in his beautiful work (Ill. Zeitschr. für Entom. 1897, 534) given many characters, especially from the squamulæ and the wings, but it seems to me, that many of them are, to be sure, of great interest but however not of the importance

which the author has laid upon them; the differences in the hairiness of the squamulae, their fringes, the presence or absence of a stigmal cross-vein, the corrugation of the wing-membrane etc. seem to be characters which are not, at all events far from always, bound to systematic groups, and the characters are also very graduated from being distinctly present to quite wanting.

The venation of the wings offers, I think, no difficulty in understanding; the lower marginal cross-vein is, I think, to be interpreted as a branch from the discal vein (compare f. inst. the wing of *Bombylus*); the vena spuria is less easily understood; it is convex; Redtenbacher considers it as a branch from the radial system (the vein III); Brauer is of a similar opinion considering its basal part to the interruption as being the real stem of the cubital vein, and its continuation as a branch from this vein. (Perhaps it might be a rudiment of vein V, the discal vein then only formed of vein VI). Brauer thinks that the cross-vein, which is generally considered as the medial cross-vein, is not this vein, but a branch from the cubital vein; as the place for the real medial cross-vein he considers the thickening or interruption on the vena spuria, referring to *Microdon*; Girschner says, that his observations have not confirmed this view; Brauer's consideration is interesting, but it is at present not possible to say anything certain about this question; if upon the whole the medial cross-vein in the Muscids is always the same vein I think however our medial cross-vein in the Syrphids may be in reality this vein.

The developmental stages of the Syrphids are rather well known and of most genera they have been more or less studied. The larvæ are rather various in appearance, and their biology is at the same time very different. The larvæ of most genera of the subfamily *Syrphinae* are aphidiphagous and live free on the plants among Aphides (or Coccids); this holds good for *Paragus*, *Triglyphus*, *Pipizella*, *Cuemodon*, *Pipiza*, *Melanostoma*, *Lasiophthicus*, *Syrphus*, *Sphaerophoria* and *Baccha*. The larvæ of these genera are more or less leech-like, generally attenuated towards the head-end and here most narrow, and they have distinct mouth hooks and a short posterior spiracular process; the pupa is more or less drop-like, and has no anterior spiracular tubes; the larva of *Melanostoma* has been observed also to take other prey than Aphides, f. inst. Diptera and *Lasiophthicus pyrastris* is recorded to have been bred from a pupa of a *Plusia*; if this latter is not erroneous the larva must have gone into the *Plusia*-larva in so late a stage that this latter has reached to pupate, and then the Syrphid larva has eaten it out and pupated in it, and this may well be probable. The larva of *Xanthandrus*, which genus is so closely allied to

Melanostoma, feeds on larvæ of Microlepidoptera. The larva of *Mesograpta*, a genus allied to *Sphaerophoria*, is recorded to live on pollen and tissues of corn (Riley and Howard: Ins. Life I, 5—8, II, 115). The larvæ of *Platychirus* and *Pyrophaena* have been found among old leaves and in flood refuse, no doubt however living on Aphides or carnivorous in some other way; the larva and pupa of these genera quite resemble those of the other allied genera, only the pupa has anterior spiracular tubes, but these are exceedingly small. The larvæ of *Xanthogramma* and *Doros* have been found in the earth under moss or turf, probably they are also carnivorous; these larvæ are somewhat leech-like, with a short posterior spiracular process; the pupa has no anterior spiracular tubes. The larva of *Neoscia* has been found in flood refuse of vegetables, probably likewise carnivorous, perhaps on microorganisms; it is not leech-like, elongated, with a short tail ending in a telescopically retractile spiracular process; the pupa has anterior spiracular tubes. The larva of *Brachyopa* lives in exuding sap on ulcerated trees; it has a somewhat long posterior spiracular process; the pupa has anterior spiracular tubes. *Rhingia* was recorded by Réaumur to have been bred from cow-dung, but the observation has never since been confirmed. The larvæ of *Chilosia* are internal feeders in root, stalk or leaves of various plants, and in fungi; they have a not long posterior spiracular process; the pupa has anterior spiracular tubes. Finally the larvæ of *Chrysogaster* (s. l.) have been found in mud and flood refuse; they have a short tail with a telescopic posterior spiracular process; the pupa has long anterior spiracular tubes. — The larvæ of the *Volucellinae* (at all events of the European species) live in nests of *Bombus* and *Vespa*, no doubt not as parasites but as scavengers; they are flat, with a short posterior spiracular process; the pupa has anterior spiracular tubes. — The larvæ of the *Eristalinae* live nearly all in putrid water, perhaps of microorganisms or of the organic matters dissolved in the water, those of *Myiatropa* and *Mallota* live in water or humidity in hollow trees; the larvæ belong to the rat-tailed type; they are more or less cylindrical with a very long, telescopic tail with apical spiracles surrounded by stellately arranged threads; the pupa has rather long anterior spiracular tubes. *Merodon* is differing, its larva lives in bulbs of Narcissus and allied plants; it is not rat-tailed but somewhat like a *Syrphus*-larva, with a short posterior spiracular process; the pupa has anterior spiracular tubes. — The larvæ of the *Milesiinae* seem generally to live in exuding sap or decaying trees; this is known for *Myiolepta*, *Criorrhina*, *Pocota*, *Brachypalpus*, *Xylota*, *Ferdinanda*, *Temnostoma* and *Callipobola*; that of *Tropidia* has been found in

flood refuse; *Eumerus* lives as larva in onions, *Syrpitta* in dung or decaying vegetables. These larvæ have a short or a little longer posterior spiracular process, generally (perhaps always) with stellately arranged threads at the apex; the larva of *Myiolepta* tapers behind and has a telescopical spiracular process, and the same is the case with *Calliprobota*, and here the process is rather long; the pupæ have all anterior spiracular tubes. The larva of *Sericomyia* has been found in water in peat, and it is curious that it belongs to the rat-tailed type. — The larva of *Chrysotoxum* has been found in decaying wood and decaying vegetables; it has a short posterior spiracular process; the pupa has no anterior spiracular tubes. — The slug-like larva of *Microdon* lives in ant's nests, the pupa has small anterior spiracular tubes. — Finally the larva of *Ceriodides* lives in sap in ulcerated trees, it has a rather long posterior spiracular process with threads at the apex; the pupa has no anterior spiracular tubes.

In spite of the various appearance of the Syrphid larvæ, they have, however, some features in common. The dermis is always tough or more or less leathery, and it is chagrined from small spinules or hairs, which are often divided; the single segments are not easily observed as the body is more or less transversely corrugated, each segment being subdivided into two to four corrugations. There are in all twelve segments, the head included. Above the mouth opening are two antennæ-like organs; they are, or may be described as, two-jointed, the last joint bearing two papillæ alongside; these two papillæ are not similar, one has at the end a small refractive body, while the other, the one nearest the mouth, is truncate and generally a little crenulated at the apical margin. These organs, which are present and nearly uniform in all cyclorrhaphous larvæ, are generally termed antennæ; Lowne takes them to be the maxillæ; they have been studied by Wandolleck (Zool. Anz. 1898, 283); this author concludes that the whole organ must be taken as antenna, and this in spite of his observation, that the upper papilla with the refractive body gets its nerve from the upper pharyngeal ganglion, while the other papilla, which is nearer the mouth gets the nerve from the lower ganglion. De Meijere suggests in his work over the *Lonchoptera*-larva (Zool. Jahrb. Abtheil. für Syst. XIV, 1900, 100) after comparing the organ with the antennæ and maxillary palpi in the larva of *Lonchoptera*, that the organ is really the antenna and maxillary palpus, which are here quite close standing and fused; the papilla with the refractive body is the antenna, the other the maxillary palpus; I think this interpretation is quite correct. In the descriptions I term the whole organ the antenna-like papilla. The mouth is either armed with hooks, sometimes bifid, or

it has only a pharyngeal skeleton. Above and at the sides of the body are always some larger spinules or warts; they may be very small and slightly pronounced (I think partly dependent on the contraction of the dermis) or they may be somewhat larger or be developed into longer filaments, as in the first group of the species of *Syrphus*; they often bear branched hairs or spines. They are always arranged in a certain way; the prothoracal segment has generally some, either more or less numerous spinules; on the meso- and meta-thoracal segments and on the first abdominal segment there is on each a transverse row of six spinules; on the other segments they are placed thus that there are two in the middle on one corrugation and two towards each side on the following corrugation; when the segments are less distinctly divided into corrugations, the spinules or warts may be all placed on one corrugation, but however the two lateral on each side more posteriorly than the two median; at the sides each segment has three spinules, generally one above and two more downwards, besides there is generally one more ventrally. On the last segment they are also present, but the arrangement is here various. The spinules or warts are, as said, always present, and the longer filaments often present at the sides of the last segments, belong to them and always answer to them in number, but when these segments are much elongated the arrangement is effaced; also the threads on the sides of the tail-shaped part in the larvæ of the *Eristalinae*, and the filaments surrounding the posterior margin of the body in the *Volucella*-larva belong to the same category. Only in a single case (some *Volucella*-larvæ) there are, besides the mentioned spinules or warts, some more. Many larvæ have below pairs of prolegs armed with spines, generally six or seven pairs. The larvæ are amphipneustic with generally small anterior spiracles at the hind margin of the first thoracal segment, and with posterior spiracles on a shorter or longer posterior process on the last segment, sometimes situated at the end of a long, tail-shaped part. As the Syrphids are cyclorrhaphous flies the pupa is a barrel-pupa; the larva pupates within the skin of the last larval stage; the skin is contracted and altered in the well known way, and in it lies the real pupa; the pupa with its enclosing barrel or puparium is in the descriptions simply termed the pupa. The pupa still shows the larval attributes, but the various spinules or filaments, the prolegs etc. are generally shorter and less distinct; the posterior spiracular process is present as in the larva (but out of function). The prothoracal spiracles of the pupa behave, as mentioned above, in different ways; in many species (most of the *Syrphinae*) they do not protrude through the puparium and are thus not visible

externally, but in some of the *Syrphinae* and in nearly all the others they protrude as shorter or longer anterior spiracular tubes, beset with tubercles in various ways. The points through which they protrude are often (perhaps always) preformed in the larval skin; these points lie in the first abdominal segment. The genus *Platychirus* seems to stand somewhat intermediate as it has the spiracles protruding, but so slightly that they are almost imperceptible. Just at the anterior margin of the pupa the larval prothoracal spiracles are often seen: they are generally small, but f. inst. in the *Eristalinae* somewhat long. The opening of the puparium takes place in a way characteristic for the family; two pieces are detached, both belonging to the dorsal side; the lower piece stretches from the mouth opening over a part of prothorax, over mesothorax and a part of metathorax, the upper piece then continues over the rest of metathorax, the first and second abdominal segments and a part of the third abdominal segment; this latter piece has near its anterior margin the anterior spiracular tubes, when such are present. As said it is only the dorsal part of the segments which are detached. This mode of opening is quite another than in other *Cyclorrhapha*, where both dorsal and ventral parts are detached, and it is in connection with the fact, that in the Syrphid pupa the mouth opening by the contraction has become situated quite downwards at the lower anterior margin and is not terminal as in most other cyclorrhaphous pupæ. Brauer has in his work over the larvæ given a quite erroneous statement, as he says that the lower side of the anterior segments by the contraction at the pupation becomes situated terminally at the anterior end, while it is in reality quite opposite. De Meijere has thoroughly described and figured the facts for some Syrphid pupæ (Zool. Jahrb. Abtheil. für Syst. XIV, 1900, 122, Taf. 7, Fig. 37—39). Only in *Microdon* the opening takes place in another way, as here three pieces are detached, two upper separated in the middle line and with the spiracular tubes, and one lower. — As the Syrphids have no frontal bladder the opening must be caused in another way. Becher says (Wien. ent. Zeitg. I, 1882, 51) that it is caused by a widening of the epistoma (Untergesicht); this is also so; when a pupa is taken out of the puparium the epistoma is somewhat folded in, and it gets first its final, more or less protruding shape by the opening of the puparium. — The pupæ are generally found on the same places as the larvæ. — The deposition of the eggs takes places on the places where the larvæ live; the eggs of *Syrphus* are laid singly between Aphides on leaves; those of *Volucella* have been found in the nests of *Hymenoptera*; *Eristalis* deposite near the surface of water, *Merodon* in the earth

near the bulbs which the larvæ attack, and *Microdon* among ants. — The hibernation seems in most cases to take place in the larval stage, but several species have more than one brood in the year.

The family of the *Syrphidae* is very characteristic, and the species cannot well be confounded with species of other families. They are distinguished by the mouth parts, especially the shape of the labrum, and also of the maxillæ, by the construction of the unsymmetrical male genitalia, the squamulæ and their fringes, the plumula and the venation of the wings, especially the vena spuria and the long anal cell in connection with the closed first posterior cell; also the larvæ are characteristic, as well as the way in which the puparium is opened. From the other cyclorrhaphous flies they are further distinguished by the want (or very rare presence) of bristles on body and legs. As well known they form, together with the *Pipunculidae*, *Platypezidae* and *Phoridae*, the group *Aschiza* of the *Cyclorrhapha*. They have no frontal bladder (though such a one has been stated by Brauer, Gerstäcker and Künckel d'Herculeis) and also no distinct bladder-seam; the lunula is generally visible above the antennæ, but sometimes not (f. inst. *Microdon* and *Ceriodes*); a rudimentary bladder-seam seems to be present above the lunula, and Verrall thinks that the pit or furrow in front of the jowls is to be interpreted as the ends of the bladder-seam; this is, I think, correct, and then the bladder-seam is most developed in *Chilosia* and *Ferdinandea* and here present to near the antennæ, separating off the cheeks (eye-margins) from the epistoma; it is also to be noted that just these two (allied) genera are bristle-bearing. — It is not easy to say anything about the affinities of the family (except that it is related to the *Pipunculidae*); only in this family we meet the curious branched hairs on the thoracal squamulæ; Girschner in his work over the postalar membrane calls attention to the fact, that the *Bombyliidae* (*Anthrax*) have similar flattened hairs on squamula alaris as found in the Syrphids, and that the wings (especially in *Bombylius*) show several agreeing features; in this I can quite consent, and I may add, that just in *Bombylius* we find a wing-fold much recalling the vena spuria. On the other hand I think there are also some affinities to the *Dolichopodidae* in spite of many differences; the male genitalia, the way in which the metaepimera are placed, and the antennæ f. inst. show agreeing points. Girschner concludes thus: "Jedenfalls haben wir die Syrphiden als cyclorhaphé Endformen eines Entwicklungszweiges zu betrachten, dessen Ursprungsstelle mit der des Muscidenzweiges nicht zusammenfällt." This may, I think, be quite correct. The similarity between *Ceriodes* and *Conops*

has no systematic value but is mere similarity, the family is in no way related to the *Conopidae*.

The species are generally very characteristic; they are sometimes somewhat small, but generally medium sized to large flies; they may be quite dark or black, but sometimes thorax has yellow stripes or markings, and abdomen has in most cases such markings as pairs of lunulate or transverse spots or as transverse bands, very varied in shape and extent, and in some cases the pale colour is predominant. The species are rarely somewhat bare, often densely but short-haired, and in not few cases more or less long-haired or densely pilose, resembling *Bombi*.

The species occur on fields, meadows and in woods and thickets, often especially on humid places or at the borders of water, and they form an essential and conspicuous part of the Insect-life; some are especially seen at ulcerated and flowing stems of trees; certain species as the *Xylota*-species are generally seen running on large leaves. Many common species occur almost everywhere in great numbers. The family is distributed all over the world and goes high towards the north, several species being found in Greenland. Most of the species are able to hover in the air; this holds good for both sexes, but it is only the males which hover continuously more or less high in the air, often rather high, and they may then be seen standing almost motionless on the wings. The species are considered to feed on juices from the flowers, and nearly all species are also generally seen on various flowers, perhaps especially on Umbelliferæ and Compositæ, but also on many others; Martelli states (Boll. del. Labor. di Zool. Gen. e Agrar. in Portici, V, 1911, 45) of *Lasiophthicus pyrastris* that it feeds on the excrements of Aphides and on the juices of flowers especially of Umbelliferæ; it is, however, not easy to imagine that their relatively so strong and well armed mouth should be only used in sucking juices. The behaviour of the sexes at copulation is somewhat like that known for many Dolichopodids, the male hovers in the air above the female resting on a leaf or a flower; I have observed this courtship especially in *Neoascia*, *Eristalis* and *Helophilus*. Some species are recorded to produce a curious noise or "singing", also when at rest; it has especially been recorded for *Helophilus*, *Sericomyia* and *Microdon*; Westwood (Introd. II, 557) thinks that in *Helophilus* this sound is produced by the plumula (which he knew only in this genus), and Verrall thinks the same with regard to *Microdon*: about *Sericomyia* interesting notes are found in Entom. Month. Mag. XVIII, 1881, 159, 189, 190.

About 660 species of the family are recorded from the palæarctic

region, and from North America about 730; of these about 38 are recorded as common to both regions.

The *Syrphidae* are not specially attacked by parasitic Hymenoptera, but not few cases are however known; I have found the following (where nothing else is mentioned the record is found in Dalla Torre's catalogue): From *Chilosia intonsa* I have bred a *Cryptus* sp., one in each pupa; from *Platychirus clypeatus* (and other species of this genus) Mr. Schlick and I have bred *Bassus* spp., one in each pupa, and *Trichosteresis glabra* Boh., four to five in each pupa; *Xanthandrus comtus*: *Microterys aeruginosus* Dalm. (Silvestri, Boll. Lab. Portici, II, 1908); *Lasiophthicus pyrastris*: *Bassus albosignatus* Grav. (Martelli, Boll. Lab. Portici, V, 1911), *Bothriothorax californicus* How. and *Apanteles lineola* Curt., the larva of this latter goes as usual out of the Syrphid larva and forms its silky cocoons (Curtis, Farm Insects, 1857); *Syrphus ribesii*: *Eucoela crassinervis* Westw., *Chrysolampus syrphi* Ratzeb., *Megaspilus syrphi* Bouché; *Syrphus vitripennis*: of this I have bred *Bassus* sp., one in each pupa; *Syrphus philadelphicus*: *Pachyneuron syrphi* Ashm.; *Syrphus nitens*: from this Mr. Schlick has bred *Pachyneuron formosum* Walk., up to fourteen parasites in each pupa, I have bred from it *Trichosteresis glabra* Boh., five in each pupa; *Syrphus tarsatus (dryadis)*: *Bassus arcticus* Holmgr.; *Syrphus tarsatus* or *arcuatus*: *Pachyneuron groenlandicum* Holmgr. (Lundbeck, Vidensk. Meddel. fra Nat. For. København 1896), three in each pupa; *Syrphus balteatus*: *Bassus laetatorius* F., this species is commonly bred and well known, also Mr. Schlick and I have bred it; one in each pupa, *Bassus albosignatus* Grav. (Martelli, Boll. Lab. Portici, V, 1911), *Homotropus tarsatorius* Panz., *Pachyneuron formosum* Walk., *Pachyneuron* sp. (Martelli, Boll. Lab. Portici, V, 1911), eight to eighteen in each pupa, *Megaspilus syrphi* Bouché; *Syrphus quadrimaculatus*: *Pteromalus quadrimaculatus* Ashm.; *Syrphus* sp.: *Limnerium clypeare* Brisch., *Promethes festivus* F., *Phygadeuon sodalis* Taschbg., *Ceraphron ancyloneurus* Ratzeb.; *Olbiosyrphus laetus*: *Bassus albosignatus* Grav.; *Xanthogramma ornatum*: *Pteromalus punctatus* Ratzeb. (Beling, Arch. f. Naturgesch. 48, 1882), many in each pupa; *Mesograpta obliqua*: *Hemiteles syrphicola* Ashm.; *Volucella* sp.: *Phygadeuon volucellae* Boje; *Eristalis tenax*: *Tropidopria conica* F.; *Myiatropa florea*: *Rheombobius nigritus* Grav.; *Myiolepta luteola*: of this I once took a number of pupæ some of which were empty; of these latter a couple showed by the shape of the hole, that a parasite, probably some Ichneumonid, had escaped from the pupæ. Finally Mr. Schlick has bred from an undetermined Syrphid pupa (*Chilosia* or perhaps *Syrpitta*) *Diapria* sp., many in the pupa.

The species of *Bassus* are rather common as parasites on Syrphids, this genus seems mainly to be dependent on Syrphids; the pupæ containing *Bassus* are generally darker and a little smaller than normal pupæ.

Syrphidae earlier recorded from Denmark:— Kramer (Specim. Insectol. Dan. 1760) has 5 Syrphids; Brünnicke (Prodr. Insectol. Siæland. 1761) has 10, and in Pontoppidan: Danske Atlas I, 1763, he enumerates 14, all under *Musca*; these species are all common, but otherwise nothing can be said about them; *M. oestracea*, which both authors have, is no doubt *E. intricarius*. O. F. Müller (Faun. Fridrichsd., 1764) mentions 20 species of *Musca* which must be Syrphids, and in 1767 (Flor. Fridrichsd.) he mentions three more, in all 23; these are likewise all common species and nothing certain can be said about them, so that their presence in the synonymi is mostly due to convenience. His *M. conopsoides*, which is among them, is most likely a *Conops*; *M. oestracea* is, I think, *E. intracarius*; of his two new species *M. fasciata* and *cyanea*, the first is no doubt a *Sphaerophoria* (female), and the other certainly *Pl. albimanus* F.; this species should thus alter its name, but I think this not advisable. Fabricius in his first work (Syst. Entom. 1775) has four species from Denmark, all new, viz. *Syrphus elongatus* (*Baccha*), *podagricus* (*Neoascia*), *ruficornis* (*Ferdinandea*) and *lugubris* (*Pipiza*); these species are thus originally described on Danish specimens; about *Ferdinandea ruficornis* see under this species. In Spec. Ins. 1781 Fabricius has the same four species, but in Mantis. Ins. 1787 he enumerates still three, *Syrphus rosarum* and *nectareus* and *Rhingia lineata*, likewise all new; of these *S. rosarum* (*Pyrophæna*) and *R. lineata* (*Helophilus*) are thus also originally described from Denmark, while *nectareus* is a synonym to *balteatus* De G. In Entom. Syst. IV, 1794 he moreover enumerates *S. subsultans* and *umbellatarum*, both new, and of these *umbellatarum* is thus likewise originally founded on Danish specimens, while *subsultans* is a *Gymnopa*. In his last work, Syst. Antl. 1805 Fabricius has the earlier species, partly under new generic names, as *podagricus* is now under *Merodon*, *elongata* under *Baccha*, *ruficornis*, *lugubris* and *subsultans* under *Eristalis* and the other species under *Scaeva*; besides he describes here two new, *Eristalis ater*, which is a synonym to *Chilosia variabilis* Panz. and *Scaeva interrupta*, a synonym to *Sphaerophoria menthastri* L. (a female). Fabricius enumerates thus in all 10 species of Syrphids from Denmark, and of these 7 are new species. Zetterstedt has in Dipt. Scand. II, 1843, 102 species; in VIII, 1849 he has still 24 species, thus in all 126 species; but of these we must strike out several; thus he has *Volucella bombylans* both as

plumata and *bombylans*; *Syrphus auricollis* both as *auricollis* and *maculicornis* and *Platychirus manicatus* both as *manicatus* and *rostratus*; his *P. podagratus* recorded from Denmark is no doubt erroneous; his 9 species of *Sphaerophoria* are in reality only 3; he has *Chilosia chloris* both as *chloris* and *flavicornis*, and *vernalis* both as *vernalis* and *pallidicornis*; of *Pipiza* two species are synonyms as *P. campestris* and *varipes* are both *Pipizella virens*, and *P. geniculata* is identical with *P. bimaculata*; *Xylota pigra* is recorded erroneously, and his 5 species of *Neoascia* are only 4 as *quadripunctata* is a synonym to *floralis*; thus we must strike out in all 16 species and the total number is then 110. Stæger published (Naturhist. Tidsskr. IV, 1842—43, 320) a paper over the Danish species of *Platychirus*, but the species included in it are all mentioned by Zetterstedt. — In Naturhist. Tidsskr. II, 1838—39 Schiødte published a list over Insects taken on a collecting journey in Sealand, Lolland and Bornholm; it is only a preliminary enumeration; it includes a number of Diptera (determined by Stæger), but the species are all enumerated by Zetterstedt; on p. 318 a new species *Criorrhina dimidiata* is mentioned, but it is a nomen nudum and the species must later have been recognised as described. — To the 110 species enumerated by Zetterstedt come two of Fabricius's species which Zetterstedt does not mention from Denmark, viz. *S. umbellatarum* and *Ferdinandea ruficornis*; the total number of known Danish Syrphids in 1849 was thus 112. — In the present work 210 species are enumerated.

Table of Subfamilies.

1. Antennæ of moderate length, the two basal joints together not longer than the third	2.	
— Antennæ elongate and porrected, the basal joints longer or about as long as the third	5.	
2. Middle cross-vein placed before the middle of the discal cell	3.	
— Middle cross-vein near or after the middle of the discal cell, often rather oblique	4.	
3. Subcostal cell open, upper marginal cross-vein very rarely recurrent (<i>Orthoneura</i>); arista bare or only short pubescent	1.	Syrphinae. 38
— Subcostal cell closed, upper marginal cross-vein recurrent above; arista long-plumose	II.	Volucellinae. 41
4. Cubital vein with a deep loop down in the first posterior cell	III.	Eristalinae. 42
— Cubital vein not or only moderately dipped down in the first posterior cell	IV.	Milesiinae. 42

5. Cubital vein without any loop or veinlet down in the first posterior cell V. *Chrysotoxinae*. 4+
- Cubital vein with a veinlet down in the first posterior cell, sometimes issuing from a more or less angulated loop. 6.
6. Antennæ with a dorsal arista; scutellum with two small spines or processes. VI. *Microdotinae*. 45
- Antennæ with a terminal style; scutellum unarmed VII. *Ceriinae*. 45

I. Syrphinae.

Antennæ short or of moderate length, not porrected or not distinctly so; arista bare or short-pubescent. Epistoma with or without central knob, sometimes with a central knob in the male, none in the female; otherwise it ranges from straight and flat to considerably hollowed below the antennæ with the knob much produced and below the knob either only retreating, or again produced at the upper mouth edge; sometimes the epistoma is conically protruding; it is densely or more or less moderately haired, or bare, and it is black or yellow with or without middle stripe. Eyes usually touching in the male. Subcostal cell open; medial cross-vein before the middle of the discal cell; cubital vein straight or slightly curved, in a few cases somewhat looped; stigmatical cross-vein never present.

The larvæ of most genera are aphidiphagous and somewhat leech-like; that of *Chrysogaster* has been found in mud and flood refuse, and has a short tail; *Chilosia* lives as larva internally in plants or in fungi; *Xanthogramma* and *Doros* have been found on the earth under moss and stones, *Neoascia* in flood refuse, it has a short tail, and *Brachyopa* in sap of ulcerated trees.

This subfamily contains by far the largest number of genera and species, and it is not quite homogenous; it is especially the first genera, *Paragus* and *Pipiza* and allied genera which stand somewhat separate, and again such genera as *Baccha*, *Neoascia* and *Rhingia*, while the genera of the other large group seem to be naturally allied.

Table of Genera.

1. Epistoma not hollowed below the antennæ, somewhat flat, straight or retreating, about parallel with the eye-margins and without central knob or produced mouth edge; it is black or æneous; epistoma and eyes hairy; dark species with no pale markings on head and thorax. 2.
- Epistoma with a central knob, or with the lower part produced, or both with central knob and produced mouth edge. 6.

2. Abdomen with four normal segments in both sexes, second and third equal and long, fourth very small (figs. 9 and 10) 2. *Triglyphus*. 52
- Abdomen with four normal segments in the male, five in the female, second to fourth about equal (figs. 25 and 26) 3.
3. Outer top angle of first posterior cell about rectangular (except in *Heringi*); third antennal joint more or less elongate; frons not conically projecting 3. *Pipizella*. 56
- Outer top angle of first posterior cell acute; third antennal joint short, rarely a little longer 4.
4. Frons somewhat conically protruding, frontal triangle in the male small, not arched (figs. 23 and 24), frons of female with side dust spots; abdomen mostly spotted 6. *Pipiza*. 75
- Frons not conically protruding, frontal triangle in the male rather large and arched (figs. 19 and 20); frons of female with or without side dust spots; abdomen unspotted 5.
5. Middle coxæ and hind trochanters in the male with a spine; frons of female with a transverse depression and abdomen somewhat pointed 5. *Cnemodon*. 10
- Coxæ and trochanters unarmed; frons of female without transverse depression and abdomen less pointed 4. *Penium*. 64
6. Epistoma not hollowed below the antennæ, arched or a little keeled, with a small central knob, partly or wholly yellow 1. *Paragus*. 75
- Epistoma hollowed below the antennæ, with a central knob or with the lower part produced, or both with central knob and produced mouth edge 7.
7. Entirely dark, black or metallic species with no pale markings on head or body (only in a single case abdomen with glaucous spots, *Chilosia maculata*) 8.
- Not entirely dark species, but more or less with pale parts or markings on head, thorax, scutellum and abdomen 9.
8. More or less metallic species; eyes in the male touching or separated; frons of the female with cross-furrows; epistoma in the male with or without central knob, in the female without central knob but more or less projecting at the mouth edge; eyes bare; no eye-margins; scutellum without fringe below the margin 7. *Chrysogaster*. 11
- Black or æneous or bluish species, not, or not distinctly metallic; eyes always touching in the male; epistoma with central knob (except in *maculata*); eyes often hairy, distinct eye-margins present; scutellum with a marginal fringe below 8. *Chilosia*. 122

9. Epistoma with a central knob and generally not specially produced at the front mouth edge 10.
 — Epistoma without central knob but its lower part rather produced, sometimes bec-like 25.
10. Hind femora simple, not spinose beneath 11.
 — Hind femora thickened, spinose beneath 35. *Myiolepta*.
 (belongs to *Milesiinae*).
11. Abdomen not specially constricted about the base 12.
 — Abdomen much or somewhat narrow and long, distinctly constricted about the base 24.
12. Epistoma and scutellum entirely black or æneous, only epistoma more or less pruinose 13.
 — Epistoma yellow or partly so, in rare cases only slightly; scutellum yellow or brownish, often translucent and at all events a little pale on the disc or at apex 17.
13. Wings a little shorter than the flattened, a little club-shaped abdomen; this latter has extended reddish markings on the middle or only one pair of spots 10. *Pyrophaena*. 222
 — Wings not shorter than abdomen and this not club-shaped or specially flattened; it has generally three or four pairs of yellow (or hoary) spots 14.
14. In the male front tibiæ or tarsi or both dilated, in the female front tarsi relatively broad; abdominal spots in the female distinct, not with the outer margin sloping inwards towards the end (distinguishing from *Melanostoma*) 9. *Platychirus*. 190
 — Front tibiæ and tarsi simple in both sexes 15.
15. Abdomen narrow, with parallel sides 16.
 — Abdomen broad, flat and ovate, with large spots, especially in the male 12. *Xanthandrus*. 234
16. Eyes a little hairy; abdomen in the female without markings 13. *Melangyna*. 238
 — Eyes bare; abdomen with pairs of spots which in the female have the outer margin sloping inwards towards the end, or (*ambiguum*) with inconspicuous metallic spots 11. *Melanostoma*. 227
17. Thorax with bright yellow side-lines and pleura with yellow spots 18.
 — Thorax without or with inconspicuous pale side-lines; pleura without yellow spots 19.
18. Abdomen narrow, elongate or clubbed, fifth segment in the male long, its hind margin not quite symmetrical 20. *Sphaerophoria*. 338
 — Abdomen somewhat broad and flat, fifth segment in the male small 21. *Xanthogramma*. 357
19. Abdomen with sharply defined yellow bands or yellow or whitish pairs of spots 20.
 — Abdomen without sharply defined yellow bands or spots, with only one basal band, or if more pairs

- the spots are more or less glaucous and the basal spots large. 22.
20. Frons inflated, especially in the male; abdominal spots strongly lunulate; eyes hairy 18. *Lasiophthicus*. 257
- Frons not inflated; abdominal spots sometimes lunulate but oftenest of other shape; eyes bare or hairy. 21.
21. Cubital vein looped; abdomen somewhat flat and marginate; scutellum without marginal fringe below 17. *Didea*. 250
- Cubital vein not looped (except somewhat in *S. annulipes* and *lapponicus*); scutellum with a fringe below the margin 19. *Syrphus*. 265
22. Body densely and long pilose, abdomen short ovate, broader than thorax, black with only the apex reddish 15. *Eriozona*. 273
- Body not densely and long pilose, abdomen not short ovate, whitish or glaucous at the base 23.
23. Abdomen with only one basal band; wings with a dark spot on the middle; epistoma somewhat descending, with a dark middle stripe 14. *Leucozona*. 240
- Abdomen with three pairs of spots; wings without spot; epistoma not descending, without black middle stripe 16. *Ischyrosyrphus*. 246
24. Alula almost wanting; abdomen very long and narrow 23. *Baccha*. 26
- Alula of ordinary size; abdomen less long and narrow, only constricted about the base 22. *Doros*. 259
25. Alula almost wanting; abdomen clavate, constricted about the base, black, generally with yellow markings; hind femora thickened and spinose beneath 26.
- Alula of ordinary size; abdomen not clavate, reddish or brown; hind femora not thickened or spinose 27.
26. Wings with the lower outer angle of first posterior cell rounded and the lower marginal cross-vein oblique; arista slightly pubescent; abdomen with no process at the base. 24. *Sphegina*. 26
- Wings with the lower outer angle of first posterior cell almost rectangular, and both marginal cross-veins perpendicular; arista bare; on each side of the base of abdomen a pointed process 25. *Neoascia*. 31
27. Epistoma not bec-like produced 26. *Brachyopa*. 32
- Epistoma bec-like produced 27. *Rhingia*. 31

II. Volucellinae.

Antennæ somewhat elongated, drooping, arista long-plumose. Epistoma hollowed below the antennæ, with a central knob in the middle and below it somewhat retreating; it is rather produced and descending, hairy and of whitish or yellow colour. Eyes touching in the male. Subcostal cell closed; medial cross-vein before the middle

of the discal cell; cubital vein nearly straight; upper marginal cross-vein recurrent above and retracted from the margin; no stigmatal cross-vein.

The larvæ are scavengers in the nests of *Vespa* and *Bombus*; they are flattened.

Only one Danish (and European) genus 28. *Volucella*. 275

III. Eristalinae.

Antennæ short or of moderate length, drooping, arista bare, pubescent or distinctly plumose. Epistoma with a small central knob or with none, in a single case conically prolonged; its ground colour is black or yellow with or without middle stripe, but it is generally densely pruinose, and it is hairy. Eyes in the male touching or separated, but less than in the female. Subcostal cell open or closed; medial cross-vein at or after the middle of the discal cell; cubital vein with a deep loop down into the first posterior cell; a stigmatal cross-vein present or indistinct or wanting. Hind femora often thickened and hind tibiæ more or less compressed and curved.

The larvæ belong to the rat-tailed type; they live in putrid water or in humid hollow trees; *Merodon* makes an exception, it is somewhat similar to a *Syrphus*-larva and feeds in bulbs of *Narcissus*.

Table of Genera.

- | | |
|---|----------------------------|
| 1. Subcostal cell closed | 29. <i>Eristalis</i> . 451 |
| — Subcostal cell open | 2. |
| 2. Hind femora with a tooth-like process beneath near apex | 33. <i>Merodon</i> . 76 |
| — Hind femora without any tooth-like process beneath at tip | 3. |
| 3. Eyes hairy, touching for a distance in the male | 31. <i>Myiatropa</i> . 67 |
| — Eyes bare, separated in the male, or only touching in a point | 4. |
| 4. Eyes separated in both sexes; thorax with longitudinal pale stripes; body not much hairy; hind femora without a dense clump of hairs beneath near apex | 30. <i>Helophilus</i> . 44 |
| — Eyes touching in a point in the male; thorax unicolorous, densely pilose; hind femora with a clump of hairs on a small swelling beneath near apex | 32. <i>Mallota</i> . 72 |

IV. Milesiinae.

Antennæ short or slightly elongate, not distinctly porrected, though often only moderately drooping, arista bare or long-plumose (*Are-*

tophila, *Sericomyia*). Frons generally prominent and generally bare, sometimes a little pubescent, rarely more haired. Epistoma very varying, straight and more or less flat or keel-shaped, or more or less hollowed with or without central knob; in a single case (*Myiolepta*) with a knob in the male, none in the female; it is not, or somewhat to much descending, and not or more or less protruding below; the colour is yellow, yellow and black or quite black, but generally pale pruinose, and it is bare or only slightly haired at or towards the sides, rarely more haired. Eyes touching or approximated in the male. Subcostal cell open (in all Danish genera); medial cross-vein at or after the middle of the discal cell, generally rather oblique, only in *Myiolepta* before the middle of the discal cell; cubital vein straight, or sometimes somewhat curved downwards or looped; no stigmal cross-vein or this indistinct. Hind femora in most cases thickened, sometimes most in the male, sometimes strongly, and often with a tooth below or with rows of spines.

The larvæ live nearly all in decaying tree or in sap on ulcerated trees, sometimes in other decaying vegetables or in dung; *Eumerus* in bulbs of *Allium*; they are more or less elongated oval, with a short or a little longer posterior spiracular process; *Pocota*, *Myiolepta* and *Calliprobola* (the latter not Danish) have a short tail, and they have all anterior spiracular tubes in the pupa. *Sericomyia* has a larva of the rat-tailed type, living in water in peat-bogs.

This subfamily is scarcely quite homogenous; *Arctophila* and *Sericomyia* with their long-plumose arista and hairy frons (and long-tailed larva) stand apart, and the same is perhaps the case with *Eumerus*.

Table of Genera.

1. Arista bare	2.
— Arista plumose	14.
2. More or less densely and long pilose species	3.
— Rather inconspicuously haired species	6.
3. Hind femora without spines beneath; abdomen more or less ovate	4.
— Hind femora with spines beneath; abdomen somewhat elongate	39. <i>Brachypalpus</i> .
4. Epistoma considerably descending, somewhat pointed at apex, with a central knob	5.
— Epistoma slightly descending, not pointed and without central knob	37. <i>Pocota</i> . + 4
5. Eyes narrowly separated in the male; densely pilose species	36. <i>Criorrhina</i> . 17
— Eyes touching in the male; moderately hairy species	

- with abdomen black on basal half, red on apical half 38. *Cynorrhina*. 501
6. Thorax without yellow markings, at all events on the disc 7.
— Thorax with yellow markings on the disc 13.
7. Hind femora more or less spinose beneath, or with a tooth-like process near apex 8.
— Hind femora not spinose beneath, nor with any tooth 12.
8. Epistoma more or less hollowed below antennæ; upper marginal cross-vein not recurrent 9.
— Epistoma not hollowed below antennæ; upper marginal cross-vein recurrent above 42. *Eumerus*. 501
9. Hind femora evenly spinose beneath, without any tooth 10.
— Hind femora with a large tooth or process beneath at tip 34. *Tropidia*. 480
10. Epistoma somewhat carinate; hind femora very strongly thickened 41. *Syritta*. 526
— Epistoma not carinate; hind femora less thickened 11.
11. Medial cross-vein before the middle of the discal cell 35. *Myiolepta*. 777
— Medial cross-vein after or near the middle of the discal cell 40. *Xylota*. 501
12. Thorax and scutellum with bristles 43. *Ferdinandea*. 541
— Thorax and scutellum without bristles 38. *Cynorrhina*. 501
13. Hind femora with a triangular tooth below near apex; anal vein considerably prolonged beyond the apex of the anal cell 44. *Spilomyia*. 578
— Hind femora without tooth; anal vein not prolonged beyond the apex of the anal cell 45. *Temnostoma*. 553
14. Densely pilose species; abdomen without yellow bands 46. *Arctophila*. 556
— Thinly haired species; abdomen with yellow bands 47. *Sericomyia*. 56

V. *Chrysotoxinae*.

Antennæ elongate, porrected; arista dorsal (in the Danish genus), bare. Frons hairy. Epistoma slightly hollowed, with a small central knob below, not much descending; it is black and yellow, hairy. Eyes touching in the male. Subcostal cell open; medial cross-vein before the middle of the discal cell; cubital vein curved evenly more or less downwards; no stigmatal cross-vein.

The larvæ live in decaying vegetables; the pupæ have no anterior spiracular tubes.

- Only one Danish genus 48. *Chrysotoxum*. 56

VI. **Microdontinae.**

Antennæ elongate, porrected, basal joints long; arista dorsal, bare. Epistoma rather broad, evenly arched, without central knob, not descending; it is æneous, densely hairy. Eyes separated in both sexes. Subcostal cell open; medial cross-vein well before the middle of the discal cell; cubital vein nearly straight, but with a curious veinlet stretching down in the middle of the first posterior cell; upper marginal cross-vein recurrent; a stigmatal cross-vein present.

The larvæ are curious, slug-like; they live in nests of ants.

Only one genus 49. *Microdon*. 5 (4)

VII. **Ceriinae.**

Antennæ elongate, porrected, sometimes placed on a long, styli-form process, third joint with a terminal style. Epistoma almost not hollowed, with a slight central knob below, considerably descending; it is yellow with black middle stripe, bare. Eyes touching in the male. Subcostal cell open; medial cross-vein after the middle of the discal cell; cubital vein curved more or less downwards in the first posterior cell, and the loop angular with a veinlet issuing downwards from it; an indistinct stigmatal cross-vein.

The larvæ live in ulcerated trees; the pupa has no anterior spiracular tubes.

Only one genus 50. *Cerioides*. 5 (4)

I. **Syrphinae.**1. **Paragus** Latr.

Medium sized or small species, of black colour or with abdomen more or less marked with red. Head about semiglobular, as broad as thorax, or a little broader, hollowed behind. Eyes touching in the male for a short distance, more or less broadly separated in the female; they are short-hairy, sometimes the hairs forming more or less distinct bands; in the male the facets are a little enlarged at the upper corner towards the suture. Antennæ inserted near each other, above the middle; they are more or less elongate, with the third joint somewhat linear, twice to several times longer than broad; arista

short, inserted at a little distance from the base of the third joint; it is bare (with a few microscopic spinules), and it seems to be only two-jointed, with a small, ring-like basal joint. Epistoma not hollowed beneath the antennæ; it is arched or more or less keeled, especially downwards, and there is a more or less pronounced, not large central knob in the middle or lower down: epistoma always more or less yellow, and it is hairy. Jowls very small, not going below the eyes, with a small depression in front. The oral aperture long and narrow; the oral cone rather long. Clypeus somewhat linear, incised in front. Proboscis likewise long and somewhat slender; labrum as long as the basal part of labium, with a narrow median process, cleft in the apex: the lower lateral processes broad, with the apex curved upwards, the upper lateral processes thin and delicate. Hypopharynx pointed, semi-tubular, the cavity upwards. Maxillæ knife-shaped, with a rather long, linear palpus. Labium with the basal part longer than the labella. Thorax about quadratic. Scutellum black or with the apex more or less yellow, at all events in the female; the margin with a row of hairs below. No thoracal or scutellar bristles. Meso- and sternopleura with long, coarse hairs; metapleura with short hairs. Abdomen with about parallel sides; the segments have a more or less pronounced transverse impression near the front margin. The first dorsal segment is larger or smaller, but not quite small; its hind margin curves forwards at the sides so that it is generally narrower than the following segment, the front corners of which stretch forwards. On the ventral side there is a small chitinisation at the base, for the rest the first and second segments slightly chitinised. In the male there are five not transformed dorsal segments, but only four ventral; the fourth ventral segment does not stretch so far backwards as the dorsal; on the ventral side, to the left lie the fifth to eighth small segments, they are curved quite round to the right in an almost snail-shaped way; the ninth segment with its appendages rather thick, partly concealed under the fourth, and all the transformed segments form a large ventral knob. In the female the abdomen has five normal segments, the sixth is generally also visible, but small, the rest more or less hidden. Legs not long, hind metatarsus a little thickened. The legs mainly short-haired, anterior femora with longer hairs on the postero-ventral side, the hind femora on the antero-ventral side; tibiæ slightly fringed above, especially the hind tibiæ. Two claws and pulvilli, and a small, bristle-shaped, pointed and slightly hairy empodium. Wings with the medial cross-vein before the middle of the discal cell; vena spuria thin, but sharply marked, with a likewise sharply defined, dot-like thickening below the origin of the cubital vein. Alula well developed;

plumula thin, but not short, with fine hairs. Alar squamulæ with simple hairs, thoracic squamulæ with long, branched hairs.

The developmental stages are described by Rondani (Nuov. Ann. Sc. Nat. Bologna, VIII, 1847); the author found the larva of *P. tibialis* (*coadunatus*) among Aphides on the roots of *Centaurea solstitialis*, that of *bicolor* under the same circumstances, the imagines came at the end of August, and that of *quadrifasciatus* between Aphides on *Sonchus asper*. I have not seen this paper. Schiner says, that the larva is brown or dark marmorate, and the pupa drop-like, thin in front, thick behind; this shape would be very curious. — Verrall states, in spite of Rondani's statement, that "the species have a very suspicious habit of hanging about the burrows of the small *Halicti*". — There is moreover a paper by Metcalf (Ohio Natural. XI, 1911) dealing with the larvæ, but also this paper I have not been able to study.

The species of *Paragus* occur on dry, sunny and sandy places, often on grass-fields, sitting on the straw; they are capable of bending the abdomen quite up under thorax. Schiner communicates that of all Syrphids he most often took specimens of *Paragus* in copula; in Denmark the species are not common, and I have never seen them in copula. Most of the species are very varying and the specific limits not quite settled, though I believe the three Danish species are quite certain.

Of the genus about 14 species are known from the palæarctic region, 3 occur in Denmark.

Table of Species.

1. Epistoma rather produced, with a black middle stripe in both sexes; scutellum quite black 1. *tibialis*.
- Epistoma slightly produced, yellow in the male; scutellum with apex or apical margin more or less yellow 2.
2. Abdomen more or less reed 2. *bicolor*.
- Abdomen black 3. *albifrons*.

1. *P. tibialis* Fall.

1817. Fall. Dipt. Suec. Syrph. 60, 5 (*Pipiza*). — 1822. Meig. Syst. Besch. III, 183, 13. — 1843. Zett. Dipt. Scand. II, 852, 6. — 1862. Schin. F. A. I, 257. — 1901. Verr. Brit. Fl. VIII, 150, 1, figs. 175—77. — 1907. Kat. palæarkt. Dipt. III, 4. — *Paragus haemorrhous* Meig. 1822. Syst. Besch. III, 182, 10. — *Paragus aeneus* Meig. 1822. ibid. III, 183, 11. — 1843. Zett. Dipt. Scand. II, 854, 8, et 1849. VIII, 3188, 8. — *Paragus obscurus* Meig. 1822. Syst. Besch. III, 183, 12. — *Paragus femoratus* Meig. 1822. ibid. III, 184, 14. — *Paragus trianguliferus* Zett. 1838. Ins. Lapp. 618, 3, et 1843. Dipt. Scand. II, 853, 7. — *Paragus dimidiatus* Loew, 1863. Berl. ent. Zeitschr. VII, 308, 63.

Male. Vertex large and long, the eye-suture short; the vertex is black, yellowish or brownish-haired; the very small frons yellow. Epistoma protruding, somewhat keel-shaped, with a slightly produced central knob in the middle; it is yellow with a black middle line and the lower margin black, and it is yellow-haired. Occiput black, pruinose downwards, with yellow hairs above, white hairs below. Antennæ black, the third joint brownish, paler beneath at base, twice as long as broad; arista short, scarcely as long as the third joint. Eyes with

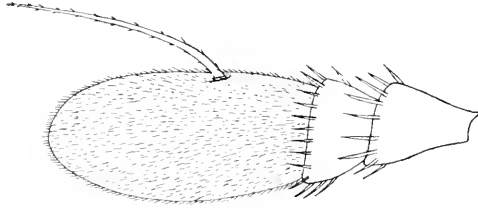


Fig. 7. Antenna of *P. tibialis* ♂, from the outside. $\times 90$.

short, whitish pubescence. Thorax black or æneous black, shining, densely punctate, with yellowish hairs, slightly longer on scutellum. Pleura with long, white hairs. Abdomen with the first segment not quite short; it is black, shining, somewhat densely punctate; the hind margins of the segments, especially of the first, are polished; the abdomen is clothed with short, yellow hairs, rather long at the base of the side margin. Venter translucent in the basal part, black towards the end, with fine, longish hairs; the fourth ventral segment with a slightly excised or about straight hind margin. Not rarely abdomen has some red colour on the third segment, more or less defined as a triangular spot, and the hind margin of the fifth segment pale. Legs yellow, anterior femora black in about the basal half, hind femora to near the apex; hind tibiæ with a black ring in the middle; sometimes

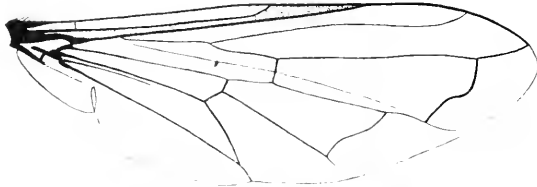


Fig. 8. Wing of *P. tibialis*.

the black colour on the femora a little less extended, and the hind tibiæ with a very weak ring or quite yellow, and this is always the case in the specimens with red colour on abdomen. The hind femora

are a little clavate about the middle, and the hind metatarsi a little thickened. The legs somewhat slightly yellow-haired, anterior femora with longer hairs on the postero-ventral side, hind femora on the antero-ventral side; the tibiæ with slightly longish hairs above, hind tibiæ with a longer fringe. Wings hyaline; stigma brown. Squamulæ and halteres pale yellow.

Female. Frons black or æneous black, punctate, with yellow hairs. The black stripe on epistoma generally broader than in the male, sometimes only the extreme sides yellow, and even these may be rather darkened.

Length 4.2 to about 6 mm.

As seen from the description this species varies somewhat with regard to the colour of abdomen and hind tibiæ; the specimens with red colour on the third segment and apex of abdomen answer to *sigillatus* Curt. (Brit. Entom. 1835, 593) and *trianguliferus* Zett., while the black specimens with quite yellow hind tibiæ answer to *obscurus* Meig. The species does not seem to vary more in our country; forms as *haemorrhous* Meig. and *æneus* Meig. I have not seen from Denmark.

P. tibialis is not properly common in Denmark; Gandløse Ore at Farum Sø, Hillerød, Rørvig; on Langeland at Lohals; in Jutland at Holstebro, Hald, Søndervig and Frederikshavn, and on Bornholm at Hasle. My dates are $\frac{20}{6}$ to the first part of August. It occurs in sandy, somewhat sunny districts, flying low, near the ground.

Geographical distribution:— The species is widely distributed, it occurs over all Europe, towards the north to northern Sweden, and in Finland; further it occurs in Asia Minor, North Africa and even down to Kilimandjaro, on the Canarian Islands and Madeira; and it also occurs in North America.

2. *P. bicolor* F.

1794. Fabr. Ent. Syst. IV, 297, 71 (*Syrphus*) et 1798. Suppl. 559, 8 (*Mulio*) et 1805. Syst. Antl. 186, 10 (*Mulio*). — 1822. Meig. Syst. Besch. III, 178, 2. — 1843. Zett. Dipt. Scand. II, 849, 1. — 1862. Schin. F. A. I, 259. — 1901. Verr. Brit. Fl. VIII, 152, 2. — 1907. Kat. paläarkt. Dipt. III, 2. — *Paragus zonatus* Meig. 1822. Syst. Besch. III, 177, 1. — *P. arcuatus* Meig. 1822. ibid. III, 179, 3, Tab. XXVII, Fig. 20, 21. — *P. taeniatus* Meig. 1822. ibid. III, 179, 4. — 1843. Zett. Dipt. Scand. II, 850, 3. — *P. testaceus* Meig. 1822. ibid. 180, 6. — *P. punctulatus* Zett. 1838. Ins. Lapp. 617, 1, et 1843. Dipt. Scand. II, 850, 2, et 1859. XIII, 6033, 2. — *P. lacerus* Loew, 1840. Programm Posen, 27, 2, et 1840. Isis 544, 2. — 1862. Schin. F. A. I, 258. — *P. ruficauda* Zett. Dipt. Scand. II, 852, 5.

Male. Vertex black, generally yellow just at the tip; it is narrow, but long, the eye-suture being quite short; it has short, yellow hairs;

the small frons yellow. Epistoma only keel-shaped below, not much protruding, and with the central knob smaller and lower down than in *tibialis*: the epistoma is yellow, thinly yellow-haired, the mouth edge and the central knob black. Occiput black, grey pruinose, the hairs yellow above, white below and on the black jowls. Antennæ black, third joint more brownish, palest beneath at base; it is four times or more as long as broad; arista brown, shorter than the third joint, inserted about a quarter of the length from the base. Eyes with short, whitish and brown hairs, arranged so that two, or about three white bands run down the eyes. Thorax black or æneous, densely and rather coarsely punctate and densely clothed with short, deep yellow hairs, not longer on scutellum; it has two short, approximated, brownish stripes in front which are more or less distinct, sometimes somewhat indistinct. Scutellum has the apical margin yellow or whitish yellow. Pleura with somewhat long, yellowish white hairs. Abdomen relatively broad and not long, with the first segment shorter than in *tibialis*; it is densely and rather coarsely punctate, most coarsely on the first segment, it is slightly shining except at the extreme hind margins of the segments. Abdomen is black and red, the red colour occupies the posterior part of the second segment, the third and the anterior half of the fourth segment; on the second segment the black colour is at the sides continued to the hind margin. Sometimes there are a pair of black side spots on the third segment. Abdomen is clothed with short hairs, only a little longer at the basal corners; the hairs are mainly yellow, but black on the disc towards the hind margins; the pale hairs form more or less distinct arcuated fasciæ on the front part of the third and fourth segments. Venter translucent at the base, reddish in the middle, but the apical part of the fourth segment and all the transformed segments black; the venter is sparingly clothed with pale hairs, most dense just at the base and towards the apex; the fourth ventral segment somewhat punctate, slightly excised in the hind margin at each side so that a slightly produced part is formed in the middle. The transformed genital segments form a large knob on the ventral side. Legs yellow, the basal part of the anterior femora, and the hind femora to more or less near the apex black; hind metatarsus darkened above, and the hind tibiæ often with a dark patch or ring on the middle; hind metatarsus a little thickened. The legs haired about as in *tibialis* with pale hairs. Wings hyaline or very slightly tinged; stigma brownish. Squamulæ and halteres yellowish white.

Female. Frons black, punctate, rather narrow upwards and together with the vertex much narrower than in *tibialis*; on each side

at the eye-margin an elongated, grey dust spot; it has yellow hairs while the vertex is black-haired. Epistoma with a broad, black middle stripe.

Length 5,5—6,7 mm.

This species varies considerably with regard to the colour on abdomen, but hitherto only the form described above has occurred in Denmark. Otherwise it varies from the palest form with only base of abdomen black (*testaceus*), through forms as the described (*bicolor*) or with the red middle part of abdomen smaller (*arcuatus*, *tæniatus*) or only present on third segment (*zonatus*), further with only red spots on second and third segments (*lucerus*), to forms with only apex red (*ruficauda*). In the darkest forms the scutellum may be unicolorous. Also the hairiness of abdomen and its colour vary, sometimes forming distinct pale or white fasciæ. Finally the size may vary, from small, rather narrow to larger and broader specimens: the size is, however, not so much varying in the few known Danish specimens.

P. bicolor seems to be rare in Denmark, only six specimens are known, two without particular locality (Schiødte) and four from Jerup near Frederikshavn (Th. Mortensen), the latter taken on ¹⁴/7. It occurs on sunny and sandy places as sandy grass-fields, sitting on the grass.

Geographical distribution:— Widely distributed species, occurring over all Europe, towards the north to middle Sweden, and in Finland; further in North-Africa, and also in North America.

3. *P. albifrons* Fall.

1817. Fall. Dipt. Suec. Syrph. 60, 6 (*Pipiza*). — 1822. Meig. Syst. Besch. III, 181, 8. — 1843. Zett. Dipt. Scand. II, 851, 4. — 1862. Schin. F. A. I, 258. — 1900. Verr. Cat. europ. Syrph. 21. — 1907. Kat. paläarkt. Dipt. III, 1. — *Paragus ater* Meig. 1822. Syst. Besch. III, 182, 9. — *Syrphus thymastri* Fabr. 1781. Spec. Ins. II, 433, 60.

This species is very like *bicolor*, but the abdomen is quite black; the hairs on abdomen form rather obvious white or pale yellow fasciæ on second, third and fourth segments. The hind margin of the fourth ventral segment in the male is straight or almost so. Scutellum has only the tip pale, and even this may be rather obscured. The hind tibiæ have always a dark ring, and also the anterior tibiæ may be obscured about the middle. The tendency of the eye-pubescence to form bands is less obvious. The species is in general smaller than *bicolor*.

Length 4,8—6 mm.

This species is, so far Danish specimens are concerned, at once distinguished from *bicolor* by its black abdomen. Verrall has raised

doubt about its specific distinctness against *bicolor*. I think, however, the species may be distinct, as I find the described difference in the shape of the hind margin of the fourth ventral segment in the male; yet the difference is slight, and it will have to be confirmed on a richer material; otherwise I find no plastic characters; moreover I have a female specimen which has a small, triangular, red spot at the base of the second segment.

P. albifrons is a little more common here than *bicolor*; Amager, Dyrehaven, Nordskoven at Jægerspris; on Langeland at Lohals; on Funen at Odense; in Jutland in Højenbæk Dal at Vejle and at Frijsenborg. One of the specimens has been bred, but no particulars are given. My dates are $2^{1/6}$ — $4/8$. It occurs in the same way as the preceding.

Geographical distribution:— Europe down into Italy; towards the north to southern Sweden, and in Finland.

2. **Triglyphus** Loew.

Species of somewhat small size and of black colour. Head about semiglobular, a little broader than high and a little broader than thorax, hollowed behind. Eyes touching in the male, well separated in the female, densely hairy; the facets in the male slightly enlarged above. Frons not protruding, arched in the male. Antennæ inserted a little below the middle; they are short, third joint roundish; arista about of the length of the antennæ, inserted basally on the third joint, and with quite small basal joints; it is bare. Epistoma not hollowed or produced, straight, slightly arched; it is black and hairy. Jowls small, very slightly descending at the mouth edge, with a small pit in front. Thorax rectangular or almost square; scutellum black, with marginal hairs below. No thoracal or scutellar bristles; metapleura with short hairs. Abdomen with nearly parallel sides in the male, more ovate in the female; the two basal ventral segments weakly chitinised. In the male there are four visible, not transformed segments above, the first small, the second and third long and of equal length, the fourth or apical quite small; on the ventral side likewise four segments, the fourth not quite small, its hind margin not reaching to the end of the fourth dorsal segment. The genitalia constructed as usual, not large. In the female abdomen likewise with four visible segments, the fourth dorsal quite small so that the fourth ventral lies under the posterior part of the third dorsal: the rest hidden, but generally a pair of them may just be seen below; the last terminates with two relatively large lamellæ. Legs with the tibiæ slightly deformed,

the hind metatarsus somewhat thickened; anterior femora with long hairs postero-ventrally, hind femora antero-ventrally, hind tibiæ with a fringe above, and hind metatarsus with long hairs on the anterior side. Two claws, two pulvilli and a small, linear, hairy empodium. Wings with the medial cross-vein long before the middle of the discal cell, the marginal cross-veins sloping outwards, the upper angle at the

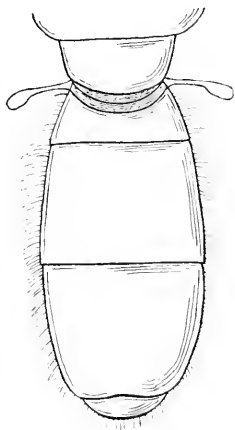


Fig. 9. Male, the apical segment is the fourth.

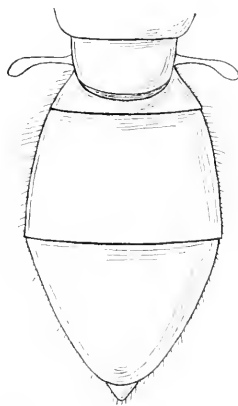


Fig. 10. Female.

Abdomen of *T. primus*.

cubital vein acute; vena spuria weak. Alula well developed. Plumula with fine hairs. Alar squamulæ with short hairs, thoracal squamulæ with long, furcately divided hairs.

The developmental stages (of the European species) are not known. — Loew described two American species (Berl. ent. Zeitschr. 1863, Cent. IV, 61, 62.) *pubescens* and *modesta*; Webster (Canad. Entom. XXX, 19) has reared the latter from larvæ feeding on *Schizoneura lanigera*; with regard to these two species see below.

This genus is quite distinct; the characters lie in the abdominal segments; the following genera have in the male four not transformed segments, the second to fourth of about equal length (fig. 25); *Triglyphus* has also four segments, but the fourth is quite small, only the second and third of equal length and rather long (fig. 9). In the female the following genera have five normal segments, with second to fourth equal (fig. 26), *Triglyphus* thereagainst only four, and also here the fourth is quite small, the second and third long (fig. 10), and the fourth ventral segment lies under the posterior end of the third dorsal. The statement by Loew and Schiner that the abdomen has one (visible)

segment less than other Syrphids is thus based on the female, the only sex known to them.

Of the genus only one palæartic species is known, also occurring in Denmark, and this is perhaps the only existing species. As said above Loew has described two American species; Williston (Syn. of the North Am. Syrphidae, Bull. of U. S. Nat. Mus. 31, 1886) declares however, that by examination of the types he found, that these species show five abdominal segments, the fifth as well developed as in *Pipiza*, and the second and third (Williston says third and fourth) not specially large; if this is so these species may not belong to *Triglyphus*, though it is not easy to understand, that Loew should have committed such an error. Also it is to note that Williston says "the fifth as well developed as in *Pipiza*" for in the *Pipiza* male there are only four segments anterior to the genital knob; if this latter is taken as the fifth, it is small both in *Triglyphus* and *Pipiza*; in the female *Pipiza* shows five segments, the fifth rather small, *Triglyphus* four, with the fourth small, and generally still a pair of very small segments visible. The real distinction lies in the character that *Pipiza* (and the other genera of the group) has in both sexes second to fourth segments about equally long, *Triglyphus* only second and third. — I should be most inclined to think that Williston has not correctly apprehended the characters.

1. *T. primus* Loew.

1840. Loew, Programm Posen, 30, Fig. 38—40 et 1840 Isis, 563, 1, Tab. I, Fig. 38—39. — 1857. Rond. Dipt. Ital. Prodr. II, 177. — 1862. Schin. F. A. I, 266. — 1907. Kat. paläarkt. Dipt. III, 5.

Male. Vertex black, frons bluish black, shining, both with black hairs. Epistoma bluish black, with greyish white and some dark hairs, a little pruinose just at the eye-margin. Occiput bluish black, grey pruinose, with black hairs above, white below. Antennæ short, third joint about roundish; they are black, third joint brownish red below at base. Arista about as long as the antennæ. Eyes densely brownish hairy. Thorax æneous, punctate, with rather long hairs which are yellowish, but on the middle of the disc and partly on scutellum brownish to blackish, or they are all blackish; they are long at the scutellar margin. Pleura with long, whitish, or above with darker hairs. Scutellum with a somewhat distinct margin. Abdomen æneous, shining, the second segment deep velvet black, dull, leaving just all four margins shining, the third segment with a velvet, transverse band on the front part, not reaching the side margin, and sometimes interrupted in the middle. Abdomen clothed with quite short hairs

which are black on the dull parts, but paler on the shining apical part; at the margin there are longish, pale hairs, increasing in length towards the base. Venter black, somewhat translucent on the basal part, with pale hairs, dark on the fourth segment. Genitalia forming a small knob. Legs black, knees yellowish red, the hind knees somewhat obscurely, the basal part of the middle metatarsus likewise pale. All tibiæ with a slight excision or incurvation on the posterior side near the apex, most distinct on the hind tibiæ. Hind metatarsus somewhat thickened. Anterior femora with long hairs on the postero-ventral side, hind femora on the antero-ventral side; they are white, on the anterior femora dark towards the apex; anterior tibiæ with short, mainly dark hairs, hind tibiæ with a long fringe above, which may be dark or pale, and with somewhat strong hairs on the postero-ventral side in the upper two thirds; front and especially hind tarsi with an adpressed, yellow pubescence below, the latter also with long hairs on the anterior side. Wings slightly tinged; stigma brownish

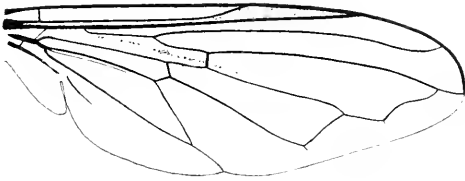


Fig. 11. Wing of *T. primus*.

yellow; the upper marginal cross-vein sloping outwards, with a more or less distinct curve, the upper angle acute. Squamulæ brownish with darker margin and a pale brownish fringe. Halteres yellow.

Female. Frons bluish black, a little punctate, with a small depression somewhat above the antennæ, black-haired above, white-haired below, but above the antennæ again with black hairs; in the middle of the frons, at the eye-margin, a pair of small dust spots. Postocular hairs all white. Antennæ with the third joint a little longer than in the male, and more pale. Thorax with short, white pubescence. Abdomen bluish black, densely somewhat finely punctate, with short, pale pubescence, only dark at the hind part of the second segment on the disc. Legs with the knees more pale than in the male, the first joint on the front tarsi and the two first joints on the middle tarsi more or less distinctly yellow; the hairs all white. Squamulæ white.

Length 5—6 mm.

This interesting species has hitherto only been known in the female sex, though both Loew and Schiner were inclined to think that the sole specimen each of these authors had was a male in spite of the separated eyes; I think this error is caused by the ovipositor of the female being somewhat protruding on the ventral side, and thus mistaken for male genitalia. Schiner, therefore, ascribes the genus separated eyes in both sexes. Rondani says (l. c.) the same, and states that he has seen type-specimens of both sexes which may be an error, as Loew had, at all events originally, only one specimen; he also says that he has himself taken both sexes, which is certainly likewise erroneous.

T. primus is rare in Denmark, only five specimens have been caught in 1906 and 1909; Copenhagen in a garden, Amager, Ordrup Mose (the author); the dates are $11/5-7/8$.

Geographical distribution:— The species is but little known; it has, besides in Denmark, been taken in Austria and Italy.

3. **Pipizella** Rond.

Species of rather small size and of black, generally a little æneous colour, in one single case with abdominal spots in the female. Head about semiglobular, a little broader than high, and a little broader than thorax, hollowed behind. Eyes touching in the male for a shorter or longer distance, broadly separated in the female. Frons in the male arched and in none of the sexes conically protruding. In the female the frons with a slight transverse depression, or this wanting, and with very slight, almost no side dust spots, only in *Heringi* these larger; on the sides at the eye-margin, about in the middle, just at the dust spots or where these should be there is a short row of hairs, a little longer than the other side hairs, and directed a little inwards towards the middle. Eyes densely hairy, generally longest in the male: the facets of equal size. Antennæ inserted near to each other, in or slightly above the middle; they are shorter or longer, generally a little longer in the female; the third joint more or less elongated, of linear or a little oval shape; arista inserted at the base of the third joint, thickened in the basal part, with very short basal joints, only seen under the microscope. The two first antennal joints a little haired, the third and the arista microscopically hairy. Epistoma a little arched, straight, without any central knob, at the mouth edge slightly or almost not reflexed; it is black, and is longish-haired. Jowls almost not descending below the eyes, in front of them a deep pit. The oral cone rather short. Clypeus horse-shoe-shaped; pro-

boscis somewhat short. Labrum somewhat strong, semitubular, the median process narrow, cleft and the apices diverging, and each branch with spine-like emergences; the lower lateral process the longest, rather broad, somewhat pointed and with the apex directed inwards; the upper lateral process is shorter and very thin and delicate; along the lateral margin on the inside labrum has a row of small warts. Hypopharynx of the length of labrum, somewhat blade-shaped, rounded at the end. Maxillæ with a short, lancet-shaped lacinia, and a cylindrical, somewhat club-shaped palpus of the same length; it has some bristles and is beset with microscopical hairs; the lacinia very densely beset with still smaller hairs. Labium with the well chitinised basal part about as long as the broad labella, it is triangularly incised in front. Thorax nearly quadratic, somewhat densely hairy. Scutellum black, with a row of marginal hairs below. No bristles present. Metapleura with short hairs. Abdomen elongate, flattened, with nearly parallel sides; on the sides of the segments more or less slight, arched elevations; on the venter there is a small chitinisation at the base, the first ventral segment otherwise more or less slightly chitinised. In the male abdomen has four not transformed segments, the first quite short, the second longest, the third and fourth shorter, of equal length. Genitalia forming a small knob; they are turned to the right, bent in under the venter and with the end hidden under the fourth ventral segment; the ninth segment together with its appendages not long; in *Heringi* the genitalia are larger. In the female there are five visible segments, the fifth small, and three hidden, forming an ovipositor ending with two small styles. Legs not long; hind metatarsus a little thickened. The anterior femora have long hairs on the posterior side and the hind femora on the anterior side; hind tibiæ with a fringe above; below the apical part of the front and hind tibiæ and the tarsi the usual short, adpressed pubescence. There are two claws and pulvilli, and a short, linear or bristle-shaped empodium with small bristles. Wings not long, about as long as abdomen; medial cross-vein before the middle of the discal cell; the upper marginal cross-vein starting rectangularly below, bent before the middle and with the upper part more or less curved, the upper angle about rectangular; in *Heringi* the upper part of the vein sloping outwards, the upper angle acute. Vena spuria weak. Alula well developed. Plumula not short, with hairs which are slightly branched from the base. Alar squamulæ with longish, simple hairs, thoracal squamulæ with long, furcately divided hairs.

The developmental stages of *P. virens (varipes)* are described by Heeger (Sitzungsber. d. kais. Akad. d. Wissenschaft. Wien, Math. Nat.

Cl. 31, 1858, 299, Taf. II, Fig. 18). The larva is aphidiphagous on Aphides on the roots of *Pastinaca*, *Petroselinum* etc. There are two generations in the year. The eggs are deposited on the roots. The first generation appears in April and May, the second in July and August; the larvæ of the second generation hibernate and pupate in March and April. The larva is green when young, but becomes later on brown; it is rough; the length is ca. 7 mm, and it has parallel sides. The posterior spiracles lie on a small, cylindrical process. The pupa is of a short drop-like shape. Goureau describes the larva and pupa, likewise of *P. virens* (Ann. Soc. Ent. de Fr. 4, VII, 1867, Bull. 86); the larva was found feeding on Aphides on Elm and Poplar; they were found from $\frac{20}{6}$ to $\frac{4}{8}$, and the imagines came from $\frac{8}{8}$ to $\frac{30}{8}$. The description of the larva agrees with that by Heeger, so that the species is no doubt *P. virens* as said at the end of the note, though at the beginning the author names the species *Eumerus aeneus*; this latter lives, however, in quite another way (in onions). Wachtl mentions (Wien. ent. Zeitg. I, 1882, 279) that *P. Heringi* came in May from galls of *Schizoneura lanuginosa* from the foregoing year, and concludes that the larva feeds on this Aphid.

The species of *Pipizella* occur in low herbage and on flowers on commons, in fens and woods, both on dry and in more humid places; they bear the abdomen hanging somewhat downwards.

Of the genus about 6 species are known from the palæarctic region: 3 occur in Denmark.

Table of Species.

- | | |
|--|------------------------|
| 1. Upper marginal cross-vein not sloping much outwards, the upper angle almost rectangular | 2. |
| — Upper marginal cross-vein starting rectangularly below, then bending angularly outwards, the upper angle acute | 3. <i>Heringi</i> . |
| 2. Pubescence on hind tibiæ pale; abdomen in the female unspotted | 1. <i>virens</i> . |
| — Pubescence on the hind tibiæ black; abdomen in the female with a pair of yellow spots | 2. <i>flavitaris</i> . |

1. *P. virens* Fabr.

1805. Fabr. Syst. Antl. 186, 12 (*Mulio*). — 1822. Meig. Syst. Besch. III, 253, 26 (*Pipiza*). — 1862. Schin. F. A. I, 260. — 1901. Verr. Brit. Fl. VIII, 155, 1, figs. 179—80. — 1907. Kat. paläarkt. Dipt. III, 7. — *Pipiza campestris* Fall. 1817. Dipt. Succ. Syrph. 59, 4. — 1843. Zett. Dipt. Scand. II, 840, 19 et 1849. VIII, 3186, 19. — *Pipiza tristis* Meig. 1822. Syst. Besch. III, 253, et 1838. VII, 119, 33. — 1862. Schin. F. A. I, 265. — *Pipiza varipes* Meig. 1822. l. c. III, 254, 28. — 1843. Zett. Dipt. Scand. II, 841, 21 et 1849. VIII, 3186, 21 et 1859. XIII, 6031, 21. — *Pipiza*

annulata Macq. 1827. Soc. Sc. Lille, 1827, 181, 15. — 1838. Meig. l. c. VII, 120, 38. — 1843. Zett. Dipt. Scand. II, 842, 22 et 1849. VIII, 3186, 22. — *Pipizella annulata* 1862. Schin. F. A. I, 260. — *Pipiza obscuripennis* Meig. 1838. l. c. VII, 119, 36. — 1862. Schin. F. A. I, 265.

Male. Vertex and frons æneous or bluish black, yellow-haired, just above the antennæ some black hairs. Epistoma somewhat bluish black, slightly pruinose, white-haired. Occiput æneous or bluish black, yellowish-haired, at the top the hairs long. Antennæ black or blackish, not so long as epistoma, third joint about twice as long as broad, but somewhat varying in length; arista shorter than the antennæ, thickened in the basal two thirds. Eyes brownish-hairy, the hairs not specially long; the suture between the eyes rather short, distinctly

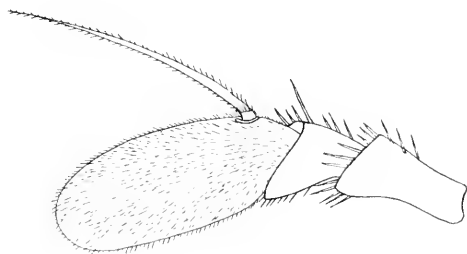


Fig. 12. Antenna of *P. virens* ♂, from the outside. $\times 80$.

shorter than the vertical triangle. Thorax æneous, densely punctate and densely clothed with longish, yellow hairs; scutellum more coarsely punctate, with the hairs at the margin longer. Pleura likewise yellow-haired. Abdomen æneous, densely and coarsely punctate, slightly shining, most towards the apex; it is clothed with short, yellow or reddish-yellow hairs, longer at the margin and longest at the basal corners of second segment; at the second and third incisures the hairs are black, and the blackish-haired spaces sometimes somewhat extended. Venter black, shining, with long, pale hairs, the fourth segment with short hairs. Legs black or æneous black, the knees more or less broadly reddish or yellowish; the tarsi sometimes almost quite black, but generally the middle metatarsus more or less yellow, often quite yellow; front tarsi generally black but the metatarsus may be more or less to quite yellowish; also the second joint of the hind tarsi may sometimes be a little yellowish. Hind metatarsi a little thickened. The legs have yellowish hairs, only at the end of the anterior femora some black hairs; the hairs are long on the posterior side of the anterior femora and on the front side of the hind femora; the tibiæ have somewhat short hairs, longer above the hind tibiæ;

below front and hind tibiæ and tarsi an adpressed, yellow pubescence. Wings a little yellowish or light brownish tinged, sometimes with an indication of a brownish cloud on the middle; stigma brown. The upper marginal cross-vein starting rectangularly below, bending more or less angularly outwards before the middle and the upper part

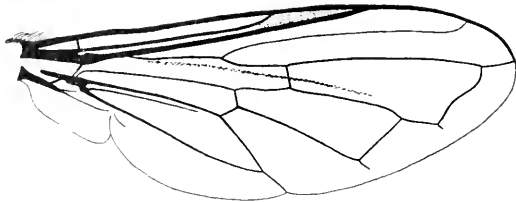


Fig. 13. Wing of *P. virens*.

curved so that the upper angle is generally rectangular; the mediastinal vein ending just before the middle cross-vein. Squamulæ whitish. Halteres yellow.

Female. Frons æneous black, slightly punctate, with a groove above the antennæ, and with a very slight or indistinct transverse depression, bounded above by an angular line with the top forwards; it is whitish-haired but with a black-haired cross-band just in front of the ocelli. Antennæ slightly longer than in the male. Eyes with short, pale hairs. Pubescence on thorax a little shorter.

Length 5.4 to about 7 mm.

This species varies, as described, somewhat with regard to the paleness of the base of the anterior tarsi; the palest forms have been described as *annulata* Macq. and *varipes* Meig. — Verrall says l. c. about the third antennal joint “usually two and a half times longer than deep”, this may be a lapsus for one and a half times, as his figure shows.

P. virens is a common species in Denmark; Utterslev Mose, Vester Fæled, Amager, Ordrup Mose, Ermelund, Dyrehaven, Lyngby Mose, Ørholm, Tyvekrog, Tisvilde, Rørvig, Stevns, Nyraad near Vordingborg; on Langeland at Lohals; on Lolland at Maribo, Kældskov and Strandby; on Funen at Odense and Veflinge; in Jutland at Horsens, Aarhus, Silkeborg and Laven, Søndervig, Bovbjerg, Rebbild near Skørping, Thisted, Allerup, Sæby, Frederikshavn, Skagen, and on Læsø; finally on Bornholm in Almindingen, at Hasle and Allinge; the dates are 7/5—10/8. It occurs in low herbage on commons, in fens and woods, especially on dry, but also on more humid localities.

Geographical distribution:— All Europe, towards the north to middle Sweden, and in Finland.

2. *P. flavitarsis* Meig.

1822. Meig. Syst. Besch. III, 248, 14 (*Pipiza*). — 1843. Zett. Dipt. Scand. II, 832, 8 et 1849. VIII, 3183, 8 et 1859. XIII, 6027, 8 (*Pipiza*). — 1862. Schin. F. A. I, 263 (*Pipiza*). — 1901. Verr. Brit. Fl. VIII, 157, 3. — 1907. Kat. paläarkt. Dipt. III, 6. — *Pipiza campestris* var. β . Fall. 1817. Dipt. Suec. Syrph. 60. — *Pipiza vitrea* Meig. 1822. Syst. Besch. III, 249, 15. — 1843. Zett. Dipt. Scand. II, 832, 9 et 1849. VIII, 3183, 9 et 1859. XIII, 6027, 9. — *Pipiza melancholica* Meig. 1822. l. c. III, 251, 20, Tab. XXIX, Fig. 12. — *Pipiza Ratzeburgii* Zett. 1843. l. c. II, 843, 23 et 1849. VIII, 3186, 23 et 1859. XIII, 6032, 23.

Male. Vertex, frons and epistoma bluish, black-haired; vertex with some yellow hairs. Eye-suture rather long, as long as or nearly as long as the vertical triangle, though varying. Occiput bluish black, somewhat greyish pruinose, especially downwards; the postocular hairs black above, white in the lower half, but the jowls black-haired. Eyes densely blackish brown-hairy. Antennæ black, not so long as epistoma, third joint twice or scarcely twice as long as broad; arista about as long as the antennæ, thickened in the basal half, brown at the base. Thorax bluish black, finely punctate; it is clothed with longish hairs, long on scutellum, especially at the margin; the hairs are pale on the disc, but dark at the side margins and at the margin of scutellum. Pleura with long, black hairs. Abdomen æneous black, second segment coarsely punctate, the others less coarsely punctate, and shining. Abdomen clothed with short hairs, a little longer at the margin, and especially at the basal corners. The hairs are black except on the side parts of third and fourth segments. Venter black, shining, with somewhat long hairs, longest and pale on the second segment, for the rest black. Legs black, shining, anterior knees and the two first joints of the anterior tarsi yellow; hind knees very narrowly reddish, second joint of hind tarsi yellow; hind metatarsus somewhat thickened. Legs haired in the usual way with black hairs, but the long hairs on the front side of hind femora white, except at the apex; the fringe above the hind tibiæ conspicuous; the adpressed pubescence on tibiæ and partly on hind metatarsi dark. Wings a little brownish tinged; stigma yellowish brown; the upper marginal cross-vein with a rectangular bend in the middle, the upper part not or slightly curved; the mediastinal vein ending just after the middle cross-vein. Squamulæ dirtily whitish or smoky, with darker margin. Halteres yellow.

Female. Frons very slightly punctate, bluish, brightly shining, with a small groove above the antennæ, but without transverse depression; it is white-haired, but with a cross-band of black hairs above. Vertex, epistoma and occiput white-haired, the postocular hairs longer and more conspicuous than in the male; eyes shorter-haired, but the

hairs dark. Antennæ longer, third joint more than twice as long as broad. Thorax and pleura white-haired and with shorter hairs than in the male. Abdomen more bluish, with two almost circular, yellow or reddish spots on the middle of second segment. Abdomen haired as in the male, but the white hairs more extended. Femora shorter-haired, and all white-haired. The wings may be a little more tinged, and the upper marginal cross-vein is more perpendicular. Squamulæ white.

Length 5,5—6,5 mm.

P. flavitarsis is not common in Denmark; Ordrup Mose, Dyrehaven, Lyngby Mose, Birkerød, Nyraad near Vordingborg and on Funen at Veflinge. My dates are $7/6$ — $3/8$. Zetterstedt records (VIII) that Stæger has taken it in copula.

Geographical distribution:— All Europe; towards the north to southern Sweden, and in Finland.

3. *P. Heringi* Zett.

1843. Zett. Dipt. Scand. II, 844, 24 et 1852. XI, 4307, 24 et 1859. XIII, 6032, 24 (*Pipiza*). — 1862. Schin. F. A. I, 260. — 1901. Verr. Brit. Fl. VIII, 159, 4, figs. 181—85. — 1907. Kat. paläarkt. Dipt. III, 6. — *Pipiza geniculata* Zett. 1843. Dipt. Scand. II, 839, 18. — *Pipiza leucogona* Zett. 1849. ibid. VIII, 3185, 18. — *Heringia Zetterstedtii* Rond. 1856. Dipt. ital. Prodr. I, 53 et 1857. II, 185, 1. — 1885. Kow. Wien. ent. Zeitg. IV, 241.

Male. Vertex, frons and epistoma æneous black; vertex with yellow, frons with black hairs; epistoma white-haired. The eye-suture

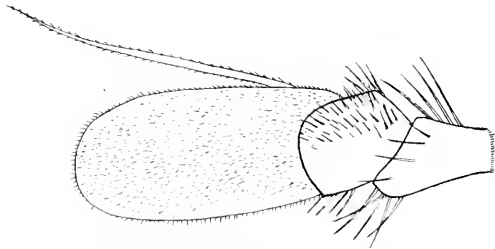


Fig. 14. Antenna of *P. Heringi* ♂, from the inside. $\times 80$.
(From a German specimen).

about as long as the vertical triangle. Occiput æneous black, a little pruinose, with yellow hairs, above there are some black hairs intermingled. Eyes densely hairy with pale, somewhat short hairs. Antennæ not long, third joint one and a half times a long as broad or fully so; they are black or blackish, third joint inconspicuously reddish

below at base; arista scarcely as long as the antennæ, thickened in about the basal half. Thorax æneous black, densely punctate, clothed with long, yellowish hairs, longest on scutellum. Pleura likewise with yellowish hairs. Abdomen black, a little æneous, almost not punctate; it is dull, only shining at the side margin, the side elevations on the third segment and at the posterior half of fourth segment; the disc is clothed with short hairs, black at the sutures, for the rest pale, but the black hairs predominant; the margin has long, pale hairs, longest at the base. Venter blackish, a little translucent at the base, with long, pale hairs on second segment, short hairs on the others. Genitalia large, shining, reaching long in under the venter and the apex here ferruginous. Legs black, knees yellow, hind knees only narrowly; the middle metatarsus somewhat indistinctly yellowish on the basal part; hind

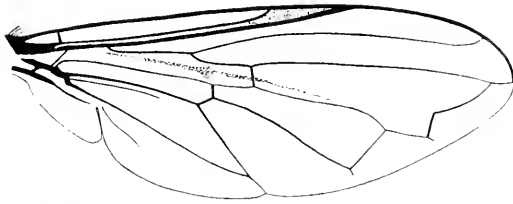


Fig. 15. Wing of *P. Heringi* ♂. (From a German specimen).

metatarsus a little thickened. The legs haired as usual, yellowish on the posterior femora, dark on front femora; anterior tibiæ mainly pale-haired, the conspicuous fringe above the hind tibiæ black; the adpressed pubescence pale below the tarsi, dark above. Wings very slightly tinged; stigma brownish yellow; mediastinal vein ending a little after the medial cross-vein; the upper marginal cross-vein starting rectangularly, after the first third part bending angularly outwards parallel with the margin, the upper angle acute. Squamulæ smoky or pale brownish, with a darker margin and a pale brownish fringe. Halteres with the knob brownish.

Female. Frons æneous or often bluish black, finely punctate, with a groove above the antennæ, and with a slight transverse depression, bordered above by a line with a triangular outskot in the middle; it is whitish-haired, above the antennæ and just in front of the ocelli some dark hairs; distinct side dust spots present. Occiput puffed out and shining above, the white postocular hairs more conspicuous than in the male; at the sides upwards some black hairs. Antennæ longer than in the male, the third joint twice as long as broad. Thorax with shorter and whiter hairs. Abdomen sometimes quite white-haired.

but generally black-haired at the incisures. Legs a little shorter-haired than in the male, and femora and tibiæ all white-haired. Wings a little more tinged, sometimes especially about the middle. Squamulæ paler, whitish.

Length 5,5—6,5 mm.

Verrall's description, at all events of the male, is not quite agreeing with my specimen; it seems to differ by the almost quite black-haired

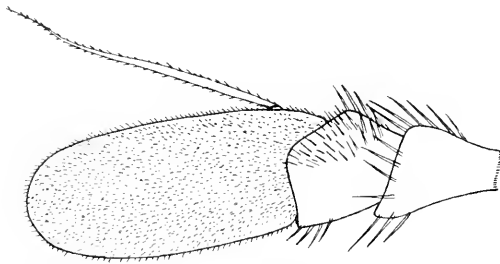


Fig. 16. Antenna of *P. Heringi* ♀, from the inside. $\times 80$.
(From a German specimen).

epistoma, the more long-haired abdomen and somewhat fringed anterior tibiæ; also the figure of the antennæ shows a rather short third joint, though in the text it is said to be about one and a half times longer than deep. One might almost be inclined to suggest, that it is my *Penium dubium* (se below) which Verrall has had before him.

P. Heringi seems to be rare in Denmark, I only know three specimens; Copenhagen in a garden (the author), and two specimens from earlier time; the only date is 18/6. The specimens are all females, but according to Zetterstedt Stæger had sent him a male (*geniculata*); it may however be noted that Zetterstedt may well have mixed the species with *Penium dubium* described below.

Geographical distribution:— All Europe; towards the north to southern Sweden; further it is recorded from the Canarian Islands.

4. **Penium** Phil.

This genus is in most respects quite agreeing with *Pipizella*. The species are medium-sized or small, black or æneous. Frons in the male arched, and in none of the sexes protruding; in the female it has no transverse depression such as in *Cnemodon*. Antennæ somewhat short, third joint short or somewhat elongated. Male genitalia rather large, the ninth segment with its appendages stretching long in under the venter. Legs as in *Pipizella*. Wings with the upper marginal cross-

vein either bent about as in *P. Heringi* or of a course about as in *Pipiza*, the upper angle thus more or less acute; the mediastinal vein ending after the medial cross-vein.

I have here accepted the genus *Penium*, following the Kat. paläarkt. Dipt., but I must say, that I do not understand that Kowarz (Wien. ent. Zeitg. IV, 1885, 241) has thought to be able to interpret Philippi's genus (Verhandl. zool. bot. Gesell. Wien, XV, 1865, 741, Tab. XXVII, Fig. 38 and 41): the description and figures are not at all sufficient, and the figures of the heads (38 a, 41 a) do not show the arched frons found in *P. carbonarium*. Provisionally then the *P. carbonarium* Meig. apud Kowarz may be taken as type. Through the kindness of Mr. Collin in Newmarket I have been able to study Kowarz's types. When I have after all accepted the genus it is because there seems to be some species which do not agree with the other genera in the *Pipiza*-group. Of these genera *Pipiza* has a conically protruding frons which is small and flat in the male (figs. 23 and 24); the other genera have the frons not conically protruding and in the male rather large and arched (figs. 19 and 20). Of these latter *Pipizella* has elongated antennæ and the upper angle at the upper marginal cross-vein about rectangular (except *Heringi*); *Cnemodon* has spurs on coxæ and trochanters in the male, a transverse depression on the frons in the female, the upper angle at the marginal cross-vein acute and short antennæ; also the abdomen in the female is somewhat pointed. Now there exist some species with unarmed legs, more or less short antennæ, no depression on the frons in the female and the upper angle at the marginal cross-vein not rectangular; to these belongs *carbonarium*, and for these species I accept the genus *Penium*. Besides *carbonarium* the genus includes a new species, *dubium*, and *morionellum* Zett. This latter species has hitherto been placed in *Cnemodon*, but this is incorrect as the male has no spurs and in the whole simple legs. We find in Zetterstedt (VIII, 3184) the following note: "Observante oculatissimo Stæger coxæ posteriores marium in speciebus 14, 15, 16 et 18 apice spina brevi sunt armatæ." The four species are *anthracina*, *morionella*, *fulvimana* and *leucogona*; but for *morionella* and *leucogona* Zetterstedt states that he could find no spurs. This is also correct: *leucogona* no doubt is the male to *Pipizella Heringi*, and *morionella* may be placed in *Penium*. Stæger (according to the note the first detector of the spurs in *Cnemodon*) has certainly committed some error and not separated the species in question correctly.

The genus *Penium* is thus distinguished from *Pipiza* by the not conically protruding frons, which is rather large and arched in the male; from *Pipizella* by the shorter antennæ and not rectangular upper

angle at the upper marginal cross-vein, and from *Cnemodon* by the simple legs in the male and the frons without transverse depression in the female: the male genitalia are rather large. It includes at present three species, *carbonarium* Meig., *morionellum* Zett. and *dubium* n. sp. Whether it will prove to be quite homogenous I dare not say; *carbonarium* and *morionellum* have short antennæ, *dubium* has them longer, and the upper marginal cross-vein is a little different in all three species: in *carbonarium* it is not much sloping outwards and the upper angle less acute; in *dubium* and *morionellum* it is about as in *Heringi*. Moreover I only know the male of *morionellum* and therefore I cannot say whether the character of the wanting transverse depression on the frons in the female will hold good: perhaps some better characters may be found, and I think it probable that *P. Heringi* Zett. and *curvinervis* Strobl should be placed in this genus.

The developmental stages are not known.

Of the genus as here accepted three species are known from the palæarctic region, the new species described below included; two occur in Denmark.

Table of Species.

- | | |
|---|-------------------------|
| 1. About 6 mm; chiefly black-haired; antennæ short; wings brownish tinged. | 1. <i>morionellum</i> . |
| — About 7,5 mm; more or less pale-haired, and at all events abdomen pale-haired at the sides and on second segment; antennæ longer; wings almost hyaline. | 2. <i>dubium</i> . |

1. ***P. morionellum*** Zett.

1843. Zett. Dipt. Scand. II, 837, 15 et 1849. VIII, 3184, 15 (*Pipiza*).
 — 1885. Kow. Wien. ent. Zeitg. IV, 243 (*Cnemodon*). — 1907. Kat. paläarkt. Dipt. III, 14 (*Cnemodon*).

Male. Vertex black, black-haired; frons and epistoma bluish black, likewise black-haired, with a little pruinose line at the eye-margin about in the middle. Occiput bluish black, greyish pruinose, black-haired. Antennæ not quite short, third joint longer than broad, blackish brown, a little paler at the base beneath: arista shorter than the antennæ, brown. Eyes densely dark brown-hairy. Thorax æneous black, densely clothed with dark hairs, longest on scutellum. Pleura black-haired. Abdomen black or æneous black with the margin and the side elevations shining; it is clothed with short, dark hairs, longer at the sides. Venter black, shining, with dark hairs, most dense towards the end. Genitalia large and reaching rather long in under the venter. Legs black, anterior knees indistinctly reddish, and middle metatarsus a little reddish on the basal part. The legs are haired as

in *Cnemodon*, hind tibiæ somewhat fringed above; the tarsi have longer hairs above than in *Cnemodon*. All the hairs are dark. Wings distinctly brownish tinged, stigma only slightly darker; the upper marginal cross-vein bent as in *Cnemodon*, but not much angularly. Halteres brownish black. Squamulæ smoky or brownish.

Female. The female does not seem to be described, unless the *ruficornis* by Strobl (Mittheil. Ver. Steierm. XXIX, 1892, 196) should belong here as suggested with a query by Verrall.

Length nearly 6 mm.

The above description is made from a male in Stæger's collection. Zetterstedt remarks (l. c. II) that he had got the male he describes from Stæger under the name *P. carbonaria* M.; Stæger has then no doubt later corrected the name in his collection.

P. morionellum seems to be rare in Denmark; in Stæger's collection there is only one specimen, a male, from Dyrehaven (two more specimens under the same name do not belong here), but a second male was sent to Zetterstedt (l. c. 837).

Geographical distribution: — Northern and middle Europe down into Bohemia and perhaps Styria; it was not known to Zetterstedt from Sweden, but Wahlgren (Entom. Tidskr. XIII, 1909, 17) records it from the southern Sweden. — When I give this distribution, as well as the above synonymi, it is because I am of opinion that the authors have probably had this species and have not observed that no *Cnemodon*-spurs are present; otherwise the species was only known to Zetterstedt, and only occurring in Denmark, while *morionellus* by Kowarz and later authors would be a new *Cnemodon*-species.

2. *P. dubium* n. sp.

Male. Vertex black, with yellow and black or almost quite black hairs. Frons bluish black with black hairs. Epistoma likewise bluish black, a little greyish pruinose; it has whitish hairs, but at the sides and downwards there are black hairs, or it is all black-haired with only some pale hairs in the middle. Occiput grey pruinose, the hairs black on the upper half, white below. Antennæ black, not short; third joint not one and a half times as long as broad; arista shorter than the antennæ. Eyes densely haired with brownish or black hairs, below the hairs paler to white. Thorax black, punctate, slightly shining; it is densely clothed with somewhat long, yellowish to dark brownish hairs, longest on scutellum and at its margin and here more or less black; also just at the side margin the hairs more or less black, and the pleura black-haired, but quite downwards there are again more or fewer pale hairs. Abdomen black, dull, but the sides.

the hind margin of the fourth segment and the side elevations shining; in the middle it is clothed with short, black hairs, but all the sides and the side elevations have long pale to whitish hairs, almost pre-

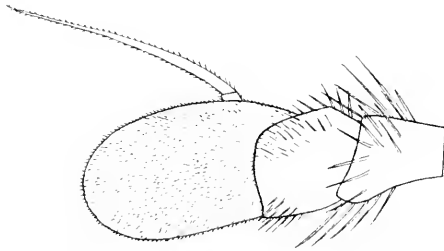


Fig. 17. Antenna of *P. dubium* ♂, from the inside. $\times 80$.

dominant on the second segment, and longest at the basal corners. Venter blackish, shining, a little translucent; it has long more or less pale hairs, most dense and dark on the fourth segment. The genitalia forming a somewhat large knob, and reaching rather long in under the venter. Legs black, anterior knees yellow, sometimes somewhat broadly, hind knees narrowly yellow, and the middle metatarsus yellow except the apex; hind metatarsus slightly thickened. The legs haired as usual, the hairs on femora rather long, yellowish or darker

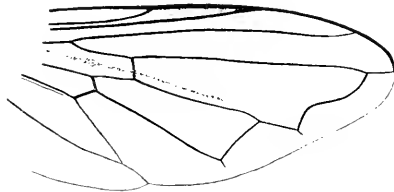


Fig. 18. Wing of *P. dubium* ♂.

to blackish and darkest on the front femora and above the hind femora; tibiae black-haired, the hairs long above the hind tibiae and here sometimes with a few pale intermingled; also above the anterior tibiae the hairs somewhat long; below the apical part of front and hind tibiae and the first tarsal joints there is the usual, adpressed, yellow pubescence; tarsi with longer hairs above than in *Cnemodon*. Wings hyaline or a little tinged about the middle; stigma dirty yellowish; the upper marginal cross-vein about as in *P. Heringi*, but the bend less angular or more roundly curved, the upper angle acute. Squamulae smoky or blackish with a darker margin and a yellowish

or brownish fringe. Halteres with the knob more or less darkened to blackish.

Female. Frons broad, black or bluish black, white-haired, but with a black-haired cross-band below the ocelli: it has somewhat large side dust spots. Epistoma and eyes white-haired. Antennæ longer than in the male with the third joint longer, but scarcely twice as long as broad, a little pale beneath at base. Thorax with longish, all white hairs. Abdomen densely punctate, with short, white hairs, black at the incisures. Legs with the knees paler than in the male, the hairs all white and almost as long as in the male. The bend of the upper marginal cross-vein generally more angular than in the male. Squamulæ and halteres whitish.

Length about 7,5 mm.

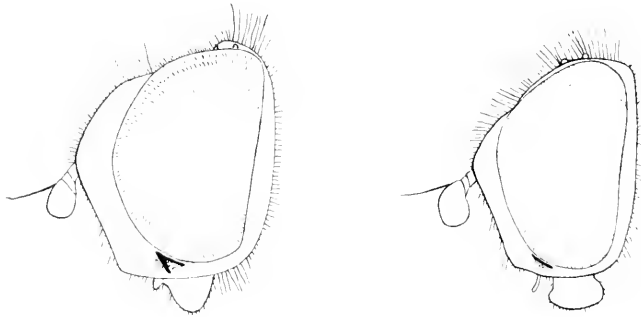
This species is easily distinguished from *morionellum* by its larger size, longer antennæ, paler pubescence and clearer wings; it is of a size as *carbonarium*, but this species has much shorter antennæ, dark-haired thorax and abdomen and the latter is all short-haired. — I have not been able to recognize the species as any earlier described; it seems to come near to *P. (Heringia) curvinervis* Strobl (Mittheil. Ver. Steierm. XXXIV, 1898, 228), but this species has the head and legs white-haired, and seems to have another course of the upper marginal cross-vein, as well as a shorter and broader abdomen. The species also very much resembles *Heringi*, but is in the male known with certainty by the shorter antennæ, the long hairs on the disc of the second abdominal segment and by the not strongly angular upper marginal cross-vein: the female on the other hand is so like the female of *Heringi* that I cannot distinguish them by any other character than the angular cross-vein in *Heringi* against the more roundly curved in *dubium*, but I do not quite trust this character. Under these circumstances the species might have been placed under *Pipizella*, but I could not resolve myself to do so, as it would somewhat have effaced the characters of this genus. On the other hand I think it will be correct to place *Heringi* and *curvinervis* under *Penium*, as at all events *Heringi* shows several characters in common with this genus, such as the long genitalia, the mediastinal vein ending after the medial cross-vein and the distinct frontal side dust spots in the female, but I have omitted to do so here, as I think it well to await the study of more material. The size and shape of the genitalia and the course of the upper marginal cross-vein seem to show, that *Penium* is more allied to *Cnemodon* than to *Pipizella*.

P. dubium does not seem to be rare, but it has only been taken in the vicinity of Copenhagen; Amager Fælled, Ermelund (the author)

and Charlottenlund (Stæger). The dates are $^{17/5}$ — $^{30/5}$; in Ermelund I took it in some number on $^{22/5}$ and $^{25/5}$, it occurred on a humid, somewhat shaded place, especially on the leaves of *Aegopodium*.

5. *Cnemodon* Egger.

This genus is like the preceding chiefly agreeing with *Pipizella*. The species are rather small, of black colour. Frons not protruding and in the male it is arched; in the female it has a transverse depression: there are no, or at all events only very small side dust spots. Antennæ short, the third joint not or only a little longer than broad.



Heads of *C. fulvimanus* in profile.

Fig. 19. Male.

Fig. 20. Female.

Abdomen elongate and somewhat narrow, not broader than thorax. Male genitalia forming a rather large knob at the end of abdomen, the ninth segment with its appendages somewhat long. In the female the abdomen narrowed towards the end and thus somewhat pointed. Legs slender, hind metatarsi slightly thickened. In the male the middle coxæ have a straight spine, hind coxæ a short spine at the apex, and hind trochanters a long, somewhat dilated spine: anterior tibiæ somewhat dilated, especially the middle tibiæ have a knob on the anterior side; anterior metatarsi a little compressed. Wings with the upper marginal cross-vein starting with an obtuse angle, a little upwards bent more or less angularly outwards, the upper angle acute; mediastinal vein ending after the medial cross-vein.

The developmental stages of *C. vitripennis* are described by Heeger (Sitzungsber. d. kais. akad. d. Wissenschaft. Wien. Mat. Nat. Cl. 31, 1858, 295, Taf. 1, Fig. 1—6). The larva lived on Coccids on *Populus*

italica. The larva is rough, light dirtily brownish with darker longitudinal stripes; it has almost parallel sides; the posterior spiracles lie on a small process behind. There are two broods in the year; the imago of the first occurs in April; its larva is stated to devour the egg-shell before it attacks the Coccids; it pupates and the second brood appears in July or August, and lays eggs in September; its larva or pupa hibernates. The pupa is drop-like and coloured as the larva.

The species of *Cnemodon* are not well known and especially the females are not well distinguished; the species occur in low herbage in fens and woods, I have taken *fulvimanus* in this way in some number in spring.

Of the genus about three species are known from the palæartic region (after exclusion of *morionellus*); two have been found in Denmark.

Table of Species.

1. Third antennal joint not longer than broad; upper marginal cross-vein distinctly angularly bent; in the male thorax chiefly and scutellum quite black-haired 1. *fulvimanus*.
 — Third antennal joint slightly or more distinctly longer than broad; upper marginal cross-vein less angularly bent; in the male thorax chiefly pale-haired and scutellum always partly pale-haired 2. *vitripennis*.

1. **C. fulvimanus** Zett.

1843. Zett. Dipt. Scand. II, 838, 16 et 1849. VIII, 3184, 16 et 1859. XIII, 6030, 16 (*Pipiza*). — 1860. Malm, K. V. och V. Samh. Göteborg Handl. VII, 67 (*Pipiza*). — 1885. Kow. Wien. Ent. Zeitg. IV, 243. — 1900. Verr. Brit. Fl. VIII, Catal. 27. — 1907. Kat. paläarkt. Dipt. III, 13. — *Pipiza anthracina* Zett. (nec Meig.) 1838. Ins. Lapp. 617, 8 et 1843. Dipt. Scand. II, 836, 14 et 1849. VIII, 3184, 14. — *Pipiza carbonaria* var. *a* Zett. 1843. Dipt. Scand. II, 836, 13 et 1849. VIII, 3184, 13. — ? *Pipiza ruficornis* Meig. 1822. Syst. Besch. III, 252, 24. — 1838. Zett. Ins. Lapp. 617, 9 et 1843. Dipt. Scand. II, 838, 17 et 1849. VIII, 3185, 17 et 1859. XIII, 6030, 17.

Male. Frons and epistoma black, black-haired; vertex and occiput likewise. Antennæ short, third joint roundish, not longer than broad; the antennæ are black, third joint more or less yellowish at the base beneath, sometimes very inconspicuously; arista as long as the antennæ. Eyes brownish-hairy. Thorax black or æneous black, finely punctate; it is densely clothed with long hairs which may be quite black, but often are yellowish on the disc to a smaller or greater extent, but they are always black on the scutellum. Pleura black-haired. Abdomen black, dull, but with the side margin, the elevations on the side of the segments and the hind-margin of fourth segment shining;

it is clothed with quite short, black hairs, a little longer and yellowish on the side-elevations, and also longer but dark at the side-margin. Venter black, shining, a little translucent at the base; it has short, chiefly black hairs. Legs black or dark piceous, anterior knees pale, front tibiæ slightly pale at the apex and front tarsi yellow except the last or two last joints; middle metatarsi generally pale on the basal part. The middle coxæ have a straight downwards directed spine anteriorly; the hind coxæ have a short spine at the apex outwards,

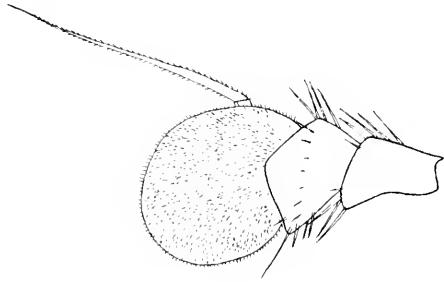


Fig. 21. Antenna of *C. fulvimanus* ♂, from the inside. $\times 80$.

and the trochanters a long spine at the apex on the front side; this latter has a dilatation somewhat before the apex on the posterior side, the apical part is flattened and slightly excised between the dilatation and the apex; the spines are black or more or less pale, especially on the apical parts. The front tibiæ have a small dilatation on the posterior side; the middle tibiæ are somewhat dilated, with a keel along the anterior side which stops about one third from apex and here forms like a small knob; it is inconspicuously serrated; the front metatarsus is a little compressed, middle metatarsus likewise and a little arched; hind metatarsus somewhat thickened. The legs are chiefly dark-haired, the hairs are long on posterior side of the anterior femora and anteriorly on the hind femora; the hind tibiæ have a fringe above, and anteriorly to this there is a row of somewhat distant, fine spines, which are observed only with difficulty; for the rest the legs are short-haired. Wings a little tinged. Stigma brown or light brownish; upper marginal cross-vein with a distinct angular bend. Squamulæ smoky or of a dirtily whitish or greyish colour, with a yellowish or brownish fringe. Halteres whitish or yellow.

Female. Vertex and frons black, black-haired, the depression across the middle yellow-haired, and likewise the ocellar triangle. Epistoma yellow-haired and likewise occiput, the latter greyish pruinose downwards. Antennæ short as in the male, the third joint larger,

roundish. Eyes quite short-haired. Thorax and scutellum with short, yellow hairs; pleura with longer, yellow hairs. Abdomen black, shining, rather coarsely punctate, clothed with short, yellow hairs, a little longer about the basal corners. Legs simple, front tarsi darker than in the male, often only the basal joint yellow; femora shorter-haired than in the male; hind tibiæ with a not long fringe above; the hairs all yellowish.

Length 5,8—6,8 mm.

In Stæger's collection we have two males labelled *anthracina* and two labelled *fulvimana*, the latter are a little smaller than the former,

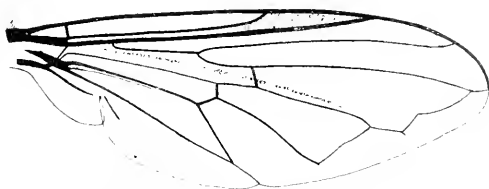


Fig. 22. Wing of *C. fulvimanus* ♂.

but for the rest I find no difference. According to Zetterstedt (VIII, 3185) Stæger has sent him *fulvimanus* named as *carbonaria*, I think Stæger has then after the correspondence altered the name.

C. fulvimanus is not rare in Denmark, but has, however, almost only been taken in the vicinity of Copenhagen; Copenhagen in a garden, Ordrup Krat, Ermelund, Dyrehaven, Bagsværd, Geel Skov, Donse, and a single specimen on Lolland at Strandby, and one in Jutland at Horsens. My dates are $10/5$ — $6/7$. It occurs in low herbage at the outskirts of woods, and on more open places; I have taken it in some numbers in Ermelund and Dyrehaven, especially on *Urtica* and *Mercurialis*, and once I took it in Geel Skov flying low over a sandy road, likewise in no small number.

Geographical distribution:— Northern and middle Europe down into Styria; towards the north to northern Sweden, and in Finland.

2. *C. vitripennis* Meig.

1822. Meig. Syst. Besch. III, 254, 29 (*Pipiza*). — 1862. Schin. F. A. I. 264 (*Pipiza*). — 1901. Verr. Brit. Fl. VIII, 177, 1, figs. 191—94. — 1907. Kat. paläarkt. Dipt. III, 14. — *C. brevidens* Egg. 1865. Verhandl. zool. bot. Gesell. Wien, XV, 574. — 1885. Kow. Wien. ent. Zeitg. IV, 243.

Male. Frons and epistoma bluish black, black- or dark brownish-haired. Vertex black, yellowish- or light brownish-haired, at the apex some dark hairs. Occiput bluish black, dark-haired above, whitish

below, but the jowls chiefly dark-haired. Antennæ short, third joint slightly longer than broad; they are black, third joint more or less yellowish at the base beneath; arista as long as the antennæ. Eyes brown- or pale-haired. Thorax æneous black, finely punctate; it is densely clothed with long, white or whitish hairs, only dark at the margin of scutellum, and sometimes just at the front of thorax. Pleura dark-haired. Abdomen dull black, shining just at the side-margin, at the hind margin of fourth segment and on the side-elevations of third and fourth segments. It is clothed with quite short, black hairs, on the side-elevations the hairs are pale and a little longer, and at the side-margin they are pale and long, longest at the basal corners. Venter black, shining, a little paler at the base, with fine, chiefly brown hairs. Legs shaped and armed quite as in *fulvimanus*, but they are relatively stronger; they are black or dark piceous, the anterior knees somewhat broadly yellow, the apical part of the front tibiæ and the tarsi except the last or two last joints yellow, the middle metatarsus likewise more or less yellow. The legs are haired as in *fulvimanus*, but the hairs are more or less whitish on the hind femora and on the front side and at the base on the posterior side of the middle femora; the fringe on hind tibiæ longer than in *fulvimanus*. Wings yellowish tinged. Stigma yellow; upper marginal cross-vein less angularly bent than in *fulvimanus*, though the difference may be slight. Squamulæ smoky, with a pale fringe. Halteres yellow.

Female. Vertex and frons black or bluish black, with blackish or dark brownish hairs, the depression across the middle and the ocellar triangle yellow-haired; epistoma and occiput whitish-haired, the latter greyish pruinose below. Antennæ larger than in the male, third joint distinctly longer than broad. Eyes quite short-haired. Thorax and scutellum black or often bluish black, with short, white hairs; pleura with longer, likewise white hairs. Abdomen black, but often somewhat translucently brownish or rufescent; it is more coarsely punctate than in *fulvimanus* and not much shining, clothed with quite short, whitish hairs, longer at the basal corners. Legs simple, front tarsi darker, generally only the metatarsus pale; the legs are quite white-haired, the fringe on hind tibiæ conspicuous, longer than in *fulvimanus*.

Length 5.8–7 mm.

This species is much like the preceding, especially as the shape and armature of the legs of the male is quite the same; in the male it is distinguished by the paler pubescence on thorax, scutellum and the abdominal side-margin, and also partly on the legs, and in the female by the distinctly longer third antennal joint and the whiter

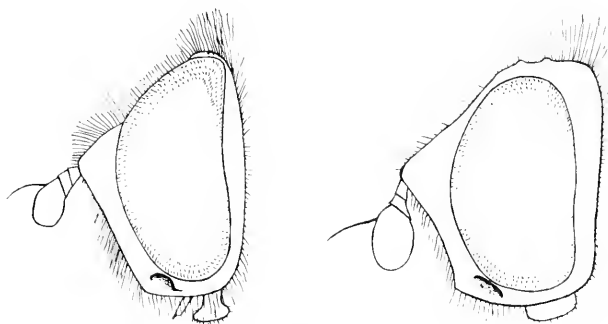
pubescence; in both sexes the anterior legs are paler, and the fringe on hind tibiæ longer, though this latter difference is not large; finally the upper marginal cross-vein is less angularly bent.

C. vitripennis seems to be somewhat rare in Denmark, it has only been taken in Ordrup Mose and Dyrehaven, and a single specimen on Lolland at Lohals (Stæger, the author); the dates are $18/7-17/8$.

Geographical distribution: — The species is recorded down into Italy; it was not known to Zetterstedt, but according to Wahlgren (Entom. Tidskr. XIII, 1909, 17) it occurs to the southern Sweden.

6. **Pipiza** Fall.

Species of medium size, black or slightly æneous, generally with pale abdominal spots. Head about semiglobular, broader than thorax and a little broader than high, hollowed behind. Eyes touching in



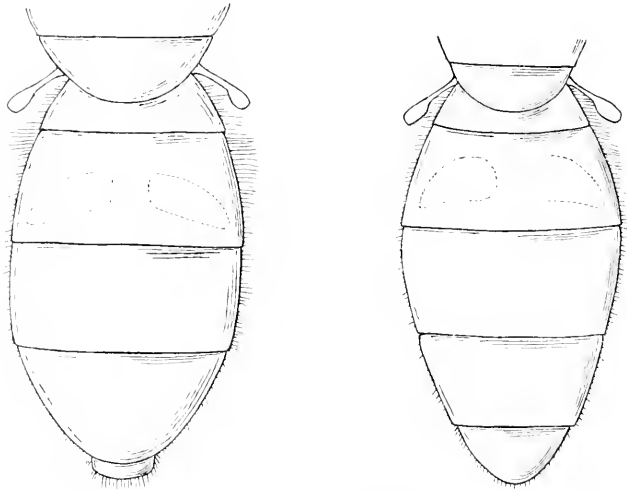
Heads of *P. bimaculata* in profile.

Fig. 23. Male.

Fig. 24. Female.

the male, broadly separated in the female. Frons in the male small, not arched, and in both sexes conically protruding. In the female the frons has distinct, larger or smaller side dust spots (only wanting or almost so in *quadrifasciata*), and on these spots there are at the eye-margin longish, inwards directed hairs: the frons has a more or less pronounced, broad and shallow, sometimes indistinct transverse depression, bordered above by an angular line with the top forwards. Eyes densely hairy, the facets of equal size. Antennæ inserted on the prominent frons, in or a little below the middle of the head; they are short, the third joint somewhat quadratic or rectangular, not elongate or very slightly so, generally largest in the female; arista inserted somewhat near the base of the third joint, it is thickened in

the basal part and has very short basal joints. The two basal antennal joints a little hairy, the third and the arista microscopically hairy. Epistoma a little retreating, without any prominence, slightly arched, not or almost not reflexed at the mouth edge; it is black, longish hairy; jowls slightly descending, with a pit in front. Clypeus horse-shoe-shaped; the mouth parts chiefly as in *Pipizella*; labrum strong and somewhat high, semitubular and with the apex as in *Pipizella*; maxillæ and palpi short, the latter club-shaped; hypopharynx strong, also semitubular, the cavity upwards, it is more pointed than



Abdomen of *P. noctiluca*.

Fig. 25. Male, the apical knob
is the eighth segment.

Fig. 26.
Female.

in *Pipizella*, but the extreme point rounded. Labium with the chitinised basal part and the broad labella about equal in length. Thorax nearly quadratic, somewhat densely hairy; scutellum black, with marginal hairs below. No bristles present; metapleura with short hairs. Abdomen elongate, flat, more or less ovate, on the broadest part broader than thorax, but somewhat varying in breadth in the various species, and often most ovate in the female; the segments have a more or less pronounced, somewhat arched elevation at each side, most distinct on third and fourth segments. On the ventral side there is a small chitinisation at the base, otherwise the basal ventral segments are weakly chitinised. In the male the abdomen shows four not transformed segments; the genitalia shaped mainly as in *Pipizella*, the ninth segment with its appendages not large. In the female abdomen

has five visible segments, three hidden and a small ninth segment with two small lamellæ. Legs as in *Pipizella*, hind femora generally more or less thickened or clavate; hind metatarsi likewise more or less thickened. Wings relatively a little longer than in *Pipizella*; medial cross-vein before the middle of the discal cell; the upper marginal cross-vein starting about rectangularly below, then bent outwards parallel with the margin with a round or more angularly curve. the shape of the curve varying even in the same species, and sometimes the curve is rather weak; the upper angle acute; vena spuria not strong. Alula well developed, tongue-like. Plumula with slightly branched hairs. Alar squamulæ with longish, simple hairs, thoracic squamulæ with long, furcate hairs.

The larvæ of *Pipiza* are recorded to be aphidiphagous; Schiner notes that Giraud has found hibernating pupæ on *Quercus aceris*, and from North America the larva of *P. femoralis* is recorded feeding on *Schizoneura lanigera* and *Phylloxera vastatrix*.

The species of *Pipiza* are easily known by the yellow spots on abdomen, and in want of these on the whole shape and the somewhat hanging abdomen. They occur on fields, in fens and woods in low herbage, on grass and flowers; most species are specially numerous in spring, but may also be seen later in the year. — The species are very difficult to distinguish and the present stage of our knowledge of the limits of the species is not good.

About 12 species are known from the palæarctic region; below I have endeavoured to recognize 8 from Denmark.

Table of Species.

- | | |
|---|----------------------------|
| 1. Anterior tarsi all yellow; pubescence of the body all pale | 1. <i>luteitarsis</i> . |
| — Anterior tarsi not quite yellow; pubescence not quite pale | 2. |
| 2. Abdomen normally with four yellow spots; epistoma rather low, antennæ inserted a little below the middle of the head | 2. <i>quadrinaculata</i> . |
| — Abdomen with two spots or unspotted; epistoma higher, antennæ not below the middle of the head | 3. |
| 3. Abdomen normally with spots; epistoma in the male black-haired (except in <i>signata</i>); wings clear or clouded, but not with a specially strong blotch | 4. |
| — Abdomen normally unspotted; epistoma in the male white-haired; hind femora rather thickened; wings strongly blotched; somewhat dullish species | 7. |
| 4. Epistoma in the male black-haired; wings clear or with a brownish cloud, in the latter case the abdominal spots in the female generally large | 5. |

- Epistoma in the male white-haired; wings a little clouded; abdominal spots in the female not large. 6. *signata*.
- 5. Generally larger species with rather large abdominal spots; wings clouded; tarsi yellow at the base; abdomen less shining 3. *noctiluca*.
- Smaller species with smaller abdominal spots; wings unclouded; tarsi rather dark; abdomen more shining. 6.
- 6. Medium sized species; third antennal joint short, not longer than broad 4. *bimaculata*.
- Small species; third antennal joint longer 5. *notata*.
- 7. Third antennal joint longer than broad, more or less brownish; hind femora thickened, but not strongly clavate; tarsi rather pale; wing-blotch in the female well defined outwards 7. *lugubris*.
- Third antennal joint short, not longer than broad, black; hind femora strongly clavate; wing blotch in the female not defined outwards 8. *austriaca*.

By the present state of our knowledge of the species of *Pipiza* the above table may of course only be taken as an attempt. I have felt compelled to make use of the abdominal spots and the wing-clouds as characters, and I also think that these characters are of some value when used with caution. — Leaving aside the two first species which are well characterised, we have still six species. Of these I consider *noctiluca*, *bimaculata*, *lugubris* and *austriaca* as well founded species, while *notata* is perhaps a form of *bimaculata* and *signata* a form of *lugubris*. — The males are most easily distinguished; they fall into two groups, distinguished by the colour of the epistomal pubescence (though aberrant specimens may occur), which is black in *noctiluca*, *bimaculata* and *notata*; *noctiluca* has more or less clouded wings, and somewhat pale tarsi; *bimaculata* and *notata* have darker tarsi and clear wings; *bimaculata* is smaller than *noctiluca*, with smaller abdominal spots, *notata* is still smaller and likewise with still smaller spots, and a little longer third antennal joint. The epistomal pubescence is white in *signata*, *lugubris* and *austriaca*; *signata* is distinguished from the two others by the presence of abdominal spots, and when this is not sufficient, by the less thickened hind femora and less clouded wings; *austriaca* is well characterised and distinguished from *lugubris* by its short antennæ, strongly clavate hind femora and characteristic wing-blotch. The females are less easily distinguished; we may here make use of the abdominal spots and the clear or less clouded wings in the first four species *noctiluca*, *bimaculata*, *notata* and *signata*, and in specimens where the spots cannot be used, the antennæ and hind femora may be distinguishing; *noctiluca*, *bimaculata* and *notata* are divided from each other by the same characters as

in the males; *signata* has smaller spots than *noctiluca* and less clouded wings, also it is generally smaller; it has paler tarsi than the clear-winged *bimaculata* and *notata*; *lugubris* has generally no abdominal spots, it has longer antennæ and more clouded wings than the four first, and moreover paler tarsi than *bimaculata* and *notata*; finally *austriaca* is distinguished by the same characters as in the male.

It will be seen, that the two species which are most difficult to distinguish are *notata* and *signata*, just the two species about which I am not sure with regard to the specific distinctness.

1. *P. luteitarsus* Zett.

1843. Zett. Dipt. Scand. II, 828, 2 et 1859. XIII, 6026, 2. — 1860. Malm, K. V. och V. Samh. Göteborgs Handl. VII, 63. — 1862. Schin. F. A. I, 265. — 1901. Verr. Brit. Fl. VIII, 165, 1, fig. 186. — 1907. Kat. paläarkt. Dipt. III, 10.

Male. Vertex black, slightly pruinose; frons and epistoma black, but distinctly greyish or yellowish pruinose; epistoma high, the antennæ placed above the middle of the head, and the epistoma is also broad, more than one third of the breadth of the head. Vertex and frons with yellow hairs, but some few anteriorly on vertex and those on the whole front part of the frons black; epistoma with yellow or brownish hairs below, black above below the antennæ, or all black or brownish black and in the latter case also the frons almost quite black-haired. Occiput grey pruinose, with yellowish white hairs, longer and more yellow at the upper eye-margin and here with some black hairs; jowls yellow-haired. Antennæ short, black, third joint not longer than broad, roundish, more or less ferruginous beneath, especially at base; arista scarcely as long as the antennæ, thickened in more than the basal half. Eyes pale brownish-hairy. Thorax and scutellum black or æneous black, slightly pruinose, shining and very finely punctate; they are clothed with long, yellow hairs, longest on scutellum especially at the margin. Pleura with long, greyish white hairs. Abdomen not broader than thorax, with subparallel sides; it is dull black, but shining and somewhat æneous just at the sides and on the posterior half of the fourth segment including an elevation on each side, and a similar shining elevation is found on each side of the third segment; on the second segment there are a pair of yellow or reddish yellow spots; they are isolated, of transverse shape, broadest outwards. Abdomen is clothed with yellow hairs, short in the middle but long at the sides; at the basal corners they are whitish. Venter appearing chiefly blackish grey, with somewhat long, pale hairs. Legs

with femora black with yellow apex; anterior tibiæ yellow with a broad black ring nearest the apex, largest and most defined on middle tibiæ; hind tibiæ black with the base somewhat broadly and just the apex yellow; tarsi yellow, middle metatarsi generally a little brownish above, and hind tarsi more or less brownish above on all joints or especially on the basal ones. Claws yellow with the tip black. Hind femora not thickened; hind metatarsi somewhat thickened. The legs are clothed with whitish or yellow hairs, long behind the anterior femora and on the anterior side of the hind femora, and somewhat long above the hind tibiæ; tarsi with short, adpressed, yellow pubescence. Wings hyaline or slightly yellowish, sometimes darkened about the middle; veins brownish black; stigma yellow. Squamulæ whitish. Halteres yellowish white, the knob generally darker to brown.

Female. Antennæ a little longer than in the male. Frons æneous black, shining, with the side dust spots large but somewhat ill defined; the hairs on frons and epistoma yellow, only black above the antennæ. Eyes shorter-haired than in the male. Occiput puffed out and shining above. Thorax with shorter pubescence than in the male. Abdomen shining and more punctate, the pubescence shorter; the yellow spots generally fully as large and paler.

Length 7—9.5 mm, the female smallest, generally not above 7.5 mm, but sometimes reaching the male in length.

This species is easily known from the other Danish species by the yellow anterior tarsi and the quite pale pubescence; also the shape of the face in the male is characteristic, as it is broader and higher than in other species. All my specimens have distinct yellow spots on abdomen, but according to Malm and Verrall (l. c.) the spots may be very small and often quite wanting in the male. Malm mentions a female specimen with four spots, as there were also a pair on third segment. With regard to the question whether the species is identical with *festiva* Meig. as suggested by Schiner and Verrall I can say nothing.

P. luteitarsis is rather rare in Denmark; besides three old specimens in Stæger's Collection I possess nine specimens seven of which I have taken in a garden in Copenhagen, one in Ermelund, and one in a garden in Hillerød. The dates are $10/5$ — $4/6$.

Geographical distribution: — Northern and middle Europe down into Hungaria, towards the north to southern Sweden; should it prove to be identical with *festiva*, the range goes much farther towards the south. *P. festiva* is also, but somewhat doubtfully, recorded from North America.

2. *P. quadrimaculata* Panz.

1804. Panz. Fn. germ. LXXXV, 19 (*Syrphus*). — 1822. Meig. Syst. Besch. III, 249, 16. — 1843. Zett. Dipt. Scand. II, 833, 10. — 1860. Malm, K. V. och V. Samh. Göteborg Handl. VII, 65. — 1862. Schin. F. A. I, 262. — 1901. Verr. Brit. Fl. VIII, 163 et 167, fig. 87. — 1907. Kat. paläarkt. Dipt. III, 12. — *Pipiza maculata* 1859. Zett. Dipt. Scand. XIII, 6028, 10. — *Pipiza quadriguttata* Macq. 1827. Soc. Sci. Lille, 178, 8. — 1838. Meig. Syst. Besch. VII, 119, 34. — 1843. Zett. Dipt. Scand. II, 833.

Male. Vertex, frons and epistoma black, slightly pruinose, shining and black-haired. Epistoma a little hollowed and rather low, the antennæ placed a little below the middle of the head. Occiput black, with black hairs, downwards and on the jowls yellow or brownish. Antennæ quite short, second and third joint brown or brownish black, the third joint short, not so long as broad, the outer margin sloping

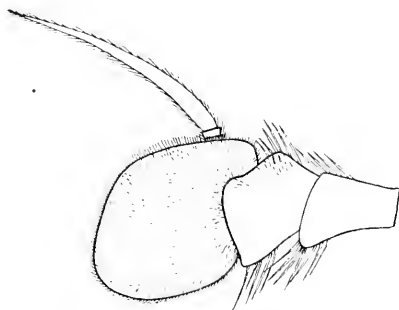


Fig. 27. Antenna of *P. quadrimaculata* ♂, from the inside. $\times 80$.

downwards so that a lower outer angle is formed, but it is rounded; arista short, not so long as the antennæ, generally a little pale at the extreme base. Eyes dark-hairy. Thorax black or bluish black, shining, somewhat densely punctate; it is densely clothed with somewhat long, erect, black hairs, longest at the margin of scutellum. Pleura black-haired. Abdomen somewhat short and ovate, about the middle broader than thorax; it is black, somewhat shining and rather densely punctate; the second and third segments have each a pair of yellow or yellowish red, transverse, isolated spots. Abdomen is clothed with short, black hairs, longer only at the sides of the first two segments; the genitalia with yellow hairs. Venter chiefly translucent, darkened towards the end, with pale hairs, only dark just at the apex and below the genitalia. Legs black, the tip of anterior femora and the basal part of the tibiæ yellow, hind knees narrowly yellowish; tarsi black or blackish brown, sometimes the middle or also the basal joints

more or less pale, especially on the anterior tarsi; hind femora and metatarsi almost not thickened. Femora and tibiæ with chiefly blackish hairs, long on the posterior side of the anterior femora and anteriorly on the hind femora; tibiæ short-haired, only a somewhat conspicuous fringe above the hind tibiæ; sometimes the hairs on the legs are paler; tarsi with adpressed, yellowish or brownish pubescence. Wings more or less yellowish or light brownish tinged, sometimes rather brown. Stigma brownish. Squamulæ dirtily whitish. Halteres yellow.

Female. Antennæ a little larger than in the male, third joint as long as broad. Frons æneous black, densely punctate in the middle, almost or quite without dust spots. Occiput shining above, with yellow hairs; vertex black-haired; frons yellow-haired but the hairs above the antennæ black. Epistoma yellow-haired. Eyes shorter and paler haired than in the male. Thorax æneous black, with short, greyish yellow pubescence. Abdomen more ovate than in the male, coarsely punctate, with short pubescence, which is pale, but black at the incisures; the spots generally larger than in the male. Legs short-haired, hind femora a little clavate, and hind metatarsi slightly thickened.

Length. This species may vary somewhat in length, from 5 to 8 mm, the smallest specimens are, however, less common.

This species is easily known by the short antennæ and the rather short and ovate abdomen; also the low epistoma causing the antennæ to be placed below the middle of the head is very characteristic, as is also the not straight but somewhat hollowed epistoma; generally the species is known at once by the four abdominal spots, but these may sometimes be obscure and indistinct and the second pair may disappear, or finally the spots may in single cases be quite wanting. It is especially in the females that the spots show tendency to disappear, and in my rather large material it is only in very few cases that no trace of spots can be detected.

P. quadrimaculata is by far the most common species of *Pipiza* in Denmark: Ørdrup Mose, Charlottenlund, Dyrehaven, Lyngby Mose, Hareskov, Bagsvæ, Fure Sø, Ørholm, Ruderhegn, Frerslev Hegn, Tyvekrog, Nyrup Hegn, Roskilde, Nordskoven at Jægerspris, Tisvilde; on Langeland at Lohals; on Lolland at Nysted and in Kældskov; on Funen at Middelfart, and in Jutland at Horsens. My dates are 12/5—27 7. It occurs among low plants in fields and meadows sitting on various flowers, often on *Ranunculus* and *Composites*; the females are most commonly met with and also present later in the season than the males.

Geographical distribution:— Europe down into the Italy, towards the north to northern Sweden, and in Finland.

3. *P. noctiluca* L.

1758. Linn. Syst. Nat. X, 593 (*Musca*). — 1805. Fabr. Syst. Antl. 247, 69 (*Eristalis*). — 1822. Meig. Syst. Besch. III, 244, 6. — 1843. Zett. Dipt. Scand. II, 826, 1 et 1849. VIII, 3180, 1. — 1860. Malm, K. V. och V. Samh. Göteborg Handl. VII, 62. — 1862. Schin. F. A. I, 262. — 1901. Verr. Brit. Fl. VIII, 168, 3, figs. 188—89. — 1907. Kat. paläarkt. Dipt. III, 11. — *P. obsoleta* Zett. 1838. Ins. Lapp. 616, 2 et 1843. Dipt. Scand. II, 828, 3. — *P. binotata* Zett. 1838. l. c. 616, 3 et 1843. l. c. II, 829, 4. — *P. hyalipennis* Zett. 1838. l. c. 616, 4 et 1843. l. c. II, 831, 7. — *P. biguttula* Zett. 1838. l. c. 616, 5. — *P. rana* Zett. 1843. l. c. II, 835, 12. — *P. carbonaria* var. b. Zett. 1843. l. c. II, 836, 13. — *P. stigmatica* Zett. 1859. l. c. XIII, 6029, 13—14.

Male. Vertex, frons and epistoma black, the latter slightly pruinose; vertex yellow-haired, just in front with some black hairs; frons and epistoma black-haired. Occiput black, slightly pruinose, the hairs black above, downwards whitish, jowls chiefly black-haired; the long hairs at the top yellow. Antennæ rather short, black, third joint very slightly longer than broad, somewhat square but with the end rounded; arista about as long as the antennæ, thickened in the basal half. Eyes densely dark brownish-hairy, the hairs somewhat long. Thorax black, shining, somewhat densely punctate; it is densely clothed with somewhat long hairs which (seen from the side) are yellowish or greyish white; on the sides and on pleura they are blackish, but downwards again more greyish; they are longest on scutellum, especially at the margin. Abdomen black or æneous black, not much shining as it is coarsely punctate; on the second segment there are a pair of fairly large, transverse, isolated, yellow or reddish spots, these may be smaller and more obscure, and sometimes quite wanting. The abdomen is densely clothed with short, black hairs, longer at the side margin and here with some pale hairs intermingled; also at the base there are long, partly pale hairs. Venter chiefly translucent, shining, with somewhat long hairs, pale on the basal, black on the apical part. Legs black, the tips of the anterior femora, and the anterior tibiæ at the base yellow or reddish; hind knees very slightly reddish; tarsi dark or blackish brown, the two basal joints more or less yellowish or brownish red, but on the hind tarsi often obscured, especially above the first joint: sometimes also the third tarsal joint is more or less pale. Hind femora somewhat thickened in about the apical half, and hind metatarsi somewhat thickened. The femora have long hairs arranged as usual, chiefly blackish on front femora but pale on posterior femora, only black at the tip; tibiæ with short, blackish hairs, longer and fringe-like above, longest on hind tibiæ: the front tibiæ have yellow, adpressed pubescence below, and the

tarsi a similar pubescence on the pale parts, but darker on the dark parts. Wings hyaline or a little yellowish on the basal half, brownish on the apical half, this colour disappearing outwards so that a brown median cloud is formed, defined inwards but not outwards; the cloud may be more or less pronounced, sometimes very weakly. Stigma blackish brown. Squamulae whitish or brownish white with a darker margin, the fringe whitish, sometimes brownish. Halteres likewise dirty whitish to pale brownish.

Female. Antennæ longer than in the male, third joint larger as it is both longer and broader, but it is likewise slightly longer than broad. Frons black, a little punctate, with distinct side dust spots; it is pale-haired but in front of the ocelli and above and at the sides of the antennæ the hairs are black; epistoma and occiput white-haired, the latter shining above. Eyes with shorter and paler hairs than in the male. Thorax with short, white pubescence. Pubescence on abdomen whitish, but black at the incisures, the spots often larger and brighter than in the male, but also here sometimes obscure and in rare cases wanting. Legs pale-haired and the hairs only slightly shorter than in the male. Wings generally with the cloud darker and more defined.

Length. Somewhat varying, 6,5—10 mm.

This species varies a good deal with regard to the abdominal spots, and also else somewhat, but I think it may be known by the spots, the cloud on the wings and the black epistomal pubescence in the male. As seen it varies considerably in size; my largest specimens are females, I think these answer to the form described as *fenestrata* by Verrall (Brit. Fl. VIII, 171) considered by the author himself to be a variety of *noctiluca*; two of these large females show a pair of small linear spots on the third segment; I may also note, that I have not rarely early in the season taken immature specimens in which almost no wing-cloud is visible; these specimens often showed translucent spots on third segment in both sexes; these spots seem later on to disappear by pigmenting. — Among the synonyms from Zetterstedt which I, following the Kat. paläarkt. Dipt., have placed under this species, some, f. inst. *hyalipennis* and *stigmatica* might perhaps with more probability belong to *bimaculata* on account of the clear wings and dark tarsi. Wahlgren (Entom. Tidskr. 1909. XIII, 15) places *hyalipennis* as synonym to *notata*, which may perhaps be correct.

P. noctiluca is not rare in Denmark; Ermelund, Dyrehaven, Lyngby Mose, Fure So. Geel Skov, Hillerød, Tyvekrog, Nyrup Hegn, Egebæks Vang, Nyraad near Vordingborg; on Lolland at Maribo and Nagelsti; on Langeland at Lohals; on Funen at Veflinge and in Jutland in Nørholm Skov at Varde, at Horsens and at Restrup near Aalborg;

finally on Bornholm in Almindingen. My dates are $16\frac{1}{5}$ — $14\frac{1}{8}$. It occurs in woods and in fields in low herbage; the males seem to be somewhat rare.

Geographical distribution:— Europe; towards the north to northern Scandinavia, and in Finland; if the synonyms usually placed under this species are correct it goes down into Italy.

4. *P. bimaculata* Meig.

1822. Meig. Syst. Besch. III, 246, 9. — 1849. Zett. Dipt. Scand. VIII, 3182, 6—7. — 1862. Schin. F. A. I, 263. — 1901. Verr. Brit. Fl. VIII, 163, 172, 5, fig. 190. — 1907. Kat. paläarkt. Dipt. III, 8. — *P. geniculata* Meig. 1822. l. c. III, 245, 7. — 1849. Zett. l. c. VIII, 3180, 1—2 et 1859. XIII, 6026, 1—2. — 1862. Schin. F. A. I, 262. — *P. guttata* Meig. 1822. l. c. III, 247, 12. — 1843. Zett. l. c. II, 830, 5. — 1862. Schin. F. A. I, 263. — *P. chalybeata* Meig. 1822. l. c. III, 252, 22. — 1862. Schin. F. A. I, 264.

Male. Vertex, frons and epistoma black or bluish black, somewhat greyish pruinose, all black-haired or the vertex more or less, sometimes almost quite dark yellow-haired. Occiput bluish black, above with black, downwards and on the jowls with yellowish white hairs; the long hairs behind the vertex yellow. Antennæ short, black, third joint short, roundly square, not longer than broad; arista shorter than the antennæ, thickened in the basal half. Eyes densely and somewhat long-haired with blackish or brown hairs. Thorax black or bluish black, somewhat punctate, shining; it is densely clothed with somewhat long, yellowish or greyish hairs (when seen from the side); the hairs are longest on scutellum, especially at the margin; at the sides and on pleura the hairs are blackish, downwards again greyish. Abdomen black or bluish black, coarsely punctate, shining, especially towards the end; on second segment there are a pair of somewhat small, narrow, transverse, yellow spots, broadly separated in the middle; they may sometimes be wanting (*chalybeata* Meig.). Abdomen is clothed with short, black hairs, longer at the margin and on the disc of second segment; the pubescence may be all black, but sometimes the long hairs on second segment are more or less pale, and also the short hairs on the side elevations of third and fourth segments may be whitish. Venter translucent, darker towards the end, shining, with long, pale hairs. Legs black, anterior knees rather narrowly yellowish or reddish, the colour going a little down the base of the tibiæ; the hind knees very indistinctly paler; tarsi rather dark, quite blackish or sometimes the two first joints of the anterior tarsi paler, brown or dark yellowish. Hind femora somewhat but not much thickened, and

hind metatarsi a little incrassated. Legs haired in the usual way, on front femora the hairs generally black, on posterior femora whitish, but black at the tip; sometimes also paler on front femora; tibiæ mainly dark-haired, with short hairs, only a more conspicuous fringe above the hind tibiæ; the tarsi and ventral apical parts of tibiæ as usual with short, adpressed, yellow pubescence, on the tarsi it may be partly darker. Wings clear; stigma yellow to brownish black. Squamulæ white to somewhat smoky. Halteres whitish to dirty yellowish.

Female. Antennæ larger and longer than in the male, the third joint larger, and perhaps slightly longer than broad. Frons slightly punctate, side dust spots small and not well defined; frons black-haired above the antennæ and in front of the ocelli, but yellow-haired in the middle. Epistoma with white or greyish white hairs. Occiput broad above and shining, all pale-haired. Eyes much shorter-haired than in the male, the hairs brownish. Thorax with somewhat short, quite pale pubescence. Abdomen with the spots generally larger than in the male, rounded inwards but pointed outwards and thus transversely pear-shaped; they seem always to be present; the abdomen is clothed with short sometimes quite white hairs, but generally the hairs at the incisures black. Both thorax and especially abdomen more coarsely punctate than in the male. Femora shorter-haired than in the male, and all pale-haired and likewise tibiæ; hind femora more thickened than in the male.

Length 6—8.5 mm. the latter size rarely reached.

This species is I think most nearly related to *P. noctiluca*, but it may generally be distinguished by the smaller size and clear wings which latter character I believe to be of some value; the colour is often distinctly bluish, and the abdominal spots smaller; abdomen, though coarsely punctate, is in both sexes more shining; the legs are absolutely blacker, and finally the antennæ in both sexes shorter. — I have followed the synonymi given in the *Kat. paläarkt. Dipt.*, but I have my doubts. Thus it seems that *geniculata* with its white-haired face and clouded wings is more like *signata* than *bimaculata*. Zetterstedt had received *geniculata* from Stæger; in Stæger's collection there are a male and two females; the male I consider as *signata*, the females on the other hand as *noctiluca*. Malm (l. c.) considered Zetterstedt's *geniculata* as *lugubris*, but he laid no stress at all on the abdominal spots, a character which I think may be used to some degree. Whether Verrall's *bimaculata* is the present species I dare not say as he describes the wings as distinctly clouded; otherwise the description is agreeing; on page 104 he declares that Meigen's type

has clear wings. — I have examined specimens of the species in Stæger's collection which Zetterstedt had seen.

P. bimaculata is not rare in Denmark: vicinity of Copenhagen, Ordrup Mose, Ermelund, Dyrehaven, Lyngby Mose, Fure Sø, Geel Skov, Nordskoven at Jægerspris, Nyraad near Vordingborg and Vemmetofte; on Lolland in Kældskov; in Jutland at Horsens. My dates are $15/5$ — $29/7$. It occurs in low herbage in similar places as the preceding species.

Geographical distribution: — Europe probably down into Italy; towards the north to southern Sweden, and according to Bonsdorff, in Finland (*geniculata*, *guttata*).

5. *P. notata* Meig.

1822. Meig. Syst. Beshr. III, 246, 10. — 1843. Zett. Dipt. Scand. II, 830, 6 et 1849. VIII, 3182, 6. — 1862. Schin. F. A. I, 263. — 1901. Verr. Brit. Fl. VIII, 175, 7. — 1907. Kat. paläarkt. Dipt. III, 12. — *P. calceata* Meig. 1822. Syst. Besch. III, 251, 19. — 1862. Schin. F. A. I, 265.

Female. Frons black or bluish black, a little punctate; the side dust spots not small, but somewhat ill defined; frons chiefly yellow-haired, but above the antennæ and just in front of the ocelli are black hairs. Epistoma pale-haired and likewise occiput. Antennæ not long, third joint brown, a little longer than broad; arista shorter than the antennæ, brown. Thorax and abdomen black or bluish black, coarsely punctate but shining; they are clothed with short, white hairs, on abdomen the second and third incisures black-haired. The second abdominal segment has two rather small, somewhat distinct, reddish yellow spots; they are roundish but with a somewhat pointed lower outer corner. Venter chiefly translucent, but black towards the end, with a yellow hind margin to the third segment; it has somewhat long, mainly pale hairs. Legs black with the anterior knees ferruginous; tarsi blackish, or somewhat brownish on the basal joints. Hind femora and metatarsi only slightly incrassated. The legs whitish-haired. Wings yellowish or slightly light brownish tinged. Stigma yellow. Squamulæ whitish. Halteres yellow.

Length 5—5,8 mm.

I do not know the male of this species, which was also unknown to Meigen; Zetterstedt describes it (l. c. VIII) with the epistoma and body with dark pubescence; he had received specimens from Stæger, first (l. c. II) under the name *bimaculata*, later (l. c. VIII) as *notata*; he had got both sexes from Stæger, but at present no male is found in Stæger's collection, but only two females (a third female is present but perhaps not belonging to this species). The species seems to me

most nearly allied to *bimaculata*, and I am not sure whether it is not a variety of this species. It seems to differ by smaller size, brown antennæ with the third joint a little longer, smaller, more roundish abdominal spots and a little more yellowish wings. Verrall thinks it possibly is a variety of *noctiluca*, but I think it more allied to *bimaculata*. — I find my specimens quite agreeing with the description given by Meigen.

P. notata seems to be rare in Denmark, we have only a couple of specimens from earlier time probably taken in the vicinity of Copenhagen, but as remarked some specimens were sent to Zetterstedt.

Geographical distribution: — Zetterstedt records it from the southern Sweden, and Bonsdorff from Finland; towards the south it is recorded to France but, of course, the latter records are doubtful.

6. *P. signata* Meig.

1822. Meig. Syst. Besch. III, 246, 8. — 1849. Zett. Dipt. Scand. VIII, 318t. 1—2. — 1862. Schin. F. A. I, 262. — 1901. Verr. Brit. Fl. VIII, 164. 174. 6. — 1907. Kat. paläarkt. Dipt. III, 13.

Male. Vertex, frons and epistoma black or bluish black, with distinct, greyish pruinosity; the frons has blackish or brownish hairs, vertex and epistoma yellowish white hairs. Occiput black, greyish pruinose, all whitish-haired and the jowls likewise; among the long hairs at the upper eye-margin some blackish are intermingled. Antennæ not specially short, black, third joint more or less blackish brown or brown, roundish square, slightly longer than broad; arista blackish brown, not so long as the antennæ, thickened in more than the basal half. Eyes densely clothed with somewhat long, brownish hairs. Thorax black, shining, densely punctate; it and pleura densely clothed with somewhat long, yellowish pubescence, longest on scutellum, only just at the margin and above on pleura some dark hairs. Abdomen black, shining, somewhat coarsely punctate; on second segment a pair of narrow, somewhat linear, reddish yellow spots; they are placed a little obliquely with the outer end nearest the hind margin. Abdomen clothed with short, yellowish hairs, broadly black at the incisures; at the base the hairs are longer. Venter translucent, with long, pale hairs. Genitalia with brown hairs. Legs black, anterior knees distinctly yellow, hind knees only slightly; tarsi blackish or brownish black, with the two basal joints paler. Hind femora somewhat, hind metatarsi very slightly, almost not, thickened. Legs haired as usual, the hairs mainly yellowish, but dark behind front femora and at the tip of posterior femora; hind tibiæ with a conspicuous dark fringe above. Wings hyaline or slightly yellowish tinged; stigma yellow or brown,

below it a weak brownish cloud. Squamulæ yellowish. Halteres whitish.

Female. Frons bluish black, side dust spots not small but not well defined; pubescence whitish on the middle, black above the antennæ and in front of the ocelli. Antennæ longer than in the male, third joint larger, longer than broad. Thorax and abdomen more coarsely punctate than in the male, the pubescence on the latter short, yellowish, black on the incisures. Abdominal spots less linear than in the male, much resembling those in *bimaculata*. Legs quite pale-haired.

Length 5,8—7,5 mm.

This species is in the male known from the preceding by the white-haired epistoma; moreover my four males have the abdomen much more white-haired (and this agrees with the notes about Meigens type given by Verrall l. c.); the occiput and eyes are paler-haired than in *bimaculata*, and the tarsi paler. The female is very like *noctiluca*, but is generally smaller, with smaller abdominal spots and less clouded wings; from the female of *bimaculata* it should be known by the paler tarsi and clouded wings; finally in both sexes the antennæ are longer I think than in both *bimaculata* and *noctiluca*. The female of *notata* is smaller with smaller abdominal spots and unclouded wings. Zetterstedt, who described the species from Danish specimens had only received the female from Stæger, but in Stæger's collection there were also males. My description is made after Stæger's specimens.

P. signata, if a distinct species, (see under *lugubris*) seems to be rare in Denmark, we have only seven specimens probably taken in the vicinity of Copenhagen, and one specimen from Horsens; the only date noted is $\frac{4}{7}$.

Geographical distribution:— The species seems unknown north of Denmark, but is recorded down into Styria.

7. *P. lugubris* F.

1775. Fabr. Syst. Entom. 770, 36 (*Syrphus*) et 1805. Syst. Antl. 246. 64 (*Eristalis*). — 1822. Meig. Syst. Besch. III, 250, 18. — 1843. Zett. Dipt. Scand. II, 834, 11 et 1849. VIII, 3183, 11. — 1885. Kow. Wien. ent. Zeitg. IV, 243. — ? 1901. Verr. Brit. Fl. VIII, 164, 176, 8. — 1907. Kat. paläarkt. Dipt. 10. — *P. funebris* Meig. 1822. Syst. Besch. III, 250, 17. — 1862. Schin. F. A. I, 264. — ? *P. austriaca* 1862. Schin. F. A. I, 264.

Male. Vertex, frons and epistoma black or bluish black, distinctly grey pruinose; frons with black or brownish black, vertex with yellow hairs, generally a few just at the apex of the triangle dark; epistoma with white or yellowish hairs. Occiput bluish black, greyish

pruinose. the hairs yellow above, downwards and on the jowls white; at the upper eye-margin of few dark hairs. Antennæ not specially short. third joint distinctly longer than broad; arista shorter than the antennæ. thickened in about the basal two thirds; the antennæ are black but second and third joints generally brown or blackish brown; arista brown, palest at the base. Eyes densely brown- or pale brown-hairy. Thorax black, rather densely punctate, shining; it is densely clothed with long, greyish yellow hairs, longest on scutellum; pleura

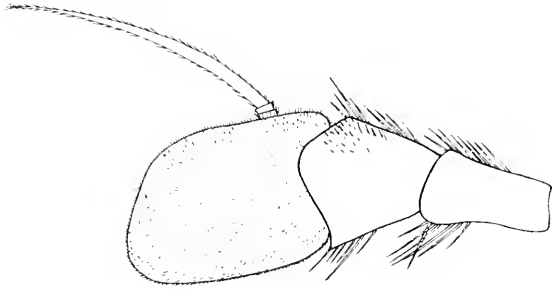


Fig. 28. Antenna of *P. lugubris* ♂. from the inside. $\times 80$.

with black hairs above, pale below. Abdomen black, coarsely punctate but however somewhat shining, less at the base; it is clothed with short, yellow or greyish yellow hairs, but at the incisures the hairs are black, and the black pubescence may be extended so that the pale hairs only form a band on each side of third and fourth segments; at the base the hairs are somewhat long. Venter translucent, blackish at the end, with long hairs which are pale on the basal part but black on the last segment. Genitalia with dark hairs. Legs black, knees distinctly yellow or reddish yellow this colour including the basal part of tibiæ; tarsi yellowish with the two last joints brown or blackish, also hind metatarsi more or less darkened. Hind femora rather distinctly thickened, hind metatarsi not much thickened. Legs haired in the usual way with pale hairs, behind the front femora and at the tip of the posterior femora the hairs are dark; also the hind tibiæ mainly dark-haired and with a conspicuous fringe above; sometimes the legs almost quite pale-haired. Wings hyaline or slightly yellowish. Stigma brown, below it a well defined brown blotch. Squamulæ more or less dirty whitish, the margin generally darkened. Halteres yellow.

Female. Antennæ larger and longer than in the male, third joint rather large, and likewise longer than broad. Frons finely punctate, the side dust spots rather large; it is white-haired with darker hairs

in front of the ocelli but almost none above the antennæ. Thorax and abdomen more coarsely punctate than in the male, abdomen almost not shining. Thorax with short, whitish hairs, also pale on the pleura. Abdomen haired as in the male, but the black-haired parts smaller. Wings with the blotch still stronger and quite defined outwards.

Length 7,5—8,5 mm.

The determination of this species is certain as I have compared it with the type of Fabricius which we have in the collection of

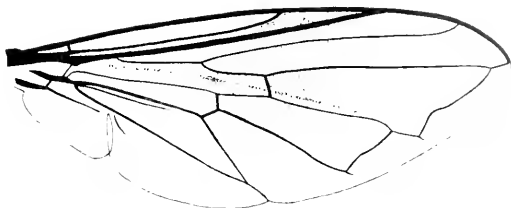


Fig. 29. Wing of *P. lugubris* ♂.

Tönder-Lund and Sehestedt. — The species has almost always an unspotted abdomen, but I have seen a male and a female with a pair of not small, but very dark and undefined and thus slightly visible spots. The species is in most cases easily distinguished from the preceding ones by the want of abdominal spots, and with exception of *signata* by the white-haired epistoma in the male; I have, however, seen a couple of specimens with almost or quite dark-haired epistoma. It may otherwise be known by the relatively long third joint of the antennæ and the strong, distinctly defined blotch on the wings, which is stronger and more defined than in any of the preceding species. It will be most difficult to distinguish from *signata*, but also here the wings, the antennæ and the thicker hind femora may be used, and perhaps also the more white-haired frons of the female. Malm (K. V. och V. Samh. Göteborg Handl. VII, 1860, 65) considered *geniculata* as a variety of *lugubris* not regarding the abdominal spots being of any value, and Wahlgren (Entom. Tidskr. XIII, 1909, 16) places *geniculata* as a synonym to *lugubris*. Under *bimaculata* I have remarked that *geniculata* seems to me a probable synonym to *signata* rather than to *bimaculata*: I am at present not quite certain with regard to the specific distinctness of *signata* against *lugubris*; should they in future prove to be identical the synonym *geniculata* would then come to *lugubris* as is the opinion of Malm and Wahlgren.

P. lugubris is not rare in Denmark; Ordrup Mose, Ermelund, Dyrehaven, Hillerød; on Funen, and in Jutland at Horsens and Laven near Silkeborg. My dates are $\frac{3}{7}$ — $\frac{11}{8}$. It occurs on low plants on meadows and in woods. In contradistinction to what is the case with *noctiluca* the males seem here to be the most common.

Geographical distribution: — Europe down into Italy, towards the north to northern Sweden, and in Finland.

8. *P. austriaca* Meig.

1822. Meig. Syst. Besch. III, 252, 23. — 1840. Loew, Programm Posen, 29, 7. — 1885. Kow. Wien. ent. Zeitg. IV, 242. — ? *P. lugubris* 1862. Schin. F. A. I. 263.

Male. Vertex, frons and epistoma bluish black, the two latter somewhat greyish pruinose; vertex pale-haired with some few darker hairs at the apex; frons black-haired with a few pale hairs intermingled, epistoma white-haired. Occiput black, greyish pruinose, white-haired, at the upper eye-margin a row of distinct, black hairs. Antennæ short, black, the third joint not at all longer than broad; arista about as long as the antennæ, thickened in more than the basal half. Eyes

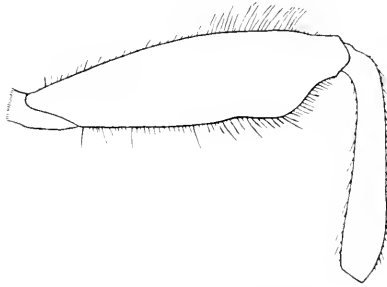


Fig. 30. Hind femur of *P. austriaca* ♂. $\times 20$.

densely dark brown-hairy. Thorax black, densely but not coarsely punctate, shining; it is densely clothed with medium long, white hairs, long on scutellum, especially at the margin. Pleura mainly white-haired, only just in front of the wing-root some darker hairs. Abdomen black, coarsely and densely punctate, almost not shining; it is clothed with short, black hairs, in the middle of the third and fourth segments there is a transverse band of white hairs, interrupted in the middle; the white hairs are a little longer than the black; also on the second segment there is a less defined band of longer, white hairs; at the sides the hairs are likewise somewhat long and almost

all whitish. Genitalia black-haired. Venter translucent at the base, black towards the end, with long hairs, pale at base, black at the end. Legs black, knees only indistinctly reddish, tarsi black, the two basal joints paler to brownish or in the highest dark yellowish. Hind femora strongly clavate, the greatest thickness lying quite near the end and from here sloping abruptly below to the apex; hind tibiæ rather stout and on account of the shape of the femora more curved at the base than usual; hind metatarsi somewhat thickened. Legs haired as usual, the hairs all white, only dark just at the apex of front and hind femora. Wings clear on the basal part, stigma brown, below it a strong, brown blotch dying evenly away outwards so that the apical part of the wing is slightly brownish. Squamulæ whitish, the margin a little darker. Halteres yellowish.

Female. Antennæ with the third joint larger than in the male but likewise not at all longer than broad. Frons somewhat punctate, side dust spots large, especially long, almost connected along the eye-margin with the pruinosity on epistoma. Frons black-haired in front of the ocelli and above the antennæ, pale haired in the middle. Eyes shorter and much paler haired than in the male. Thorax and abdomen haired as in the male, the hairs on thorax short.

Length 8 to fully 9 mm.

This is a somewhat strong and stout species, and certainly a good species. It is distinguished from *lugubris* by the shorter antennæ with the third joint not longer than broad, and by the more strongly clavate hind femora; the abdomen is more conspicuously white-haired, and the white hairs form more conspicuous bands. The wing blotch seems still stronger and larger, and it is not in the female sharply defined outwards as in *lugubris*. — I have named the species *austriaca* Meig. for the following reasons: As declared the foregoing species is *lugubris* F. determined after the type. If we now suppose that Meigen had seen Fabricius's type (which is probable according to the introduction to his work) and determined his species correctly, and if *funebis* is only a synonym to *lugubris*, then I find no other description which answers to the present species, than that of *austriaca*. In reality the description of *funebis* and *lugubris* with "Hinterschenkel stark verdickt" would seem to answer better to the present species than that of *austriaca* with "Hinterschenkel etwas verdickt." but according to the above this interpretation is not well possible. There are thus here two distinct species, and I think that Kowarz's suggestion (l. c.) that Schiner's *austriaca* is identical with *lugubris* F. and vice versa is somewhat probable, and for the same reason I do not think that *austriaca* is synonym to *festiva* as given with a query

in Kat. paläarkt. Dipt. (after Verrall). To which of the two species Verrall's *lugubris* may belong I cannot say.

P. austriaca seems to be rare in Denmark, we have four specimens, two males and two females; they are taken in Ordrup (Stæger) and in Jutland at Horsens (O. G. Jensen); the only date is ⁵/₈.

Geographical distribution:— The species (or one under this name) is recorded down into Italy; as Zetterstedt did not seem to know it, it does not seem to occur north of Denmark.

7. **Chrysogaster** Meig.

Species of medium size and of black or more or less metallic colour. Head somewhat semiglobular, as broad as or a little broader than thorax, and somewhat hollowed behind. Eyes in the male touching for a shorter or longer distance, or in some species (Subgenus *Liogaster*) separated; in the female broadly separated. Frons in the male more or less arched, sometimes (Subgenus *Chrysogaster*) considerably arched and puffed out; in the female the frons is characteristic, it has in the middle a more or less marked, longitudinal, depressed line or space, or this space is bounded at each side by an impressed line; on each side of the middle space there is a various number of more or less pronounced cross-furrows. Eyes bare; the facets are of equal size (*Liogaster*) or the upper facets are somewhat enlarged in the male; sometimes (*Chrysogaster*) they are enlarged in the upper half and the division between the large and small facets is then rather distinct. Antennæ inserted about in the middle or a little above or below this; they are short or somewhat elongated, as the third joint is either short, roundish or more quadrate, sometimes rather large, or it is more or less elongated, sometimes linear; the two basal joints short, especially the first. Arista inserted dorsally at the base of the third joint, with very small basal joints, only seen under the microscope. The basal antennal joints have bristly hairs, often long below second joint; the third joint and the arista microscopically haired. Epistoma is somewhat various; in the male it is either straight, without central knob, only a little arched, or it is hollowed beneath the antennæ with a smaller or larger, more or less projecting central knob, in *Liogaster* hollowed without knob as in the female; the mouth-edge is more or less projecting, sometimes slightly or almost not; in the female there is no central knob, but the epistoma is more hollowed, and with the mouth-edge more projecting; the epistoma is black or metallic, very slightly haired, or nearly bare. The jowls

descend only slightly below the eyes; they are separated from epistoma by an impressed line which generally ends with a small groove or pit; sometimes the line goes a little higher up, separating a narrow eye-margin from epistoma, but this eye-margin, which in *Chilosia* is so characteristic, is here rather inconspicuous and short. The oral cone well developed with the clypeus lying on the front side; this latter somewhat horse-shoe-shaped, consisting of an upper piece sending a thin prolongation downwards on each side. Proboscis shorter or longer; labrum (*solstitialis*) strong and strongly semitubular, the apical processes somewhat long, of about equal length, the median and upper lateral fine, thin and with some spines, the lower lateral broad; along the lateral margin of labrum are the usual rows of small warts; maxillæ somewhat short, knife-shaped, with a very long, thin palpus, double as long as the lacinia, it is thickened at the end and thus club-shaped, and its apical part is more or less recurved; it bears some bristles and is beset with microscopical hairs, and the lacinia with very dense microscopical hairs in longitudinal rows. Hypopharynx lancet-like, pointed, about as long as labrum. Labium with the basal part well chitinised, the labella broad. Thorax rectangular or almost square; scutellum black or æneous, generally more or less marginate; thorax and scutellum without bristles, and scutellum without a fringe of marginal hairs below. Metapleura densely haired with shortish hairs. Abdomen elongate, flat, in the female generally rather ovate, broader than in the male and sometimes rather broad; the ventral segments well chitinised. In the male there are four not transformed segments, the first short. Genitalia as usual turned to the right, ninth segment not large, partly hidden under the fourth ventral segment. In the female there are five visible segments, the fifth somewhat small, the rest are hidden, the last terminates with two lamellæ. Legs of medium length; tibiæ more or less furrowed towards the dorsal side; hind metatarsus a little thickened. The legs not very hairy, the hairs longest on posterior side of the anterior femora; hind femora generally setulose beneath (except in *Liogaster*); a dense depressed pubescence present as usual on the antero-ventral side of the front tibiæ and base of tarsi and on the postero-ventral side of hind tibiæ and tarsal base; middle metatarsi a little setulose beneath. Claws and pulvilli well developed. Empodium very small, bristle-shaped. Wings with the medial cross-vein more or less before the middle of the discal cell; upper marginal cross-vein more or less parallel with the wing-margin or (in *Orthoneura*) more or less recurrent. Vena spuria very weak, sometimes only just to be traced. Alula well developed. Alar squamula with short, simple or a little flattened hairs, thoracal

squamula with long, fine, branched hairs. Plumula well developed, densely hairy with simple or very slightly branched hairs.

With regard to the developmental stages Réaumur describes and figures a larva (Mém. IV, 1738, 477, Pl. XXXI, figs. 13—16) found in water in a hole in a tree; it was somewhat like an *Eristalis*-larva and had a short tail; the pupa had four short horns; according to the imago figured it seems to have been some *Chrysogaster* s. l. Brauer mentions (Denkschr. d. Kais. Akad. d. Wissensch. XLVII, 1883, 69) that Marno found a larva similar to an *Eristalis*-larva (*O. nobilis*) at the border of a fen among decaying leaves. Beling mentions (Verh. zool. bot. Gesell. Wien, XXXVIII, 1888, 3) that he has bred *L. metallina* (*metallica*) and *C. viduata* from larvæ found in the mud in a ditch, and he describes the larva of *viduata*; it is 6 mm long, 2 mm in diameter, flat below, arched above, of a dirty yellowish colour. The single segments divided in corrugations by fine furrows; the number of segments is given as twelve. The dorsal side with fine hairs in transverse rows; towards the tapering posterior end longer haired; the posterior end has at each side some strong, pointed, long-haired warts, and it terminates into a short, attenuating, brownish yellow tail-shaped part with the spiracles. Above the mouth opening two approximated two-jointed organs. The larvæ were found on $30/4$ and the imagines of the two species developed on $22/5$ — $29/5$. I possess a male and a female of *C. Macquarti* together with their puparia, bred by Mr. Esben Petersen. The pupæ were found in flood refuse on $16/5$ and developed soon after. The puparium answers well to the description of the larva of *C. viduata* given by Beling. It is dirty yellowish, about 6 mm long (the tail excluded); above it has fine, somewhat thread-like spines in transverse rows, increasing in length behind; they are specially long at each side of the somewhat attenuating posterior end; the end itself terminates into an about 1 mm long, thin, tail-shaped spiracular process, and this again ends with a thin brown, pointed styliform part which in the larva evidently has been telescopically retractile. The anterior spiracular tubes are characteristic; they are long, about 2 mm, thin, cylindric and somewhat ring-like corrugated in the outer half; they are approximated at the base, each protruding through a brown disc, and the two discs touching each other in the middle; the tubes point upwards and forwards and are diverging. There are no larval spiracles visible.

The species of *Chrysogaster* s. l. occur in humid places, in fens, on humid meadows and at borders of water; they generally sit on flowers, often on *Ranunculus* and *Umbelliferæ*; they are not very lively and may easily be caught.

Of the genus about 33 species are found in the palæarctic region. of these one is described here as new; 12 species occur in Denmark.

Table of Subgenera.

- | | |
|--|-----------------------------|
| 1. Antennæ short, third joint rather large; eyes widely separated in both sexes; abdomen all shining | II. <i>Liogaster.</i> 1 J |
| — Antennæ short or elongated but third joint not specially large; eyes touching in the male; abdomen generally dull on the disc (not in <i>C. viduata</i> ♀) | 2. |
| 2. Antennæ with the third joint elongated (only short in <i>brevicornis</i>); upper marginal cross-vein more or less recurrent | I. <i>Orthonoura.</i> |
| — Antennæ short, third joint small; upper marginal cross-vein not recurrent. | III. <i>Chrysogaster.</i> 2 |

I. *Orthonoura* Macq.

Eyes touching in the male for a short or longer distance, the facets quite above a little enlarged, but there is no dividing line. Frons in the male almost flat or slightly arched. Epistoma without central knob (or in foreign species with a small one, *tumescens* Loew). Antennæ generally with the third joint elongated, but sometimes shorter or quite short (f. inst. *brevicornis*). Abdomen dull on the disc. Hind femora setulose beneath except in the females of *geniculata* and *brevicornis*. Wings with the upper marginal cross-vein more or less recurrent.

There are about 13 palæarctic species, one of which is described here as new; 5 occur in Denmark.

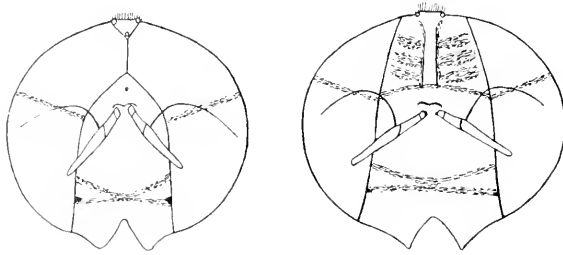
Table of Species.

- | | |
|---|------------------------|
| 1. Legs more or less yellow | 2. |
| — Legs black | 4. |
| 2. Eyes with a dark cross-band; third antennal joint linear, about four times longer than broad | 1. <i>elegans.</i> |
| — Eyes without cross-band; third antennal joint less linear, about three times longer than broad. | 3. |
| 3. Base of stigma dark, middle cross-vein thick and a little infuscated; epistoma much broader than the diameter of the eye; eye-suture in the male short, shorter than the frons | 2. <i>geniculata.</i> |
| — Base of stigma not dark, middle cross-vein not infuscated; epistoma about as broad as the diameter of the eye; eye-suture longer, about as long as the frons | 3. <i>intermedia.</i> |
| 4. Third antennal joint short, roundish quadrate; upper marginal cross-vein slightly recurrent | 4. <i>brevicornis.</i> |
| — Third antennal joint elongated, about twice as long as broad; upper marginal cross-vein more recurrent | 5. <i>nobilis.</i> |

1. *O. elegans* Meig.

1822. Meig. Syst. Besch. III, 272, 14, Tab. XXX, Fig. 9. — 1843. Loew, Stett. ent. Zeitg. IV, 275, Tab. III, Fig. 22—24. — 1843. Zett. Dipt. Scand. II, 824, 8 et 1859. XIII, 6024, 8. — 1862. Schin. F. A. I, 272. — 1907. Kat. palæarkt. Dipt. III, 15.

Male. Head somewhat short, about as high as broad; vertex at the base nearly as broad as long, eye-suture about as long as vertex or nearly so. Vertex, frons and epistoma metallic green, shining; frons



Heads of *O. elegans*.

Fig. 31. Male.

Fig. 32. Female.

with a more or less small dot-like impression, or this almost wanting. Epistoma broad, a little widening downwards, broader than the diameter of the eye; it is somewhat arched, on the middle almost keel-shaped, above the somewhat protruding mouth-edge is a transverse

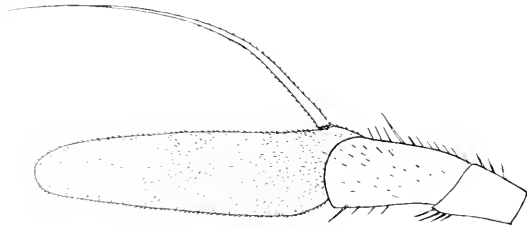


Fig. 33. Antenna of *O. elegans* ♂. from the inside. $\times 80$.

impression which is polished, while the part above is finely striated; just below the antennæ there is on each side at the eye-margin a roundish or triangular, somewhat silvery dust spot. Vertex with pale brownish hairs, frons and epistoma with few and inconspicuous pale hairs. Occiput greenish or bluish black, a little pruinose, with very short dark hairs. Antennæ elongated, third joint linear, a little attenuated outwards, about four times as long as broad; arista longer than the

third joint; the antennæ are brown, paler beneath, second joint with only inconspicuous dark bristles beneath. Eyes with a distinct dark transverse band across the middle. Thorax brass-coloured or more greenish, coarsely and somewhat rugosely punctate and hence dull; it has four brown or purplish, quite dull stripes, two in the middle, abbreviated behind, and one on each side, interrupted at the furrow; the middle stripes darkest. The disc is clothed with very short, yellowish hairs. Scutellum marginate and with one or a couple of more or less distinct transverse furrows. Pleura less punctate, shining, with a little longer, sparse, pale hairs. Abdomen brownish black, dull, the sides and the apical part brassy or greenish and shining, also the first segment less dull; abdomen is clothed with exceedingly short, dark hairs, paler at the sides and a little longer and pale at the apex; they are also longer and likewise pale at the basal corners. Venter greenish metallic, shining, with short pale hairs. Legs metallic greenish, knees yellowish, this colour stretching down the basal part of tibiæ; tarsi with the two first joints more or less yellowish, the rest black; hind metatarsi slightly thickened. The legs with short and inconspicuous

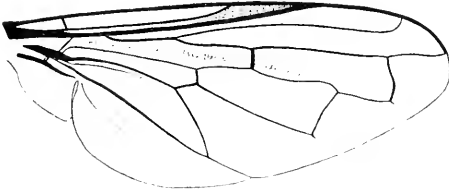


Fig. 34. Wing of *O. elegans* ♂.

mainly pale or brownish hairs, hind femora black setulose beneath. Wings very slightly tinged; stigma yellow; upper marginal cross-vein somewhat recurrent, slightly sinuous. Squamulæ dirtily whitish with a brownish margin and a yellowish fringe. Halteres yellow.

Female. Frons and epistoma not very broad, but in the height of the antennæ considerably broader than the diameter of the eye; frons with a slightly marked middle channel or stripe, and in front of it a small dot-like impression; to each side there are some oblique cross-furrows; the frons is bluish above. Eyes with a dark band as in the male, but it is placed a little higher, above the middle. Fourth abdominal segment with a very small, almost imperceptible wart in the middle of the hind margin. Anterior tarsi with the basal joints darker than in the male or brownish.

Length 5 to about 6 mm.

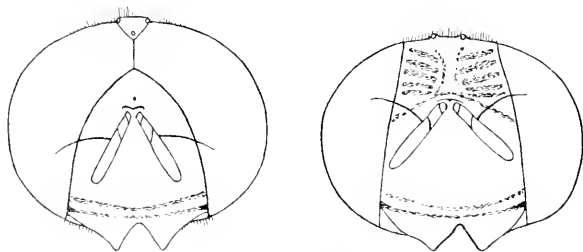
O. elegans is rare in Denmark, I know only six specimens, four males and two females; the males are taken in Jutland: at Horsens (O. G. Jensen), Laven near Silkeborg, Frijsenborg (H. J. Hansen) and at Fussingsø near Randers (Tryde); of the females one is taken in Nørholm Skov at Varde (Kryger) the other is found in Westermann's collection, labelled Sealand. The dates are from June to August.

Geographical distribution:— Europe down into Italy; towards the north to middle Sweden, and in Finland. It is upon the whole a not common species.

2. *O. geniculata* Meig.

1830. Meig. Syst. Besch. VI, 352. 16. — 1843. Zett. Dipt. Scand. II, 824, 9 et 1859, XIII, 6025, 9 p. p. — 1843. Loew, Stett. ent. Zeitg. IV, 273, 280, Tab. III, Fig. 25—27. — 1862. Schin. F. A. I, 273. — 1907. Kat. palæarkt. Dipt. III, 16. — *Chrysogaster fuscipennis* Zett. 1838. Ins. Lapp. 615, 3. — *Orthonera elegans* 1901. Verr. Brit. Fl. VIII, 187, figs. 197—198.

Male. This species is very much like *elegans*. Head broader than high; vertex equilateral. Frons rather flat, distinctly punctate. Epistoma much broader than the diameter of the eye, widening downwards; it is a little more protruding above the transverse depression



Heads of *O. geniculata*.

Fig. 35. Male.

Fig. 36. Female.

below than in *elegans*, and also the mouth edge is more protruding. The silvery side dust spots larger, triangular. Frons with more conspicuous, white hairs. Antennæ brown or dark brown, shorter than in *elegans*, third joint about three times as long as broad; arista not much longer than the third joint; second joint with small, pale bristles beneath. Eyes without band. Thorax a little more conspicuously pale-haired, the stripes much less distinct. Legs with also tip of the tibiæ a little yellowish. Wings somewhat tinged, with the upper marginal cross-vein almost straight and perpendicular; middle cross-

vein rather thick and a little seamed. Stigma yellow but with just the base darkened or blackish.

Female. Frons and epistoma very broad, in the height of the

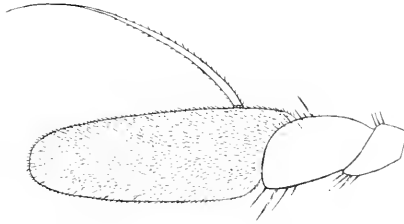


Fig. 37. Antenna of *O. geniculata* ♂, from the inside. $\times 80$.

antennæ about twice as broad as the diameter of the eye; frons otherwise chiefly as in *elegans*, but more punctate, the middle channel less distinct. Antennæ a little larger than in the male. Thorax more

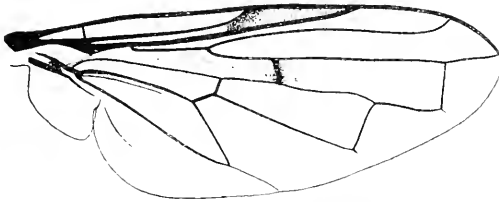


Fig. 38. Wing of *O. geniculata* ♂.

conspicuously haired than in *elegans*. Fourth abdominal segment with a distinct wart in the middle of the hind margin, the fifth with an impression on each side at the hind margin. Hind femora not black

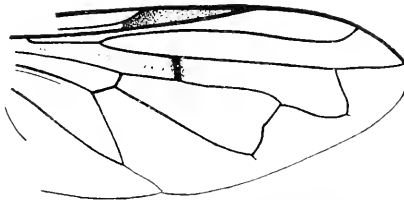


Fig. 39. Wing of *O. geniculata* ♀.

setulose. Wings less tinged than in the male or almost not tinged: upper marginal cross-vein distinctly recurrent and the lower a little angular with the angle inwards.

Length about 5,5 mm.

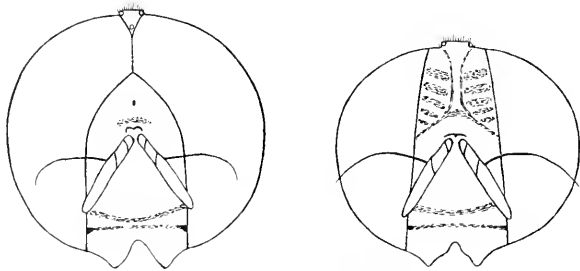
O. geniculata is very rare in Denmark, only two specimens, both females, have been taken in Lyngby Mose on $\frac{3}{6}$ 1909 and $\frac{16}{6}$ 1915 (the author); the latter specimen is remarkable as it has the upper marginal cross-vein perpendicular and the lower not angular, the venation thus being quite as in the male.

Geographical distribution:— The species is recorded from all Europe down into Italy; towards the north to northern Sweden, and in Finland; it must, however, be remembered, that it has perhaps been confounded with the following species.

3. *O. intermedia* n. sp.

Orhoneura geniculata Loew, 1857. Wien. ent. Monatschr. 1, 8. — *Chrysogaster geniculatus* Zett. 1859. Dipt. Scand. XIII, 6025, 9, p. p. (specimina stigmatate pallescente, absque puncto basali fusco et nervo transverso ordinario parum infuscato).

Male. This species again highly resembles the two preceding: Head a little longer, about as high as broad; the eye-suture longer, longer than vertex which is longer than broad. Frons somewhat arched, with a transverse depression above the antennæ and a small,



Heads of *O. intermedia*.

Fig. 40. Male.

Fig. 41. Female.

dot-like impression above it; it is more finely punctate than in *geniculata*. Epistoma much narrower than in the two preceding species, about as broad as the diameter of the eye, with almost parallel borders; the side dust spots small, roundish. Vertex with somewhat short, yellowish hairs, frons with pale, above rather long hairs; epistoma with short but distinct, pale hairs. Occiput greenish, with dark hairs above, pale below. Antennæ about as in *geniculata*, but a little larger, third joint about three times longer than broad; arista almost as long as the antennæ; the antennæ are dark or blackish brown.

paler beneath; second joint with pale bristles of some length beneath. Eyes without band. Thorax about as in *elegans*, the dull stripes somewhat distinct; it is very short-haired, but however a little more conspicuously haired. Scutellum deeply marginate, with a couple of

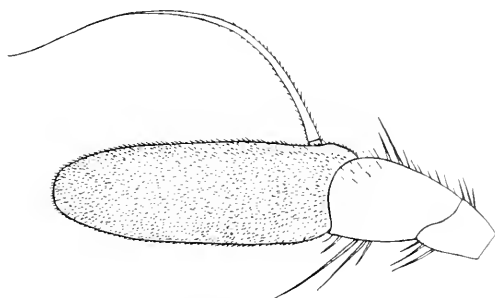


Fig. 42. Antenna of *O. intermedia* ♂, from the inside. $\times 80$.

generally very indistinct transverse furrows. Abdomen dull black on the disc, brightly shining, greenish or brassy at the sides and apex, haired as in *elegans*. Legs as in *geniculata* with also the extreme tip of the tibiae yellow. Wings hyaline; stigma light yellow; upper marginal cross-vein somewhat recurrent. Squamulae dirtily whitish with a darker margin and a yellow fringe. Halteres yellow.

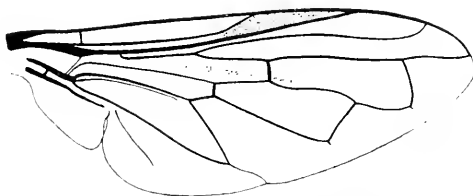


Fig. 43. Wing of *O. intermedia* ♂.

Female. Frons and epistoma somewhat narrow, narrower than in the two preceding species, in the height of the antennae about as broad as the diameter of the eye; otherwise the frons about as in the two preceding species, the middle space more or less impressed or even elevated, the cross-furrows not deep. Antennae as in the male. Abdomen with a small but distinct wart in the middle of the hind margin of the fourth segment. Legs as in the male, hind femora likewise setulose beneath. Wings as in the male, upper marginal cross-vein recurrent in the same way.

Length 5.5–6 mm.

O. intermedia is like the two preceding species rare in Denmark, we have in all eleven specimens; Lyngby Mose (Schlick, the author), Hillerød (Godskesen), and a specimen in Westermann's collection labelled Sealand; on Funen at Faaborg (Schlick), and one specimen from earlier time, probably from Horsens in Jutland. The dates are from June and to the first part of August.

Geographical distribution:— Besides from Denmark the species is hitherto known also from Posen and Sweden, and according to specimens sent to me from Mr. Th. Becker also from Silecia and Ural.

Remarks: The three species *elegans*, *geniculata* and *intermedia* are very similar, but however very distinct; *elegans* is distinguished from the other two by the banded eyes and the long antennæ, and *geniculata* is distinguished from *intermedia* by the shorter eye-suture in the male, by the stigma dark at the base, the thick and infuscated middle cross-vein and the shape of the upper marginal cross-vein. Besides there are characters in the frons, the breadth of epistoma, the side dust spots, the relative length of the arista and still more. A very curious character is that the female of *geniculata* has not, as the male, the hind femora black setulose beneath, while this is distinctly the case with the females of the two other species. — It is curious that the banded eyes of *elegans* have not been mentioned since Meigen and Zetterstedt, (though it is mentioned by Girschner in his work "Einiges über die Färbung der Dipterenaugen," Berl. Ent. Zeitschr. XXXI. 1887, 161) even not by Loew, but yet I think, that it is *elegans* he describes in Stett. Ent. Zeitg. l. c. (otherwise it would be a new species which might be indicated by the strongly sinuous upper marginal cross-vein in the figure). For the rest the descriptions allow well to decide the species the authors have had before them; thus it is evident, that Verrall describes *geniculata* as *elegans* both from his description of antennæ, wings and the colour of the legs, as well as from the figures of the wings; likewise it is evidently my new species *intermedia* which Loew and Zetterstedt mention in the places cited above, but those authors seem to have seen only the male.

4. *O. brevicornis* Loew.

1843. Loew, Stett. ent. Zeitg. IV, 269, Tab. III, Fig. 19—21 et 1857. Wien. ent. Monatschr. I, 7. — 1862. Schin. F. A. I, 272. — 1901. Verr. Brit. Fl. VIII, 188, 2, figs. 199—200. — 1907. Kat paläarkt. Dipt. III, 15.

Male. Head a little broader than high. Vertex, frons and epistoma black or bluish black; frons with a dot-like, somewhat longitudinal impression; epistoma broad, widening downwards, with a greyish

pruinose transverse band below the antennæ; for the rest dullish, but polished in the middle above the rather protruding mouth edge, which projects more than the antennal projection. Vertex with long, yellowish hairs, dark in front; frons with short, pale hairs and epistoma inconspicuously haired. Occiput black, grey pruinose along the margin, with short, pale hairs, longer on the jowls. Antennæ short, third joint roundish quadrate; second joint with long, whitish bristles below; the antennæ are black or brownish black. Thorax æneous green, somewhat dull as it is very densely punctate, it has very faint or almost no stripes and is clothed with short, somewhat depressed, yellowish hairs; scutellum is more bluish black, with dark hairs; it is marginate and with a slight transverse depression on the middle. Pleura less punctate, shining, with slightly longer hairs. Abdomen dull black on the disc, æneous and shining at the sides and apex; it is clothed with short hairs, chiefly dark on the disc, pale at the sides and longer at the basal corners. Venter greenish, shining, with pale hairs. Genitalia somewhat large. Legs black, femora a little æneous; hind metatarsus a little thickened; the legs are inconspicuously pale-haired, hind femora

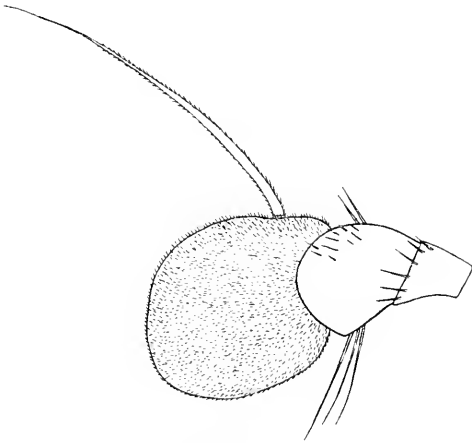


Fig. 44. Antenna of *O. brevicornis* ♀, from the inside. $\times 80$.

black setulose beneath. Wings slightly tinged; stigma brownish and below it a somewhat indistinct brownish cloud; upper marginal cross-vein about perpendicular but curved out in the middle. Squamulæ yellowish white with a yellow fringe. Plumula darker than in the other species. Halteres whitish yellow.

Female. Frons very broad, with a depressed middle stripe and in front of it a dot-like impression; on each side a number of cross-

furrows. Frons and epistoma a little more conspicuously haired than in the male. Antennæ with the third joint somewhat larger, generally pale at the base below. Thorax a little more conspicuously hairy than in the male, the stripes more conspicuous. Abdomen æneous or coppery at the sides and less dull on the disc, rather densely punctate.

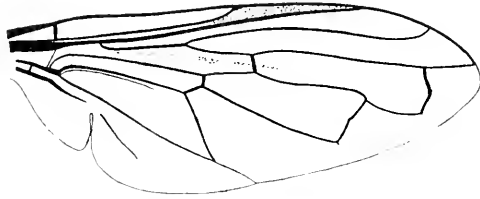


Fig. 45. Wing of *O. brevicornis* ♀.

tate and densely hairy; fourth segment without wart. Hind femora not setulose beneath. Wings more evenly and less tinged or almost hyaline.

Length 5,6 to about 7 mm.

O. brevicornis is rare in Denmark, only four specimens, all females have been taken; Ordrup Mose, Ermelund, Lyngby Mose and at Fure Sø (the author); the dates are $^{22}/_5$ — $^{21}/_6$; the first specimen was taken in 1906. It occurs on flowers in fens and on humid places.

Geographical distribution:— Europe down into Italy; it is not known north of Denmark, but occurs in England.

5. *O. nobilis* Fall.

1817. Fall. Dipt. Succ. Syrph. 57, 17 (*Eristalis*). — 1822. Meig. Syst. Besch. III, 272, 13, Tab. XXX, Fig. 18. — 1843. Zett. Dipt. Scand. II, 823, 7. — 1843. Loew. Stett. ent. Zeitg. IV, 262, Tab. III, Fig. 16—18. — 1862. Schin. F. A. I, 272. — 1901. Verr. Brit. Fl. VIII, 190, 3, figs. 201—202. — 1907. Kat. paläarkt. Dipt. III, 16. — *Chrysogaster nigricollis* Meig. 1822. Syst. Besch. III, 271, 12.

Male. Head broader than high. Vertex, frons and epistoma metallic green, or the latter more bluish; frons with a small dot-like impression above the antennæ; eye-suture quite short. Frons and epistoma somewhat narrow above, rather rapidly widening downwards; the epistoma is a little arched and the mouth edge somewhat produced; below the antennæ there is a grey dust spot on each side, stretching as a line down on the jowls along the eye-margin. Vertex and upper part of frons with brown hairs, the lower part of the frons and epistoma

with white hairs. Occiput greenish, grey pruinose with white hairs. Antennæ not specially long, third joint elongated, somewhat pointed, scarcely twice as long as broad; arista about as long as the antennæ; the antennæ black or brownish black, third joint pale beneath especially towards the base; the second joint has long, white bristles beneath.

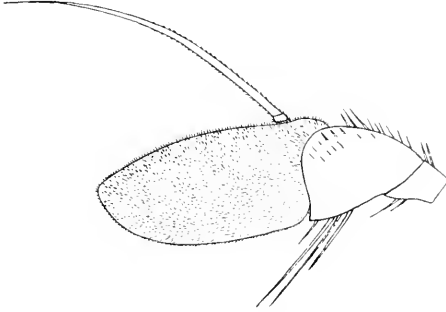


Fig. 46. Antenna of *O. nobilis* ♂, from the inside. $\times 80$.

Thorax metallic green or brassy, very densely punctate, slightly shining; it has four slight more brass-coloured or brownish stripes, the two median abbreviated behind; it is clothed with very short, pale brown hairs. Pleura metallic green, densely punctate, with longer, pale hairs. Abdomen bluish black and dull on the disc, metallic green, shining at the sides and apex; it is clothed with short hairs which are pale at the sides, dark and still shorter on the dull part; the hairs are longer

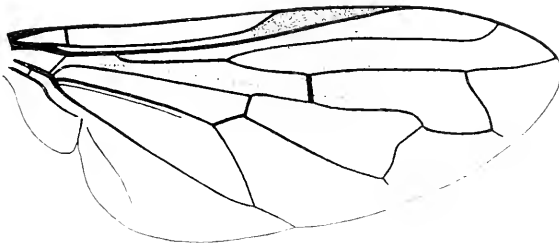


Fig. 47. Wing of *O. nobilis* ♂.

at the sides of the first segment and still longer at the basal corners of second. Genitalia rather large. Venter metallic green with pale hairs. Legs unicolorous, metallic green, tarsi black; the hairs short and pale, hind femora a little setulose beneath; hind tibiæ somewhat curved and a little compressed towards both ends and hind metatarsus slightly

thickened. Wings a little tinged; stigma brown, below it an undefined browning; upper marginal cross-vein somewhat recurrent (but varying in this respect), very slightly undulated; lower marginal cross-vein curved a little angularly inwards. Squamulæ white. Halteres pale yellow.

Female. Frons broad, rugosely punctate, with a slightly depressed channel down the middle and a dot-like impression in front of it; on each side there are four to six irregular cross-furrows; the pubescence all pale, only a little dark about the ocelli. Third antennal joint a little broader than in the male. Fourth abdominal segment with a rather large, somewhat pointed wart in the middle of the hind-margin, and the fifth with a small, narrow excision in the hind margin.

Length 5—6 mm.

O. nobilis is somewhat rare in Denmark: Roskilde and Boserup at Roskilde; on Funen at Odense (H. J. Hansen), and at Faaborg (Schlick); in Jutland at Horsens (O. G. Jensen) and at Laven near Silkeborg (H. J. Hansen). The dates are in July and August. It occurs in low herbage and on flowers on humid places and at borders of water.

Geographical distribution: — Europe down into Italy; towards the north to northern Sweden, and in Finland.

II. *Liogaster* Rond.

Eyes in the male widely separated, the facets of equal size. Epistoma without central knob. Antennæ short with the third joint rather large, and larger in the male than in the female. Abdomen all shining. Hind femora not setulose beneath. Wings with the upper marginal cross-vein not recurrent.

There are three palæarctic species, two occur in Denmark.

Table of Species.

1. Antennæ and legs black	1. <i>metallina</i> .
— Third antennal joint more or less yellowish beneath; tarsi more or less yellow	2. <i>splendida</i> .

1. *L. metallina* Fabr.

1777. Fabr. Gen. Ins. 307 et 1781. Spec. Ins. II, 431, 52 et 1787. Mant. Ins. II, 340 et 1794. Entom. Syst. IV, 303, 95 (*Syrphus*). — 1862. Schin. F. A. I, 268. — 1901. Verr. Brit. Fl. VIII, 192, 1, figs. 203—204. — 1907. Kat. palæarkt. Dipt. III, 17. — *Eristalis metallica* Fabr. 1805. Syst. Antl. 246, 67. — 1817. Fall. Dipt. Suec. Syrph. 57, 16. — *Chryso-*

gaster metallica 1822. Meig. Syst. Besch. III, 267, 3. — 1843. Zett. Dipt. Scand. II, 820, 5 et 1849. VIII, 3178, 5. — 1843. Loew, Stett. ent. Zeitg. IV, 211. — *Chr. violacea* Meig. 1822. l. c. III, 267, 2. — 1843. Loew, l. c. IV, 210. — 1862. Schin. F. A. I, 269. — *Chr. grandicornis* Meig. 1822. l. c. III, 270, 7. — 1843. Loew, l. c. IV, 253 et 1857. Wien. ent. Monatschr., I, 6. — *Chr. discicornis* Meig. 1822. l. c. III, 270, 8.

Male. Frons broad, about one third of the breadth of the head. Vertex, frons and epistoma metallic green; frons with a transverse depression below the ocellar triangle and a small dot-like impression

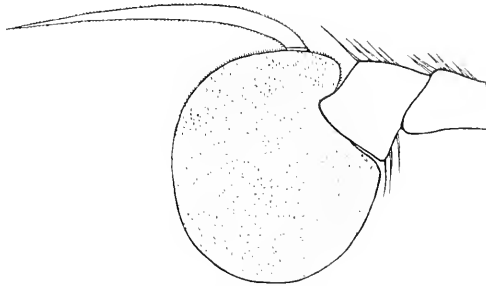


Fig. 48. Antenna of *L. metallica* ♂, from the inside. $\times 70$.

above the antennæ; on the upper part it is coarsely punctate. Epistoma retreating downwards but strongly produced at the mouth edge, more protruding than the antennal prominence. Vertex and frons with pale yellow, epistoma with white hairs, longest on the eye-margins. Occiput greenish, a little pruinose, pale haired. Antennæ black, third joint large, disciform, a little broader than long; arista about as long as

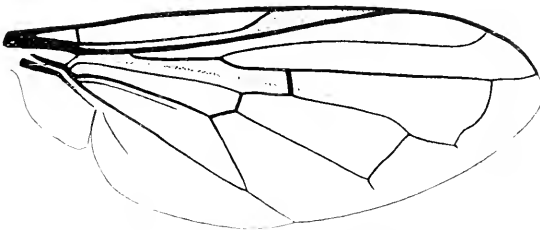


Fig. 49. Wing of *L. metallica* ♂.

the antennæ; in single cases the third joint may be yellowish beneath. Thorax metallic green or somewhat brassy, in front it has traces of two approximated, more brass-coloured stripes; it is densely punctate

but shining. Scutellum usually distinctly marginate and with a transverse depression. The thoracal disc is densely clothed with short, yellow hairs, longer at the margin of scutellum. Pleura with a little longer hairs. Abdomen æneous green, densely punctate but shining; it is densely clothed with short, whitish pubescence, longer at the basal corners. Venter similarly coloured and haired. Genitalia forming a rather large knob. Legs æneous green, tarsi black, hind metatarsi slightly thickened; the legs short-haired with pale hairs. Wings a little yellowish tinged on the basal half. Stigma yellowish or brownish. Squamulæ whitish with a little darker margin. Halteres orange.

Female. Frons broader than in the male, punctate, with a slight middle channel and shallow cross-furrows on the sides; antennæ with

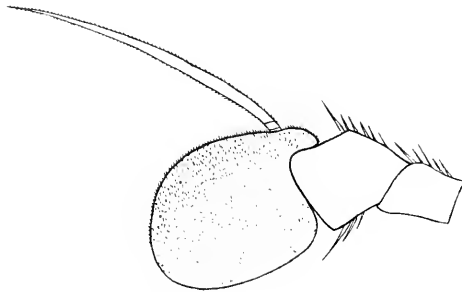


Fig. 50. Antenna of *L. metallina* ♀, from the inside. $\times 70$.

the third joint smaller but still large, longer than broad. Abdomen less shining, often more brassy or copper-coloured, more rarely bluish on the disc. Sometimes both head, thorax and partly abdomen coppery or violet.

Length 6 to about 7 mm.

L. metallina is common in Denmark; Lersø, Ordrup Mose, Ernelund, Bøllemosen, Lyngby Mose, Ørholm, Hillerød, Frederikssund, Boserup at Roskilde; on Lolland at Strandby, in Høvænge Skov and Dødemose west of Nysted and at Sandager; in Jutland at Henne south of Ringkøbing Fjord, Greisdal at Vejle, Nebsager near Horsens, Sminge near Silkeborg, Gjerlev near Randers Fjord, Hald at Viborg, Bovbjerg, Frederikshavn and Læsø, and on Bornholm at Allinge and Hammeren. My dates are $\frac{9}{5}$ — $\frac{16}{8}$. It occurs in low herbage and on flowers on humid meadows and at borders of ditches.

Geographical distribution:— Europe down into Spain and Italy; towards the north to middle Sweden, and in Finland.

2. *L. splendida* Meig.

1822. Meig. Syst. Besch. III, 271, 11. — 1843. Loew, Stett. ent. Zeitg. IV, 258. — 1862. Schin. F. A. I, 267. — 1901. Verr. Brit. Fl. VIII, 193, 2. — 1907. Kat. paläarkt. Dipt. III, 17. — *Chrysogaster tarsata* Meig. 1822. l. c. III, 271, 10. — 1843. Zett. Dipt. Scand. II, 822, 6 et 1849. VIII, 3178, 6. — 1843. Loew, Stett. ent. Zeitg. IV, 255. — *Chr. bicolor* Macq. 1827. Soc. Sc. Lille, 193, 5. — 1838. Meig. l. c. VII, 121, 18. — 1843. Loew, Stett. ent. Zeitg. IV, 259. — *Chr. amethystina* Macq. 1834. Suit. à Buff. I, 563, 13. — 1857. Loew, Wien. ent. Monatschr. I, 6. — *Chr. amethystea* Meig. 1838. l. c. VII, 122, 21. — *Chr. rufitarsis* Loew, 1840. Programm. Posen, 31, 6, Fig. 41 et 1840 Isis, 564, 6.

Male. Frons broad, a little narrower than in *metallina*; vertex, frons and epistoma metallic green; frons punctate, with a small or wanting dot-like impression above the antennæ and a transverse depres-

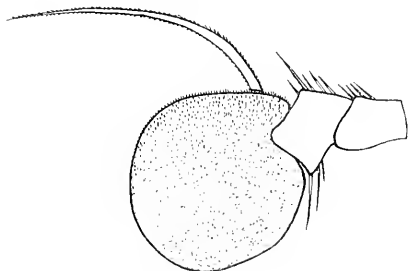


Fig. 51. Antenna of *L. splendida* ♂, from the inside. $\times 70$.

sion above, nearer the ocelli than in *metallina*; epistoma retreating downwards, strongly produced at the mouth edge, a little dusted above. All the hairs pale. Occiput greenish with white hairs. Antennæ with the third joint rather large, but smaller than in *metallina*, it is roundish or a little longer than broad. The antennæ are black or brownish black, the third joint pale or yellow beneath at the base to a greater or smaller degree; arista thinner than in *metallina*. Thorax æneous green or more brass-coloured, especially behind, less punctate and more shining than in *metallina*, clothed with short, pale hairs, longer at the margin of scutellum. Pleura with slightly longer hairs. Abdomen æneous green, often coppery or sometimes violet; it is likewise less punctate and more shining than in *metallina*, and haired in the same way. Legs as in *metallina*, but the three first joints of the tarsi more or less yellow, when darker the dark color begins at the base, and hind metatarsus often æneous. Wings almost hyaline. Stigma yellow. Squamulæ whitish. Halteres orange.

Female. Frons a little broader than in the male, punctate, without or with slight cross-furrows; also a slight middle channel may be present or wanting, or this space may even be a little elevated. Antennæ with the third joint longer. Abdomen generally bluish or violet on the disc. Legs generally with the tarsi, especially the hind ones, darker.

Length 5—6,5 mm; a single male only reaches 4,8 mm.

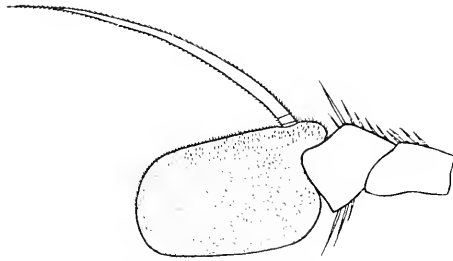


Fig. 52. Antenna of *L. splendida* ♀, from the inside. $\times 70$.

This species is much like *metallina* but is recognized by the shape and colour of the antennæ and the colour of the tarsi, besides by other characters.

L. splendida is rather rare in Denmark and much rarer than *metallina*; Lersø, Ordrup Mose, Lyngby Mose, Ørholm and on Lolland in Kældskov; the dates are $^{1}/_{6}$ — $^{29}/_{6}$. It occurs on the same localities as *metallina*.

Geographical distribution:— Europe down into Italy, and in Asia Minor; towards the north to middle Sweden.

III. *Chrysogaster* Meig. s. str.

Eyes touching in the male, the facets in the upper half enlarged, and there is a more or less distinct dividing line between the large and small facets. Frons arched and considerably puffed out; epistoma in the male as a rule with a more or less distinct central knob, but sometimes not (f. inst. *splendens* and *insignis* both non-Danish). Antennæ short, third joint rather small. Abdomen dull on the disc in the male, and also, but to a less degree, in the female, and quite shining in the female of *viduata*. Hind femora setulose beneath. Wings with the upper marginal cross-vein not recurrent.

There are about 17 palæartic species; 5 occur in Denmark.

Table of Species.

- | | |
|---|--------------------------|
| 1. Antennæ black | 2. |
| — Antennæ reddish or reddish brown | 3. |
| 2. Mouth edge in the male about equally protruding with the central knob; thorax densely haired and venter longish-haired; larger species | 1. <i>Macquarti</i> . |
| — Mouth edge in the male more projecting than the central knob; thorax thinly haired in the male, almost bare in the female; venter short-haired; smaller species | 2. <i>viduata</i> . |
| 3. Frons and epistoma somewhat narrow; wings blackish | 3. <i>solstitialis</i> . |
| — Frons and epistoma broad; wings not blackish | 4. |
| 4. Wings yellow at base; pleura grey pruinose above front coxæ and on hypopleura; central knob in the male large but slightly projecting | 4. <i>chalybeata</i> . |
| — Wings not yellow at base; pleura without grey pruinose spots; central knob in the male small but more projecting | 5. <i>virescens</i> . |

1. *C. Macquarti* Loew.

1843. Loew, Stett. ent. Zeitg. IV, 250. — 1862. Schin. F. A. 1, 269. — 1901. Verr. Brit. Fl. VIII, 199. — 1907. Kat. paläarkt. Dipt. III, 19. — *Chr. viduata* Macq. (nec Linn.) 1827. Soc. Sc. Lille, 194, 8 et 1834. Suit. à Buff. I, 562, 9. — 1843. Zett. Dipt. Scand. II, 818, 2 et 1855. XII, 4670, 2 et 1859. XIII, 6023, 2.

Male. Vertex, frons and epistoma black, shining; frons puffed out, with a more or less distinct longitudinal or dot-like impression. Epistoma hollowed below the antennæ, with a not large central knob and an about equally protruding mouth edge; it is a little greyish pruinose across below the antennæ. Vertex and frons with long, black hairs, epistoma with shorter, paler hairs on the side parts, darker hairs below. Eye margins narrow but distinct. Occiput æneous black, a little pruinose, with black hairs, downwards and on the jowls pale hairs. Antennæ small, black, third joint roundish; second joint with a couple of longish, pale or darker bristles below; arista much longer than the antennæ, thickened just at the base. Thorax æneous black, finely densely punctate and densely clothed with somewhat long hairs, which are yellowish brown, more or less mixed with black until being almost quite blackish; they are longest at the margin of scutellum. On the front of thorax are very slight traces of three stripes, often scarcely to be seen. Pleura with a little longer, generally darker hairs. Abdomen dull velvet black on the disc, æneous and shining at sides and apex; it is clothed with quite short, yellowish hairs, longer at the sides and here increasing in length towards the base. Venter æneous green, shining, with longish, pale hairs. Genitalia forming a large knob. Legs black, with short, yellowish hairs, only somewhat long on the

postero-ventral side of the anterior femora and to a less degree on the hind femora; on the front femora they are partly or quite dark; front and hind tibiae and tarsi with short, adpressed reddish pubescence below; hind femora setulose below; hind metatarsus very slightly thickened. Wings a little tinged; stigma brownish, below it generally a large indefinite browning, sometimes almost wanting. Plumula blackish. Squamulae brownish or blackish brown with a yellowish fringe. Halteres blackish brown, the peduncle paler.

Female. Frons broad with a slight or very slight depressed middle channel, and more or less distinct, irregular and sometimes almost wanting cross-furrows; epistoma without central knob; frons and occiput pale-haired. Antennae a little larger than in the male. Thorax with short, dense, yellow hairs. Abdomen aeneous black, indefinitely dullish on the disc, with short, yellow hairs. Femora shorter-haired than in the male. Squamulae a little paler.

Length 6.5—7.2 mm.

C. Macquarti is not rare in Denmark; Ordrup Mose, Ermelund, Bollemosen, Dyrehaven, Lyngby Mose, Bagsvær, Ørholm, Ruderhegn, Birkerød, Hillerød; on Lolland at Nysted, Strandby, Kældskov and Dødemose west of Nysted; on Funen at Odense; in Jutland in Nørholm Skov at Varde, at Horsens, Nebsager near Horsens, Silkeborg, Holstebro, Hald near Viborg, Rebbild near Skørping and Frederikshavn, and on Bornholm in Almindingen. My dates are $18/5$ to the first part of August. It occurs on flowers in fens and on humid marshes. The pupa was found in flood refuse at Silkeborg on $16/5$, it developed soon after (Esbén Petersen).

Geographical distribution:— Europe down into Italy; towards the north to middle Sweden, and in Finland.

2. *C. viduata* L.

1758. Linn. Syst. Nat. X, 598 et 1767. XII, 2, 994, 94 et 1761. Fn. Suec. 1852 (*Musca*). — 1817. Fall. Dipt. Suec. Syrph. 56, 15 (*Eristalis*). — 1822. Meig. Syst. Besch. III, 269. 6. — 1843. Loew, Stett. ent. Zeitg. IV, 248. — 1862. Schin. F. A. I, 268. — 1907. Kat. paläarkt. Dipt. III, 20. — *Chr. nuda* Macq. 1827. Soc. Sc. Lille, 195, 9 et 1834. Suit. à Buff. I, 562, 10. — 1838. Meig. l. c. VII, 122, 20. — 1843. Zett. Dipt. Scand. II, 820, 4 et 1855. XII, 4670, 4.

Male. Vertex, frons and epistoma black; frons much arched and puffed out, with a longitudinal or more dot-like impression; epistoma with a rather small central knob, the mouth edge a little more protruding than the knob; below the antennae the epistoma is somewhat greyish dusted, the dust forming a transverse spot, pointed towards

the sides, but from the middle of the spot a curved, finely striated space curves down to each side, these spaces together with the middle of the dusted spot looking as a grey, bow-shaped part. Vertex and frons with long, black hairs; epistoma with pale hairs at the sides above. Occiput black, a little pruinose, with black hairs; quite below and on the jowls the hairs white. Eyes with the large and small facets distinctly contrasted and the division across the eyes rather distinct. Eye-margins very narrow. Antennæ small, black, third joint roundish, second joint with only small hairs below; arista much longer than the antennæ. Thorax black, slightly æneous, dullish in front, shining behind, finely not densely punctate; anteriorly it has three somewhat distinct dull black stripes, the median most distinct, the lateral abbreviated and quite short. Thorax is clothed with longish, fine and not dense, brownish or black hairs. Pleura with black hairs. Abdomen dull velvet black on the disc, shining and a little æneous at sides and apex; it is sparingly clothed with fine hairs which are partly dark, but quite short and inconspicuous on the disc, a little longer and pale at the sides and here somewhat long at the basal corners. Venter black or a little æneous, shining, sparingly clothed with short, pale hairs. Genitalia somewhat large. Legs black, haired as usual; the hairs mainly black on the anterior femora and on tibiæ, but here quite inconspicuous; hind femora black setulose below. Hind tibiæ rather distinctly curved, hind metatarsus a little thickened. Wings a little tinged; stigma brownish yellow, below it generally an undefined brownish cloud, sometimes the wings almost hyaline; middle cross-vein generally a little thickened. Plumula blackish. Squamulæ dirtily whitish, with a dark margin and a pale fringe. Halteres blackish or blackish brown.

Female. Frons very broad, relatively broader than in *Macquarti*; it has a distinct longitudinal channel and vague, irregular cross-furrows; the bow-shaped impression above the antennæ distinct and below it a dot-like groove. Epistoma without central knob. Mouth edge a little more produced than in *Macquarti*; frons very short-haired, epistoma almost bare. Antennæ a little larger than in the male. Thorax æneous black, shining, sparingly punctate and with very short, mainly dark hairs so that it may look almost bare. Abdomen likewise æneous black and shining, on the disc more black or bluish black but not dull; it is sparingly punctate and haired, the hairs quite short, yellowish, but dark on the middle. Wings generally with the cloud stronger than in the male, and also often with the base darkened.

Length 5,5 to fully 6 mm.

This species is easily distinguished from *Macquarti*, in the male

by the more produced mouth edge, the distinct division between the eye-facets, the more thinly haired thorax and abdomen and shorter haired venter, and in the female by the broader frons, the thinly and very short-haired and more dark-haired thorax and abdomen; in both sexes the wings are generally more strongly clouded and finally the size is smaller.

O. viduata is common in Denmark; Vester Fælled, Ordrup Mose, Lyngby Mose, Ørholm, Geel Skov, Hillerød, Frederikssund, Boserup at Roskilde; on Lolland at Strandby, in Egholm Skov and in Dødemose west of Nysted; on Funen at Odense and in Jutland at Silkeborg. My dates are $19\frac{1}{5}$ — $22\frac{2}{6}$. It occurs in fens and on meadows often at borders of ditches, on various flowers thus often on *Ranunculus*.

Geographical distribution:— Europe down into Italy; towards the north to southern Sweden, and in Finland.

3. *C. solstitialis* Fall.

1817. Fall. Dipt. Suec. Syrph. 56, 14 (*Eristalis*). — 1843. Zett. Dipt. Scand. II, 817, 1 et 1849. VIII, 3177, 1 et 1855. XII, 4669, 1 et 1859. XIII, 6022. 1. — 1901. Verr. Brit. Fl. VIII, 203, 6. — 1907. Kat. paläarkt. Dipt. III, 19. — *Musca coemeteriorum* 1775. Fabr. Syst. Entom. 779, 28 et 1781. Spec. Ins. II, 443, 39 et 1787. Mant. Ins. II, 339 (*Syrphus*) et 1794. Ent. Syst. IV, 303, 94 (*Syrphus*) et 1805. Syst. Antl. 246, 65 (*Eristalis*). — 1801. Panz. Fn. Germ. LXXXII, 17 (*Syrphus*). — *Chr. coemeteriorum* 1822. Meig. Syst. Besch. III, 268, 5, Tab. XXX, Fig. 17. — 1843. Loew, Stett. ent. Zeitg. IV, 246. — 1862. Schin. F. A. I, 270.

Male. Vertex dull, frons and epistoma æneous black, shining; frons considerably puffed out, with an obvious longitudinal furrow; epistoma with a greyish band below the antennæ and with the central knob and likewise the mouth edge only slightly produced; frons and epistoma not broad, the latter with parallel borders. Vertex and frons with longish, black hairs, epistoma almost bare only with some few, pale hairs. Occiput black, greyish dusted at the eye-margin, with short hairs which are blackish above, pale below. Antennæ small, brownish red or reddish, third joint generally palest beneath at the base; second joint with somewhat long, dark bristles beneath; arista much longer than the antennæ. Thorax dull velvet black on the disc, the sides and scutellum æneous and somewhat shining, punctate; it is clothed with longish, more or less depressed, and with short, black hairs, the hind part of the disc and scutellum with short, bristly hairs, longer at the margin of scutellum; this latter is depressed in the middle. Pleura æneous, shining, with black hairs. Abdomen dull velvet black or brownish black, the apex and the extreme sides æneous and shining;

it is clothed with very short, dark hairs, only the second segment has long, yellowish hairs both at the sides and on the disc, but here somewhat sparse. Venter æneous, shining, with very short, pale hairs. Legs black, haired in the usual way with short, partly dark, partly yellowish hairs, longest and dark on the posterior side of anterior femora; the adpressed ferruginous pubescence below the apical part of front and hind tibiæ and basal part of tarsi obvious. Hind femora black setulose beneath; hind metatarsi very slightly thickened. Wings blackish tinged, most towards the anterior margin; stigma only slightly darker; the upper marginal cross-vein bends rather evenly upwards so that the lower angle is almost rounded away (but somewhat varying). Plumula yellowish. Squamulæ brownish with darker margin and yellow fringe. Halteres brownish.

Female. Frons broad but not very broad, black, shining, with a depressed middle space and a number (about 9) of oblique cross-furrows on each side; epistoma without central knob, the mouth produced about equally with the antennal prominence. Vertex with short



Fig. 53. Antenna of *C. solstitialis* ♂, from the inside. $\times 70$.

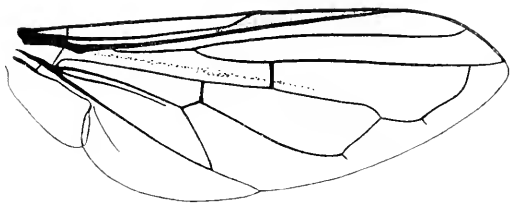


Fig. 54. Wing of *C. solstitialis* ♂.

hairs, frons with very few short, pale hairs. Antennæ with the third joint a little larger than in the male. Thorax æneous, often coppery or violet on the disc, more or less shining, dull at the anterior end; it is coarsely punctate and both on disc and pleura clothed with very short, black, bristly hairs. Abdomen with the shining sides broader

than in the male. Wings a little less blackish; upper cross-vein more steep than in the male, the lower angle more pronounced. Squamulae whitish with a whitish fringe.

Length 6,8—8,4 mm.

Not rarely specimens occur, especially females, which are more or less brown on abdomen, often with a dark middle stripe, and also with the venter brown; they are I think not fully mature, and they have generally also less darkened wings.

Remarks: Loew thinks (Stett. ent. Zeitg. IV, 1843, 279) that Zetterstedt has partly mixed *solstitialis* with specimens of *chalybeata*, especially because he speaks of a yellowish wing-base; this may be possible but is of slight consequence, and I think it not advisable to cite *solstitialis* Zett. under *chalybeata*, at all events not before certainty is obtained. In 1854 Loew mentions (Neue Beitr. II, 18) under *C. inornata*, that he had got a female of this species together with a male of *chalybeata* from Zetterstedt, both determined as *solstitialis*. Zetterstedt (l. c. XIII) will not admit this and says he had found no other species under his *chalybeata* and *solstitialis*. Loew's description of *inornata* is very short, only the female is known, and the species has not been mentioned since; I think that if *inornata* is at all a good species, it does not occur in Sweden nor in Denmark. — In keeping the name *solstitialis* I follow Zetterstedt and Verrall as I think, Linné's *coemeteriorum* is another species. In the Kat. paläarkt. Dipt. besides *coemeteriorum* L. also *coemeteriorum* Fabr. is given with a query, but according to specimens in the collection of Tønder Lund and Sehestedt, Fabricius's species is *solstitialis* Fall. and can thus be given in the synonymi with certainty.

C. solstitialis is common in Denmark; Ordrup Mose, Ermelund, Dyrehaven, Lyngby Mose, Ørholm, Hillerød, Grib Skov; on Lolland in Kældskov, Dødemose, and at Nysted; on Langeland at Lohals; on Funen at Odense and Middelfart; in Jutland in Højenbæk Dal at Vejle, at Horsens, Laven near Silkeborg, Hald near Viborg, Rebbild at Skørping, Sæby and Frederikshavn, and on Bornholm at Hammeren, Almindingen and Ronne. It is seen during the whole summer, my dates are $\frac{6}{16}$ — $\frac{3}{19}$. It occurs in low herbage and on flowers, often Ranunculus, in fens, humid meadows and at borders of ditches.

Geographical distribution: — Europe down into Spain and Italy; towards the north to middle Sweden, and in Finland.

4. *C. chalybeata* Meig.

1822. Meig. Syst. Besch. III, 267, 4. — 1843. Loew, Stett. ent. Zeitg. IV, 241. — 1843. Zett. Dipt. Scand. II, 819, 3 et 1849. VIII, 3177, 3

et 1855. XII, 4670, 3 et 1859. XIII, 6023, 3. — 1862. Schin. F. A. I, 270. — 1901. Verr. Brit. Fl. VIII, 201, 5, fig. 209. — 1907. Kat. paläarkt. Dipt. III, 18. — *Chr. cupraria* Macq. 1827. Soc. Sc. Lille, 194 et 1834. Suit. à Buff. I, 562, 8. — 1838. Meig. Syst. Besch. VII, 122, 19. — *Chr. coenotaphii* Meig. 1830. l. c. VI, 351, 15. — 1862. Schin. F. A. I, 267.

Male. Vertex frons and epistoma æneous black, shining, especially the frons; this latter considerably puffed out, with a longitudinal impression; epistoma narrowly pruinose all across below the antennæ, and also else a little dusted, somewhat striated at the sides; the central knob large but slightly produced, and the mouth edge not produced at all; frons and epistoma very broad, more than twice as broad as the diameter of the eye. Vertex and frons with long, blackish or brownish hairs, on the frons only present towards the margin; epistoma with few, short, pale hairs. Occiput æneous or bluish black, with short hairs which are black above, whitish below and on the jowls. Antennæ a little larger than in *solstitialis*, brown or brownish red, the basal joints dark; second joint with some long, pale bristles below; arista much longer than the antennæ. Thorax æneous black, punctate, slightly shining; in the middle of the front part a more or less distinct dull black stripe; scutellum coarsely punctate, not marginate. Thorax and scutellum clothed with longish, blackish hairs; pleura somewhat greenish, likewise with blackish hairs; above the front coxæ and on the hypopleura they are grey pruinose, dull. Abdomen dull velvet black on the disc, æneous or æneous black and shining at the extreme side margin and the apex; it is clothed with short, dark hairs, paler at the sides backwards and whitish on the genitalia; second segment with long, yellowish hairs both on the disc and at the

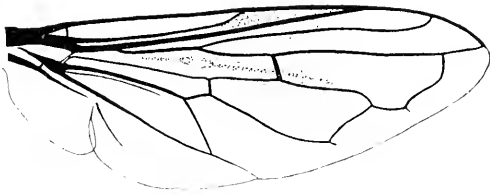


Fig. 55. Wing of *C. chalybeata* ♂.

sides. Venter æneous, brightly shining, with short, pale hairs. Legs black, haired as in *solstitialis*, hind femora likewise black setulose beneath. Wings a little yellowish, with a more or less distinct dark yellowish or brownish cloud on the middle, the base distinctly yellow; stigma yellow or light brownish; upper marginal cross-vein a little

more steep than in *solstitialis*, and with a more distinct lower angle. Plumula dark yellowish. Squamulæ smoky with a brown margin and a dark yellow fringe. Halteres with yellow peduncle and brown knob.

Female. Frons and epistoma broad, much broader than in *solstitialis*; frons æneous black, shining, with a more or less depressed middle space and at each side a number of often somewhat vague, oblique cross-furrows; epistoma without central knob and with the mouth edge less produced than in *solstitialis*; it is grey pruinose on the whole upper half. Vertex with few, short hairs and frons still less hairy. Antennæ a little longer than in the male. Thorax æneous, shining, rather coarsely punctate, with exceedingly short, dark hairs and with a few longer, pale hairs which seem to be easily rubbed, but in in the præsutural depression there are always long, yellow hairs, which is not the case in *solstitialis*. Abdomen with the æneous side parts broader than in the male but less shining. Wings generally a little less darkened, with the upper marginal cross-vein a little steeper. Squamulæ whitish. Halteres with the knob paler brown.

Length fully 6 to about 8 mm.

Also of this species specimens occur with the abdomen more or less brownish.

This species resembles *solstitialis*, but is distinguished by many characters, thus besides by the broad frons and epistoma, the colour of the wings and the yellow wing-base also by the quite different hairiness of the thorax and the grey pruinose spots on the pleura, as well as by the colour of thorax and the course of the upper marginal cross-vein in the male.

Remarks: Loew thinks (Wien. ent. Monatschr. I, 1857, 6) that Zetterstedt has described the male of *basalis* Loew as *chalybeata*, I think chiefly because Zetterstedt says: "alis disco macula fusca", but this expression may well be used about *chalybeata*, and I think it beyond doubt that Zetterstedt has not had *basalis* and that this species does not occur neither in Sweden nor in Denmark.

C. chalybeata is common in Denmark; Ordrup Mose, Ermelund, Dyrehaven, Donse, Hillerød, Grib Skov, Rorvig, Jægerspris; on Lolland at Strandby, Kærstrup and in Dødemose west of Nysted; on Funen at Middelfart; in Jutland in Nørholm Skov at Varde, at Horsens, Nebsager near Horsens, Laven near Silkeborg, Gjerlev near Randers Fjord and Rebbild near Skørping. My dates are $\frac{3}{7}$ — $\frac{30}{8}$. It occurs on the same localities as *solstitialis*.

Geographical distribution:— Europe down into Spain and Italy; towards the north to middle Sweden and in Finland.

5. *C. virescens* Loew.

1854. Loew, Neue Beitr. II, 17, 36. — 1862. Schin. F. A. I, 270. — 1901. Verr. Brit. Fl. VIII, 200, 4, fig. 208. — 1907. Kat. paläarkt. Dipt. III, 21.

Male. This species is very similar to *chalybeata*. Frons and epistoma about as broad as in *chalybeata*, of more greenish colour, haired in the same way; frons a little less inflated, with a large longitudinal impression; central knob small, but well defined and more projecting and likewise the mouth edge, which projects equally with the central knob. Antennæ as in *chalybeata*. Thorax æneous, slightly shining, but a little less punctate and slightly more shining than in *chalybeata*, clothed with longish, dark hairs. Scutellum slightly marginate. Pleura æneous, shining, without pruinose spots, black haired. Abdomen coloured as in *chalybeata*, the sides generally more æneous green; it is clothed with short, dark hairs on the middle, pale at the sides and here longer towards the base; abdomen is thus in the whole more pale-haired than in *chalybeata*; on the second segment are pale hairs, but they are quite short, or only a few are slightly longer. Legs black, haired as usual. Wings with the apical two thirds brownish on the anterior half; stigma light brownish; upper marginal cross-vein a little more steep than in *chalybeata*, and the two veinlets from the lower angles seem to be longer than usual. Plumula brownish or yellowish brown. Squamulæ brownish with pale fringe. Halteres with the knob brown.

Female. Much like *chalybeata*. Frons of about the same breadth, somewhat bluish, the middle space and the cross-furrows fainter, and the latter not reaching the ocelli; epistoma less dusted, and the mouth edge more projecting. Vertex and frons quite imperceptibly haired. Thorax more bluish and a little brighter than in *chalybeata*, likewise very inconspicuously haired; the præsutural depression without long hairs. Pleura with short but somewhat distinct yellowish hairs. Abdomen dull bluish black on the middle, but the dull space smaller than in *chalybeata*, the margin much broader, more brightly shining and less punctate; abdomen also more sparingly haired. Wings less or almost not darkened. Squamulæ paler to whitish.

Length 6,7—8 mm.

This species is very similar to *chalybeata* but may be distinguished with certainty by the smaller but more projecting central knob in the male; in both sexes by the not yellow wing-base, the marginate scutellum, the second abdominal segment without long hairs or these only few, and the pleura without pruinose spots; finally it is more shining, especially in the female.

C. virescens is somewhat rare in Denmark: Dyrehaven, Lyngby Mose (the author) and in Jutland at Sæby (H. J. Hansen); the dates are from ¹¹/₆ to July; it was for the first time taken in 1881 and only two specimens were known until this year (1915), when I took it in some number in Lyngby Mose on ¹⁶/₆—²⁵/₆.

Geographical distribution: — Northern and middle Europe down into Styria and Bohemia; its northern limit seems to be in Denmark, and it occurs in England.

8. **Chilosia** Meig.

(*Cheilosia*).

Species of somewhat large or medium size and of dark, black or dark æneous colour, very rarely with greyish spots on abdomen; they are more or less hairy, sometimes with rather long, dense hairs, and nearly always the male is much longer haired than the female. Head about semiglobular, flat or slightly hollowed behind, a little broader than high and about of the breadth of thorax or slightly broader. Eyes touching in the male, broadly separated in the female. Frons a little protruding in the male, with a longitudinal groove, in the female trisulcate or only with lateral channels, generally also with a slight transverse depression a little above the antennæ. Eyes bare or with more or less long and dense hairs; in a few cases hairy in the male, bare in the female; the facets are in the male a little enlarged in about the upper half. Antennæ inserted about in or a little above the middle of the head; they are short, third joint usually circular or roundish square, sometimes a little longer than broad; it may be somewhat large and is as a rule larger in the female than in the male; the basal joints small; arista inserted dorsally near the base of the third joint; it is thread-like, a little thickened in the basal part, with two very small basal joints: the basal antennal joints have small bristles at the end margin, largest above and below the second joint; the third joint densely microscopically hairy: the arista with shorter or longer, but always rather short hairs, sometimes apparently bare i. e. microscopically hairy. Epistoma more or less hollowed below the antennæ, sometimes only slightly; it has, about in the middle or lower down a central knob, which may vary very much in size and breadth and be more or less prominent; below the knob the epistoma is again more or less hollowed between the knob and the front mouth edge; when this latter is not prominent there is no hollow, the epistoma then only retreats below the knob; the whole lower part of epistoma,

including the central knob is more or less protruding, sometimes rather strongly, and likewise more or less descending, generally only slightly; in a single case (*maculata*) the central knob and the front mouth edge are fused together. On account of the protruding epistoma the oral aperture is rather large and elongated; the oral margin has a special shape as the side margins end in front with a somewhat drooping point or lateral angle, and the front edge between the points or angles is more or less incurved, the curvature stretching forwards and more or less upwards; (something similar is found in species of *Chrysogaster* f. inst. *Macquarti*, and for the rest also in other Syrphids, but to a slighter degree). In the female the epistoma is as a rule more hollowed with the central knob and the lower part more prominent than in the male. The epistoma is black, only in a few species it has a yellowish or reddish spot below the eye; it is bare and shining or sometimes more or less pruinose, but in one group of species it has erect hairs on the sides. At each side of epistoma the cheeks are separated off as more or less narrow so-called eye-margins by a deep furrow, stretching upwards to somewhat below the antennæ, and downwards to below the eye, here ending with a more or less distinct pit; the epistoma and the cheeks are thus well separated. The cheeks — eye-margins — bear shorter or longer hairs. The jowls are broad but slightly or not descending. The oral cone well developed with the elongated horse-shoe-shaped clypeus lying on the front side. Proboscis shorter or longer; labrum (*chloris*) long, strongly semitubular; the apical processes of equal length, the median and upper lateral delicate, pointed, the former cleft in the whole length; the lower lateral process broad and blunt at the end; along the lateral margins of labrum is on the inside a row of small papillæ or warts; hypopharynx a little shorter than labrum, somewhat attenuated but the apex rounded; it is also semitubular; maxillæ with a slightly curved, knife-shaped lacinia, and a somewhat long, thread-shaped palpus, a little longer than the lacinia and a little dilated at the end and here with some fine bristles. The palpus is densely clothed with short hairs and the lacinia very densely beset with small spines, placed in longitudinal rows, but they require a high magnifying power (2—300) to be distinctly seen. Labium with a somewhat long basal connecting membrane, and with the well chitinised basal part a little longer than the elongated oval labella. Thorax about quadratic or a little rectangular; it is densely haired above with longer or shorter, erect hairs in the male, but as a rule with short, more or less depressed hairs in the female, rarely in this sex haired about as in the male. Scutellum black, in a small group of species orange at the tip in the female; it

has below the margin a fringe of somewhat long, downwards directed hairs. Thorax has generally more or less distinct notopleural, supraalar and postalar bristles and a number of scutellar marginal bristles, and there may also be bristles or bristly hairs above on mesopleura; the bristles are sometimes rather inconspicuous, especially the notopleural and supraalar, and these may be wanting. In one group of species there are no bristles on thorax or scutellum, or in rare cases (e. g. *canicularis*) only supraalar and postalar bristles. Metapleura have short dense hairs. Abdomen more or less ovate or more parallel-sided, in the female generally more ovate than in the male; like thorax it has as a rule longer and more erect hairs in the male, shorter and depressed in the the female; the ventral segments are well chitinated. In the male there are four not transformed segments, the first short; the fifth dorsal segment is small, unsymmetrical and hidden, the fifth ventral is excised in the hind margin in the whole breadth, and it is quite small and hidden. The genitalia are of the usual construction, the ninth segment with its appendages not large. In the female there are five not transformed segments, the fifth somewhat small, and three hidden, the last terminating with two small lamellæ. Legs simple, hind metatarsi often a little thickened, sometimes more, rarely also front metatarsi (in non-Danish species). Femora with long hairs on the posterior side of the anterior femora and on the anterior side of hind femora, the latter generally more or less setulose below from short bristles; tibiæ short-haired. Claws and pulvilli well developed. Empodium small, spine- or bristle-shaped, finely hairy. Wings of common shape, somewhat various in length in certain species; middle cross-vein well before the middle of the discal cell; the upper angle at the upper marginal cross-vein more or less acute or rectangular. Vena spuria very weak especially in its basal part. Alula well deloped. Alar squamulæ with short, simple hairs, thoracal squamulæ with long, furcately divided hairs. Plumula well developed, densely clothed with somewhat short, simple or slightly branched hairs.

Chilosia is a well characterised genus, distinguished by the black epistoma, the separated cheeks (eye-margins), the weak vena spuria and other characters; the specially distinguishing character is the eye-margin as such are at most present below in some other genera (*Chrysogaster*, *Platychirus*), or when more developed (*Ferdinanda*) the genus is easily distinguished by other characters. From *Chrysogaster* is *Chilosia* besides distinguished by the marginal fringe below the scutellum.

Not much is known about the developmental stages, especially the larvæ. Réaumur (Mém. Ins. V, 1740, 65, Pl. VIII, fig. 4—5) men-

tions and figures a pupa found in truffles which seems to be a *Chilosia*-pupa. Léon Dufour mentions and describes the larva of *C. scutellata* from *Boletus edulis* and *pinetorum* (Ann. Sc. nat. XIII, 1840, 149, Pl. III, fig. 1—4. — Ann. de la Soc. Ent. de Fr. 3, I, 1853, 384); the same author describes the larva of *C. vernalis?* (*aerea*) (Ann. Sc. nat. 3, IX, 1848, 205, Pl. XVI, fig. 6—10); it was found at the end of October under decaying leaves of *Verbascum pulverulentum*, the imago came in April the next spring. Van Roser found the larva of *C. scutellata* in rotten fungi (Württemberg. Corr. Bl. 11, 1834). Zetterstedt mentions the pupa of *C. variabilis* and *albitarsis* (*flavimana*), the latter developed on $\frac{21}{7}$ (Dipt. Scand. II, 1843, 790, 795). Scheffer (Rossi: Syst. Verz. 1848, 41, 28) mentions the larva of *C. mutabilis*; it was found gregarious in the upper end of the roots of *Carduus acanthoides*; it pupated in the earth. Boie (Stett. ent. Zeitg. XI, 1850, 212) bred *C. albipila* (*flavicornis*) from the stalks of *Carduus crispus* and *Cirsium oleraceum* where the larva is found in autumn near the roots; it pupates in the earth; the imago came in May. some bred in a warm room already in March. Goureau bred a species from truffles of which he describes the male to be similar to *mutabilis* and the female to *scutellata* (Ann. Soc. Ent. de Fr. 2, X, 1852, Bull. LXXV and Laboulbène, *ibid.* 4, IV, 1864, 88) (according to Verrall, 221, it seems that the male was *scutellata*, the female *soror*). Kaltenbach mentions *C. vernalis?* (*nitidula*); the larva lives in May and June in the stalk of *Matricaria chamomilla*, through which it goes down to the root; it pupates in the earth; the first imago came on $\frac{20}{6}$ (Verh. nat. Ver. pr. Rheinl. 1864, 233). Frauenfeld bred *C. cynocephala* from the stalk of *Carduus nutans* (Verh. zool. bot. Gesell. Wien, XVI, 1866, 976); Kaltenbach made the same observation; the larva begins in the bud and goes downwards; the imagines came in June and first in July (Die Pflanzenfeinde, 1874, 378); further Frauenfeld found the larva of *C. scutellata* in *Polyporus* (*ibid.* XVIII, 1868, 161). Weyenbergh describes and illustrates the metamorphoses of *C. albipila* (*chrysocoma*); the larvæ live in the stalk of *Carduus crispus* and they go down to the root, which they eat so that the plant dies; they pupated in the beginning of October, the imagines came in spring (Nederland. Tijdschr. v. Entom. XII, 1869, 164, Tab. V). *C. vernalis* Fall.? (*chalybeata*) was bred by Hardy from stalks of *Sonchus oleraceus* (Scott. Naturalist, I, 177). Kaltenbach mentions that *C. chloris* has been bred in June from larvæ living in the roots of *Petasites niveus*; further he records the larva of *C. variabilis*, which lives in spring and summer in the stalks of *Carduus nutans* and *acanthoides* and *Cirsium lanceolatum*. It begins in the buds and goes down through the stalks; the attack causes the plant to be low and richly

branched as the middle stalk is destroyed (Die Pflanzenfeinde, 1874, 325 and 378). Brischke found the larva of a species which he thought to be *gigantea* Zett. in the roots of *Scrophularia nodosa*, where they made cavities; they were found in August, the pupa hibernated and developed the next March (Entom. Nachricht. VI, 1880, 56); Mik thinks (Wien. ent. Zeitg. VI, 1887, 264) that the species may be *velutina* Loew. Beling describes the metamorphoses of *C. fasciata*; the larva lives in the leaves of *Allium ursinum* in June feeding on the parenchym and thereby causing elongated, yellow coloured cavities; they pupated in the earth; the imagines came next spring in April (Verh. zool. bot. Gesell. Wien, XXXVIII, 1888, 3). Carpenter records the metamorphoses of *C. antiqua (sparsa)*; the larvæ were found in Primroses, e. g. *Primula pulverulenta*, in the upper part of the roots and in the lower, thickened part of the stem; they were found in spring in May, but it is recorded that they may be present as early as February and as late as September; the author thinks it probable that the pupal stage is normal for wintering, but I should be inclined to think that it is the larva which hibernates. A specimen was bred in May (The Economic Proceed. Roy. Dubl. Soc. II, 1913, 96, Pl. X, figs. D 1—3). Fryer mentions larvæ of *C. variabilis*, they were found in roots of *Scrophularia nodosa* in September, the imago came next spring on 7/5 (Ent. Month. Mag. LI, 1915, 193). Finally I record below the pupa of *C. scutellata*, *intonsa*, *albitarsis* and *vernalis*, of which *intonsa* was found in Februar and April, *albitarsis* in Februar, April and May and *vernalis* in May, all in flood refuse. Further I possess a larva which is no doubt a *Chilosia*-larva; it is reddish brown, 10—12 mm long; it was taken by the consulting agriculturist Mrs. S. Rostrup in the roots of Turnips on 19/10 in Charlottenlund; about twelve per cent of the plants were destroyed by the attack, but the larva was not bred.

According to the descriptions the larvæ of *Chilosia* are whitish or yellowish to brownish, slightly flattened below, somewhat attenuated towards both ends; they are transversely corrugated and somewhat but short spinulose or granulated; they have strong mouth hooks; there are two small anterior spiracles or spiracular processes; at the posterior end are some (4—6) pointed warts and a short, more or less longitudinally divided posterior spiracular process; it is a little constricted in the middle, granulated and with a flat end bearing the spiracles. The pupa is generally darker to brownish; it is arched above, more flattened below; there are two about 0,5 mm long, cylindrical anterior spiracular tubes; these tubes are generally reddish, transversely corrugated, pointing upwards and somewhat forwards, and distant at the base; the anterior larval spiracles lie at the anterior

end but are very small, often not seen. The posterior end is roundly pointed, sometimes (*albitarsis* and *vernalis*) cut and flat; it bears the same short, longitudinally somewhat divided, reddish spiracular process as in the larva.

As seen from the above recorded the larvæ are phytophagous, living internally in plants, in stalks, roots or leaves, or in fungi; they are thus as to feeding habits quite different from the aphidiphagous larvæ of the allied genera, a fact also proving the validity of the genus. With regard to hibernation there seems to be some variation: some species are recorded to hibernate as pupa (perhaps especially the early spring species), while others were bred in the same year in which the larvæ were found feeding.

The species of *Chilosia* occur on various plants and flowers in woods, fens, on fields and meadows; some are exclusively spring species, occurring on spring flowers and seeking early flowering trees as *Salix*, while others occur later in the year or during the whole season.

Of the genus about 140 species are known from the palæarctic region; 30 have been found in Denmark.

Table of Species.

Males.

1. Eyes bare	2.
— Eyes hairy	10.
2. Abdomen with grey spots	1. <i>maculata</i> .
— Abdomen unspotted	3.
3. Legs black	4.
— Legs more or less pale	7.
4. Thorax coarsely punctate, with a double pubescence	5.
— Thorax finely punctate, pubescence simple, not double	6.
5. Pubescence on thorax somewhat long and the long hairs somewhat dense; wings strongly brownish	3. <i>nigripes</i> .
— Pubescence on thorax short and the longer hairs less dense; wings nearly colourless	4. <i>vicina</i> .
6. Epistoma almost not pruinose; pubescence on thorax black; abdomen with black hairs at the basal corners of second segment; halteres with the knob generally a little darkened	2. <i>antiqua</i> .
— Epistoma pruinose; pubescence on thorax short, yellow; abdomen without black hairs; halteres orange	5. <i>pubera</i> .
7. Arista distinctly pubescent	8.
— Arista almost bare	9. <i>pagana</i> .
8. Central knob on epistoma not specially broad; thorax black-haired; tibiæ blackish except base and apex	8. <i>longula</i> .
— Central knob on epistoma very broad; thorax yellow-haired or mainly yellow-haired; tibiæ orange with black rings	9.

9. Third antennal joint paler or darker brownish; eye-margins very narrow; thorax finely punctate 6. *scutellata*.
 — Third antennal joint orange; eye-margins a little broader; thorax a little more coarsely punctate 7. *soror*.
10. Epistoma with hairs on the sides 11.
 — Epistoma without hairs 12.
11. No thoracal or scutellar marginal bristles 13.
 — Thoracal and scutellar marginal bristles present 13.
12. Pubescence very long, tricolorous on abdomen; wings with a more or less distinct band or blotch on the middle 10. *illustrata*.
 — Pubescence rather short, unicolorous on abdomen; wings without band or blotch 14. *intonsa*.
13. Legs black 11. *variabilis*.
 — Legs more or less yellowish 14.
14. Frons not large and swollen; epistoma not specially broad; antennæ dark; scutellar marginal bristles short and inconspicuous; tibiæ not pale at apex 12. *honesta*.
 — Frons large and swollen; epistoma broad, twice as broad as the diameter of the eye; antennæ more or less reddish; scutellar marginal bristles long, though inconspicuous; anterior tibiæ a little pale at apex 13. *frontalis*.
15. Scutellum without marginal bristles, and likewise postalar callus (except *cunicularis*) 16.
 — Scutellum with marginal bristles, when indistinct at all events postalar callus with bristles 19.
16. Eyes hairy only on the upper part; arista distinctly pubescent; thorax with some short bristles at the sides; antennæ brown or brownish red 15. *cunicularis*.
 — Eyes hairy all over; arista almost bare; no bristles on thorax 17.
17. Antennæ brown or blackish brown 16. *grossa*.
 — Antennæ orange 18.
18. Tibiæ quite yellow, at most the anterior tibiæ with indications of rings; frons yellow-haired 17. *albipila*.
 — All tibiæ with distinct, blackish rings; frons black-haired 18. *chloris*.
19. Legs quite black or with only middle joints of anterior tarsi pale 20.
 — Legs more pale (in *carbonaria* only anterior knees rather obscurely) 21.
20. Legs quite black 23. *impressa*.
 — Middle joints of anterior tarsi pale 24. *albitarsis*.
21. Legs only slightly pale, hind tibiæ quite or almost quite black and tarsi all black 22.
 — Legs generally paler, hind tibiæ generally not quite black, tarsi more or less pale, at least middle tarsi somewhat pale (in *mutabilis* hind tibiæ black and middle tarsi sometimes rather obscurely pale) 24.
22. Eye-hairs pale; epistoma not much protruding or

- descending; third antennal joint black or blackish brown; venter a little pruinose 21. *gigantea*.
- Eye-hairs blackish; epistoma more protruding and descending; third antennal joint brownish red or red; venter shining 23.
23. Wings rather long; hairs on thorax and abdomen long and the long hairs on posterior part of thorax and scutellum three or four times longer than the short; antennæ small; legs nearly quite black 25. *carbonaria*.
- Wings rather short; hairs on thorax and abdomen shorter and the long hairs on posterior part of thorax and scutellum only twice as long as the short; antennæ a little larger; legs with the knees more pale 26. *cynocephala*.
24. Anterior or all tarsi more or less pale 25.
- Only middle tarsi more or less pale 29.
25. Largish species; basal joints of anterior tarsi pale 26.
- Small species; basal joint of anterior or front tarsi darkened 28.
26. Epistoma considerably hollowed below the antennæ; eyes bare on the lowermost part 27.
- Epistoma flat, almost not hollowed; eyes haired all over 28. *velutina*.
27. Hind tibiæ with a more or less faint or almost no blackish ring, front and hind tarsi more or less darkened above; antennæ brownish red; hairs on eyes and body not long 19. *fraterna*.
- Hind tibiæ generally with a distinct blackish ring, tarsi rather yellow but hind metatarsus dark above; antennæ orange; hairs on eyes and body long 20. *Bergenstammi*.
28. Antennal arista not short, distinctly pubescent; hind tibiæ almost quite black and hind tarsi black; scutellar bristles numerous 29. *mutabilis*.
- Antennal arista short, practically bare; all tibiæ yellow with a black ring, all tarsi yellow on the middle; scutellar bristles weak, not numerous 30. *ruralis*.
29. Eye-hairs pale, not short; venter greyish pruinose 22. *proxima*.
- Eye-hairs blackish, more or less short; venter shining 27. *vernalis*.

Females.

1. Eyes bare 2.
- Eyes hairy 13.
2. Abdomen with grey spots 1. *maculata*.
- Abdomen unspotted 3.
3. Legs black or with only the middle joints of front tarsi more or less pale 4.
- Legs more or less pale 8.
4. Legs quite black 5.
- Legs with middle joints of front tarsi more or less pale 24. *albitarsis*.

5. Thorax coarsely punctate, slightly shining, with depressed greyish and black pubescence 6.
 — Thorax finely punctate, shining, with more or less erect, all yellow pubescence 7.
6. Wings strongly brownish; thorax very coarsely punctate 3. *nigripes*.
 — Wings almost colourless; thorax less coarsely punctate 4. *vicina*.
7. Epistoma almost not pruinose; thorax and abdomen not densely punctate and not densely haired; the hairs on thorax short 2. *antiqua*.
 — Epistoma pruinose; thorax and abdomen densely punctate and very densely haired; the hairs on thorax longer, especially anteriorly 5. *pubera*.
8. Epistoma without hairs; scutellum with distinct marginal bristles 9.
 — Epistoma with slight hairs; scutellum without marginal bristles 14. *intonsa*.
9. Arista distinctly pubescent; tip of scutellum yellowish 10.
 — Arista slightly pubescent or almost bare; tip of scutellum not yellowish 12.
10. Central facial knob very broad; legs extensively pale 11.
 — Central facial knob not specially broad; legs more darkened; antennæ dark 8. *longula*.
11. Third antennal joint smallish, brown or reddish brown; thorax finely punctate; posterior tarsi with third and fourth joints broad 6. *scutellata*.
 — Third antennal joint large, orange; thorax more coarsely punctate; posterior tarsi not with third and fourth joints broad 7. *soror*.
12. Third antennal joint smallish, blackish 29. *mutabilis*.
 — Third antennal joint very large, orange 9. *pagana*.
13. Epistoma with hairs on the sides 14.
 — Epistoma without hairs 17.
14. No thoracal or scutellar marginal bristles, pubescence long, tricolourous on abdomen; wings with a black band or blotch on the middle 10. *illustrata*.
 — Thoracal and scutellar marginal bristles present; pubescence short, not tricolourous on abdomen; wings without band or blotch 15.
15. Legs black 11. *variabilis*.
 — Legs more or less yellowish 16.
16. Antennæ dark; scutellar marginal bristles very short; tibiæ not pale at apex 12. *honesta*.
 — Antennæ more or less reddish; scutellar marginal bristles longer; anterior tibiæ pale at apex 13. *frontalis*.
17. Scutellum without marginal bristles, and likewise postalar callus (except in *canicularis*) 18.
 — Scutellum with marginal bristles, when indistinct at all events postalar callus with bristles 21.
18. Eyes hairy only on the upper part; arista distinctly pubescent; thorax with some bristles at the sides; antennæ brown or brownish red 15. *canicularis*.

- Eyes hairy all over; arista almost bare; thorax without bristles 19.
19. Antennæ brown or blackish brown 16. *grossa*.
— Antennæ orange 20.
20. Femora pale 17. *albipila*.
— Femora black except apex 18. *chloris*.
21. Legs black 23. *impressa*.
— Legs more or less pale 22.
22. Tarsi black, only middle tarsi a little pale at base 23.
— Tarsi less black, middle tarsi more pale and generally also front or all tarsi more or less pale, at all events below 25.
23. Antennæ black or blackish brown; wings evenly tinged; venter somewhat pruinose 21. *gigantea*.
— Antennæ red or brownish red; wings with the apical part strongly tinged, basal part much less tinged; venter shining 24.
24. Wings rather long; antennæ small; legs almost all pale-haired 25. *carbonaria*.
— Wings short; antennæ larger; front femora and all tibiæ more black-haired 26. *cynocephala*.
25. Tibiæ quite yellow or with small or faint rings 26.
— Tibiæ with distinct and broad rings 28.
26. Largish species; third antennal joint orange, not longer than broad, arista not short 27.
— Small species; third antennal joint brownish, longer than broad, arista short 30. *ruralis*.
27. Third antennal joint not large; hairs on thorax strongly depressed; hind femora not setulose below 19. *fraterua*.
— Third antennal joint large; hairs on thorax a little obliquely erect; hind femora distinctly setulose below 20. *Bergenstammi*.
28. Epistoma pruinose, slightly hollowed below antennæ 28. *velutina*.
— Epistoma not or slightly pruinose, much hollowed below antennæ 29.
29. Eye-hairs whitish; venter grey pruinose 22. *proxima*.
— Eye-hairs dark above; venter shining 27. *cernalis*.

As an exact description of the outline of epistoma is difficult I have given figures of the heads of all species; the figures are all of males, and they are drawn in absolute profile, thus the shape of the antennæ and the breadth of the eye-margins cannot be sufficiently judged from them. It must also be noted that the outline of epistoma, though characteristic for each species, may vary a little or sometimes even more.

1. *C. maculata* Fall.

1817. Fall. Dipt. Succ. Syrph. 52, 6 (*Eristalis*). — 1822. Meig. Syst. Besch. III, 295, 34 (*Syrphus*). — 1843. Zett. Dipt. Scand. II, 780, 4 (*Eristalis*). — Loew, Verh. zool. bot. Gesell. Wien, VII, 616, 27. — 1862. Schin. F. A. I, 278. — 1894. Beck. Nov. Act. Leop. Carol. Akad. LXII, 366, 29, Fig. 158. — 1901. Verr. Brit. Fl. VIII, 212, 1, figs. 212, 214—216. — 1907. Kat. paläarkt. Dipt. III, 32.

Male. Eyes bare, the suture quite short. Frons distinctly yellowish grey pruinose, but with an elevated, shining triangle and this with a longitudinal furrow. Vertex and frons black-haired, the middle frontal triangle bare. Epistoma strongly hollowed below the antennæ, very produced but slightly descending; the central knob and upper mouth edge united; the epistoma greyish yellow pruinose, most below the antennæ, the protruding knob shining. Eye-margins rather broad, densely yellowish pruinose, with dark hairs. Occiput black, grey pruinose along the eye-margin, with yellow hairs which are long above and below, short in the middle and here partly dark; besides there are some long, black hairs above. Antennæ orange red, the basal joints darker, third joint about circular, but higher than long; arista brown, paler at the base, apparently bare. Thorax black, somewhat shining, clothed with short, somewhat decumbent yellow hairs; black scutellar marginal bristles short; the downwards

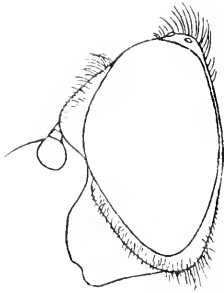


Fig. 56. Head of
C. maculata ♂.

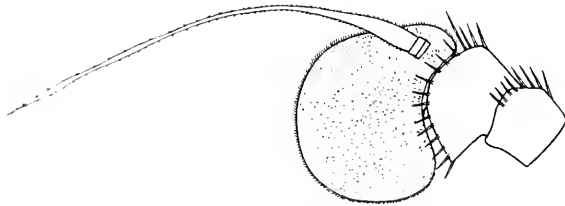


Fig. 57. Antenna of *C. maculata* ♂, from the outside. $\times 75$.

turned fringe below the margin of scutellum short and inconspicuous. Pleura greyish pruinose, with longish hairs. Abdomen dull black, with a pair of grey, subquadrate spots on second, third and fourth segments towards the anterior margin; it is clothed with shortish pubescence, yellow on the grey spots, black on the black parts; it is longer on the sides towards the base. Venter black, somewhat shining, with

pale hairs. Legs black, knees very narrowly reddish; the longer hairs on the anterior femora pale, and the short hairs on the hind femora yellow on the basal part; for the rest the pubescence chiefly black; hind femora not spinulose beneath, only the black hairs towards the apex distinct; hind metatarsus not thickened. Wings a little tinged, most towards the base; the upper angle at the upper marginal cross-vein somewhat acute. Squamulæ pale yellow, with a white fringe. Halteres yellowish brown.

Female. Vertex somewhat narrow, but the frons rapidly widening downwards; above the antennæ a similar triangle as in the male; frons and vertex all yellow-haired. Thorax with shorter, more depressed hairs, and the postalar calli rather orange. Abdomen with the grey spots less defined and the black parts not dull.

Length 7,5—8,5 mm.

C. maculata is rare in Denmark, or at all events very local; it has only been taken on Falster at Resle (H. J. Hansen, Schlick), on Lolland at Maribo, Bremersvold and near Nysted (L. Jørgensen) and, according to a communication, in Jutland in Hansted Skov at Horsens (A. Petersen); it was for the first time taken in 1881. The dates are $17/5$ — $13/6$. The reason of its being so local is, that it is exclusively associated with *Allium ursinum*, which is well known; generally only males are taken, the females being very rare. Mr. L. Jørgensen gave me some interesting communications about it; he says, that the species is more slow than the other species of the genus, they fly low among the plants of *Allium*, as also Verrall records (l. c. 679), and they fly only short, from leaf to leaf; when the females are taken so rarely, it is, says Jørgensen, because they occur still lower among the plants than the males; when he worked with the net quite down to the ground, he also got females. — The developmental stages of the species are not known, I think the biology of the larva will prove to be similar to that of *C. fasciata*, the larva of which lives in the leaves of *Allium ursinum* (see under the description of the genus).

Geographical distribution:— Northern and middle Europe down into Switzerland; towards the north to northern Sweden.

2. *C. antiqua* Meig.

1822. Meig. Syst. Besch. III, 291, 24 (*Syrphus*). — 1902. Beck. Zeitschr. Hymn. Dipt. II, 353, 24. — 1907. Kat. paläarkt. Dipt. III, 23. — *C. sparsa* Loew, 1857. Verh. zool. bot. Gesell. Wien, VII, 604, 20. — 1862. Schin. F. A. I, 278. — 1894. Beck. Nov. Act. Leop. Carol. Akad. LXII, 339, 8, Fig. 139. — 1901. Verr. Brit. Fl. VIII, 214, 2.

Male. Eyes bare. Frons somewhat shining, with a longitudinal groove. Frons and vertex black-haired. Epistoma much hollowed below the antennæ, the central knob large and prominent, slightly

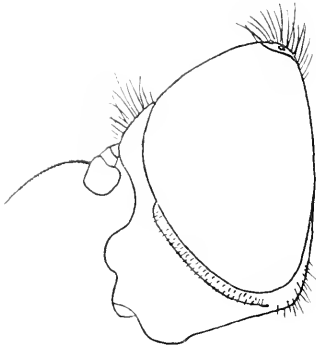


Fig. 58. Head of *C. antiqua* ♂.

compressed; epistoma only slightly descending; it is greyish pruinose below the antennæ, for the rest only very slightly pruinose. Eye-margins somewhat broad, grey pruinose, with short, pale hairs. Occiput and jowls greyish pruinose, with yellow hairs below, black above. Antennæ not large, black, third joint squarely roundish, not longer than broad; arista somewhat long, thickened in the basal part, short-pubescent. Thorax black, shining, finely and not densely punctate; it is clothed with not long, erect, blackish hairs, longest anteriorly; scutellar marginal bristles distinct, but fine and rather long, notopleural and postalar bristles also distinct, but the supraalars inconspicuous. Pleura with longish, black hairs. Abdomen black, finely and sparsely punctate, nearly all shining, only somewhat dull on the disc of first and second segments and just on the middle line of the third; it is clothed with short, yellow hairs which become longer at the sides; in the middle line the hairs are more or less dark, and also sometimes at the hind margins of the last segments; at the basal corners of the second segment is a tuft of long, black hairs. Venter black, shining, with pale hairs. Legs all black; the hairs on posterior femora more or less pale, otherwise the pubescence mainly dark, except the usual reddish pubescence on the front and hind tibiæ and tarsi. Hind femora finely black spinulose beneath; hind metatarsus slightly thickened. Wings brownish tinged at the base and towards the anterior margin; upper marginal cross-vein almost straight, and the upper angle acute. Squamulæ whitish yellow, with a yellow fringe. Halteres yellow, the knob often more or less brownish.

Female. Frons of medium breadth, widened downwards, trisulcate with the middle furrow distinct; it is short yellow-haired, at the vertex some black hairs. Antennæ very slightly larger than in the male. Thorax shining, with short, somewhat erect, yellow hairs. Abdomen shining, with quite short, depressed, yellow hairs. Hind femora only setulose towards apex. Wings generally a little more brownish yellow tinged. Halteres orange.

Length 7—8 mm.

C. antiqua is somewhat rare in Denmark or at all events rather local; at Nyraad near Vordingborg (J. C. Nielsen), at Boserup and Svenstrup near Roskilde (H. J. Hansen); on Lolland at Bremersvold, in Kældskov, Dødemose and in Holmeskov at Saxkøbing (L. Jørgensen), and in Jutland at Horsens (O. Jensen); the dates are $\frac{3}{5}$ — $\frac{7}{6}$.

Geographical distribution: — Northern and middle Europe down into Switzerland and perhaps into France; it seems to have its northern limit in Denmark, and it occurs in England.

3. *C. nigripes* Meig.

1822. Meig. Syst. Besch. III, 282, 8, ♀ (*Syrphus*). — 1857. Loew, Verh. zool. bot. Gesell. Wien, VII, 609, 22. — 1902. Beck. Zeitschr. Hymn. Dipt. II, 350, 8. — 1907. Kat. paläarkt. Dipt. III, 34. — *C. antiqua* Loew, (nec Meig.) 1857. l. c. 606, 21. — 1862. Schin. F. A. I, 278. — 1894. Beck. Nov. Act. Leop. Carol. Akad. LXII, 336, 7, Fig. 138. — 1901. Verr. Brit. Fl. VIII, 215, 3. — *Eristalis coemeteriorum* var. β . 1817. Fall. Dipt. Suec. Syrph. 55. — 1838. Zett. Ins. Lapp. 613, 13. — *Eristalis lugubris* Zett. 1838. Ins. Lapp. 614, 19 et 1843. Dipt. Scand. II, 815, 39. — *Eristalis Schmidtii* Zett. 1843. Dipt. Scand. II, 813, 38, p. p. var. a et 1849. VIII, 3174, 38. — *Syrphus tropicus* Meig. 1822. Syst. Besch. III, 291, 25, ♂. — *C. tropica* 1902. Beck. Zeitschr. Hymn. Dipt. II, 353, 25.

Male. Eyes bare. Frons black, shining, with a longitudinal or almost triangular groove; vertex and frons with black hairs. Epistoma much hollowed below the antennæ and here greyish pruinose; the central knob somewhat large and prominent, not compressed; epistoma slightly hollowed between the knob and the mouth edge, almost not descending. Eye-margins not broad, almost not pruinose, but punctate and with short, pale hairs. Occiput greyish pruinose along the eyes, the pruinosity stopping below on the jowls; there are whitish hairs below, black above. Antennæ not large, black, third joint roundish, not longer than broad; arista distinctly but short-pubescent. Thorax black or bluish black, densely and coarsely punctate and hence not much shining; it is densely clothed with a double pubescence, long, less dense, black hairs and shorter, more dense hairs which are likewise black or more or less brownish or even paler; there are distinct notopleural, postalar and scutellar marginal bristles, but the supraalars are inconspicuous. Pleura with longish hairs which are partly black, partly pale, especially down-

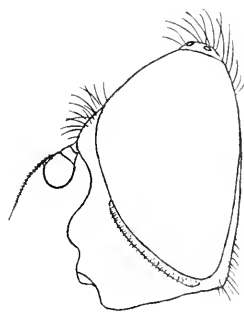


Fig. 59. Head of
C. nigripes ♂.

wards. Abdomen black or bluish black, densely punctate; it is dullish on the disc of the second and third segments, and it is clothed with short, whitish hairs, longer at the sides and at the side margin; on the disc the hairs are dark. Venter black, shining, with pale hairs

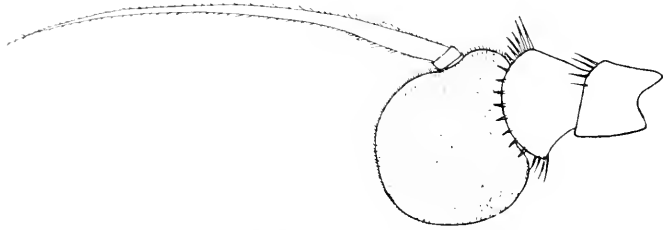


Fig. 60. Antenna of *C. nigripes* ♂, from the outside. $\times 75$.

which are longish on second segment. Legs black; pubescence on the posterior femora mainly pale for the rest chiefly black; hind femora black setulose beneath; hind metatarsi very slightly thickened. Wings strongly brown or blackish brown fumigated, especially at the base and on the anterior part; upper angle at the upper marginal cross-vein somewhat acute. Squamulae white with a white fringe. Halteres brown with a blackish brown knob.

Female. Frons of medium breadth, widened downwards, slightly trisulcate; it is yellow-haired, but above with partly black hairs and the vertex black-haired. Antennae slightly larger than in the male. Thorax and abdomen coarsely punctate as in the male; thorax with quite short, depressed hairs which are greyish and black, the latter prevailing, especially in the middle. Abdomen likewise with quite short hairs, only longer at the base of the side margin, they are greyish yellow, but dark on the disc. Hind femora setulose about as in the male. Wings sometimes less tinged than in the male. Halteres yellow.

Length 7—9 mm.

This species is distinguished from *antiqua* by the coarsely punctate thorax and abdomen, the more bluish colour and more white-haired abdomen without black hairs at the basal corners of second segment; also the wings are more strongly tinged. The Danish specimens have almost always thorax quite black-haired.

C. nigripes is not rare in Denmark, but has hitherto only been taken on Sealand, Langeland and Lolland; Charlottenlund, Ordrup Mose, Ermelund, Lyngby Mose, at Fure Sø, Hillerød, Nyraad near Vordingborg; on Langeland at Lohals and on Lolland at Maribo,

Bremersvold, Kældskov and Strandby; the dates are $\frac{3}{5}$ — $\frac{1}{7}$. I have taken it on flowers on humid meadows.

Geographical distribution:— Northern and middle Europe and, as it seems, down into Italy; towards the north to northern Sweden, and in Finland.

4. *C. vicina* Zett.

1849. Zett. Dipt. Scand. VIII, 3175, 38—39 et 1859. XIII, 6021, 38—39 (*Eristalis*). — 1894. Beck. Nov. Act. Leop. Carol. Akad. LXII, 342, 12, Fig. 132. — 1907. Kat. paläarkt. Dipt. III, 41. — *Eristalis Schmidtii* Zett. 1843. Dipt. Scand. II, 814, p. p. var. *b*.

Male. Eyes bare. Frons greyish pruinose, dull, with a longitudinal groove; vertex and frons with black hairs. Epistoma much hollowed below the antennæ, the central knob somewhat strongly protruding, about as in *antiqua*, and epistoma hollowed between it and the mouth edge; it is pruinose below the antennæ, for the rest very slightly pruinose and almost not descending. Eye-margins somewhat narrow, distinctly punctate and with short, white hairs. Occiput grey pruinose along the eyes and below them, the pruinosity stopping here; the hairs are pale, but above there are long, black hairs. Antenna small, black, third joint roundish, not longer than broad; arista not long, distinctly but short-pubescent. Thorax black or generally greenish or bluish black, densely and coarsely punctate, but less coarsely than in *nigripes*, somewhat shining; it has a double pubescence as in *nigripes*, but the hairs are shorter and more decumbent, and the long hairs much more scattered; the long hairs are black or blackish, the short yellowish, but mixed with dark hairs, these latter are especially present on the middle, generally in such a way, that when viewed from in front a dark middle band is seen and sometimes also traces of a dark cross-band; there are distinct and not weak notopleural, postalar and scutellar marginal bristles; also supraalar bristles are present, but shorter. Pleura with longish, pale hairs, only the bristly hairs at the top of mesopleura black. Abdomen black, densely punctate; it is shining, but dullish on first and second segments and slightly and indefinitely on third segment; it is clothed with short, yellowish hairs, longer on the sides at base; on the posterior part of the second and on the whole disc of third and fourth segments the hairs are black.



Fig. 61. Head of
C. vicina ♂.

Venter black, shining, with pale hairs, longish on the two first segments. Legs black, pubescence mainly as in *nigripes*; hind femora black setulose beneath, hind metatarsi slightly thickened. Wings very slightly tinged or almost hyaline; upper marginal cross-vein almost straight, the upper angle somewhat acute. Squamulæ whitish with a whitish fringe. Halteres with the peduncle yellowish brown, the knob brown or blackish brown.

Female. Frons of medium breadth, widening downwards, slightly trisulcate; it has short, yellow hairs with some black intermingled, and the vertex is black-haired. Antennæ a little larger than in the male. Thorax and abdomen coarsely punctate, but, however, less coarsely than in *nigripes*; thorax has short, depressed, greyish yellow hairs, but on the middle there is a longitudinal patch of black hairs; abdomen has likewise short, depressed, pale hairs, but black hairs on the middle. Hind femora only setulose in the apical half. Halteres orange.

Length 6 to about 8 mm.

This species is much like *nigripes*, but is in general smaller; it has thorax and abdomen a little less coarsely punctate, and the wings are incoloured or almost so; thorax is in the male shorter-haired and in both sexes generally paler-haired, and the black band or longitudinal patch on thorax, formed of the hairs, is somewhat characteristic. — According to Zetterstedt (l. c. VIII) it was Stæger who first separated it as a species from *nigripes*, and the name is due to him; I have examined Stæger's specimens.

C. vicina is not rare in Denmark; Søndermarken, Ermelund, Dyrehaven, Ørholm, Geel Skov, Hillerød, Tyvekrogen, Tisvilde, Roskilde; on Lolland at Bremersvold and Strandby; on Langeland at Lohals; on Funen at Odense and in Jutland at Frijsenborg and Laven near Silkeborg. The dates are $13/5$ to the first part of August.

Geographical distribution:— Scandinavia, Denmark and Finland, towards the north to northern Sweden. Perhaps it goes down into France if the record in Pandellé (Rev. entom. XXIV, 1905, 40) is correct.

5. *C. pubera* Zett.

1838. Zett. Ins. Lapp. 613, 16 et 1843. Dipt. Scand. II, 810, 34 et XII, 4669, 34 (*Eristalis*). — 1857. Loew, Verh. zool. bot. Gesell. Wien VII, 324, 24. — 1862. Schin. F. A. I, 278. — 1894. Beck. Nov. Act. Leop. Carol. Akad. LXII, 346, 15, Fig. 140. — 1907. Kat. paläarkt. Dipt. III, 36.

Male. Eyes bare. Frons a little pruinose, slightly shining, with a longitudinal groove. Vertex and frons black-haired. Epistoma much

hollowed below the antennæ, the central knob protruding but epistoma very slightly hollowed below it; it is pruinose all over (when not rubbed), and it is somewhat but not much descending. Eye-margins somewhat broad, a little pruinose, with pale hairs. Occiput grey pruinose, with distinct, yellow hairs all round, and above besides with long, black hairs. Antennæ black or brown, third joint small, roundish, not longer than broad; arista distinctly thickened in about the basal third, distinctly but short-pubescent. Thorax black, somewhat olive, finely punctate, shining; it is clothed with somewhat short, erect, deeply yellow hairs; on the posterior part there are some few stronger and a little longer, almost bristly, black hairs. There are distinct but not long notopleural, postalar and scutellar marginal bristles; the supraalar bristles short. Pleura

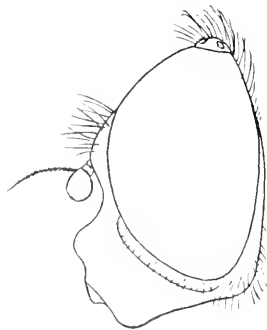


Fig. 62. Head of
C. pubera ♂.

with long, yellow hairs, black above and generally also posteriorly. Abdomen black, somewhat olive, finely punctate, shining but dullish on the greater part of the disc of the three first segments, least on the third; it is clothed with not quite short, all yellow pubescence, longest at the sides, especially towards the base. Venter somewhat greyish pruinose, with pale hairs, longest on the two first segments. Genitalia somewhat large. Legs black; the longer hairs on femora yellow, and also the short hairs on both femora and tibiæ to a high degree yellow; front femora with some black, almost bristly hairs on the posterior side, and middle femora with some similar hairs beneath; hind femora black setulose beneath; hind metatarsi slightly thickened. Wings somewhat strongly yellow tinged, especially towards base and anterior margin, the extreme base browner; upper angle at the upper marginal cross-vein acute. Squamulæ whitish, with a yellowish margin and fringe. Halteres orange.

Female. Frons not narrow, widening downwards, trisulcate with the middle furrow somewhat distinct; it is somewhat densely and quite yellow-haired, only on the vertex there are some dark hairs. Antennæ very slightly larger than in the male. Thorax and abdomen densely but finely punctate; thorax with short, quite erect, almost golden pubescence, longest anteriorly; scutellar marginal bristles numerous; abdomen with very dense, yellow pubescence, long at the basal corners. Legs all or almost all yellow-haired; hind femora not black setulose beneath.

Length 7—7.8 mm.

This species is of a more olive colour than the preceding, only the female of *antiqua* is somewhat similar in this respect. The species is most similar to *antiqua*, but it is distinguished by the pruinose epistoma, and in the male by the short, yellow pubescence on thorax, the want of black hairs at the basal corners of second abdominal segment, and the pale halteres; in the female it is distinguished by the more densely punctate and haired thorax and abdomen, the hairs on thorax also being more erect, longer anteriorly and more golden.

C. pubera is not common in Denmark; Lersøen, Ordrup Mose, at Fure Sø and at Roskilde; on Lolland in Kældskov, Vester Ulslev Mose, and Dødemose west of Nysted; on Funen at Odense. The dates are $\frac{7}{5}$ — $\frac{10}{6}$. It occurs on flowers in fens and on humid meadows.

Geographical distribution: — Northern and middle Europe down to the Alps; towards the north to northern Sweden, and in Finland.

6. *C. scutellata* Fall.

1817. Fall. Dipt. Succ. Syrph. 55, 13 (*Eristalis*). — 1822. Meig. Syst. Besch. III, 284, 12, Tab. XXX, Fig. 29—30 (*Syrphus*) et 1838. VII, 123. — 1843. Zett. Dipt. Scand. II, 808, 32 et 1849. VIII, 3173, 32 et 1859. XIII, 6020, 32 (*Eristalis*). — 1857. Loew. Verh. zool. bot. Gesell. Wien, VII, 600, 15. — 1862. Schin. F. A. I, 280. — 1894. Beck. Nov. Act. Carol. Leop. Akad. LXII, 368, 31, Fig. 159. — 1901. Verr. Brit. Fl. VIII, 219, 5, figs. 218—220. — 1907. Kat. paläarkt. Dipt. III, 38. — *Syrphus urbanus* Meig. p. p. 1822. l. c. III, 287, 16. — *C. urbana* p. p. 1902. Beck. Zeitschr. Hymn. Dipt. II, 352, 16. — *Syrphus curialis* Meig. 1822. l. c. III, 287, 17. — *C. curialis* 1902. Beck. l. c. II, 352, 17. — *Syrphus anthraciformis* Meig. 1822. l. c. III, 291, 21. — *C. anthraciformis* 1902. Beck. l. c. II, 352, 21.

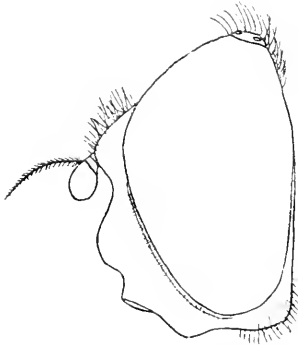


Fig. 63. Head of *C. scutellata* ♂.

Male. Eyes bare. Frons black, shining, with a longitudinal groove; vertex and frons black-haired. Epistoma somewhat hollowed below the antennæ, the central knob large and very broad, reaching the eye-margins on each side, and lying somewhat high; the epistoma distinctly hollowed between the central knob and the mouth edge, but this latter and the whole lower part of epistoma somewhat retracted, and the drooping lateral angles lying more backwards than usual and thus the lateral margin of the oral aperture short, while the front margin forms a much deeper curve than usual; the epistoma

is very slightly or not descending, it is grey pruinose below the antennæ, especially on a triangular spot at each side, for the rest it is slightly pruinose, the central knob shining, especially above. Eye-margins very narrow, grey pruinose, with short, whitish hairs. Occiput greyish pruinose, with longish, white hairs below becoming shorter to quite short above and here yellow; besides some long, black hairs above. Antennæ not large, third joint longer than broad; the basal joints

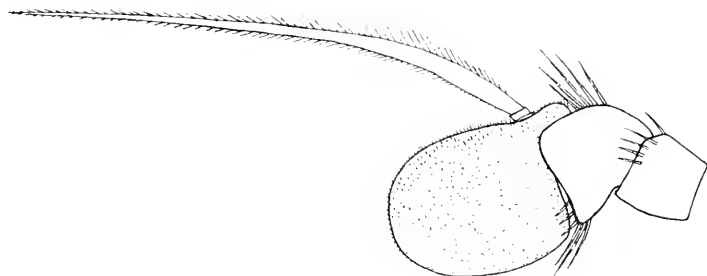


Fig. 64. Antenna of *C. scutellata* ♂, from the inside. $\times 75$.

blackish, the third paler or darker brownish; arista distinctly pubescent, longest above. Thorax æneous black, shining, finely punctate; it is clothed with longish, erect, yellow hairs, among which often more or fewer black, especially at both ends and also towards the sides; there are somewhat short notopleural and long postalar and scutellar marginal bristles, the latter numerous and often pale at the apex; supraalar bristles inconspicuous; the fringe below scutellum long. Pleura with longish, greyish hairs, generally black above. Abdomen black, the second segment and the third except the basal parts towards the sides dull; it is clothed with somewhat long, yellow hairs, longest at the sides and towards the base; in the middle line sometimes black hairs and at the apex some black hairs and also often at the apical corners of the third segment. Venter black, shining, with long, pale hairs. Genitalia not large, grey pruinose. Legs with the femora black with yellow apical part, tibiæ yellow with a black ring in the middle, broadest on hind tibiæ; tarsi yellow with the two or three last joints black, hind tarsi also with the basal joints black above. Femora somewhat long-haired, the hairs pale, but the bristly hairs on the posterior side of the front femora black; hind femora black setulose beneath only in the apical half, the bristles not short; tibiæ with short, pale hairs, hind tibiæ with a dorsal fringe which is long and dark on the black part; hind metatarsus thickened. Wings a little yellowish

tinged, most towards the stigma; upper angle at the upper marginal cross-vein acute. Squamulae whitish, with yellow margin and fringe. Halteres orange.

Female. Frons somewhat broad, slightly widening downwards, shining, without channels, only a little marginate at each side towards

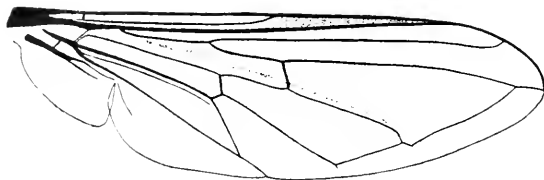
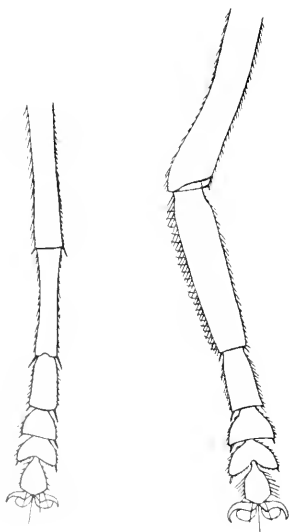


Fig. 65. Wing of *C. scutellata* ♂.

the margin of the eye; it is yellow-haired, only in front of the ocelli a few darker hairs; on each side above the antennae is a small dust

spot. Epistoma has below the eyes a yellow or brownish yellow spot, stretching from the eye to the lower margin. Third antennal joint slightly larger than in the male. Thorax with short, decumbent, yellow hairs; humeral callus generally more or less brown. Scutellum with the apical part yellow, scutellar marginal bristles strong and numerous. Pleura with white hairs. Abdomen somewhat indefinitely dullish on second and third segments, clothed with short, depressed hairs which are chiefly black, but whitish and erect just at the front margin and the sides of second and the basal corners of third and fourth segments; they are long at the basal side margin; the extreme apex of abdomen brownish. Legs generally paler than in the male, the dark rings on the anterior tibiae often weak; the third and fourth joints of the middle



C. scutellata ♀.

Fig. 66. Middle tarsus. Fig. 67. Hind tarsus.
× 25.

and especially of the hind tarsi considerably broadened; hind femora beneath only setulose towards the apex.

Length 7,5—9,5 mm.

Two of the specimens in our collection have been bred from pupæ, but no particulars are given; the pupa is dirty brown with two yellowish, about 0.5 mm long thoracal spiracular tubes; the posterior end is rounded, slightly conically pointed and terminating in a short, cylindrical, yellow spiracular process. The length of the pupa is about 7 mm. The species is earlier recorded as bred from fungi.

This species seems to vary somewhat in the colour of the thoracal pubescence; Zetterstedt says: "nigro-pilosa, pilositate certo situ fusca", and Verrall says: "blackish or obscurely brownish", while Meigen has: "rostgelbhaarig"; the Danish specimens have all the thoracal pubescence yellow with more or fewer black hairs at the ends and sides.

C. scutellata is common in Denmark; Hellerup, Ordrup Mose, Dyrehaven, Donse, Hillerød, Frerslev Hegn, Grib Skov, Tisvilde, Esbjergærde, Nordskoven at Jægerspris, Faxe Ladeplads; on Lolland in Dødemose west of Nysted; on Langeland at Lohals; in Jutland in Greisdal and Højenbæk Dal at Vejle and at Sæby, and on Bornholm in Almindingen. It is no spring species, my dates are $2\frac{1}{6}$ — $18/8$. It occurs on flowers on meadows.

Geographical distribution:— All Europe, towards the north to northern Sweden, in Finland and also in Siberia; further in Asia minor and Syria.

7. *C. soror* Zett.

1843. Zett. Dipt. Scand. II, 809, 33 (*Eristalis*). — 1857. Loew, Verh. zool. bot. Gesell. Wien, VII, 559, 14. — 1862. Schin. F. A. I, 279. — 1894. Beck. Nov. Act. Leop. Carol. Akad. LXII, 369, 32, Fig. 160. — 1901. Verr. Brit. Fl. VIII, 221, 6, fig. 221. — 1907. Kat. paläarkt. Dipt. III, 38. — *Syrphus means* Meig. (nec F.) 1822. Syst. Besch. III, 285, 13. — *C. means* 1894. Beck. l. c. LXII, 240 et 1902. Zeitschr. Hymn. Dipt. II, 351, 13. — ? *Syrphus fulvicornis* Meig. 1822. l. c. III, 288, 18. — *C. fulvicornis* 1862. Schin. F. A. I, 288. — 1902. Beck. Zeitschr. Hymn. Dipt. II, 352, 18.

Male. This species is much like *scutellata*; the frons and upper part of epistoma a little broader; epistoma and oral aperture of the same shape, likewise somewhat retracted below; central knob not fully so broad, more conically pointed, and epistoma more pruinose; eye-margins, though narrow, however, broader, and longer-haired. Antennæ with the third joint a little larger and orange;

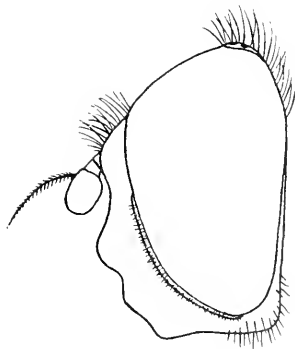


Fig. 68. Head of *C. soror* ♂.

arista more densely and a little longer-haired. Thorax more coarsely punctate, though the punctuation is not coarse; the postalar and scutellar marginal bristles less strong. Abdomen and its pubescence about as in *scutellata*, but there are no black hairs at the hind corners of third segment. Legs as in *scutellata*, but the black rings on all tibiæ smaller and generally only the two last joints on the anterior tarsi black and the hind tarsi orange in the middle; the legs are nearly quite pale-haired as the long hairs on the posterior side of front femora are mainly pale; the fringe on the hind tibiæ is less extended, pale with only some few dark hairs.

Female. Likewise very similar to *scutellata*; frons a little broader, with more distinct lateral channels towards the eyes. The central facial knob less wide than in the male, and the sides of epistoma below the eyes not or very slightly pale; third antennal joint much larger and considerably larger than in the male, bright orange. Thoracal and scutellar marginal bristles distinctly weaker. Third and fourth joint of posterior tarsi not broad.

Length 7.5—9 mm.

This species is very nearly allied to *scutellata* but distinguished in both sexes by the orange antennæ with the third joint larger, especially in the female, the longer and more densely-haired arista, the smaller central facial knob and the slightly broader eye-margins besides by other characters; in the female the sides of epistoma below are not or scarcely pale, and a good character is the not broad third and fourth joints of the posterior tarsi.

C. soror is very rare in Denmark, only one specimen, a male, has been caught in Jutland in Greisdal at Vejle on $\frac{2}{8}$ 1908 (the author).

Geographical distribution:— Northern and middle Europe and recorded down into Spain and Italy; towards the north to middle Sweden, in Finland, and in Siberia.

8. *C. longula* Zett.

1838. Zett. Ins. Lapp. 613, 15 et 1843. Dipt. Scand. II, 812, 36 (*Eristalis*). — 1894. Beck. Nov. Act. Leop. Carol. Akad. LXII, 370, 33, Fig. 162. — 1901. Verr. Brit. Fl. VIII, 217, 4, fig. 217. — 1907. Kat. paläarkt. Dipt. III, 31. — *C. plumulifera* Loew, 1857. Verh. zool. bot. Gesell. Wien, VII, 600, 17. — 1862. Schin. F. A. I, 280. — 1894. Beck. l. c. 252. — ? *Eristalis geniculata* Zett. 1855. Dipt. Scand. XII, 4669, 37. — 1894. Beck. l. c. 249. — ? *C. nigricornis* Macq. 1827. Soc. Sci. Lille, 203, 10. — 1838. Meig. Syst. Besch. VII, 126, 24. — 1902. Beck. Zeitschr. Hymn. Dipt. II, 355, 24. — ? *C. albiseta* Meig. 1838. l. c. VII, 127, 36. — 1862. Schin. F. A. I, 288. — 1902. Beck. Zeitschr. Hymn. Dipt. II, 355, 36.

Male. Eyes bare. Frons black, shining, with a longitudinal groove; vertex and frons black-haired. Epistoma a little less retracted below than in the two preceding species, but not prominent; the front margin of the oral aperture less deeply curved; epistoma slightly hollowed below the antennæ, the central knob broad but less broad than in the two preceding, pointed and with a sloping upper outline, so that the apex lies somewhat downwards, below it the epistoma is distinctly hollowed and the mouth edge somewhat prominent; the epistoma is narrowly pruinose below the antennæ, for the rest almost not pruinose, shining; it is slightly descending. Eye-margins very narrow, greyish pruinose, with pale hairs. Occiput greyish pruinose, with pale hairs below, black above. Antennæ black or blackish brown, third joint slightly or almost not longer than broad; arista distinctly pubescent. Thorax black or æneous black, finely punctate, shining; it is clothed with longish, erect, black hairs, on scutellum intermingled with yellow hairs; notopleural, postalar and scutellar marginal bristles distinct and somewhat long, supraalar bristles less distinct. Pleura with longish, black hairs. Abdomen black or æneous black, second segment quite dull, the third with a shining space on each side towards the front margin; pubescence somewhat long, erect, pale yellow, it is shorter in the middle and here with some dark hairs, especially behind and at the apex, and on the slightly pruinose genitalia are black hairs; at the sides in the basal half the pubescence is rather long. Venter black, shining, with longish, pale hairs. Legs black, the knees more or less narrowly yellow, but the base of tibiæ generally more broadly; the extreme apex of tibiæ likewise yellow; tarsi black or blackish, the anterior, especially the middle tarsi may be indistinctly pale at the base. Legs with the short hairs mainly black, the long hairs on femora chiefly pale but black behind the front femora and also partly on the middle femora; the black spinulation below the hind femora rather fine; hind metatarsi slightly thickened. Wings yellowish tinged, towards the anterior margin more light brownish; upper angle at the upper marginal cross-vein somewhat acute. Squamulæ dirty yellowish or light brownish, with a yellow or pale brownish fringe. Halteres yellowish orange.

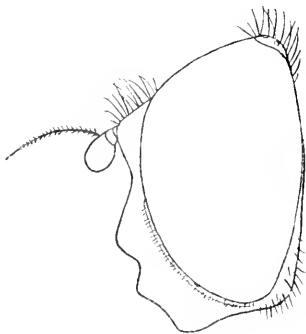


Fig. 69. Head of *C. longula* ♂.

Thorax black or æneous black, finely punctate, shining; it is clothed with longish, erect, black hairs, on scutellum intermingled with yellow hairs; notopleural, postalar and scutellar marginal bristles distinct and somewhat long, supraalar bristles less distinct. Pleura with longish, black hairs. Abdomen black or æneous black, second segment quite dull, the third with a shining space on each side towards the front margin; pubescence somewhat long, erect, pale yellow, it is shorter in the middle and here with some dark hairs, especially behind and at the apex, and on the slightly pruinose genitalia are black hairs; at the sides in the basal half the pubescence is rather long. Venter black, shining, with longish, pale hairs. Legs black, the knees more or less narrowly yellow, but the base of tibiæ generally more broadly; the extreme apex of tibiæ likewise yellow; tarsi black or blackish, the anterior, especially the middle tarsi may be indistinctly pale at the base. Legs with the short hairs mainly black, the long hairs on femora chiefly pale but black behind the front femora and also partly on the middle femora; the black spinulation below the hind femora rather fine; hind metatarsi slightly thickened. Wings yellowish tinged, towards the anterior margin more light brownish; upper angle at the upper marginal cross-vein somewhat acute. Squamulæ dirty yellowish or light brownish, with a yellow or pale brownish fringe. Halteres yellowish orange.

Female. Frons not narrow, without channels, bluish black, shining, above the antennæ a small, somewhat indistinct dust spot at each

side; it is yellow-haired, only just in front of the ocelli some darker hairs. Below the eyes the epistoma is indefinitely and obscurely brownish. Antennæ with the third joint a little larger than in the male, likewise longer than broad and generally paler; arista a little more pubescent. Thorax with short, decumbent, greyish pubescence, humeral callus yellowish; scutellum with the margin yellow, the bristles somewhat strong. Abdomen with the middle of the second and hind part of the third segment indefinitely dullish; its pubescence is short, depressed and black on the dullish parts and the larger hind part of fourth segment, on the other parts pale and more erect, longest at the sides, especially at the base. Legs sometimes a little paler than in the male, and squamulæ more yellow; hind femora not setulose beneath.

Length 7—8 mm.

This species is known from the two preceding by the smaller central facial knob and the darker legs, besides by other characters; it is also smaller. I possess a curious female specimen which has the hind metatarsi strongly swollen, of ovate shape; it is no doubt only a monstrous specimen; it is taken in company with typical males.

C. longula is rare in Denmark and has hitherto only been taken on Langeland at Lohals (the author) and in Jutland at Holstebro (H. J. Hansen), Rebbild near Skørping (Kryger), Jerup near Frederikshavn (Th. Mortensen) and at Skagen (Brinkmann). My dates are ¹⁴/₇ to towards the end of August. It was for the first time taken in 1882.

Geographical distribution:— Europe, recorded down into Italy; towards the north to northern Sweden, in Finland, and in Siberia.

9. *C. pagana* Meig.

1822. Meig. Syst. Besch. III, 292, 28 (*Syrphus*). — 1902. Beck. Zeitschr. Hymn. Dipt. II, 354, 28. — 1907. Kat. paläarkt. Dipt. III, 35. — *Eristalis means* Zett. (nec Fabr.) 1843. Dipt. Scand. II, 787, 12 et 1849. VIII, 3167, 12 et 1859. XIII, 6014, 12. — *C. pulchripes* Loew, 1857. Verh. zool. bot. Gesell. Wien, VII, 597, 13. — 1862. Schin. F. A. I, 281. — 1894. Beck. Nov. Act. Leop. Carol. Akad. LXII, 372, 35, Fig. 161. — 1901. Verr. Brit. Fl. VIII, 222, 7, figs. 222—223.

Male. Eyes bare. Frons black, grey dusted at the sides, with a distinct but small, longitudinal groove; vertex yellow-haired, only a few darker hairs just at the front end, but sometimes much more black-haired; frons black-haired. Epistoma not much hollowed below the antennæ, the central knob not large, pointed and sloping evenly above and at the sides, epistoma slightly hollowed between it and the mouth edge; it has the lower part somewhat protruding and is

a little descending; it is very slightly pruinose and only slightly more below the antennæ, but here there is a whitish spot on each side. Eye-margins somewhat narrow, narrowed below and somewhat short; they are not pruinose, slightly white-haired. Occiput grey pruinose, this colour stopping below under the eye; the hairs are whitish below, yellow above and here there are besides longer, black hairs, but at the top they are yellow as the vertical hairs. Antennæ somewhat large, third joint considerably longer than broad; they are orange, third joint often darkened at the dorsal margin and apex or only at the latter; arista not long, thickened in the basal part, very short-pubescent, apparently bare. Thorax black or æneous, finely punctate, with a somewhat long, erect, pale yellow or yellow pubescence, often more or less mixed with black hairs until becoming quite black; notopleural, postalar and scutellar marginal bristles distinct but neither long nor strong; supraalar bristles shorter. Pleura with long, whitish or greyish hairs,

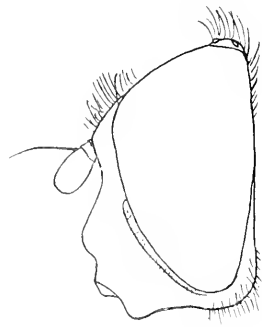


Fig. 70. Head of *C. pagana* ♂.

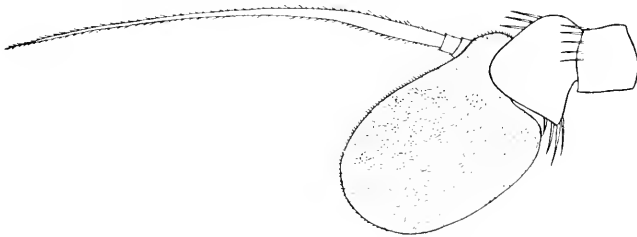


Fig. 71. Antenna of *C. pagana* ♂, from the inside. $\times 75$.

often more or less mixed with black, especially upwards. Abdomen æneous black, shining, but on second and third segments dullish at the front and hind margins and in the middle, so that the dull part may be almost hour-glass-shaped; the dull parts sometimes rather indistinct; abdomen is clothed with rather long and erect, yellow or pale yellow pubescence, longest at the sides and towards the base; in the middle it is shorter and here a little dark on second and third segments; in dark specimens the dark hairs may be more extended on the dull parts and almost all the fourth segment black-haired. Genitalia shining. Venter black, shining, with longish, pale hairs. Legs with the femora black with yellow apex, tibiæ yellow, with a rather

small, black ring below the middle, tarsi yellow with the last joint black, front metatarsus a little darkened above and hind metatarsus blackish. Legs almost all yellow-haired; only the hairs behind the front femora and towards the end of middle femora more or less black, and sometimes the short hairs on the anterior side of hind tibiæ black; hind femora distinctly black setulose below and hind metatarsus slightly thickened. Wings yellowish tinged most towards the base and anterior part; upper angle at the upper marginal cross-vein acute. Squamulæ white with a white fringe. Halteres pale yellowish, sometimes with the knob slightly darkened.

Female. Frons somewhat broad, slightly widening downwards, with narrow lateral but no middle channel; it is yellow-haired but with dark hairs at the ocelli, sometimes black-haired. Antennæ with

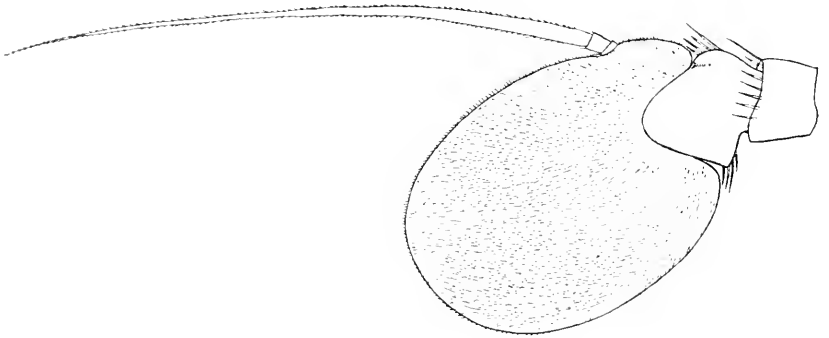


Fig. 72. Antenna of *C. pagana* ♀, from the inside. $\times 75$.

the third joint very large. Thorax with short, decumbent pubescence, varying as in the male from yellow to black. Abdomen shining with yellow, longish, erect hairs at the sides, especially towards base; in the middle the hairs are short and depressed, and often more or less dark on the hind parts of second and third segments and in dark specimens they may be black on fourth and fifth segments. Legs chiefly as in the male or slightly paler, sometimes the anterior tibiæ quite yellow; hind femora only slightly setulose below the apex. The wings may be more distinctly tinged.

Length 6—8,5 mm.

As Loew correctly remarks the eyes in the male of this species show some scattered hairs; they are more distinct in some specimens than in others.

C. pagana is common in Denmark; Amager, Ordrup Mose, Ermelund, Dyrehaven, Lyngby Mose, Hareskov, Geel Skov, Hillerød, Bose-

rup at Roskilde; on Lolland at Saxkøbing, in Kældskov, Dødemose and at Strandby west of Nysted; on Langeland at Lohals; on Funen; in Jutland in Vejle Nørreskov and Højenbæk Dal at Vejle and at Horsens, and on Bornholm at Allinge. My dates are $^{20}/_1$ — $^{30}/_8$. It occurs on flowers in fens and meadows, and also on open places in woods, and it is often seen in great numbers in spring, especially in May, on Tussilago and Anemone, but it may be found during the whole summer.

Geographical distribution:— All Europe, towards the north to northern Sweden, and in Finland and Siberia; it is also recorded from North America from Alaska.

10. *C. illustrata* Harr.

1776. Harr. Expos. engl. Ins. 104, Tab. XXXII, fig. 32 (*Musca*). — 1901. Verr. Brit. Fl. VIII, 234, 13, fig. 234. — 1907. Kat. paläarkt. Dipt. III, 29. — *Syrphus oestraceus* 1775. Fabr. (nec L.) Syst. Entom. 766, 18 et 1781. Spec. Ins. II, 426, 23 et 1794. Entom. Syst. IV, 290, 44 et (*Eristalis*) 1805. Syst. Antl. 240, 34. — 1803. Schell. Genr. Mouch. Dipt. 54, Tab. XI, Fig. 2 a--d. — 1816. Fall. Dipt. Suec. Syrph. 21, 9. — 1822. Meig. Syst. Besch. III, 279, 2 et (*Cheilosia*) 1838. VII, 123. — *Eristalis oestracea* 1843. Zett. Dipt. Scand. II, 778, 2. — *C. oestracea* 1857. Loew, Verh. zool. bot. Gesell. Wien, VII, 584, 1. — 1862. Schin. F. A. I, 274. — 1894. Beck. Nov. Act. Leop. Carol. Akad. LXII, 380, 39.

Male. Eyes hairy with long, yellowish or brownish hairs. Frons densely yellowish pruinose, with a shallow longitudinal groove; vertex and frons with long, yellow hairs. Epistoma densely greyish yellow pruinose all over and with rather long, pale hairs; it is somewhat hollowed below the antennæ, the central knob of medium size and moderately prominent, epistoma slightly hollowed between it and the very little protruding mouth edge, and somewhat descending. Eye-margins very broad, densely pruinose, with long, pale hairs, below with some more or less numerous black hairs intermingled, and from here down to the mouth edge there are generally some black hairs. Occiput grey pruinose, with dense hairs which below and on the jowls are long and whitish, in the middle short but becoming long upwards and yellow on the upper half; just at the lower eye-margin there is a brownish pruinose spot. Antennæ of moderate size, reddish or blackish brown; arista black, densely short-

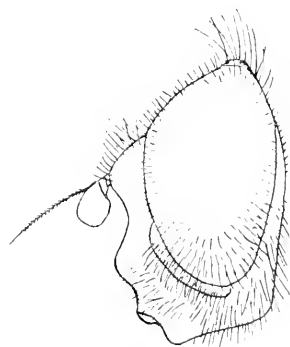


Fig. 73. Head of
C. illustrata ♂.

pubescent. Thorax æneous on the front half, more black on the posterior half, finely punctate, shining; it is clothed with long, erect hairs which are yellow or whitish on the front part, black across the middle and whitish at the hind margin and on scutellum, the latter with black hairs in the middle; there are no bristles. Pleura grey pruinose with long, whitish hairs on meso- sterno- and partly on pteropleura. Abdomen black, shining, but the first and second segments grey pruinose; it is clothed with long, erect hairs which are pale at the base, but reddish yellow towards the hind margin of second segment, the third segment has mostly black hairs but in the middle and on the hind part are reddish yellow hairs, and the whole apical part of abdomen has reddish yellow hairs; sometimes abdomen is much more reddish yellow-haired, black hairs only present at the sides of third segment. Genitalia grey pruinose. Venter greyish pruinose with long, pale hairs. Legs black, femora greyish pruinose with the extreme apex yellow, tibiæ with the basal part yellow, the apex of the middle tibiæ and the first or first two joints of the middle tarsi more or less obscurely yellowish. The legs have rather long hairs, not only the anterior femora behind but also the hind femora on the anterior side, and likewise the other hairs on the femora and those on the tibiæ are relatively longish and hence the tibiæ somewhat fringed above; the hairs all pale, only towards the apex of middle femora some black hairs; the hind femora are not properly setulose beneath, but have some short, black bristles in the apical two thirds, somewhat crowded at the apex; hind metatarsus not thickened. Wings slightly tinged, with a more or less distinct, blackish band or blotch on the middle; the upper angle at the upper marginal cross-vein nearly rectangular. Squamulæ smoky whitish or brownish, with a darker margin and a yellow fringe. Halteres yellow with the knob more or less blackish.

Female. Frons moderately broad, somewhat rapidly widening downwards, with a lateral channel at each side; it is yellow-haired and at a distance above the antennæ is a greyish pruinose band. Third antennal joint considerably larger than in the male. Thorax and abdomen haired as in the male, the hairs only slightly shorter; scutellum without black hairs.

Length 9.5—11 mm.

Remarks: As well known this species was for a long time considered as identical with *Musca oestracea* L., but as shown by Haliday in 1851 (Stett. ent. Zeitg. XII, 139) by examining the type, and also shown by the description, this is not so, the *Musca oestracea* L. being identical with *Eristalis apiformis* Fall. Verrall has then in

1900 (Catal. of the Syrph.) worked out a synonymy, also followed in the Kat. paläarkt. Dipt., and from it he excludes *Syrphus oestraceus* of Fabricius placing this to *Musca oestracea* L., and in Brit. Fl. VIII he says that *M. oestracea* L. was correctly interpreted by the following authors (except Schellenberg) until Fallén made the mistake. This seems, however, not to be so, for in the collection of Tönder Lund and Sehestedt, the determination of which was mainly due to Fabricius, the present species stands as *Eristalis oestraceus*, and consequently I have included Fabricius in my synonymical list. It is also to be noted that Fabricius in his first work, Syst. Ent. 1775 excludes the specially distinguishing words of Linné "scutello albido" from his description; in the later works he takes them up, I think only following Linné's description.

C. illustrata is a rather common species in Denmark, though somewhat local; Amager, Ordrup Mose, Jægerspris; on Lolland at Maribo, in Kældskov and Dødemose; on Funen at Middelfart; in Jutland in Vejle Nørreskov and Højenbæk Dal at Vejle, at Horsens, in Hø Skov at Aarhus and at Rebbild near Skørping; on Bornholm in Almindingen. My dates are $\frac{6}{6}$ — $\frac{5}{8}$. It occurs in fens and in woods and thickets on open places and generally on flowers of Umbelliferae.

Geographical distribution: — Widely distributed species, occurring all over Europe, towards the north to middle Scandinavia, in Finland, and further in north and middle Asia.

11. *C. variabilis* Panz.

1798. Panz. Fn. Germ. LX, 10 (*Syrphus*). — 1822. Meig. Syst. Besch. III, 281, 6 (*Syrphus*) et 1838. VII, 123. — 1843. Zett. Dipt. Scand. II, 790, 14 et 1849. VIII, 3168, 14 et 1855. XII, 4664, 14 (*Eristalis*). — 1857. Loew, Verh. zool. bot. Gesell. Wien, VII, 589, 7. — 1862. Schin. F. A. I, 276. — 1894. Beck. Nov. Act. Leop. Carol. Akad. LXII, 381, 40, Fig. 117. — 1901. Verr. Brit. Fl. VIII, 224, 8, fig. 210. — 1907. Kat. paläarkt. Dipt. III, 40. — *Eristalis nigrita* Fabr. 1805. Syst. Antl. 244, 55. — *Eristalis ater* Fabr. 1805. l. c. 246, 66. — *Syrphus nigrinus* Meig. 1822. Syst. Besch. III, 282, 7. — *C. nigrina* 1902. Beck. Zeitschr. Hymn. Dipt. II, 350, 7.

Male. Eyes with longish, brownish hairs. Frons black, greyish pruinose at the sides, with a longitudinal groove; vertex and frons black-haired. Epistoma pruinose below the antennæ, for the rest slightly pruinose, with long, black hairs, pale below; it is somewhat hollowed below the antennæ, the central knob moderately prominent:

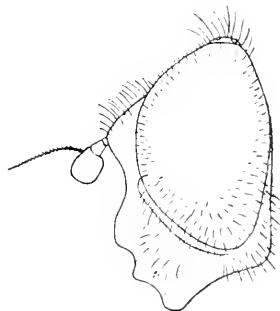


Fig. 74. Head of *C. variabilis* ♂.

between the knob and the mouth edge the epistoma is distinctly hollowed, and it is somewhat descending; the lower part is somewhat protruding and the anterior margin of the oral aperture with a deep curve. Eye-margins moderately broad, slightly pruinose, with longish, pale hairs. Occiput greyish pruinose, the colour stopping under the eye; the hairs are white below, more yellowish above, and here there are besides long, black hairs. Antennæ of medium size, third joint

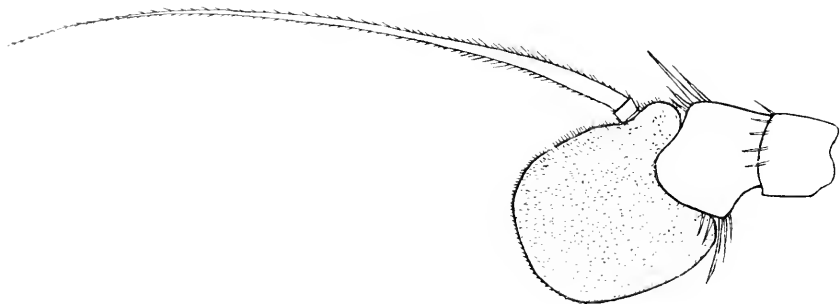


Fig. 75. Antenna of *C. variabilis* ♂, from the inside. $\times 75$.

squarely roundish, not longer than broad; they are black, third joint rarely more or less dark brownish; arista rather long, short-pubescent. Thorax æneous black, finely punctate, clothed with a double pubescence of longer, black and shorter hairs which are partly pale, especially in front, and sometimes almost all pale; there are distinct notopleural, postalar and scutellar marginal bristles, the latter are numerous but not strong; supraalar bristles short. Pleura with long, whitish hairs, more or less black above and behind. Abdomen somewhat long and rather parallel-sided; it is black or somewhat bluish black, second and third segments almost quite dull, only the latter a little shining on each side in the middle; fourth segment shining; the hairs are longish and erect at the sides, and here pale yellow except at the hind corners of third and fourth segments, where they are black; they are also pale at the base on most of or on the whole second segment, but they are black, shorter and somewhat depressed in the middle, beginning at the hind margin of second segment, and on third and fourth segments a large triangular space with the point forwards and stretching over about the whole breadth behind is occupied of the short, black hairs. Venter bluish black, shining, with pale hairs, long on the two first segments, short on the two last. Genitalia pale-haired. Legs black, sometimes the anterior tibiæ dark piceous on the basal half; femora pale-haired, but the long hairs behind front femora

and the short hairs at the apex of posterior femora black; tibiæ blackish-haired except the usual golden pubescence on front and hind tibiæ; hind femora somewhat strongly black-setulose below except at the base; hind metatarsus not or almost not thickened. Wings more or less brownish tinged, most towards the anterior margin; the upper marginal cross-vein strongly curved above, the upper angle rectangular. Squamulæ whitish with a whitish fringe. Halteres yellowish with the knob brown or blackish.

Female. Frons somewhat broad, widening downwards, trisulcate (generally); it has yellow hairs intermingled with longish, darker hairs, especially above and on the vertex. Antennæ with the third joint a little larger than in the male. Thorax with double pubescence as in the male, but the hairs much shorter and decumbent; the bristles more conspicuous than in the male. Abdomen shining, a little indefinitely dullish on the middle of second and third segments, haired chiefly as in the male, but the hairs at the sides shorter, except at the base, and all pale. Hind femora less setulose below and only on the apical two thirds. Halteres quite orange.

Length 10—11 mm; sometimes smaller specimens occur down to scarcely 9 mm.

Remarks: I have examined the type-specimens of *Eristalis ater* Fabr. in Sehestedt's collection; there are two, the specimen on the label is a female of *albitarsis*, the other a female of the present species.

C. variabilis is common in Denmark; Charlottenlund, Ordrup Mose, Ermelund, Dyrehaven, Lyngby Mose, Hareskov, Ørholm, Geel Skov, Søllerød, Hillerød, Nyrup Hegn, Nordskoven at Jægerspris; on Lolland at Maribo, Strandby, Kældskov, Bremersvold and Christianssæde; on Funen at Middelfart, Odense, and on Fænø; in Jutland in Nørholm Skov at Varde; Højenbæk Dal at Vejle, Horsens and Frederikshavn, and on Bornholm at Hasle. My dates are $\frac{9}{5}$ — $\frac{18}{8}$; I have taken it in copula on $\frac{21}{5}$. It occurs in woods and fens on various flowers.

Geographical distribution: — All Europe, towards the north to northern Sweden, and in Finland.

12. *C. honesta* Rond.

1868. Rond. Atti Soc. ital. Sc. Nat. XI, 30. — 1894. Beck. Nov. Act. Leop. Carol. Akad. LXII, 255. — 1901. Verr. Brit. Fl. VIII, 226, 9. — 1907. Kat. paläarkt. Dipt. III, 29. — *C. lasiopa* Kow. 1885. Wien. ent. Zeitg. IV, 206. — 1894. Beck. l. c. 386, 43, Fig. 108.

Male. Eyes hairy with pale hairs. Frons black, dusted at the sides, with a longitudinal groove; frons and vertex black-haired. Epistoma distinctly pruinose, with a triangular, whitish spot at each

side below the antennæ and with longish, pale hairs on the sides; it is hollowed below the antennæ, the central knob rather prominent but not large, somewhat pointed, and between it and the mouth edge

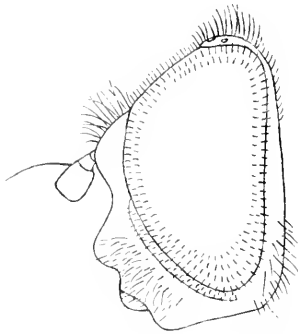


Fig. 76. Head of *C. honesta* ♂.

the epistoma somewhat hollowed; it is slightly descending and the lower part not much protruding. Eye-margins broad, grey pruinose, with short, yellow hairs. Occiput grey pruinose with whitish, above more yellow hairs, and here besides with long, black hairs. Antennæ black, third joint more or less brownish, not small, squarely roundish with the upper margin straight or almost concave; arista not long, thickened in the basal half and very short-pubescent. Thorax blackish æneous, finely punctate, shining; it is clothed with not long, yellow or greyish yellow hairs more or less intermingled with black, the latter sometimes predominant on the middle; there are notopleural, postalar and scutellar marginal bristles, but they are rather weak and not much conspicuous. Pleura with longish, black or downwards more or less pale hairs. Abdomen æneous black, shining, second and third segments dull black on the disc but broadly shining at the sides; abdomen has longish, erect, yellow hairs, longest at the sides and towards the base; on the middle of second and third segments are short, black, depressed hairs, and the yellow hairs on the middle of fourth segment are also depressed. Genitalia rather large, yellow-haired. Venter a little greyish pruinose with longish, pale hairs. Legs black, extreme apex of femora and the basal part of tibiæ yellowish or reddish yellow, most obscurely on hind tibiæ. The long hairs on femora for the most part black behind front femora, for the rest chiefly pale; the hairs on tibiæ mainly pale on front tibiæ, black on posterior tibiæ except the usual golden pubescence; hind femora densely black setulose beneath except at the base; hind metatarsi not thickened. Wings brownish tinged, most towards the anterior margin and on the middle; upper marginal cross-vein curved above, the upper angle about rectangular. Squamulæ whitish with a yellow margin and fringe. Halteres yellow, the knob blackish.

Female. Eyes short-hairy. Frons moderately broad, widening downwards, trisulcate; it is yellow-haired, vertex with some dark hairs. Antennæ with the third joint larger than in the male, likewise squarely roundish. Thorax with short, decumbent hairs which are as in the

male yellow with black intermingled; the bristles, especially the scutellar marginal bristles, very short. Abdomen shining, clothed with short, pale hairs, only longer at the basal corners; the hairs are depressed, except at the basal corners of the segments where they are erect, the space with erect hairs largest on second segment becoming smaller on each following segment; on the middle of second and third segments are black hairs on the hind part, and thus the depressed, pale hairs form to some degree bands. The base of middle tarsi may be more or less reddish. Hind femora only with a few black, setulose hairs below at apex. Halteres orange.

Length 8 to about 10 mm.

C. honesta is rare in Denmark, and it was for the first time taken in 1897; Ordrup Mose, Lyngby Mose, Ørholm, Geel Skov. Donse, Tyvekrogen (the author), Hillerød (Godskesen), in all 8 specimens. My dates are $^{13}/_5$ — $^6/_6$, it is thus evidently a spring species.

Geographical distribution: — Northern and middle Europe down into Italy; it is not known from Scandinavia but is recorded recently from Finland.

13. *C. frontalis* Loew.

1875. Loew, Verh. zool. bot. Gesell. Wien, VII, 587, 4. — 1862. Schin. F. A. I, 275. — 1894. Beck. Nov. Act. Leop. Carol. Akad. LXII, 392, 48, Fig. 118. — 1907. Kat. paläarkt. Dipt. III, 27.

Male. Eyes brownish-hairy. Frons large and unusually swollen, bluish black, shining, with a narrow longitudinal groove; vertex and frons black-haired. Epistoma broad, greyish pruinose, with longish, partly pale, partly dark hairs on the sides; it is slightly hollowed below the antennæ; the central knob not very prominent, somewhat pointed, between it and the mouth edge the epistoma is somewhat hollowed; it is somewhat descending but the lower part slightly prominent. Eye-margins not broad, somewhat pruinose except quite below, with longish, pale hairs. Occiput grey pruinose, this colour stopping below the eyes; the hairs are whitish, above there are besides some long, black hairs, but the long hairs behind vertex are yellow. Antennæ small, third joint roundish, not longer than broad; the third joint is reddish or yellowish red, but

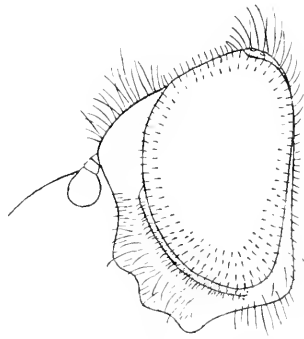


Fig. 77. Head of *C. frontalis* ♂.

brown or blackish above and at apex; arista apparently bare. Thorax black, pruinose and almost dull, with indistinct traces of duller stripes; it is clothed with long, erect, greyish yellow hairs, only at the margins with some few dark hairs and some on scutellum; there are postalar and scutellar marginal bristles, but they are weak and slightly conspicuous, and I could see no notopleural bristles. Pleura with white hairs, above and in front black hairs. Abdomen black, almost quite dull, with long, erect, whitish hairs, only at the hind margin of third segment and at the apex some black hairs. Venter somewhat greyish pruinose, with pale hairs. Legs black, anterior femora yellowish at the extreme apex; tibiæ yellow on the basal part, anterior tibiæ also slightly yellow at apex. The legs almost quite white-haired, only the hairs behind the front femora and at the apex of middle femora black, and the hind tibiæ with a short, dark fringe on the antero-dorsal side, longest on the middle; the hairs on femora long and rather dense; hind femora a little black-setulose beneath except at the base; hind metatarsi not thickened. Wings a little tinged; the upper angle at the upper marginal cross-vein acute. Squamulæ whitish with a whitish fringe. Halteres brown with the knob blackish.

Female. Frons rather broad, distinctly trisulcate, yellow-haired; on vertex some black hairs. Epistoma much more hollowed below the antennæ and with the central knob and lower part more prominent than in the male; it is only pruinose below the antennæ, for the rest shining. Antennæ with the third joint a little larger than in the male, similarly coloured. Thorax shining, finely punctate, with short, somewhat erect, yellowish white hairs. Abdomen likewise shining, with short, depressed, white hairs, a little longer and more erect at the sides and at the basal corners of the segments. Legs with the apex of anterior tibiæ distinctly pale; hind femora not setulose beneath. Halteres orange.

Length 6,5 to fully 7 mm.

Remarks: This species seems to vary with regard to the colour of the thoracal hairs; Loew describes thorax as mainly black-haired; the above description of the male is made from a specimen from Zermatt, kindly sent to me from Mr. Th. Becker; it has thorax almost quite pale-haired. — The species bears some resemblance to *C. barbata*, but this is a larger species with the arista distinctly pubescent, the frons in the male not large and swollen, epistoma narrower and thorax shining; in the female it has likewise a much narrower frons and the thoracal hairs more depressed. The nearest ally to *frontalis* is *melanopa* Zett. but it is a larger and blacker species, as the antennæ and legs are black.

C. frontalis is very rare in Denmark, we have only two specimens, both females, taken in Ryget Skov at Farum Sø on $7/5$ 1911 (Kryger).

Geographical distribution: — Northern and middle Europe down to the Alps; it is not known from Sweden but is recently recorded from Finland.

14. *C. intonsa* Loew.

1857. Loew, Verh. zool. bot. Gesell. Wien, VII, 588, 5. — 1862. Schin. F. A. I, 274. — 1894. Beck. Nov. Act. Leop. Carol. Akad. LXII, 394, 50, Fig. 112—113. — 1901. Verr. Brit. Fl. VIII, 232, 12. — 1907. Kat. paläarkt. Dipt. III, 30. — *Eristalis fraterna* Zett. p. p. (nec Meig.) 1843. Dipt. Scand. II, 798, 22 et 1849. VIII, 3172, 22 et 1859. XIII, 6017, 22. — 1894. Beck. l. c. 248, 74. — *Eristalis latifrons* Zett. 1843. l. c. II, 811, 35 et 1859. XIII, 6020, 35. — 1894. Beck. l. c. 249, 84.

Male. Eyes sparingly and short-hairy with white hairs, the lower part quite bare. Frons æneous black, not pruinose, with a longitudinal groove, yellow-haired above, black-haired below; vertex yellow-haired. Epistoma greyish pruinose, most below the antennæ, with shortish, yellow hairs on the sides; it is slightly hollowed below the antennæ, the central knob not small, but somewhat low, not very prominent; between the knob and the mouth edge the epistoma is slightly hollowed, it is slightly descending and the lower part not much protruding. Eye-margins very broad, broadest downwards, very slightly pruinose, with short, yellow hairs. Occiput grey pruinose, this colour stopping below the eyes; it has whitish or yellowish hairs all round. Antennæ small, darker or paler brownish, third joint longer than broad; arista short, distinctly thickened in about the basal third, very short-pubescent. Thorax dark æneous, finely but densely punctate, not much shining; it is clothed with not long, erect, yellowish hairs; there are no bristles. Pleura with longish, yellow hairs. Abdomen æneous black, shining, second segment dull on the disc, third on the posterior half and in the middle line. Abdomen is clothed with short, yellow hairs, longer and erect towards the sides and longest at the base. Genitalia not large, somewhat pruinose. Venter greyish pruinose, with longish, pale hairs. Legs with the femora black, greyish pruinose, the apex yellow; tibiæ yellow with a blackish ring below the middle, largest on hind tibiæ; tarsi with the three basal joints reddish, but

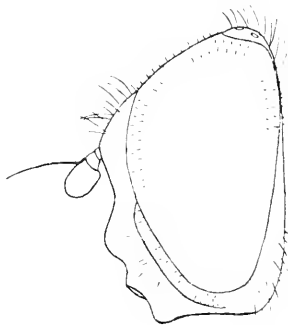


Fig. 78. Head of *C. intonsa* ♂.

front and especially hind metatarsus more or less darkened above. The legs almost all pale-haired, only behind front femora some dark hairs; hind femora not setulose beneath and the hairs dark yellow, only towards the apex some short, black, bristly hairs; hind metatarsus a little thickened. Wings somewhat short and somewhat brownish tinged; upper marginal cross-vein curved, the upper angle nearly rectangular. Squamulae whitish yellow, with a yellow fringe. Halteres yellowish, the knob blackish.

Female. Eyes practically bare. Frons indistinctly trisulcate, coarsely punctate at the sides, yellow-haired. Epistomal hairs shorter than in the male. Antennae with the third joint a little larger, longer than broad, often paler than in the male. Thorax with short, somewhat decumbent, yellow hairs. Abdomen shining, a little dullish in the middle on second segment, with short, depressed hairs, longer at the sides towards the base; they are more erect at the basal corners of second and third segments, but there is no tendency to form bands. The base of the fifth segment distinctly narrower than the hind margin of fourth. Halteres orange.

Length 6.5 to about 8 mm.

The pupa is dirty yellowish, of a length of about 7 mm, with two not long, reddish, somewhat granulated anterior spiracular tubes; it is somewhat rounded at the posterior end, with a reddish yellow spiracular process which is granulated in the outer part, not quite cylindrical but somewhat transverse in section and with the indication of a dividing longitudinal middle line above and below in the outer part; the process is directed somewhat upwards or sometimes horizontally backwards.

This species is easily known from the other species in this group by the want of thoracal and scutellar bristles; the female also is known by the bare eyes, thus being the sole species with haired epistoma and bare eyes (but only in the female sex).

C. intonsa seems to be rather rare in Denmark, we have only ten specimens; Ruderhegn (Kryger), Tyvekrog (the author); on Lolland in Kældskov and at Strandby (L. Jørgensen) and on Funen at Odense (H. J. Hansen). The dates are in the latter part of April to $^{10}/_8$. Of the species only a few specimens have been captured, the others have been bred. The pupa was sifted from flood refuse in Ruderhegn by Mr. Kryger on $^9/_2$ and $^{13}/_4$, the imagines came respectively on $^{14}/_4$ and on $^{28}/_1$ — $^{5}/_5$. — Zetterstedt communicates (VIII, 3172) that Stæger had sent him a specimen of this species (his *fraterna*) under the name *mutabilis*, and other specimens under the name *vernalis*; as *intonsa* had at that time not been found in Denmark and was not present

in Stæger's collection I think the mentioned specimens may have belonged to *velutina*, which according to Becker was mixed by Zetterstedt with *intonsa* under his *fraterna*, and which in Stæger's collection was named *fraterna*, probably determined so by Zetterstedt.

Geographical distribution: — Europe down into Italy, towards the north to middle Sweden, and in Finland.

15. *C. canicularis* Panz.

1801. Panz. Fn. Germ. LXXXII, 20, ♀ (*Syrphus*). — 1822. Meig. Syst. Besch. III, 280, 3 (*Syrphus*). — 1862. Schin. F. A. I, 284. — 1894. Beck. Nov. Act. Leop. Carol. Akad. LXII, 404, 59, Fig. 4. — 1907. Kat. paläarkt. Dipt. III, 24. — *Syrphus himantopus* Panz. 1798. l. c. LIV, 9, ♂. — 1822. Meig. l. c. III, 289, 20. — *C. himantopus* 1862. Schin. F. A. I, 285. — 1902. Beck. Zeitschr. Hymn. Dipt. II, 352, 20. — *Eristalis auratus* Fabr. 1805. Syst. Antl. 244, 53. — *C. auripila* Meig. 1838. l. c. VII, 124, 8. — 1862. Schin. F. A. I, 287. — 1902. Beck. Zeitschr. Hymn. Dipt. II, 355, 8.

Male. Eyes with somewhat short, brown hairs which are present only on the upper part with the larger facets. Frons somewhat small, greyish pruinose at the sides, with a longitudinal groove; vertex and frons with long, mixed black and yellow hairs. Epistoma somewhat greyish pruinose, most below the antennæ; it is hollowed below the antennæ, the central knob large and considerably protruding, between it and the very prominent mouth edge the epistoma is rather hollowed, and it is considerably protruding below and a little descending. Eye-margins not broad, somewhat pruinose, with short, yellowish hairs. Occiput grey pruinose, especially along the eyes, the colour stopping below the eyes; the hairs are yellowish, above besides some long, black hairs. Antennæ small, third joint squarely roundish, second and third joints brown or brownish red; arista distinctly pubescent. Thorax æneous or greenish black, shining, finely punctate; it is densely clothed with not long, erect, yellow or dark yellow hairs, on the hind part more or less extensively black-haired, especially in the middle; scutellum with longer, mainly black hairs, but the marginal hairs yellow; sometimes thorax and scutellum almost quite yellow-haired; there are short notopleural, supraalar and postalar bristles, but no scutellar marginal bristles. Pleura with longish, yellow hairs. Abdomen æneous olive, shining, slightly and indefinitely

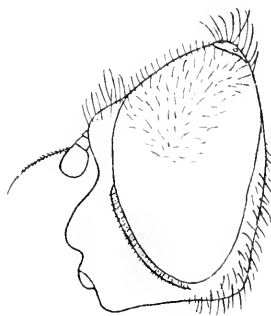


Fig. 79. Head of
C. canicularis ♂.

dullish on second and third segments: it is clothed with somewhat long, erect, yellow hairs, shortest on the middle; the hairs at the hind margins of the segments more or less decumbent, thus forming more or less conspicuous fringes, generally most conspicuous on third segment. Venter æneous black, shining, with long, pale hairs. Legs with the femora black with yellow apex, tibiæ yellow, generally with more or less distinct blackish rings; tarsi yellow. The legs not specially long-haired and almost quite pale-haired, only behind the anterior femora towards apex sometimes some black hairs; hind femora setulose beneath, the bristles black in the apical half; the black spinulation below middle tarsi conspicuous; hind metatarsi not thickened. Wings a little yellowish towards the anterior margin; the upper angle at the upper marginal cross-vein a little acute or almost rectangular. Squamulæ whitish with yellow margin and fringe. Halteres whitish with the knob darkened.

Female. Frons not broad, widening downwards, trisulcate, the middle channel inconspicuous; at the sides towards the eyes the frons is yellow pruinose, and it is yellow-haired, at the ocelli with some black hairs. Antennæ generally a little paler than in the male, and with the third joint somewhat larger. Thorax and abdomen haired as in the male, but the hairs shorter, the hindmarginal fringes still more conspicuous. Tibiæ quite yellow; hind femora not setulose beneath, only with some short, black bristles towards the apex. Halteres whitish yellow.

Length 10,5—13 mm.

C. canicularis is rare or at all events very local in Denmark and has only been taken in the southern Jutland in Greisdal at Vejle (H. J. Hansen, the author) and at Horsens (O. G. Jensen). The dates are in August. It was for the first time taken in 1878. I have taken it on flowers of *Carduus* and other *Compositæ* and on *Umbelliferæ*. — The variety with bare arista and no hindmarginal fringes on abdomen does not occur in Denmark.

Geographical distribution:— Europe down into Italy; it seems to have its northern limit in Denmark and is not known from England; if *C. rufitarsis* Zett. (XII, 4665, 17—18) is identical with *canicularis* as considered by Strobl (Mitth. Ver. Steierm. 1893, XXIX, 176 and 1898, XXXIV, 225), and as seems to me rather probable, the species goes to the southern Sweden, but is rare.

16. *C. grossa* Fall.

1817. Fall. Dipt. Suec. Syrph. 53, 7 (*Eristalis*). — 1822. Meig. Syst. Besch. III, 281, 5 (*Syrphus*). — 1843. Zett. Dipt. Scand. II, 781, 5 et 1849. VIII,

3166, 5 (*Eristalis*). — 1862. Schin. F. A. I, 286. — 1894. Beck. Nov. Act. Leop. Carol. Akad. LXII, 402, 58, Fig. 1. — 1901. Verr. Brit. Fl. VIII, 236, 14. — 1907. Kat. paläarkt. Dipt. III, 28.

Male. Eyes with very long, blackish brown or black hairs. Frons grey pruinose, especially towards the sides, with a longitudinal groove; vertex and frons with long, yellow hairs. Epistoma densely yellowish grey pruinose; it is slightly hollowed below the antennæ, the central knob not much protruding, lying rather long downwards, the epistoma distinctly hollowed between it and the somewhat prominent upper mouth edge, and somewhat descending. Eye-margins broad, yellowish pruinose, with long, yellow hairs. Occiput grey pruinose, this colour stopping at the lower eye-margin; the hairs somewhat long and dense, yellow, palest below. Antennæ not large, brown or blackish brown, third joint roundish, slightly longer than broad; arista thickened in about the basal third, almost bare. Thorax blackish æneous, somewhat shining, finely punctate;

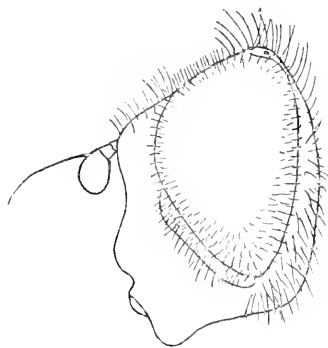


Fig. 80. Head of *C. grossa* ♂.

it is clothed with long, yellow or pale yellow hairs; there are no bristles. Pleura grey pruinose, with long, pale hairs, above generally some black hairs intermingled, and also a few black hairs in the præ-sutural depression. Abdomen black, shining, sometimes with slight bluish or cyaneous reflexes, second segment dull on the disc and third more or less dullish; abdomen is clothed with long, erect, deeply yellow or reddish yellow hairs, paler at the base; they are also a little paler at the apex and here with some black hairs intermingled and the sides of fourth segment generally almost quite black-haired: along the middle the hairs are shorter. Venter black, greyish pruinose, with long, pale hairs, but the fourth segment and the genitalia below with black hairs. Legs with the femora black, a little greyish pruinose, the very apex yellow; tibiæ yellow with a blackish ring below the middle, hind tibiæ often quite yellow; tarsi black or blackish, the middle tarsi may be slightly obscurely reddish on the middle. Femora with rather long, mainly pale hairs, but partly black behind front femora and at the apex of posterior femora; tibiæ longer-haired than usual and hence a little fringed above, the hairs all pale; hind femora not properly setulose beneath, but with somewhat short, strong hairs, black in the apical half; hind metatarsi almost not thickened. Wings somewhat yellowish tinged at the base and anterior margin; upper

marginal cross-vein curved above, the upper angle rectangular or a little obtuse. Squamulae yellowish with a yellow margin and fringe. Halteres pale yellow, the knob more or less darkened to blackish. Plumula rather long-haired.

Female. Frons broad, almost not widening downwards, with slight lateral and sometimes also a middle channel; it has rather long, erect, yellow hairs. Antennae with the third joint a little larger than in the male. Abdomen shining and generally more bluish or cyaneous than in the male. The hairiness of the body nearly as long as in the male, on thorax generally more brilliant deeply yellow, and more black at the end of abdomen, the whole fourth and fifth segments black-haired and the black hairs at the sides stretching in on third segment. Legs paler, tibiae yellow, anterior tibiae sometimes with faint rings; hind femora with stronger hairs below about as in the male. Wings more yellow, especially at the base.

Length 10,5—12 mm.

Remarks: This species varies somewhat with regard to the colour of the hairs at the end of abdomen; Schiner and Becker say that the male has here no black hairs, while Verrall states, that such are generally but not always present; the female has the end of abdomen black-haired to a smaller or larger extent, and according to Becker in rarer cases quite yellow-haired. All Danish specimens have in the male the end and sides of fourth segment more or less black-haired, and in the female the fourth and fifth and the hind margin of the third segment black-haired.

C. grossa is not common in Denmark, and has hitherto only been taken in North Sealand and on Lolland; Ordrup Mose, Ermelund, Geel Skov and Ryget Skov at Farum Sø; on Lolland in Kældskov. My dates are $^{16}/_1$ — $^{17}/_5$; it is exclusively a spring species and it occurs on spring flowers as *Caltha* in fens and meadows, and I have also taken it on the flowers of *Salix*; on $^{16}/_1$ I saw it hovering rather high in the air near *Salix* and other spring-flowering trees, and the sexes sought each other in the air; at the same time some were seen on the flowers of *Salix* together with numerous specimens of an *Andrena*, to which the *Chilosia* was rather similar.

Geographical distribution: — Northern and middle Europe down into France, and also recorded from Italy; towards the north to northern Sweden, and in Finland.

17. *C. albipila* Meig.

1838. Meig. Syst. Besch. VII, 125, 9. — 1862. Schin. F. A. I, 288.
— 1894. Beck. Nov. Act. Leop. Carol. Akad. LXII, 414, 68. — 1901. Verr.

Brit. Fl. VIII. 239, 16. — 1902. Beck. Zeitschr. Hymn. Dipt. II, 355, 8. — 1907. Kat. paläarkt. Dipt. III, 21. — *Eristalis flavipes* Zett. (nec Panz.) 1838. Ins. Lapp. 611, 5 et 1843. Dipt. Scand. II, 784, 9 et 1849. VIII, 3167, 9. — *C. flavicornis* Schin. (nec Fabr.) 1862. F. A. 1, 285.

Male. Eyes with dense, somewhat long, brown hairs. Frons somewhat large, slightly pruinose towards the sides, with a broad, longitudinal groove; vertex and frons yellow-haired, just above the antennæ may be some black hairs. Epistoma only pruinose below the antennæ, for the rest shining; it is slightly hollowed below the antennæ, nearly straight from the antennal prominence to the central knob, this latter small, little prominent and lying somewhat long downwards; between the knob and the prominent mouth edge the epistoma is hollowed, its lower part is moderately prominent and somewhat descending. Eye-margins broad, almost not pruinose, with shortish, yellowish hairs. Occiput grey pruinose, this colour stopping below the eye; the hairs all yellow, or whitish below. Antennæ somewhat large, orange, third joint a little longer than broad; arista apparently bare. Thorax æneous olive, shining, very finely punctate; it is densely clothed with somewhat long, erect, yellow hairs. There are no bristles. Pleura with long, yellow hairs. Abdomen æneous black or more olive, often with slight bluish or purplish reflexes, somewhat dull on second and third segments; it is clothed with long, erect, yellow hairs, shortest along the middle. Venter blackish, somewhat pruinose, with long, pale hairs. Legs with femora black with yellow apex, tibiæ yellow, the anterior may be slightly darkened in the middle; anterior tarsi yellowish with the last or two last joints blackish, front metatarsi blackish above and also middle metatarsi slightly so; hind tarsi blackish, the middle joints more or less obscurely reddish. The hairs on the legs yellowish, but more or less black behind the apical half of front femora, and below the apex of posterior femora are some black hairs; hind femora densely but somewhat finely setulose beneath, the bristles yellow at the base but mixed with black outwards, and towards the apex almost quite black. Hind metatarsi almost not thickened. Wings yellow tinged, especially at the base and anterior margin; upper marginal cross-vein curved above, the upper angle rectangular. Squamulæ whitish with margin and fringe yellow. Halteres yellow with blackish knob.

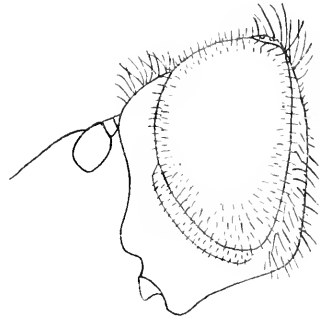


Fig. 81. Head of *C. albipila* ♂.

Female. Frons somewhat broad, widening downwards, trisulcate; it has yellow, erect hairs. Epistoma more hollowed than in the male. Third antennal joint a little larger. Thorax and abdomen haired as in the male, but the hairs a little shorter. Legs quite pale as also the femora are yellow, only the last tarsal joint black and hind metatarsi more or less blackish above: hind femora not setulose below and the short hairs here all yellow, or at the apex a few black bristles. Wings more yellow than in the male and often even a little brownish on the apical part. Halteres orange.

Length 8,5—11,5 mm.

This species bears some resemblance to *C. grossa* but is easily distinguished by the orange antennæ and in the female by the quite pale legs.

C. albipila is not common in Denmark; Ordrup Mose, Hillerød. Tyvekrog, Grib Skov; on Lolland in Kældskov. It is exclusively a spring species, my dates are $\frac{7}{4}$ — $\frac{12}{5}$. It occurs on spring flowers on meadows.

Geographical distribution:— All Europe, towards the north to northern Sweden, and in Finland.

18. *C. chloris* Meig.

1822. Meig. Syst. Besch. III, 284, 11 (*Syrphus chlorus*) et 1830. VI. 352 et 1838. VII, 123. — 1843. Zett. Dipt. Scand. II, 788, 13 (*Eristalis*). — 1862. Schin. F. A. I, 286. — 1894. Beck. Nov. Act. Leop. Carol. Akad. LXII, 420, 73, Fig. 21—22 et 1902. Zeitschr. Hymn. Dipt. II, 351, 11. — 1907. Kat. paläarkt. Dipt. III, 25. — *Syrphus flavicornis* Fabr. 1781. Spec. Ins. II. 431, 49 et 1794. Entom. Syst. IV, 302, 87. — 1822. Meig. l. c. III, 285, 14. — *Eristalis flavicornis* Fabr. 1805. Syst. Antl. 244, 56. — 1843. Zett. Dipt. Scand. II, 785, 10 et 1849. VIII, 3167, 10. — *C. flavicornis* 1902. Beck. Zeitschr. Hymn. Dipt. II, 351, 14. — *C. limbata* Macq. 1827. Soc. Sc. Lille, 204. — 1838. Meig. l. c. VII, 128, 47.

Male. Eyes with somewhat long, dark brown hairs. Frons æneous, with a longitudinal groove, black-haired; vertex yellow-haired, or with black hairs intermingled to nearly black-haired. Epistoma about as in *albipila*, slightly pruinose below the antennæ, for the rest shining; it is slightly hollowed, the central knob small, lying long downwards. Between it and the somewhat prominent upper mouth edge the epistoma hollowed; it is moderately prominent below and somewhat descending. Eye-margins of medium breadth, not pruinose, with short, yellow hairs. Occiput grey pruinose, the colour stopping below the eye; the hairs yellow, above besides some long, black hairs. Antennæ not large, the two last joints orange, the third about circular; arista apparently bare, more or less distinctly yellowish at the base. Thorax

æneous or greenish, finely punctate, shining; it is clothed with erect, yellow or pale yellow hairs of medium length; on the hind part there are besides short, black hairs on the middle, generally not very conspicuous. There are no bristles, only generally a couple of stronger, black hairs on the postalar calli. Pleura with long, yellow hairs and above with some black hairs. Abdomen dark æneous or greenish, shining, second and third segments dull on the disc, the dull space contracted in the middle and thus more or less hour-glass-shaped, especially on third segment. Venter black, shining, with long, pale hairs. Legs with the femora black with yellow apex, tibiæ yellow with a somewhat broad, black ring below the middle; anterior tarsi yellow, the two or three last joints black, hind tarsi black above, but the three basal joints yellowish below; the basal joints of front tarsi also more or less darkened above. The long hairs on the femora black behind front femora, yellow on posterior femora, but black below middle femora and at the apex of hind femora; the hairs on tibiæ partly yellow, partly dark; hind femora black setulose beneath; hind metatarsi almost not thickened. Wings yellow tinged, especially at the base and anterior part; upper marginal cross-vein curved above, the upper angle rectangular. Squamulæ whitish with yellow margin and fringe. Halteres yellow, the knob more or less darkened.

Female. Frons somewhat broad, widening downwards, only with lateral channels; it is yellow-haired with short hairs. Epistoma more hollowed than in the male. Third antennal joint slightly larger. Thorax with short, depressed, almost golden pubescence. Abdomen shining, with depressed hairs, coloured as on thorax, only erect at the basal corners of the segments thus giving rise to a slight indication of bands. Legs paler than in the male, the rings on tibiæ smaller and often more faint; tarsi quite yellow except the two last joints, and sometimes front and hind metatarsi blackened above. The legs all yellow-haired; hind femora finely setulose beneath, the bristles yellow, only some black towards apex.

Length 9—10.5 mm.

One of our specimens has been bred: the pupa is yellow, conically tapering behind but somewhat rounded; it has somewhat short, yellow, rugose anterior spiracular tubes, and an upwards directed, about one mm long, yellow posterior spiracular process, rugose in

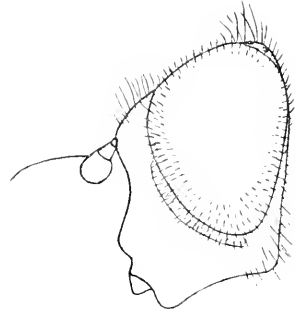


Fig. 82. Head of *C. chloris* ♂.

the outer half, and with a dividing longitudinal line above and below. The length is about 9 mm.

Remarks: Becker has stated (Zeitschr. Hymn. Dipt. II, 1902, 351) *E. flavicornis* Fabr. = *S. flavicornis* Meig. = *S. chloris* Meig.; a specimen in the collection of Sehestedt and Tønder Lund labelled *flavicornis*, and no doubt determined by Fabricius (but not type), is likewise *chloris*, and this confirms the statements given by Becker. It is thus incorrect when *flavicornis* Meig. in the Kat. paläarkt. Dipt. is placed as synonym to *Langhofferi* Beck. — I agree with Becker and Verrall in considering it the most advisable to keep the name *chloris*.

C. chloris is common in Denmark; Charlottenlund, Ordrup Mose, Ermelund, Dyrehaven, Lyngby Mose, Ryget Skov at Farum Sø and Bagsvær: on Lolland at Strandby, in Kældskov and Dødemose west of Nysted; in Jutland at Horsens. It is a spring species, my dates are $14/4$ — $20/6$, the latter date unusually late. It occurs in fens and on meadows on various spring flowers, especially *Caltha* and *Taraxacum*.

Geographical distribution:— Northern and middle Europe down into France and probably to Italy; towards the north to middle Sweden, and in Finland.

19. *C. fraterna* Meig.

1830. Meig. Syst. Besch. VI, 352, 97. (*Syrphus*). — 1862. Schin. F. A. I, 285. — 1894. Beck. Nov. Act. Leop. Carol. Akad. LXII, 244. — 1901. Verr. Brit. Fl. VIII, 248, 20, fig. 227. — 1902. Beck. Zeitschr. Hymn. Dipt. II, 355, 97. — 1907. Kat. paläarkt. Dipt. III, 27. — *Eristalis dimidiata* Zett. 1849. Dipt. Scand. VIII, 3168, 17—18. — *C. dimidiata* 1894. Beck. l. c. LXII, 422, 74, Fig. 64. — *C. rufitibia* Egg. 1860. Verh. zool. bot. Gesell. Wien, X, 349. — 1862. Schin. F. A. I, 288, nota. — *C. chloris* 1870. Verr. (nec Meig.) Ent. Month. Mag. VI, 205. — 1885. Kow. Wien. ent. Zeitg. IV, 205.

Male. Eyes with short, dark hairs, disappearing at the lower end of the eye. Frons pruinose at the sides, with a longitudinal groove; vertex and frons black-haired. Epistoma a little pruinose, most below the antennæ and here at each side with a distinct, triangular, greyish or whitish spot; it is rather much hollowed below the antennæ, the central knob not large but prominent; between the knob and the mouth edge the epistoma a little hollowed, the lower part somewhat protruding and a little descending. Eye-margins of medium breadth, not pruinose, punctate, with short, yellowish hairs. Occiput greyish pruinose, this colour stopping below the eye; the hairs yellow, above besides a few long, black hairs. Antennæ small, brownish red, third joint roundish; arista not long, apparently bare. Thorax æneous black or posteriorly more bluish black, shining, densely and not quite finely

punctate; it is clothed with relatively short, erect hairs which are yellow, but at the sides more or less mixed with black hairs, and on the posterior part and scutellum quite or almost quite black, but just in front of scutellum are again yellow hairs.

There are very short supraalar and more conspicuous postalar bristles, and at the margin of scutellum (generally) short and fine bristles.

Pleura with longish, yellow hairs, at the upper hinder angle of mesopleura a tuft of black hairs, among which a couple of bristles or bristly hairs.

Abdomen rather broad and ovate, æneous black, shining but somewhat dull on second and third segments; it is clothed with not long, yellow or reddish yellow, erect hairs, short on the middle.

Venter black, shining, with long, yellow hairs. Legs with the femora black with yellow apex, tibiæ yellow,

the anterior with a small, black or blackish ring just below the middle, most obvious on the posterior side; hind tibiæ with a similar but more faint ring or patch, or this almost disappearing; middle tarsi with the two basal joints reddish, front and hind tarsi with the basal joints reddish below but darkened above, especially on hind tarsi. Femora not long-haired, the hairs black behind front femora and on the apical half on the front side of hind femora, for the rest yellow; the hairs on tibiæ partly yellow, partly black; hind femora densely black-setulose beneath, yellow at the base; hind metatarsi very slightly thickened. Wings yellow or brownish yellow at the base and on the anterior part; upper marginal cross-vein curved above, the upper angle rectangular. Squamulæ white with margin and fringe pale yellow. Halteres yellow.

Female. Eyes with very short, pale hairs, as in the male wanting on the lower end of the eye. Frons somewhat narrow, widening downwards, with a faint or no middle channel; it has short, yellow hairs, at the vertex some black hairs. Antennæ with the third joint a little larger than in the male. Thorax with short, depressed, yellow or almost golden hairs; short, black bristles at the margin of scutellum generally present, but they may sometimes be very weak and yellow and then very little conspicuous. Abdomen very ovate, shining, with short, depressed, yellow hairs, only erect at the basal corners of the segments. Legs with the rings on tibiæ generally more faint than in the male and hind tibiæ generally quite yellow; all tarsi sometimes yellow with only the last two joints black; hind femora not setulose

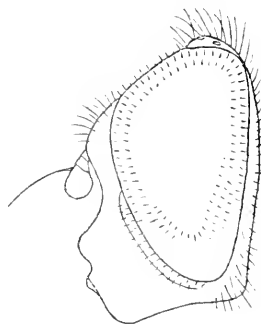


Fig. 83. Head of
C. fraterna ♂.

beneath. the short hairs here all yellow, or a couple of black at the apex. Wings sometimes darker than in the male.

Length 8—9.5 mm.

This species is similar to *chloris*, but, however, distinguished without difficulty: *chloris* is a larger and, especially in the male, less broad species: it has both eyes and body longer-haired, thorax more finely punctate, epistoma of another shape, all tibiæ with distinct black rings, the arista yellow at base, and finally it has no thoracal or scutellar bristles, while *fraterna* has always at all events distinct postalar bristles; in the female *chloris* has a larger and brighter third antennal joint. — According to Zetterstedt the name *dimidiata* was due to Stæger.

C. fraterna is rare in Denmark; Ordrup Mose (Stæger), Geel Skov, Noddebo (the author); on Lolland at Nysted and in Kældskov (L. Jørgensen), and in Jutland at Allerup in Vendsyssel (Esben Petersen); in all only eight specimens. My dates are only $16/5$ — $2/6$.

Geographical distribution: — All Europe down into Italy; towards the north to middle Sweden (after Wahlgren, Zetterstedt only records it from Denmark, but according to Becker (l. c. 247) a female of Zetterstedt's *flavicornis* was *fraterna*); recently it is also recorded from Finland.

20. *C. Bergenstammi* Beck.

1894. Beck. Nov. Act. Leop. Carol. Akad. LXII, 462, 102, Fig. 55. — 1901. Verr. Brit. Fl. VIII. 250, 21, fig. 228. — 1907. Kat. paläarkt. Dipt. III. 23.

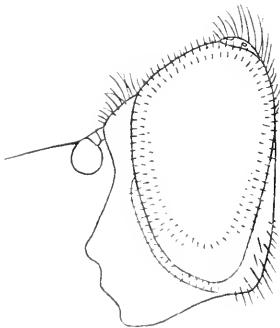


Fig. 84. Head of
C. Bergenstammi ♂.

Male. Eyes with somewhat long, yellowish brown hairs, disappearing at the lower end. Frons a little pruinose, with a shallow longitudinal groove not reaching the top. Vertex yellow-haired, just in front with some black hairs: frons with mixed black and yellow hairs. Epistoma slightly pruinose, shining, most pruinose below the antennæ; it is hollowed below the antennæ, the central knob not large, somewhat prominent: between the knob and the mouth edge the epistoma a little hollowed, the lower part somewhat protruding and descending. Eye-margins of medium breadth,

a little pruinose, with short, yellow hairs. Occiput grey pruinose, this colour stopping below the eye; the hairs yellow, or below more

whitish. Antennæ not large, third joint orange, almost circular; arista apparently bare, it may be indistinctly brownish at the base. Thorax æneous or greenish black, finely punctate, shining; it is clothed with somewhat long, yellow hairs; there are weak and inconspicuous notopleural, short supraalar and a little longer postalar bristles; scutellum has rather fine and little conspicuous marginal bristles, which are moreover sometimes yellow. Pleura with long, yellow hairs. Abdomen narrow and a little more parallel-sided than in *fraterna*, æneous and shining; the second segment almost quite dull, the third indefinitely dullish on the hind part and sometimes also in the middle line; abdomen is clothed with somewhat long, erect, yellow hairs, a little shorter on the middle. Venter shining, with long, pale hairs. Genitalia somewhat pruinose. Legs with femora black with yellow apex, tibiæ yellow with a blackish ring below the middle, the ring may be brown or indistinct on hind tibiæ; tarsi yellow with the last two joints black and hind metatarsi black above. The hairs on femora a little longer than in *fraterna*, all pale, or black behind front femora and at the apex of posterior femora; the hairs on tibiæ almost all pale, only above the middle tibiæ are dark hairs; hind femora black setulose below; hind metatarsi almost not thickened. Wings a little yellowish tinged; upper angle at the upper marginal cross-vein a little acute. Squamulæ whitish with yellow margin and fringe. Halteres yellow.

Female. Frons not narrow, slightly widening downwards, trisulcate, the middle channel more or less indistinct; it is yellow-haired, on the vertex black hairs. Third antennal joint somewhat large, considerably larger than in the male, about circular. Thorax less coarsely punctate than in *fraterna*, the hairs short, but longer than in *fraterna* and more erect; they are all yellow or black on the middle of the disc; scutellar marginal bristles more conspicuous than in the male and stronger, but varying in length, and sometimes more or fewer are yellow, but they are longer than in *fraterna*. Abdomen with longish, yellow, depressed hairs, erect at the basal corners of the segments. Legs with the rings on tibiæ less distinct than in the male; tarsi with generally only the last joint black, and hind metatarsi less darkened; hind femora black setulose below on the apical half.

Length 9—9,5 mm.

This species is much like *fraterna*, but is distinguished in both sexes by the longer hairs on eyes, thorax and abdomen, and in the female the hairs on thorax are more erect; the scutellar bristles are longer, abdomen is narrow and less ovate, the antennæ brighter orange and in the female considerably larger, the rings on tibiæ are generally more distinct, and the tarsi are paler; finally in the female the frons

is more parallel-sided, thorax less coarsely punctate and the hind femora setulose beneath. — The species varies with regard to the scutellar bristles; my material consists of one Danish male and three females and further of two males and two females from Verrall's collection: two of the males (a Danish and an English) have fine, long, black bristles, the third (an English) similar bristles but all yellow; of the females one (Danish) has somewhat short, black bristles, another (English) longer, black bristles, and three others (two Danish and an English) similar but partly yellow bristles.

C. Bergenstammi is rare in Denmark, I only possess four specimens, a male and three females; two of the females are taken in Højenbæk Dal at Vejle on $\frac{1}{8}$ 1908 (the author) and one at Allerup in Vendsyssel on $\frac{2}{6}$ 1909 (Esben Petersen); the male is without particular locality.

Geographical distribution: — Northern and middle Europe down into Austria; Becker records it from Scandinavia as he found a specimen in Loew's collection with Zetterstedt's handwriting; it is otherwise not known from Scandinavia.

21. *C. gigantea* Zett.

1838. Zett. Ins. Lapp. 612, 7 et 1843. Dipt. Scand. II, 791, 16 et 1849. VIII, 3168, 16 et 1859. XIII, 6015, 16 (*Eristalis*). — 1894. Beck. Nov. Act. Leop. Carol. Akad. LXII, 429, 78 et 507, Fig. 66—67. — 1907. Kat. paläarkt. Dipt. III, 28. — *Eristalis olivacea* Zett. 1838. Ins. Lapp. 611, 6 et 1843. Dipt. Scand. II, 791, 15 et 1855. XII, 4664, 15 et 1859. XIII, 6015, 15. — 1894. Beck l. c. LXII, 247.

Male. Eyes with longish hairs, yellowish above, paler below. Frons æneous black with a longitudinal groove; vertex and frons black-haired. Epistoma pruinose below the antennæ, for the rest shining; it is hollowed below the antennæ, the central knob somewhat large and prominent, and between it and the upper mouth edge the epistoma somewhat hollowed; it is only little prominent below and slightly descending. Eye-margins of medium breadth, somewhat pruinose, with longish, white hairs; at the lower margin of the eye a brownish spot. Occiput greyish pruinose, the hairs whitish below but almost exclusively black above. Antennæ not large, third joint squarely roundish; they are black or third joint blackish brown; arista somewhat long, very short pubescent or apparently bare. Thorax æneous black, shining, finely punctate; it is clothed with somewhat long, erect, black or brownish black hairs, partly mixed with paler hairs; there are notopleural, supraalar and postalar bristles, but not very conspicuous; scutellum with numerous, somewhat long but fine marginal

bristles. Pleura with longish, pale and above some black hairs. Abdomen æneous black, shining, second segment dull on the whole disc and the third with a more or less hour-glass-shaped dull patch; abdomen clothed with rather long, erect, yellow hairs, shorter on the middle; they are palest at the base, black at the hind margins of third and fourth segments, on the latter at all events at the hind corners. Venter somewhat pruinose, with long, pale hairs. Legs with femora black, the anterior narrowly reddish at the end, tibiæ more or less obscurely reddish with a broad, black ring below the middle, broadest on hind tibiæ, which are only a little reddish at base and slightly at apex; tarsi black. The hairs on femora black behind front femora, for the rest whitish, on tibiæ mainly dark except the usual golden pubescence below front and hind tibiæ; all tibiæ somewhat distinctly fringed above; hind femora black-setulose beneath only on the apical half; hind metatarsi not or almost not thickened. Wings somewhat strongly brownish tinged, especially towards the anterior margin; upper marginal cross-vein a little curved above, the upper angle about rectangular. Squamulæ yellowish white with yellow margin and fringe. Halteres yellow, the knob more or less darkened.

Female. Frons of medium breadth, widening downwards, trisulcate, the middle channel more or less indistinct; it has yellow hairs, not quite short and directed forwards, in front of the ocelli black hairs. Third antennal joint slightly larger than in the male. Thorax more coarsely punctate, with a pubescence of shorter and somewhat long, rather erect, yellow hairs; some of the longer hairs are dark, especially behind, and likewise some on scutellum; scutellar marginal bristles a little shorter but stronger than in the male. Abdomen somewhat bluish black, shining; the hairs somewhat short and depressed, but erect at the basal corners of the segments; they are whitish at the sides and just at the front margins of the segments, but otherwise black on the middle, this giving rise to narrow, arcuated bands of whitish hairs. Legs a little paler than in the male as the reddish parts are more bright, and the base of middle metatarsi and the front tarsi below more or less yellowish; the legs are quite pale-haired, and hind femora without black bristles below. Wings often a little less tinged.

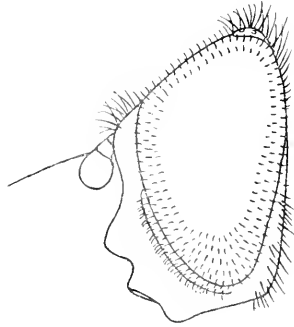


Fig. 85. Head of
C. gigantea ♂.

Length 9 to nearly 11 mm.

Remarks: Becker describes the thoracal pubescence of the female as having the short hairs partly and the long hairs all black; in my specimens the pubescence is nearly all yellow with only few of the long hairs black.

C. gigantea is rare in Denmark, I only know two specimens, both females, one from Ordrup Mose ^{16/6} 1844 (Stæger) and one from Laurberg near Randers in Jutland ^{22/5} 1910 (Esben Petersen).

Geographical distribution:— Northern and middle Europe down into Bohemia, and also recorded from Italy; towards the north to northern Sweden, and in Finland.

22. *C. proxima* Zett.

1843. Zett. Dipt. Scand. II. 792, 17 (*Eristalis*). — 1862. Schin. F. A. I, 282, 12. — 1894. Beck. Nov. Act. Leop. Carol. Akad. LXII, 432, 80, Fig. 71—72. — 1901. Verr. Brit. Fl. VIII, 265, 25. — 1907. Kat. paläarkt. Dipt. III, 36. — *C. modesta* Egg. 1860. Verh. zool. bot. Gesell. Wien, X, 354. — 1862. Schin. F. A. I, 287.

Male. Eyes with longish, yellowish, above more pale brownish hairs. Frons broadly grey dusted at the sides, with a longitudinal groove; vertex and frons black-haired. Epistoma pruinose below the antennæ, for the rest very slightly pruinose, shining; it is hollowed

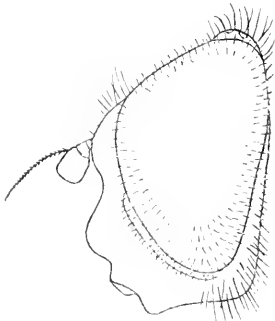


Fig. 86. Head of
C. proxima ♂.

below the antennæ, the central knob somewhat broad and prominent; between the knob and the upper mouth edge the epistoma is hollowed, the lower part not prominent, and it is very slightly descending. Eye-margins of medium breadth, pruinose, with white hairs. Occiput grey pruinose, the hairs white below, black above and here long, but behind the vertex may be yellow hairs. Antennæ small, black or blackish brown, third joint squarely roundish; arista short, distinctly pubescent. Thorax æneous or dark greenish black, shining, finely punctate; it is densely clothed with somewhat long, erect, yellow or brownish yellow hairs, more or less mixed with black, until becoming almost quite black-haired; on scutellum the hairs longer, but besides there are shorter hairs. There are notopleural, supraalar and postalar bristles, the supraalar very short, the postalar strongest, but the bristles not conspicuous; scutellum has numerous, somewhat long, but fine marginal bristles. Pleura with

longish, greyish yellow hairs, more or less mixed with black and often quite black above. Abdomen somewhat short, æneous black, second and third segments almost quite dull, only the latter a little shining at the sides; the fourth shining; abdomen is clothed with rather long, erect hairs, shorter on the middle; the hairs are yellow but more or less black on the middle and at the hind margins of third and fourth segments; the yellow hairs at the sides are thus interrupted by black at the hind corners of third and fourth segments; also at the hind corners of second segment may be a few black hairs. Venter black, densely grey pruinose, with long, pale hairs, on third and fourth segments also black hairs. Legs black, anterior femora slightly reddish at the extreme apex; tibiæ yellowish or reddish in about the basal third and at the apex, hind tibiæ rather indistinctly; tarsi blackish, middle tarsi obscurely reddish at the base; sometimes the anterior tarsi more reddish; the long hairs behind front femora black, on posterior femora white but black at the apex of hind femora, and also at the apex of middle femora a few black hairs; tibiæ dark-haired except the golden pubescence below front and hind tibiæ, and they are somewhat fringed above; hind femora black-setulose below, at the base the bristles yellow, towards apex some longer, bristly hairs; hind metatarsi almost not thickened. Wings more or less yellowish or somewhat brownish tinged, especially towards the anterior margin; upper marginal cross-vein curved above, the upper angle rectangular. Squamulæ dirty whitish with a brownish margin and a yellow fringe. Halteres yellowish or pale yellowish, the knob sometimes slightly darkened.

Female. Frons somewhat broad, slightly widening downwards, the middle channel indistinct; it has yellowish hairs, directed forwards, but above and on vertex the hairs are black. Antennæ with the third joint somewhat larger than in the male. Thorax more coarsely punctate, with short, somewhat decumbent, greyish yellow pubescence, mixed with some slightly longer, black hairs; the scutellar bristles considerably stronger than in the male. Abdomen somewhat bluish black, with somewhat short, depressed, white hairs, erect at the basal corners of the segments; on the whole middle of second, third and fourth segments are short, black hairs, rather extended at the hind margins of the two former segments. Legs all pale-haired and hind femora not setulose beneath. Wings generally less or almost not tinged.

Length 7,5—8,5 mm.

This species is nearly allied to *gigantea* but it is smaller, the facial knob is a little broader; abdomen more dull above, and it is relatively shorter as it is about as long as thorax and scutellum together, while in *gigantea* it is longer than thorax and scutellum;

the wings are much less tinged; in the female the thoracal pubescence is different as it is longer, more erect and more conspicuously formed of long and short hairs in *gigantea* than in *proxima*.

C. proxima is not at all common in Denmark; Ordrup Mose, Lyngby Mose, at Fure Sø, Hillerød, Donse, Espergærde, Jægerspris; on Lolland in Egholm Skov and Kældskov and at Kærstrup; on Funen at Odense and in Jutland at Horsens. My dates are $\frac{4}{7}$ — $\frac{13}{8}$, it thus seems to be a somewhat late occurring species.

Geographical distribution:— All Europe, towards the north to middle Sweden; further in North Asia.

23. *C. impressa* Loew.

1840. Loew, Programm Posen, 33, 9 et Isis 1840. 570, 9. — 1862. Schin. F. A. I, 282. — 1894. Beck. Nov. Act. Leop. Carol. Akad. LXII, 436, 84, Fig. 89. — 1901. Verr. Brit. Fl. VIII, 243, 18, fig. 226. — 1907. Kat. paläarkt. Dipt. III, 30. — *Eristalis coemeteriorum* Fall p. p. (nec L.) 1817. Dipt. Suec. Syrph. 51, 11. — 1843. Zett. Dipt. Scand. II, 804, 28 et 1859. XIII, 6019, 28. — *Syrphus vernalis* 1822. Meig. (nec Fall.), Syst. Besch. III, 290, 23. — *C. vernalis* 1902. Beck. Zeitschr. Hymn. Dipt. II, 352, 23.

Male. Eyes with not long, brown hairs. Frons somewhat narrow, with a narrow and not deep longitudinal groove; vertex and frons black-haired. Epistoma slightly pruinose, shining, and only a little more pruinose below the antennæ; it is not much hollowed below the antennæ, the central knob somewhat large but relatively not much prominent and between it and the mouth edge the epistoma moderately hollowed; its lower part not prominent and very slightly descending. Eye-margins rather narrow, not pruinose, with short, whitish hairs. Occiput slightly greyish pruinose, below at the margin of the eye it is more distinctly but narrowly grey, the colour stopping below the eye: the hairs are white below, mainly dark and long above. Antennæ black, not large,

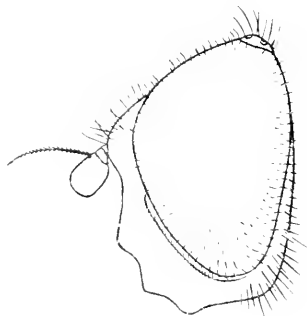


Fig. 87. Head of *C. impressa* ♂.

third joint nearly quadratic, not or very slightly longer than broad, sometimes a little pale beneath the base; arista distinctly but short-pubescent. Thorax æneous or bluish black, densely and somewhat coarsely punctate, not much shining; it is clothed with somewhat long, erect, and much shorter, more decumbent, black hairs; there are

notopleural, supraalar and postalar bristles, the supraalar shortest, the postalar rather long; scutellum with numerous, somewhat long, distinct marginal bristles. Pleura bluish black, with longish, black hairs. Abdomen somewhat short and ovate, æneous black, shining, second segment dull velvet black except the shining hind margin, and third

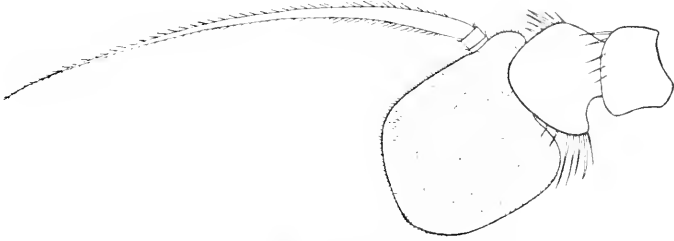


Fig. 88. Antenna of *C. impressa* ♂, from the inside. $\times 75$.

segment dull on the front part in the middle; abdomen is clothed with long, erect hairs, shorter on the middle; they are yellow, only black at the hind margins of second, third and fourth segments and especially at the hind corners of these segments. Venter black, shining, slightly pruinose, with paler hind margins to the segments; it has long, pale hairs on the two first segments and at the sides and hind margins of third and fourth but the middle part of these latter segments has short, black hairs. Genitalia somewhat small, with black hairs. Legs all black; the long hairs black behind front femora, but mostly pale on posterior femora except at apex, and the short hairs on the anterior side of anterior femora and the posterior side of hind femora chiefly pale; below the front side of hind femora some long, downwards directed hairs; the hairs on tibiæ dark except the usual, golden pubescence below front and hind tibiæ; the tibiæ are short-fringed above, hind tibiæ a little longer fringed, especially about the middle; hind femora densely black-setulose beneath but the bristles short; hind metatarsi slightly thickened. Wings somewhat yellow or brownish yellow tinged, especially on the basal part, and the base itself distinctly yellow; upper marginal cross-vein curved above, the upper angle about rectangular. Squamulæ yellowish with a darker yellow margin and fringe. Halteres yellow.

Female. Eyes with very short hairs. Frons of medium breadth, a little widening downwards, without middle channel; it has short, mixed black and yellow hairs, at the vertex black hairs. Antennæ with the third joint somewhat larger than in the male, and paler. Thorax with short, depressed, greyish hairs, more or less mixed with

black, and often a broad longitudinal middle band black-haired. Abdomen densely and coarsely punctate and not much shining, with short, depressed, whitish hairs, only erect at the basal corners of abdomen. Legs short-haired, hind femora with very short, bristly, pale hairs below, black and a little stronger on the apical part.

Length 6 to fully 8 mm.

C. impressa is somewhat common in Denmark; at Copenhagen, Lerso, Amager, Ordrup Mose, Dyrehaven, Hillerød, Tyvekrog, Faxø Ladeplads, Jægerspris; on Lolland in Kældskov, Egholm Skov, Dødemose, Kærstrup and Strandby; on Langeland at Lohals; on Funen at Odense. My dates are $^{11}/_6$ — $^{1}/_9$, it thus occurs somewhat late. It occurs in grass and on flowers in fens and on fields.

Geographical distribution: — All Europe, towards the north to middle Sweden, and in Finland.

24. *C. albitarsis* Meig.

1822. Meig. Syst. Besch. III, 290, 22 (*Syrphus*). — 1838. Zett. Ins. Lapp. 612, 8 et 1849. Dipt. Scand. VIII, 3170, 18—19 et 1855. XII, 4666, 18—19 (*Eristalis*). — 1862. Schin. F. A. I, 283. — 1901. Verr. Brit. Fl. VIII, 245, 19, fig. 213. — 1902. Beck. Zeitschr. Hymn. Dipt. II, 352, 22. — 1907. Kat. paläarkt. Dipt. III, 22. — *Musca viduata* Fabr. (nec L. teste Meig.) 1775. Syst. Entom. 781, 41 et 1781. Spec. Ins. II, 446, 54 et 1787. Mant. Ins. 348 et 1794. Ent. Syst. IV, 336, 10. — *C. viduata* 1862. Schin. F. A. I, 288. — 1894. Beck. Nov. Act. Leop. Carol. Akad. LXII, 235 et 439, 86, Fig. 91. — *Eristalis coemeteriorum* var. γ , 1817. Fall. Dipt. Suec. Syrph. 55. — *Syrphus viduus* Meig. 1822. l. c. III, 282, 9 et 1838 (*Cheilosia*) VII, 124. — 1902. Beck. Zeitschr. Hymn. Dipt. II, 351, 9. — *C. flavimana* Meig. 1838. l. c. VII, 126, 25. — *Eristalis flavimana* 1843. Zett. l. c. II, 793, 18 et 1849. VIII, 3169, 18. — *C. flavimana* 1902. Beck. Zeitschr. Hymn. Dipt. II, 355, 25. — *Eristalis innupta* Zett. 1843. l. c. II, 802, 26 et 1849. VIII, 3172, 26 et 1859. XIII, 6018, 26. — 1894. Beck. Nov. Act. Leop. Carol. Akad. LXII, 249.

Male. Eyes with somewhat short, brownish hairs. Frons shining, with a somewhat broad and triangular longitudinal groove; vertex and frons black-haired. Epistoma somewhat greyish pruinose all over and only slightly more below the antennæ; it is much hollowed below the antennæ, the central knob rather large and prominent; between the knob and the mouth edge the epistoma somewhat hollowed, the lower part somewhat protruding and also somewhat descending. Eye-margins somewhat narrow, a little pruinose, with short, white hairs. Occiput greyish pruinose, narrowly grey towards the margin of the eye, the colour stopping below the margin of the eye; the hairs whitish below, chiefly black above, and here there are long hairs. Antennæ small, black or second and third joints blackish brown,

third joint almost broader than long; arista very short-pubescent, almost bare. Thorax bluish black, rarely more dark æneous, somewhat densely and not quite finely punctate, shining; it is clothed with long, erect hairs, and besides with shorter hairs, especially distinct on the posterior part and scutellum; the hairs are all black or sometimes greyish or yellowish at the front margin; there are inconspicuous notopleural and supraalar bristles and more conspicuous postalar bristles; the scutellar marginal bristles are often rather weak but sometimes stronger and more distinct. Pleura with long, black hairs. Abdomen somewhat parallel-sided, bluish or æneous black, second and third segments dull on the middle, shining at the sides, the fourth segment shining; abdomen is clothed with long, erect, yellow hairs,

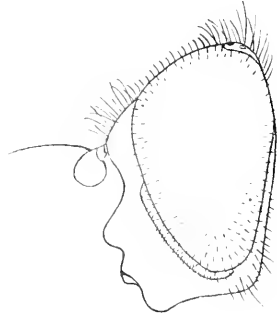


Fig. 89. Head of
C. albitalis ♂.

longest at the sides; just at the front corners of the second segment are generally more or fewer black and somewhat bristly hairs. Venter shining, with long, pale hairs, on the whole middle of third and fourth segments short, black hairs. Genitalia rather large. Legs black, the apex of front metatarsi and the three following joints yellow, the middle tarsi similarly coloured but generally more obscure, and on the hind tarsi the four first joints generally a little pale at apex. Legs mainly black-haired only with white hairs behind middle and hind femora; hind femora densely black-setulose beneath; hind metatarsi slightly thickened. Wings yellow, or when quite mature more or less strongly brown tinged, especially towards the anterior margin and the base, which latter is yellow or more or less strongly brown; upper marginal cross-vein curved just above, the upper angle rectangular. Squamulæ white to yellow with a darker margin and fringe. Halteres orange, sometimes the knob more or less darkened.

Female. Eyes bare. Frons not broad, widening downwards, trilobate, but the middle channel often disappearing in the middle; the frons has short, yellow hairs, at the vertex some black hairs. Antennæ almost not larger than in the male, often a little paler. Thorax bluish black or more æneous, densely punctate, with very short, depressed hairs which are all black or more or less mixed with pale hairs; the bristles distinct. Abdomen ovate, bluish or generally æneous, shining; it has short, depressed, yellowish hairs, only erect at the basal corners of second and sometimes also of third segment. Legs with the middle tarsal joints generally less pale than in the male

or almost quite obscure, but then, however, somewhat pale below; hind femora setulose beneath but the bristles very short. Wings almost quite yellow or yellowish brown.

Length 7—10 mm.

The pupa is rather characteristic and easily known from the other mentioned *Chilosia*-pupæ. It is dirty yellowish brown, 7.5 mm long; there are two a little corrugated anterior spiracular tubes, about 1 mm long; the posterior end is characteristically shaped, it is only slightly attenuated and suddenly cut off, so that the posterior end forms a flat, circular disc, turned very slightly obliquely upwards and with some small, distant bunches of spines round the margin; in the middle of the disc is the short, brownish black spiracular process, directed straight backwards; its posterior end is flat, divided into two halves by a perpendicular furrow, and with eight small, pointed protuberances round the margin.

This species is easily recognised by the characteristic colour of the tarsi and the brown or brownish yellow wings; also the black hairs at the front corners of the second abdominal segment in the male is characteristic, but may sometimes be wanting; when in the female the tarsi are obscured it may bear some resemblance to *nigripes*, but this species has blackish wings and a much shorter-haired abdomen.

C. albitarsis is our most common species of the genus and has been taken in all parts of our country, including Bornholm. My dates are $^{20}/_4$ — $^{26}/_7$. It occurs on various flowers, especially *Caltha* and *Ranunculus*, in fens, on fields and in thickets, and especially in spring. The pupa was taken by Mr. Kryger in flood refuse in Damhusmosen on $^{24}/_5$, the imago came on $^{16}/_6$, and in Ruderhegn on $^{9}/_2$ and $^{13}/_4$, the imagines developing respectively on $^{16}/_4$ — $^{27}/_4$ and on $^{5}/_5$; further it has been bred by Mr. Schlick from flood refuse at Randers, the imagines came in May.

Geographical distribution:— The species is distributed over all Europe and into North Africa; towards the north to northern Sweden, and in Finland.

25. *C. carbonaria* Egg.

1860. Egg. Verh. zool. bot. Gesell. Wien, X, 353. — 1862. Schin. F. A. I. 281. — 1894. Beck. Nov. Act. Leop. Carol. Akad. LXII, 454, 97, Fig. 31—32. — 1901. Verr. Brit. Fl. VIII, 260, 20. — 1907. Kat. paläarkt. Dipt. III, 24.

Male. Eyes with not long, blackish brown hairs. Frons somewhat small and slightly arched, a little pruinose, more distinctly at the margin; it has a longitudinal groove. Vertex with black and yel-

low hairs, frons black-haired. Epistoma a little pruinose below the antennæ, for the rest slightly pruinose, shining; it is much hollowed below the antennæ, the central knob not large but very prominent, between it and the mouth edge the epistoma somewhat hollowed and the lower part much prominent and rather considerably descending. Eye-margins not broad, a little pruinose, with somewhat short, white hairs. Occiput grey pruinose, the colour stopping below the eye; the hairs white below, yellow above, and here besides some long, black hairs. Antennæ small, third joint red or brownish red, not at all longer than broad; arista distinctly but very short-pubescent. Thorax black or somewhat bluish black, finely punctate, shining; it is clothed with somewhat long, erect, black hairs and shorter, pale hairs; the short hairs are longest on the front part and may here almost reach the long hairs in length, they are short behind and on scutellum, and here more or less black, and the long hairs are here three to four times as long as the short; the long hairs are longest behind and on scutellum. There are indistinct notopleural and supraalar bristles and more distinct postalar bristles; the scutellar marginal bristles are long and distinct, though fine. Pleura with long, yellow hairs, at the top of mesopleura some black, more bristly hairs. Abdomen somewhat long, parallel-sided and rather flat; it is black or bluish black, shining but dull on the disc of second segment and partly on third, here most broadly towards the hind margin; it is clothed with long, erect, yellow hairs, on most of the dull parts are short, black hairs and also the fourth segment has short, black hairs on the disc. Venter black, shining, with yellow hairs, long on second segment, short on the rest except at the hind margin of third segment. Genitalia shining, with yellow hairs. Legs black, anterior knees and extreme apex of anterior tibiæ reddish, but generally very obscurely; the hairs behind front femora black, on the posterior femora yellow in front, white on the posterior side, but at the apex some black hairs; the hairs on tibiæ dark except the usual golden pubescence on front and hind tibiæ below; the hairs on anterior tarsi somewhat long; hind femora densely and somewhat strongly black-setulose beneath; hind metatarsi a little thickened. Wings somewhat long, anterior margin a little more distinctly spinulose than usual; they are rather strongly brownish tinged, especially on the apical half but also

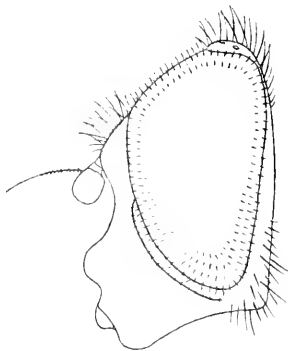


Fig. 90. Head of
C. carbonaria ♂.

the base is brown; upper marginal cross-vein curved, the upper angle rectangular. Squamulæ whitish or yellowish white with yellow margin and fringe. Halteres orange, the knob may be a little darkened.

Female. Frons not broad, widening downwards, the middle channel only represented by an impression in front; the frons is yellow-haired, at the ocelli a few black hairs. Antennæ with the third joint a little larger than in the male and more red. Thorax somewhat coarsely punctate, with short, somewhat depressed, yellow pubescence. Abdomen broader than in the male with the greatest breadth about at the hind part of third segment; it has short, depressed, black hairs, at the sides long, erect, yellow hairs; between the erect, pale and the depressed, black hairs are depressed, pale hairs forming slight fasciæ. Legs considerably paler than in the male as all tibiæ are broadly reddish yellow at base, and anterior tibiæ at apex; also hind tibiæ may be reddish at the extreme apex; the base of middle tarsi and of front tarsi below more or less reddish; the legs almost all pale-haired except on middle tibiæ; hind femora black-setulose beneath. Wings with the difference between the basal and the more strongly brown apical half more pronounced than in the male.

Length 9—9,5 mm.

C. carbonaria is rare in Denmark, only six specimens, a male and five females have been caught; on Funen at Veflinge (H. J. Hansen) and Middelfart (the author), and in Jutland in Greisdal and Højenbæk Dal at Vejle (the author) and at Horsens (O. G. Jensen). The dates are $\frac{7}{7}$ — $\frac{1}{8}$.

Geographical distribution: — Northern and middle Europe down to the Alps and in northern France; it seemed to have its northern limit in Denmark; to be sure Becker records it from Scandinavia, but this is, I think, on account of a specimen in our collection, determined by Becker, as it is otherwise not known from Sweden; it is there-against recently recorded from Finland, and it occurs in England, but it seems everywhere to be a somewhat rare species.

26. *C. cynocephala* Loew.

1840. Loew, Programm Posen, 32, 7, Fig. 45 et 1840. Isis, 569, Fig. 45. — 1862. Schin. F. A. I, 282. — 1894. Beck. Nov. Act. Leop. Carol. Akad. LXII, 456, 98, Fig. 33—34. — 1901. Verr. Brit. Fl. VIII, 259, 26, fig. 211. — 1907. Kat. paläarkt. Dipt. III, 26. — *Eristalis coracina* Zett. 1843. Dipt. Scand. II, 805, 29 et 1849. VIII, 3173, 29. — *Eristalis rostrata* Zett. 1843. l. c. II, 805, 30 et 1849. VIII, 3173, 30 et 1855. XII, 4668, 30 et 1859. XIII, 6019, 30. — 1894. Beck. l. c. LXII, 249.

Male. This species is much like *carbonaria*. Eyes with somewhat long, blackish hairs. Frons a little more arched, not pruinose, shining.

Epistoma similar but the lower part less prominent, and also less descending. Eye-margins a little broader. Antennæ with the third joint a little larger. Thorax bluish black, similarly haired, but the hairs shorter and a difference between long and short hairs only present on the posterior part and scutellum, and the long hairs only about twice as long as the short. Scutellar marginal bristles almost not longer than the long hairs. Abdomen likewise with the erect hairs shorter. Legs a little paler, the tibiæ distinctly reddish yellow at the base, indistinctly at apex; the legs haired chiefly in the same way as in *carbonaria*, hind femora likewise densely but less strongly setulose beneath. Wings similar but short, considerably shorter than in *carbonaria*. Squamulæ white with the fringe whitish. Halteres pale yellow.

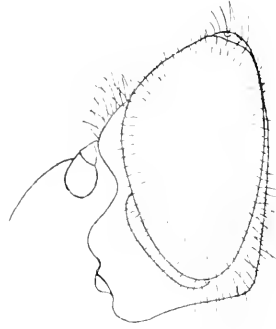


Fig. 91. Head of
C. cynocephala ♂.

Female. Likewise similar to the female of *carbonaria*. Antennæ considerably larger than in the male and consequently also larger than in the female of *carbonaria*, and more brown. Thorax and abdomen more densely and coarsely punctate. The hairs on thorax slightly shorter and more mixed with black; the scutellar bristles a little shorter. Pubescence on abdomen similar, but I find no traces of fasciæ. Legs as in *carbonaria* but the front femora black-haired behind and the tibiæ much more black-haired. Wings likewise with the contrast between the basal and the brown apical part distinct, but they are considerably shorter.

Length 8—8,5 mm.

C. cynocephala is rare in Denmark, we have only five specimens, two males and three females; the three specimens are from earlier time, without particular locality; of the other two one is taken at Damhussø on $\frac{4}{6}$ 1915, the other at Thisted in Jutland on $\frac{14}{8}$ 1906 (the author); they are both taken in low herbage at water.

Geographical distribution:— Northern and middle Europe down into Austria and Styria, and also recorded from Italy; towards the north to southern Sweden, and in Finland.

27. *C. vernalis* Fall.

1817. Fall. Dipt. Suec. Syrph. 55, 12 (*Eristalis*). — 1843. Zett. Dipt. Scand. II, 797, 21 et 1849. VIII, 3171, 21 et 1859. XIII, 6016, 21 (*Eristalis*). — 1862. Schin. F. A. I, 287. — 1894. Beck. Nov. Act. Leop. Carol. Akad.

LXII. 457, 99, Fig. 35. — 1901. Verr. Brit. Fl. VIII, 254, 24. — 1907. Kat. paläarkt. Dipt. III, 40. — *Syrphus pallidicornis* Meig. Syst. Besch. III, 294, 31. — *Eristalis pallidicornis* 1843. Zeit. l. c. II, 800, 24 et 1849. VIII, 3172, 24. — *C. pallidicornis* 1902. Beck. Zeitschr. Hymn. Dipt. II, 354, 31. — *C. luctuosa* Meig. 1838. l. c. VII, 125, 16. — 1902. Beck. Zeitschr. Hymn. Dipt. II, 355, 16. — *C. nitida* Meig. 1838. l. c. VII, 126, 17. — 1902. Beck. l. c. II, 355, 17. — *C. obscura* Loew. 1840. Programm Posen, 33, 10 et lsis 1840. 570, 10.

Male. Eyes with somewhat short, dark brownish to blackish pubescence, generally paler quite below; the hairs have generally a somewhat strong appearance. Frons not pruinose, with a longitudinal groove; vertex with black and yellow hairs, frons black-haired. Epistoma a little pruinose below the antennæ, for the rest shining; it is

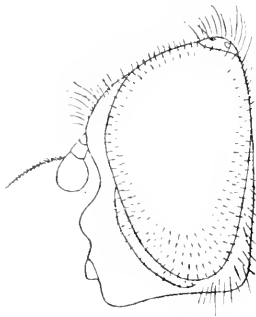


Fig. 92. Head of
C. vernalis ♂.

somewhat hollowed below the antennæ, the central knob distinctly prominent and together with the lower part rather protruding; between the knob and the mouth edge the epistoma is only a little hollowed, and it is slightly descending. Eye-margins of medium breadth; they are not pruinose but have short, pale hairs. Occiput grey pruinose, the colour stopping below the eye; the hairs yellowish, some of the long hairs above black. Antennæ not large, third joint somewhat roundish, blackish brown to reddish; arista short-pubescent. Thorax greenish or æneous black, sometimes bluish black, densely, somewhat

finely punctate, shining; it is clothed with longish, erect, yellow hairs which may be more or less mixed with black, especially towards the sides, and in rare cases they may be all black; on the posterior part and scutellum are besides short, black hairs; there are rather short and inconspicuous notopleural, supraalar and postalar bristles; the scutellar marginal bristles distinct but not long. Pleura with longish, yellow hairs, more or less mixed with black. Abdomen æneous or sometimes bluish black, second and third segments almost quite dull, fourth segment shining; the pubescence is erect, somewhat long and yellow, but shorter and black along the middle, the hairs may also be more or less black at the hind margin of the third and on almost all the fourth segment, so that the hairs at the sides are black at the hind corners of third and fourth segments, or along the whole side of the fourth segment. Venter shining, with long, pale hairs, short on third and fourth segments. Legs with femora black with just the apex yellow, tibiæ yellow with a broad, black ring

below the middle, broadest on hind tibiæ; middle tarsi more or less yellowish on the basal joints; the hairs on femora black behind front femora and on the apical part or half of posterior femora, for the rest pale; on the tibiæ the hairs are chiefly black except the usual, golden pubescence on front and hind tibiæ; hind femora densely black-setulose beneath; hind metatarsi somewhat thickened. Wings some-

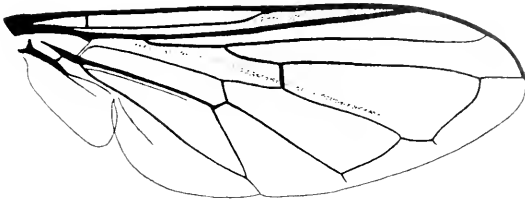


Fig. 93. Wing of *C. vernalis* ♂.

what brownish tinged; upper marginal cross-vein curved above, the upper angle rectangular. Squamulæ whitish with a whitish fringe. Halteres pale yellow.

Female. Frons of medium breadth, a little widening downwards, with the middle channel indistinct or quite wanting; the frons has short, yellow hairs, in front of the ocelli are black hairs. Antennæ with the third joint larger than in the male and often paler. Thorax almost not more strongly punctate than in the male, with short, somewhat depressed or more erect, yellow hairs, often more or less black on the posterior part of the disc. Abdomen ovate, shining, with short, depressed, black hairs, but longer, erect and yellow at the sides of second and third segments, and sometimes the short hairs yellow over a large part of the segments and also more erect. Legs chiefly as in the male but the tarsi often paler and also front and hind tarsi pale on the basal joints, especially below; hind femora black-setulose below.

Length 5.5—7 mm.

The pupa is yellowish white, of the same characteristic shape as that of *albitarsis*, as the posterior end is cut off, forming a flat disc bearing in the middle the yellow spiracular process stretching horizontally backwards. The length is about 4 mm.

This species varies somewhat; the eye-hairs may vary in length, but are always rather short; the antennæ vary in colour from red to almost black, and the third joint may also vary a little in size in both sexes; finally the hairs on thorax and abdomen vary not little in colour, from nearly all yellow to all black on thorax and ex-

tensively so on abdomen; the pale-haired specimens are greenish or æneous while the dark-haired are bluish black; the pale-haired females have also generally the hairs more erect both on thorax and abdomen. — Of the foregoing species it bears resemblance to *proxima*, but this species is larger, has paler and a little longer eye-hairs and the hind metatarsi almost not thickened; a good character is also that it has the venter greyish pruinose, not shining as in *vernalis*. It is also allied to *cynocephala*, but this is distinctly larger, has a more protruding and descending epistoma and a little longer eye-hairs.

C. vernalis is common in Denmark; at Copenhagen, Amager, Utterslev Mose, Ordrup Mose, Ermelund, Dyrehaven, Lyngby Mose, at Fure Sø, Søllerød, Hillerød, Tyvekrog, Nyraad near Vordingborg; on Lolland at Bremersvold, in Egholm Skov and Dødemose west of Nysted; on Langeland at Lobals; on Funen at Odense, and in Jutland at Horsens, Holstebro, Thisted and Lønstrup. My dates are $\frac{6}{5}$ — $\frac{1}{9}$. It occurs on various flowers on fields and meadows and also in woods during the whole summer. The pupa was taken by Mr. Schlick in flood refuse in Utterslev Mose, the imago came in May.

Geographical distribution:— All Europe, towards the north to northern Sweden and in Finland.

28. *C. velutina* Loew.

1840. Loew, Programm Posen, 33, II, Fig. 44 et Isis 1840, 570, 11, Fig. 44. — 1862. Schin. F. A. I, 288. — 1894. Beck. Nov. Act. Leop. Carol. Akad. LXII, 486, 122, Fig. 80. — 1907. Kat. paläarkt. Dipt. III, 40. — *C. decidual* Egg. 1860. Verh. zool. bot. Gesell. Wien, X, 356. — 1862. Schin. F. A. I, 275. — *Eristalis fraterna* 1843. Zett. p. p. (nec Meig.) Dipt. Scand. II, 798, 22 et 1849. VIII, 3172, 22 et 1859. XIII, 6017, 22.

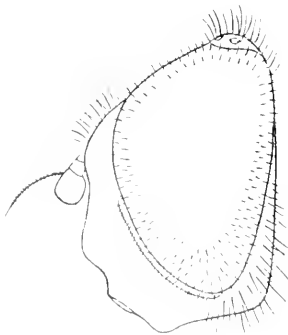


Fig. 94. Head of *C. velutina* ♂.

Male. Eyes with not long, yellowish or pale brownish hairs. Frons more or less pruinose, especially at the top and the sides, with a longitudinal groove; frons black-haired or with yellow hairs above, vertex yellow-haired with a few black hairs in front. Epistoma distinctly grey pruinose, of a characteristic flat shape; it is very slightly hollowed, almost straight from the antennæ to the central knob, and this latter is thus slightly prominent, but broad; between the knob and the not protruding mouth edge the epistoma is very slightly hollowed, the lower part is not prominent

and slightly descending; the lateral margin of the oral aperture is short, the front margin deeply curved. Eye-margins somewhat narrow, a little pruinose, with longish, white hairs. Occiput grey pruinose, the colour stopping below the eye; the hairs white below, yellow above, and here besides long, black hairs. Antennæ small, the basal joints black, the third roundish, brown or brownish red; arista short-pubescent. Thorax æneous or dark brassy, very finely punctate, shining; it is clothed with medium long, erect, yellow hairs: there are black hairs in the præsutural depression but no distinct notopleural or supraalar bristles and only one well developed postalar bristle: scutellum with distinct but not strong marginal bristles. Pleura with yellow hairs and some black hairs intermingled. Abdomen with second and third segments dull black except the front corners of the latter; the fourth segment æneous, shining; abdomen is clothed with longish, erect, yellow hairs, on most of the dull parts are shorter, black hairs. Venter grey pruinose, with long, pale hairs, on the middle of third and fourth segments short, black hairs. Genitalia somewhat pruinose. Legs with femora black with the extreme apex yellow, only slightly on the hind femora; tibiæ yellow with a black ring below the middle, broadest on hind tibiæ; tarsi black, the anterior with the two basal joints more or less yellowish. Legs almost quite pale-haired, only behind the front femora above the hairs more or less black, and at the apex of posterior femora a few black hairs; tibiæ with pale hairs, only hind tibiæ with black hairs on the front side; hind femora setulose beneath, the bristles yellow, but black on about the apical half; hind metatarsi almost not thickened. Wings yellow or light brownish tinged towards the anterior margin; upper marginal cross-vein curved above, the upper angle rectangular. Squamulæ whitish with margin and fringe yellow or pale brownish. Halteres pale yellow, the knob a little darkened.

Female. Frons somewhat broad, a little widening downwards, with a distinct dust spot on each side somewhat above the antennæ; it is trisulcate but the middle channel indistinct; the pubescence short and all whitish. Antennæ with the third joint somewhat larger than in the male, but varying, and generally paler. Thorax densely punctate, with short, obliquely erect, pale pubescence. Abdomen densely punctate, shining, with short, depressed, black pubescence, and on the front corners of the segments erect, pale pubescence; on the borders between the black and the erect, pale hairs are depressed, pale hairs forming arcuated fasciæ. Legs chiefly as in the male, but all pale-haired; hind femora setulose below about as in the male.

Length 7,5—8,5 mm.

This species is easily known already by its characteristic flat epistoma.

C. relutina is not rare in Denmark: at Copenhagen, Amager, Ordrup Mose, Dyrhaven, Donse, Hillerød, Grib Skov, Faxe Ladeplads; on Lolland at Strandby and in Vester Ulslev Mose; on Langeland at Lohals; in Jutland in Højebæk Dal at Vejle, at Horsens, Marselisborg at Aarhus and Haarup near Silkeborg, and on Bornholm at Rønne. My dates are $^{11/7}$ — $^{26/s}$. It occurs on commons and meadows and is a rather late occurring species.

Geographical distribution:— Northern and middle Europe down into Austria: towards the north to middle Sweden, as it according to Becker was mixed with *intonsa* under Zetterstedt's *fraterna*; as remarked under *intonsa* the species stood also in Stæger's collection determined as *fraterna* probably by Zetterstedt; the species is further recently recorded from Finland.

29. *C. mutabilis* Fall.

1817. Fall. Dipt. Suec. Syrph. 54, 10 (*Eristalis*). — 1822. Meig. Syst. Besch. III, 283, 10 (*Syrphus*). — 1843. Zett. Dipt. Scand. II, 802, 27 et 1859. XIII, 6019, 27 (*Eristalis*). — 1862. Schin. F. A. I, 283. — 1894. Beck. Nov. Act. Leop. Carol. Akad. LXII, 490, 124, Fig. 79. — 1901. Verr. Brit. Fl. VIII, 252, 23. — 1902. Beck. Zeitschr. Hymn. Dipt. II, 351, 10. — 1907. Kat. paläarkt. Dipt. III, 33. — *Syrphus funeralis* Meig. 1822. l. c. III, 292, 26. — *C. funeralis* 1902. Beck. Zeitschr. Hymn. Dipt. II, 353, 26. — *Syrphus pratensis* Meig. 1822. l. c. III, 293, 30. — *C. pratensis* 1902. Beck. l. c. 354, 30. — *C. placida* Meig. 1838 l. c. VII, 128, 40. — 1862. Schin. F. A. I, 288. — 1902. Beck. l. c. II, 355, 40. — *Eristalis pygmaea* Zett. 1838. Ins. Lapp. 614, 20 et 1843. Dipt. Scand. II, 796, 20 et 1849. VIII, 3171, 20 et 1859. XIII, 6016, 20.

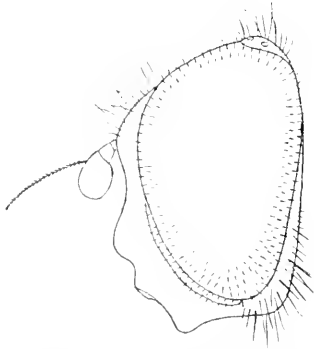


Fig. 95. Head of *C. mutabilis* ♂.

Male. Rather narrow species. Eyes with short, yellowish hairs. Frons slightly arched and slightly pruinose, with a longitudinal groove; vertex and frons black-haired. Epistoma a little pruinose, only slightly hollowed below the antennæ, the central knob somewhat broad and somewhat pointed, but slightly prominent; between the knob and the mouth edge the epistoma is hollowed, the lower part not prominent, a little descending. Eye margins rather narrow, not pruinose, with short, white hairs. Occiput narrowly grey pruinose at the eyes, the colour stopping

below the eye; the hairs whitish below, very short upwards but here besides with long, black hairs. Antennæ not small, black, third joint a little longer than broad; arista short-pubescent. Thorax dark æneous, seen quite from in front slightly pruinose with very faint traces of

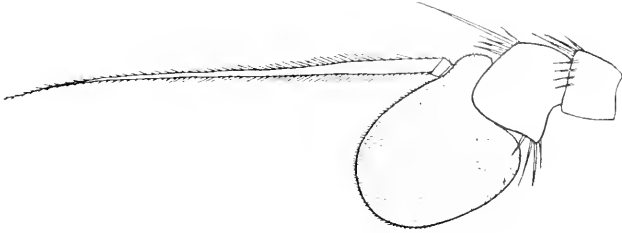


Fig. 96. Antenna of *C. mutabilis* ♂, from the inside. $\times 75$.

stripes: it is finely punctate, shining; it is clothed with long, erect hairs, and with shorter hairs, especially distinct on the posterior part and scutellum where the long hairs are longest; the hairs may be all greyish or brownish yellow with only a few black intermingled, or the long hairs are all black. There are distinct notopleural, inconspicuous supraalar and more distinct postalar bristles; scutellar marginal bristles numerous, distinct and long. Pleura with longish, black and pale mixed hairs. Abdomen narrow and somewhat long, parallel-sided; it is dull black on second and third segments, only a little shining at the front corners of the latter; fourth segment æneous black, shining; abdomen is clothed with somewhat long, erect, yellow hairs, on the middle of third and fourth segments are short, black, more depressed hairs, extended over the whole breadth backwards on the fourth segment, and the hind corners or the whole side margin of the segment often black-haired: also the second segment has often the sides more or less black-haired, especially at the front corners. Venter black, shining, with longish, pale hairs, the fourth segment has short, black hairs, long at the hind margin. Legs black, anterior femora narrowly yellowish at the apex; anterior tibiæ reddish at the base and narrowly at the apex, hind tibiæ slightly or not; anterior tarsi with the three middle joints reddish, metatarsus black, at all events above; the hairs behind front femora black and also generally a few below middle femora, for the rest pale: the hairs on tibiæ dark, except the usual golden pubescence on front and hind tibiæ; hind femora distinctly black-setulose below; hind metatarsi a little thickened. Wings somewhat slightly greyish brown tinged: upper marginal cross-vein a little curved above, the upper angle a little acute or almost

rectangular. Squamulae dirty whitish with a whitish or yellowish fringe. Halteres yellow or brownish with the knob more or less black to quite black.

Female. Eyes very slightly hairy, practically bare. Frons somewhat narrow, widened downwards, with shallow and narrow side channels and the middle channel indistinct or wanting; it is haired with mixed pale and black hairs, sometimes almost all pale or on the contrary all black. Antennae with the third joint larger and longer than in the male. Thorax finely punctate, shining, clothed with short, yellow, obliquely erect hairs among which some single black; scutellum with six to eight long marginal bristles. Abdomen narrow, finely punctate, shining; it is clothed with short, black, depressed hairs, at the sides with longer, erect, whitish hairs; fourth and fifth segments quite black-haired, or only at the front corners of the fourth some yellow hairs. Legs chiefly as in the male, hind femora not setulose beneath. Halteres yellow.

Length 6 to about 8 mm.

This species may be known by its narrow shape, the characteristic colour of the anterior tarsi and the bare or almost bare eyes in the female, in both the latter respects resembling *albitarsis*, to which it is certainly related.

C. mutabilis is not rare in Denmark; Rørvig, Tisvilde, Nyraad near Vordingborg; on Lolland at Nysted; on Langeland at Lohals; on Funen and Middelfart, Odense and Hoffmangave; in Jutland in Greisdal and Højenbæk Dal at Vejle, at Horsens, Holstebro, Søndervig, Sæby and Skagen, and on Bornholm at Rønne, Hasle and Allinge. My dates are $\frac{26}{6}$ — $\frac{9}{8}$, it is thus a somewhat late species. It occurs on fields and meadows on flowers and in low herbage.

Geographical distribution: — All Europe, towards the north to northern Sweden, and in Finland.

30. *C. ruralis* Meig.

1822. Meig. Syst. Besch. III, 293, 29 (*Syrphus*). — 1902. Beck. Zeitschr. Hymn. Dipt. II, 354, 29. — 1907. Kat. paläarkt. Dipt. III, 37. — *Eristalis praecox* Zett. 1843. Dipt. Scand. II, 801, 25 et 1855. XII, 4668, 25 et 1859. XIII, 6018, 25. — *C. praecox* 1862. Schin. F. A. I, 287. — 1894. Beck. Nov. Act. Leop. Carol. Akad. LXII, 493, 126, Fig. 85. — 1901. Verr. Brit. Fl. VIII, 251, 22. — *Syrphus urbanus* Meig. p. p. 1822. l. c. III, 287, 16. — *C. urbana* 1902. Beck. Zeitschr. Hymn. Dipt. II, 352, 16. — *C. glabrata* Meig. 1838. l. c. VII, 125, 15. — 1902. Beck. l. c. II, 355, 15.

Male. Somewhat narrow species. Eyes with short, pale yellowish hairs. Frons somewhat small, greyish pruinose, especially towards the

sides, with a longitudinal groove; vertex yellow-haired, generally with a few black hairs at the front angle, frons black-haired. Epistoma grey pruinose below the antennæ, for the rest shining; it is very slightly hollowed below the antennæ and the central knob slightly prominent, somewhat pointed and lying rather long downwards; between the knob and the mouth edge the epistoma is only little hollowed, the lower part slightly prominent and descending. Eye-margins of medium breadth, not pruinose, with short, pale hairs. Occiput grey pruinose, the colour stopping below the eye: the hairs are whitish below, yellow and short above, and here besides long, black hairs, but on vertex yellow hairs. Antennæ somewhat small, (though a little varying), third joint longer than broad, blackish to brownish red; arista short, apparently bare. Thorax æneous black, very finely punctate, shining; it is clothed with long, erect, yellow or yellowish white hairs; there are one notopleural, two or more short supraalar and two or three postalar bristles; the bristles

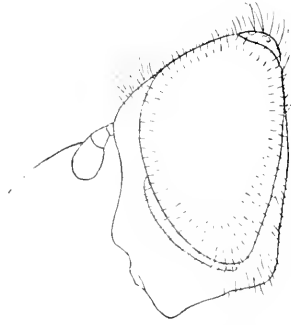


Fig. 97. Head *C. ruralis* ♂.

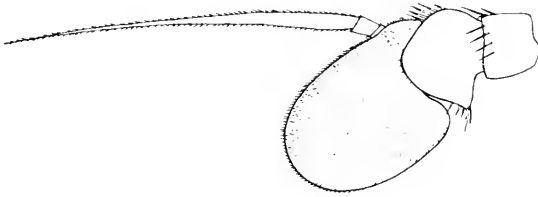


Fig. 98. Antenna of *C. ruralis* ♂, from the inside. $\times 75$.

are distinct but weak; the scutellar marginal bristles likewise weak, of various numbers, not rarely only the middle pair distinct. Pleura with long, yellowish hairs. Abdomen narrow, parallel-sided, æneous and shining; second and third segments dull black, but with the front corners of the second and a large side space towards the front margin of the third shining and with a slight greyish hue, so that they almost look as spots; abdomen is clothed with longish, erect, pale yellow hairs, short on the middle. Venter shining, with long, pale hairs, shorter towards the end. Legs with the femora black with yellow apex, tibiæ yellow with a black ring a little below the middle; tarsi yellow with the last joint black, front metatarsus blackish above and

hind metatarsus blackish. The legs almost quite pale-haired, only more or less black-haired behind the front femora, and sometimes some few black hairs on posterior femora; hind femora very slightly black-setulose below, and only on the apical part: hind metatarsi somewhat thickened. Wings almost hyaline or a little yellowish tinged towards the anterior margin: upper marginal cross-vein curved above, the upper angle rectangular. Squamulae whitish with a whitish fringe. Halteres yellow with the knob darkened.

Female. Frons of medium breadth, a little widening downwards, with distinct lateral channels but the middle channel indistinct or wanting; it is yellow-haired. Epistoma considerably more hollowed below the antennae than in the male. Antennae with the third joint somewhat larger than in the male and generally paler. Thorax very finely punctate, with short, erect, yellow or white hairs. Abdomen shining, with short depressed, yellow hairs, longer and erect at the sides. Legs paler than in the male, tibiae with slight rings, or these quite wanting, and tarsi paler, often with front and hind metatarsi slightly or not darkened; hind femora not setulose beneath. Halteres orange.

Length 5.5 to fully 7 mm.

I possess a male of this species with hairs on epistoma, but the hairs are slight and of a somewhat woolly appearance; it is interesting that also Becker mentions a similar male specimen, but I do not think that the suggestion advanced by Verrall (Brit. Fl. VIII, 252) that possibly many species should bear epistomal pubescence when newly emerged, but soon be rubbed, is correct.

The species is nearest allied to *mutabilis* but, besides by many other characters, it is distinguished by the fewer and weaker scutellar marginal bristles.

C. ruralis is not rare in Denmark; Charlottenlund, Bagsvær, Geel Skov, Hillerød, Grib Skov, Tisvilde, Nyraad near Vordingborg; in Jutland at Horsens. It is a spring species, my dates are ²⁰/₄—²⁸/₅. It occurs on various spring flowers on fields and meadows.

Geographical distribution:— All Europe and Northern Asia, towards the north to southern Sweden, and in Finland.

9. **Platycheirus** St. Farg. et Serv.

(*Platycheirus*).

Species of medium size and of a somewhat narrow and elongate shape: the colours are black or dark æneous with yellow or sometimes

more æneous and hoary spots on abdomen (melanoid specimens may occur). Head somewhat semiglobular, generally a little broader than high, and a little broader than thorax; it is somewhat excavated behind. Eyes touching in the male, separated in the female; they are bare, the facets in the male a little enlarged in the upper part. Antennæ inserted well above the middle; they have the third joint generally a little longer than broad, oval or more square; arista inserted near the base, thickened in about the basal half, with two quite small basal joints; the basal antennal joints have small bristles at the end margin, the third joint and the arista are microscopically haired. The epistoma has a central knob, and the upper mouth edge may be a little produced; the lower part of epistoma with the central knob may be more or less produced, in some species rather strongly, or epistoma may be rather flat with only the central knob a little protruding. At the lower eye-margin there is a furrow, somewhat separating epistoma from the jowls, but not reaching up to the central knob. Epistoma is black but more or less covered with dust, and it is thinly haired on the side paria with erect hairs. The oral aperture larger or smaller in accordance with the epistoma being more or less protruding; when protruding the front ends of the lateral mouth edges, the lateral angles, are drooping and the front mouth edge somewhat excised, when the epistoma is more flat the mouth aperture is simply rounded a little upwards in front. The jowls only slightly descending. Oral cone well developed; clypeus of usual shape, with a basal part and two long, thin legs. Proboscis somewhat long; labrum (*albimanus*) strongly semitubular, the apical processes of nearly equal length, the median cleft at the end, with the apices diverging and divided into several pointed branches: the upper lateral processes thin and delicate, the lower broad with the apex rounded and curved a little upwards: the lateral margin of labrum bears below a row of small papillæ or warts. Hypopharynx a little shorter than labrum, semitubular, linear and slightly attenuated outwards with rounded apex, and with a distinct salivary duct. Maxillæ with a slightly curved, knife-shaped lacinia, and long, thread-like palpi with the end clubbed; the palpi are densely clothed with short hairs and have some bristles on the clubbed end part; the lacinia is beset with microscopical spines in longitudinal rows about as in *Chilosia*. Labium has the chitinised basal part somewhat narrow, longer than the oval labella. Thorax rectangular, at the upper end of the præsutural depression is a small tubercle. Scutellum æneous, not pellucid, below its margin a fringe of hairs, directed downwards. There are no bristles present. Metapleura densely short-haired. Abdomen elongate, rather narrow and

parallel-sided, especially in the male, with three or four pairs of yellow or sometimes darker or bluish spots. The ventral segments distinctly chitinised. In the male there are five not transformed segments, the first short and the fifth about half as long as the foregoing, or smaller. Genitalia of the usual shape, turned to the right, the ninth segment not large; on the ventral side all the transformed segments, sixth to ninth, are visible. In the female abdomen shows six visible segments, the sixth small, and further two more or less hidden, the last ending with two small lamellæ. Legs somewhat slender, hind metatarsi more or less thickened, generally most in the male; in the male the legs show secondary sexual characters, generally to a high degree, especially the front tibiæ and tarsi are dilated in various ways, and also specially coloured; sometimes not the tibiæ but only the tarsi are dilated; also the middle tibiæ are as a rule specially shaped; further the front, or the anterior, femora are specially haired in the male in various ways, and likewise generally the middle, or the anterior tibiæ; otherwise the legs are haired as usual, with somewhat long hairs on the posterior and postero-ventral side of anterior femora and on the antero-ventral side of hind femora; tibiæ generally short-haired, when not with special hairs in the male. The front tarsi are also in the female a little broad and flat, and for the rest slight traces of the special shape or hairiness in the male are also partly found in the female; thus f. inst. the peculiar, white, tangled hair found at the base of front femora in the males of many species, is then also present in the female, but much shorter and smaller. Claws and pulvilli well developed. Empodium short, bristle-shaped and hairy. Wings with the medial cross-vein before the middle of the discal cell. Vena spuria distinct though not strong, with a more chitinised point below the base of the cubital vein. Alula well developed. Alar squamula with quite short simple hairs, thoracal squamula with long, furcately divided hairs. Plumula densely haired with somewhat plumose hairs.

Platychirus is characterised by the dilated and specially shaped front tarsi or tibiæ and tarsi, the special hairiness of the front femora, and also often by the shape and hairiness of the middle femora and tibiæ; these characters are only present in the male, but also the females may be known by the front tarsi being, to be sure slightly, broadened and flattened; otherwise the shape of the abdominal markings, and partly the colour of the antennæ will separate them from the females of the allied genera.

Only little is known about the developmental stages. *P. scutatus* is recorded to have been bred from rotten fungi (v. Roser: Württemb.

corr. Bltt. 1834, 10) but I have not seen this paper. Malm mentions (Ent. Tidskr. I, 1880, 70) that he has bred *P. scambus* from a larva, found on excrements from a patient immediately after the stool, but this may be quite accidentally. Zetterstedt mentions (Dipt. Scand. II, 748) that he has bred *P. clypeatus* from a pupa sitting on the leaf of a grass. I have myself bred *P. albimanus* from a pupa found among old leaves in a garden on $^{22}/_4$, the imago came first in May; Mr. Schlick has bred the same from flood refuse, the imagines came in May; further I have bred *clypeatus* from a larva found in flood refuse, chiefly of reeds, in a fen on $^{24}/_3$, it pupated in the room on $^5/_4$ and the imago came on $^{12}/_4$; other larvæ of this species and *immarginatus* were taken in the same way on $^4/_4$ on a common near the shore, and on $^{12}/_4$ in a fen, the imagines came in the first half of May; Mr. Kryger has bred *clypeatus* from larvæ in flood refuse, taken on $^9/_2$, they pupated on $^{13}/_4$ and the imagines came on $^{20}/_{11}$; Mr. Schlick bred the same species from larvæ in flood refuse in fens, the imagines developing in April and May, and he has bred *immarginatus* and *fulviventris* likewise from larvæ in flood refuse in fens, the imagines of the former came in April and May, of the latter in May; finally Mr. Kryger has bred *peltatus* from a pupa found on the ground in a wood on $^7/_3$, it developed on $^{18}/_5$, and Mr. Schick has bred the same species from larvæ in flood refuse, the imagines developing in April and May. — The larva (of *clypeatus*) is of a length of about 10 mm or more: it is somewhat flat below, more arched above, attenuated towards the head and less towards the end; it is transversely corrugated and the dermis is finely chagreened; above and on the sides there are some small and short spines, placed with regular intervals on some of the corrugations in transverse rows; as far as I have been able to see these small spines are placed in the following way: on two of the first segments (the meso- and metathoracal) is on each a transverse row of six spines on one corrugation and some at the sides; on the following segment, the first abdominal, is likewise a transverse row of six spines on one corrugation; but on the next six segments the arrangement is such that the two middle spines are placed on one corrugation, the two on each side more backwards, on the next corrugation; each of these seven abdominal segments has three spines at each side, two anterior, one behind the other, the foremost quite small, and one posterior higher upwards; each of these segments seems to have four raised corrugations divided by furrows, and the spines are placed on the two middle corrugations. Below there are about seven slight transverse swellings more or less divided in the middle and armed with some very small spines. There

are distinct mouth hooks; on prothorax are a pair of small prothoracal spiracular tubes, and dorsally at the posterior end a short, longitudinally somewhat divided posterior spiracular process. The colour is greyish yellow with a dark, longitudinal, dorsal stripe and some translucent reddish markings; along each side is a pale reddish stripe. The pupa is somewhat arched, of a conical shape with the dorsal side convex and the ventral concave; the head end is rounded and it is somewhat, but evenly attenuated towards the posterior end; it is thus not drop-like; it is slightly transversely corrugated and has the same posterior spiracular process as the larva, and the small larval spines may also be detected; above on the anterior part are a pair of exceedingly small (0,06 mm) anterior spiracular tubes (as also mentioned by de Meijere. Zool. Jahrb. Abtheil. für Anat. XV, 1902, 679); the tubes are thus only slight, scarcely detectible warts, and when the pupa is preserved in alcohol they may be drawn back and are not to be seen. The colour of the pupa is somewhat like that of the larva but more effaced, and the empty puparium is whitish or pale yellowish. The pupa has a length of about 6 mm.

It is remarkable that I have found my larva under quite other circumstances than the larva mentioned by v. Roser, and I am inclined to think there may be some error with his observation. Whether the larvæ are aphidiphagous I cannot say, but I think they are, or at all events carnivorous in some other way, as indicated by their mouth hooks and as in accordance with the larva of *Melanostoma*. The larva hibernates and pupates in spring in March or April; at the pupation it fastens itself to a leaf or straw.

The species of *Platychirus* occur in low herbage in fens and on meadows, often near water, and also in woods; some species are common near the shore on salt marshes. The genus is widely distributed and goes far towards the north as species are found in Siberia and in Greenland. Several of the European species occur in North America, and Verrall is inclined to think that most or all American species are identical with European. — It was remarked above, that traces of the sexual ornamentation of the male are generally found in the females; in connection with this it is curious to note, that hermaphroditic (or hermaphroditic looking) specimens seem to be relatively common in this genus. Becker (Nov. Act. Leop. Carol. Akad. LXII, 1894, 249) has mentioned such a specimen of *manicatus*, Wahlberg (Öfvers. Kgl. Vet. Akad. Förh. IV, 1847, 101) of *clypeatus*, and Villeneuve describes (Wien. ent. Zeitg. XXIX, 1910, 81) a similar specimen of *peltatus*, which had the head as in the female, abdomen with only three pairs of spots but with exterior male genitalia; the front

legs as in the male, but the dilated joints narrower, and the bristles on front femora less strong than in normal males. Below I have mentioned such specimens of *peltatus* and *scutatus*.

Of the genus 19 species are known from the palearctic region; 11 occur in Denmark.

Table of Species.

Males.

- | | |
|---|--------------------------|
| 1. Front tibiæ practically not dilated, but the two first tarsal joints much dilated | 2. |
| — Front tibiæ distinctly dilated, if slightly also the tarsi slightly dilated | 3. |
| 2. Thorax dull; mouth edge more produced than the central knob; hind tibiæ with few long hairs above in the middle | 1. <i>manicatus</i> . |
| — Thorax shining; mouth edge scarcely more produced than the central knob; hind tibiæ with numerous long hairs above in the middle. | 2. <i>tarsalis</i> . |
| 3. Front tibiæ dilated more or less abruptly at the apex or in the apical third; antennæ pale beneath third joint | 4. |
| — Front tibiæ evenly dilated from base to tip (in <i>sticticus</i> very slightly), or dilated soon after the base; antennæ all black (except <i>sticticus</i>) | 6. |
| 4. Front femora with a ciliation of strong bristles behind in almost the whole length; first tarsal joint very large, as long as the four following joints. | 3. <i>peltatus</i> . |
| — Front femora with two clumps of tangled hairs behind near base; first tarsal joint smaller, not so long as the four following joints | 5. |
| 5. Front tibiæ with a tuft of black hairs above the dilatation; first tarsal joint six times as long as the equally broad second joint; abdominal spots yellowish | 4. <i>scutatus</i> . |
| — Front tibiæ with a few black hairs above the dilatation; first tarsal joint not three times so long as the narrower second joint; abdominal spots hoary æneous | 5. <i>albimanus</i> . |
| 6. Front femora with a row of five or six long, isolated, black, bristly hairs behind in the whole length | 7. |
| — Front femora without a row of long, isolated hairs behind | 8. |
| 7. Front femora with no peculiar, white, tangled hair at the base; abdominal spots large. | 6. <i>scambus</i> . |
| — Front femora with a peculiar, white, tangled hair at the base; abdominal spots very large, abdomen extensively yellow with only narrow black lines. | 7. <i>immarginatus</i> . |
| 8. Femora and tibiæ all yellow, front femora with a dense, black ciliation behind | 8. <i>fulviventris</i> . |

- Hind or all femora more or less black, front femora without any dense, black ciliation behind. 9.
- 9. Front tibiae and tarsi distinctly dilated; abdominal spots yellow; halteres pale. 10.
- Front tibiae and tarsi very slightly dilated; abdominal spots hoary aeneous; halteres dark 11. *sticticus*.
- 10. Middle pair of abdominal spots not much longer than broad; second and third joints on hind tarsi yellow 9. *clypeatus*.
- Middle pair of abdominal spots about twice as long as broad; second and third joints on hind tarsi (generally) darkened. 10. *angustatus*.

Females.

- 1. Antennae quite black 2.
- Antennae pale beneath third joint 8.
- 2. Lower part of epistoma with the central knob much produced 3.
- Epistoma rather flat, slightly or scarcely produced 4.
- 3. Thorax dull; mouth edge more produced than the central knob; anterior tibiae and tarsi rather dark. 1. *manicatus*.
- Thorax shining; mouth edge scarcely more produced than the central knob; anterior tibiae and tarsi much paler 2. *tarsalis*.
- 4. Femora and tibiae quite yellow; sixth abdominal segment yellow 8. *fulviventris*.
- Hind femora and tibiae with blackish rings or at all events with traces of such. 5.
- 5. Hind femora and tibiae with usually slight dark rings; hairs behind front femora short and of equal length; sixth abdominal segment quite or partly yellow. 6.
- Hind femora and tibiae with usually more conspicuous blackish rings; hairs behind front femora longer and increasing in length towards the base; sixth abdominal segment black. 7.
- 6. Front femora with no special white hair at the base; basal abdominal spots large; antennae somewhat large, arista about as long as the antennae 6. *scambus*.
- Front femora with the special white hair at the base present; basal abdominal spots smaller; antennae shorter, arista not so long as the antennae. 7. *immarginatus*.
- 7. Not specially narrow species; frontal dust spots moderately large; fifth abdominal segment with distinct spots 9. *clypeatus*.
- Narrow species with abdomen pointed; frontal dust spots small; fifth abdominal segment without spots 10. *angustatus*.
- 8. Abdominal spots bluish; frontal dust spots small; hind femora not or slightly pale at base 9.
- Abdominal spots yellowish; frontal dust spots larger; hind femora with the basal part pale. 10.
- 9. Vertex about one third or fourth of the breadth of the head, shining; length 7—9 mm. 5. *albimanus*.

- Vertex about one fifth of the breadth of the head, dull;
length 5,5—6 mm. 11. *sticticus*.
10. Abdomen with four pairs of spots; epistoma rather pro-
truding below 3. *peltatus*.
- Abdomen with only three pairs of spots; epistoma rather
flat. 4. *scutatus*.

1. *P. manicatus* Meig.

1822. Meig. Syst. Besch. III, 336, 91 (*Syrphus*). — 1838. Zett. Ins. Lapp. 606, 33 et 1843. Dipt. Scand. II, 745, 48 et 1849. VIII, 3144, 48 (*Scaeva*). — 1843. Stæg. Naturh. Tidsskr. IV, 321. — 1862. Schin. F. A. I, 294. — 1901. Verr. Brit. Fl. VIII, 266, 1, figs. 229—230. — 1907. Kat. paläarkt. Dipt. III, 44. — *Eristalis geniculata* Zett. 1838. Ins. Lapp. 612, 12 et 1843. Dipt. Scand. II, 812, 37 et 1849. VIII, 3174, 37, ♀, (nec XII, 4669, 37, ♂). — 1894. Beck. Nov. Act. Leop. Carol. Akad. LXII, 249.

Male. Frons brownish yellow pruinose; vertex and frons black-haired. Epistoma greenish black, densely yellow pruinose, with longish, yellow hairs, the central knob shining. The lower part of epistoma with the central knob much protruding, and the upper mouth edge more protruding than the knob; the lateral angles of the mouth edge somewhat descending; the epistoma a little widening downwards. Occiput greyish yellow pruinose, the hairs whitish below, yellow above, and here besides long, black hairs; behind the vertex long, yellow hairs. Antennæ somewhat small, black. Thorax æneous or dark æneous green, slightly shining, dull or dullish but more shining on the posterior part and especially on scutellum; it has generally some faint traces of darker and duller stripes, especially one on the middle. Thorax is clothed with long, yellow hairs, longest posteriorly and on scutellum; there are some black hairs intermingled, most numerous on the posterior part and scutellum, and there is also generally an indication of a longitudinal stripe of black hairs on each side. Pleura yellow-haired. Abdomen dull black, a little shining at base and apex; second segment with two widely separated, elongated triangular, yellow to reddish spots, narrowed in front; third segment with two elongated, subquadrate spots, reaching from the front to near the hind margin with the inner hind corner rounded, and leaving less than one third of the breadth of abdomen black; fourth segment with similar spots and the fifth more or less yellowish at the sides; the spots do not touch the side margin. Pubescence yellow, long at the sides, shorter above and here more or less black on the middle line. Venter yellowish, generally somewhat darkened and pruinose behind, with long, pale hairs, short on fourth segment. Legs blackish, apex of femora and basal part of tibiæ yellow but on the hind legs narrowly:

the two basal joints of middle tarsi more or less yellowish or brownish. Front tibiae almost not dilated towards apex, the apex white; front tarsi with the two basal joints strongly dilated, forming together an oval disc, the first joint about three times as long as second, which latter is a little narrower; the disc is white with four black spots below, two on each joint, and some dark markings: the three apical joints blackish brown. Front and middle trochanters with a large brush of short, black spines; femora with long hairs in the usual way, longest on the antero-ventral side of hind femora; they are mainly pale, only black towards the apex behind front femora; middle femora with some short bristles on the antero-dorsal side in the apical half; tibiae with short, pale hairs, anterior tibiae with long, black hairs on the posterior side in the apical half, somewhat few on the middle tibiae, hind tibiae with a few long, black or yellow hairs on the antero-dorsal side in the middle; front metatarsus with a black ciliation at the posterior margin; hind metatarsus strongly dilated with the ventral side straight, the dorsal arched. Wings more or less yellowish or slightly brownish tinged, sometimes almost hyaline. Squamulae whitish to brownish, with a darker margin and a yellow fringe. Halteres whitish or yellow.



Fig. 99.
P. manicatus ♂,
right front leg
from below.
× 20.

Female. Frons yellow pruinose like epistoma, with yellow hairs, longest and black in front of the ocelli, sometimes almost all black. Thorax duller than in the male, the sides and a narrow stripe at each side paler pruinose, and between the latter generally a pair of faint stripes, but the stripes somewhat varying; thorax and scutellum all yellow-haired and shorter-haired than in the male. Abdomen more shining than in the male, the spots less elongated, especially second and third pairs; fifth segment with distinct spots. Legs simple, anterior tarsi blackish, hind metatarsi slightly thickened. Length 8—10 mm.

P. manicatus is common in Denmark; Amager, Vesterfæled, Lersø, Damhusø. Ordrup Mose, Ermelund, Dyrehaven, Lyngby Mose, Birkerød, Tyvekrog, Trørød, Nyraad near Vordingborg, Frederikssund, Egholm at Skelskør; on Lolland at Maribo, Strandby and in Kældskov and Merrits Skov; on Fejø; on Langeland at Lohals; in Jutland at Horsens, Gjerlev near Randers Fjord, Frederikshavn and on Læsø, finally on Bornholm in Almindingen. My dates are ¹⁸/₅—¹⁶/₉. It occurs

in grass and on flowers in fens and meadows, I have often taken it on salt marshes. I possess a female specimen with almost quite black abdomen.

Geographical distribution:— All Europe, towards the north to Sweden, and in Finland.

2. *P. tarsalis* Schumm.

1836. Schumm. Arb. schles. Gesell. 84 (*Syrphus*). — 1901. Verr. Brit. Fl. VIII, 268, 2, figs. 231—232. — 1907. Kat. paläarkt. Dipt. III, 46. — *P. ciliger* Loew, 1856. Neue Beitr. IV, 44, 36. — 1862. Schin. F. A. I, 293.

Male. Frons a little brownish yellow pruinose; vertex and frons black-haired. Epistoma black, yellowish pruinose, with erect, pale hairs, the central knob shining and the shining space produced somewhat upwards. The lower part of epistoma with the central knob rather protruding, but not so much as in *manicatus*, and the upper mouth edge scarcely more protruding than the knob; the epistoma somewhat keel-shaped in the middle and more parallel-sided than in *manicatus*. Occiput grey pruinose, with yellowish hairs, above some long, black hairs. Antennæ small, black. Thorax dark æneous or greenish, shining; it is somewhat thinly clothed with longish, yellowish hairs among which some few black may be seen; the hairs are longest on the posterior part and scutellum. Pleura pale-haired. Abdomen dull black or brownish black, the yellow spots about as in *manicatus*, but those on third and fourth segments smaller, stretching less backwards, only over about the anterior two thirds of the segments; fifth segment indefinitely reddish at the base. Pubescence pale with some black hairs on the middle. Venter yellowish, blackish towards the end, with long, pale hairs, short on fourth segment. Legs blackish with the anterior knees broadly and the hind knees narrowly yellow as in *manicatus*: middle tarsi pale with the apical joints more darkened. Front tibiæ practically not dilated, white at apex; the two first tarsal joints forming an oval disc as in *manicatus*, the disc more emphatically oval as the second joint is broader but a little shorter than in *manicatus*; the disc is white with indistinct obscure markings below, the third joint white with dark apex; the apical joints brownish, the fifth palest. Anterior trochanters with a brush of short spines below, rather inconspicuous

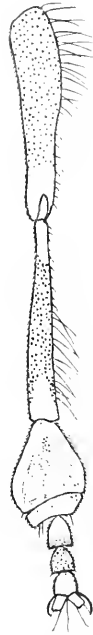


Fig. 100.
P. tarsalis ♂.
right front leg
from below.
× 20.

on the middle trochanters; femora haired as usual, the hairs pale, only dark at the apex of front femora; middle femora with bristly hairs as in *manicatus*; front tibiæ with long, dark hairs on the postero-dorsal side in the apical half, middle tibiæ with some few and hind tibiæ with rather long, dark hairs on the antero-dorsal side in and somewhat above the middle, these hairs much denser and more numerous than in *manicatus*; front metatarsus ciliated on the posterior margin, with a few black hairs in the middle; hind metatarsus swollen as in *manicatus*. Wings hyaline or nearly so. Squamulæ and fringe whitish. Halteres pale yellow.

Female. Frons slightly pruinose, dark-haired, only yellow-haired above the antennæ. Thorax shining, short-haired. Abdomen as in the male but the basal spots larger and less triangular; fifth segment with distinct spots. Legs paler than in the male, anterior tibiæ with faint or almost disappearing rings, anterior tarsi pale with only third and fourth joints brownish; hind metatarsi a little thickened.

Length 8 mm.

This species may be known from *manicatus* by the shining thorax, the less produced epistoma and the smaller abdominal spots; in the male also the front tarsi are a little different both in shape and colour, the middle tarsi paler and the long hairs above hind tibiæ are much more numerous and denser; the female has the anterior tibiæ and tarsi much paler.

P. tarsalis is very rare in Denmark, we have only five specimens, three males and two females, all from earlier time; Charlottenlund, Ordrup Mose (Stæger) and Horsens in Jutland (O. G. Jensen); the dates are in May ($12\frac{1}{5}$ — $29\frac{1}{5}$).

Geographical distribution:— Middle Europe down into Styria and Moravia; it is not known north of Denmark but occurs in England; it is upon the whole no common species.

3. *P. peltatus* Meig.

1822. Meig. Syst. Besch. III, 334, 89, Tab. XXX, Fig. 31—32 (*Syrphus*). — 1838. Zett. Ins. Lapp. 606, 30 et 1843. Dipt. Scand. II, 747, 50 (*Scaeva*). — 1843. Stæg. Naturh. Tidsskr. IV, 322. — 1862. Schin. F. A. I, 295. — 1901. Verr. Brit. Fl. VIII, 274, 5, figs. 237—238. — 1907. Kat. paläarkt. Dipt. III, 45. — *Scaeva albimana* p. p. 1817. Fall. Dipt. Suec. Syrph. 46. — *Scaeva rostrata* Zett. 1838. Ins. Lapp. 607, 34 et 1843. Dipt. Scand. II, 746, 49 et 1849. VIII, 3144, 49. — *Melanostoma octomaculata* 1862. Schin. F. A. I, 292.

Male. Frons and epistoma æneous green, somewhat brownish yellow pruinose; vertex with yellow hairs behind, black anteriorly; frons black-haired. Epistoma with erect hairs, dark above, yellow

downwards; the central knob shining. The lower part of epistoma and the knob somewhat produced, the mouth edge and knob about equally protruding. Occiput greyish yellow pruinose, with yellow hairs, above some long, black hairs but the hairs behind vertex yellow. Antennæ not large, third joint yellowish below at base to a higher or smaller degree. Thorax greenish æneous, sometimes more brassy, shining; it is clothed with erect, yellow hairs, long behind and on scutellum; on each side of the disc more or fewer black hairs may be intermingled, tending to form two longitudinal bands; also in the middle on the posterior part may be black hairs. Pleura yellow-haired. Abdomen dull black, shining at the apex, with three pairs of quadrate or subquadrate, yellow spots, the first pair smallest, the second largest: the second and third pairs lying quite near the front margin; the fifth segment with a pair of small, more or less indistinct spots. Abdomen is clothed with yellow hairs, long at the sides and towards the base; on the black parts are mainly black hairs. Venter translucent or more or less æneous, especially towards the end, shining and with long, pale hairs, short on fourth segment. Legs with the femora blackish, anterior femora yellowish in about the apical half, but below the black colour stretching about to the apex; anterior tibiæ and tarsi mainly pale, middle metatarsi more or less darkened; hind legs almost quite black only the knees narrowly reddish. Front trochanters with a brush of short spines below, middle trochanters with a small, inconspicuous brush; front femora with dense and strong, black bristles on the posterior and postero-ventral side; front tibiæ suddenly somewhat dilated at the end, on the lower side the basal part, two oblique transverse bands and the apex are brown, the upper band widening to a spot on the posterior side; this side bears a short fringe, black above, yellow below; the metatarsus dilated, somewhat rectangular with the anterior end corner produced and about as long as the four following joints; it is whitish with some blackish markings below, especially two larger spots on the anterior lateral half; the spots have short, black hairs; the anterior side margin is black; the second tarsal joint is a little dilated, whitish, the three last yellow; middle coxæ with a small, triangular, dent-like prolongation at apex on the front side; the middle femora have a large excision after the middle on the anterior side, below there are short, black bristles, specially short on the edge of the excision, and just



Fig. 101.
P. peltatus ♂,
right front leg
from below.
× 20.

after it there is a little clump of short hairs on the anterior side; the middle tibiæ are a little dilated ventrally after the base, the dilatation bears very short, dense, black bristles, and on the anterior side a tuft of longish, yellow hairs; after the dilatation the tibia is a little excised below and the end a little thickened; on the posterior side there is in the middle a little tuft of longish hairs; the middle metatarsus is thin; the hind tibiæ have a row of short, black bristles on the antero-dorsal side, very short on the upper part; hind metatarsus a little thickened. Wings slightly or a little more brownish tinged. Squamulæ whitish to brownish white, with a darker margin and a yellow fringe. Halteres yellow, sometimes the knob a little darkened.

Female. Frons and epistoma not broad; frons metallic shining with two large, yellow dust spots, black-haired; the hairs on epistoma yellow. Antennæ generally paler beneath the third joint than in the male. Thorax brightly shining, sometimes somewhat purplish, short-haired. Abdomen with four distinct pairs of yellow spots, sometimes somewhat hoary; the basal spots larger than in the male and quite near to the front margin, the second and third pairs more transverse, slooping off outwards from the front margin of the segments and with the hind margin somewhat concave; the fourth pair quite distinct. Legs paler than in the male, the anterior quite pale or with traces of rings on tibiæ, the hind legs with base of femora and knees distinctly pale; the middle femora show a slight excavation on the same place as in the male.

Length 8—10 mm.

The pupa has a length of 6 mm; it is yellowish or light brownish yellow, slightly transversely corrugated, with a short, brown, longitudinally divided posterior spiracular process.

This species is in the male known at once by the shape and hairiness of the anterior legs; the female is distinguished from the preceding among others by the less produced epistoma, the distinct four pairs of abdominal spots and the pale anterior legs; finally in both sexes the third antennal joint is pale beneath. — I possess of this species a curious, hermaphroditic specimen; it has exterior male genitalia, only somewhat small; the eyes are separated and the frons only a little narrower than in the female; the front femora have a few black, bristly hairs between the pale, the tarsi have the first joint shaped as in the male but much narrower; the other characters, as the hairiness of the body and the abdominal spots are rather intermediate between male and female. Verrall mentions a female with stronger and partially black hairs on front femora and small, dark abdominal spots, perhaps also a hermaphrodite.

P. peltatus is common in Denmark; Lersø, Utterslev Mose, Vester Fælled, Amager, Damhusmose, Charlottenlund, Ordrup Mose, Ermelund, Dyrehaven, Lyngby Mose, Trørød, Tisvilde, Nyraad near Vordingborg; on Lolland at Maribo, Strandby and in Kældskov; on Fejø; on Langeland at Lohals; in Jutland at Horsens, Silkeborg, Randers, Jerup near Frederikshavn, and on Bornholm at Hammeren. My dates are $17/5$ — $19/9$. It occurs in fens. on commons and meadows. The pupa was found on the ground in Dyrehaven on $7/3$, it developed on $18/5$ (Kryger); the species has been bred from larvæ in flood refuse on Vesterfælled, in Damhusmose and at Randers, the imagines came in April and May (Schlick).

Geographical distribution:— Northern and middle Europe, down into France; towards the north to northern Sweden, and in Finland; it occurs also in North America.

4. *P. scutatus* Meig.

1822. Meig. Syst. Besch. III, 333, 88 (*Syrphus*). — 1843. Zett. Dipt. Scand. II, 751, 55 et 1859. XIII, 6003, 55 (*Scaeva*). — 1843. Stæg. Naturh. Tidsskr. IV, 322. — 1862. Schin. F. A. I, 295. — 1901. Verr. Brit. Fl. VIII, 277, 6, figs. 239—240. — 1907. Kat. paläarkt. Dipt. III, 46. — *Scaeva albimana* p. p. 1817. Fall. Dipt. Suec. Syrph. 46. — *Syrphus quadratus* Macq. 1827. Soc. Sc. Lille, 230, 8 et 1838. Suit. à Buff. I, 549, 49. — *P. quadratus* 1862. Schin. F. A. I, 297. — *Syrphus sexnotatus* Meig. 1838. Syst. Besch. VII, 134, 107. — 1862. Schin. F. A. I, 312.

Male. Frons and epistoma greenish æneous, brownish yellow pruinose, somewhat thinly on frons; the central knob a little shining. Vertex yellow-haired, only just at the apex some dark hairs, or the vertex dark-haired to a higher degree; frons black-haired; epistoma with erect, yellow hairs, sometimes some black intermingled. The lower part of epistoma slightly produced, the mouth edge less produced than the knob. Occiput greyish yellow pruinose, with yellow hairs, between which no long, black hairs. Antennæ small, yellowish beneath on second and base of third joint; arista brown at the base. Thorax æneous, shining, clothed with long, yellow hairs, longest on scutellum. Pleura yellow-haired. Abdomen dull black, a little shining at apex; it has three pairs of not large, yellow or reddish yellow spots; the first pair small, somewhat roundish, lying on the middle of the segment, the second pair rectangular or quadrate, the third quadrate or transverse, both near to the front margin; the fifth segment shows no trace of spots. Abdomen is clothed with pale yellowish hairs, long at the sides and towards the base; the black parts more or less clothed with black hairs. Venter yellowish translucent,

more or less blackened in the apical half, with long, pale hairs, short on fourth segment. Legs black and yellow; front femora yellowish on the anterior, black on the posterior side, but here yellow at the base with about four, black, roundish spots, the apex yellow; middle femora yellow, black below: middle tibiae black except base and apex, middle tarsi blackish or brownish, especially below, with the apex of the joints more or less pale; hind legs black with only the knees yellowish. Front trochanters with a brush of relatively long, yellow



Fig. 102.
P. scutatus ♂,
right front leg
from below.
× 20.

bristles below; front femora on the posterior side at the base with some curled and united, long, white hairs, then follow two clumps of likewise curled and tangled, black hairs with the apex curved forwards, and hereafter long, bristly, black hairs and below some yellow hairs; the front tibiae are rather abruptly dilated in about the apical third on the posterior side; they are whitish above: below the basal part is brown, then there is a whitish, transverse band, after it a brown patch, the apical part is again whitish with two narrow, undulated, brown transverse bands at the apex; the posterior margin is black in the middle and it has a fringe of partly black, partly yellow hairs, and similar hairs above; above the dilated part is a tuft of long, tangled, black hairs at the posterior margin; front metatarsus dilated, nearly as long at the following joints, second joint as dilated as the first, but very short, about one sixth of the length of the first; third and fourth joints less dilated, the third most; the joints are dilated to the posterior side; the tarsus is white, metatarsus with some longitudinal, blackish markings below, and the two next joints with the posterior corner blackish below; fifth joint yellow; the middle coxae bear at the apex on the front side a spine-like, yellow prolongation, often dark at the apex; behind it is another small and inconspicuous prolongation; the middle femora have long, pale hairs behind, black, bristly hairs below in the apical half and here also finer, dark hairs on the antero-ventral side; at the apex below there are three to four fine, recurved hairs; the middle tibiae are a little thickened on the middle part, slightly narrowed before the apex and here curved a little inwards; they have longish, somewhat tangled, yellow or dark hairs on the posterior side in the basal two thirds and a delicate, short fringe on the postero-dorsal side, but with long hairs in the middle; below there is a short, dense fringe of erect,

pale hairs, with some longer hairs at the base; the hind femora are haired as usual with pale hairs, the hind tibiæ have some few, long, dark hairs on the antero-dorsal side about the middle; hind metatarsi a little thickened. Wings hyaline or nearly so. Squamulæ whitish to brownish white and with a whitish fringe. Halteres pale yellow.

Female. Frons and epistoma not broad; frons bluish with moderate side dust spots and with the hairs black above and below, yellow in the middle. Thorax short-haired, the hairs erect. Abdomen with the spots about as in the male, but more transverse; there are only three pairs, the fifth segment without spots; sometimes the spots are rather hoary. Anterior legs yellow with only faint, brown rings on tibiæ; the front femora have as in the male a peculiar, combined, white hair at the base, but it is straight, small and inconspicuous; hind femora yellow with a broad, dark ring near the apex, and hind tibiæ yellow at base and apex.

Length 7,3—9 mm.

This species is in the male distinguished at once by the characters on the anterior legs; in the female it somewhat resembles *peltatus*, but it is easily known by the less produced epistoma and upper mouth edge, the slightly more erect thoracal pubescence, the smaller abdominal spots, especially the first pair and the want of a fourth pair; finally it is a smaller species. — The finger-like prolongation at the base of the middle legs is not placed on the trochanter, as stated by Verrall, but on the coxa, and it is, as also the dent-like process in *peltatus*, a special development of the thin, chitinous prolongation of the front side of the coxa commonly present. — I possess a hermaphroditic specimen of this species; it has female exterior genitalia, but the last segments are not quite as in a normal female. The frons is about as broad as in normal females; anterior femora and tibiæ coloured about as in the male; the right front femur has the peculiar white hair and two small clumps of black, tangled hairs; on the left femur they are less developed; the tibiæ are almost not flattened, the tarsi somewhat broad and flat but not much; middle legs simple. The specimen is melanoid with a black abdomen.

P. scutatus is not just common in Denmark; Copenhagen in a garden, Frederiksberg Have, Charlottenlund, Ordrup Mose, Dyrehaven, Geel Skov, Trørød, Tyvekrog, Egebæks Vang; on Langeland at Lohals; on Funen at Middelfart, Strib and on Fænø; in Jutland in Vejle Nørreskov, at Horsens, Hald near Viborg and Jerup near Frederikshavn. The dates are $^{28}/_5$ — $^{25}/_9$, but it is most common in the later part of the summer.

Geographical distribution:— Europe down into Italy; towards the north to northern Sweden, and in Finland.

5. *P. albimanus* Fabr.

1781. Fabr. Spec. Ins. II, 434, 63 et 1794. Entom. Syst. IV, 310, 117 (*Syrphus*) et 1805. Syst. Antl. 253, 23 (*Scaeva*). — 1817. Fall. Dipt. Suec. Syrph. 46, 19, p. p. (*Scaeva*). — 1822. Meig. Syst. Besch. III, 333, 87 (*Syrphus*). — 1843. Zett. Dipt. Scand. II, 752, 56 (*Scaeva*). — 1843. Stæg. Naturh. Tidsskr. IV, 326. — 1862. Schin. F. A. I, 294. — 1901. Verr. Brit. Fl. VIII, 280, 7, figs. 241—244. — 1907. Kat. paläarkt. Dipt. III, 42. — *Musca cyanea* O. F. Müll. 1764. Fn. Fridrichsd. 85, 761.

Male. Frons and epistoma greenish black, thinly brownish pruinose, somewhat shining, central knob not pruinose; vertex black-haired, behind the ocelli yellow-haired; frons and epistoma all black-haired. The lower part of epistoma with the central knob a little produced. Occiput grey pruinose, the hairs whitish below, yellow upwards and here besides a few long, black hairs. Antennæ smallish, yellowish beneath the base of the third joint, but often somewhat indistinctly. Thorax æneous, shining but not brightly, clothed with long, yellow hairs, longest on scutellum and here black on the posterior part; at the sides of the disc are also blackish hairs tending to form two longitudinal stripes. Pleura with pale hairs. Abdomen dull black, the very base and the fifth segment shining; it has three pairs of æneous spots, the first pair in the middle of the segment, the two other pairs somewhat triangular or more subquadrate, placed near the front margin, all continuous with the shining æneous side margin; the spots are hoary but in a different way according to the direction in which they are seen; when seen from behind the inner part of the spots is hoary, but when seen from in front it is the outer part which is hoary; the basal spots only slightly hoary. The pubescence is long and yellow at the sides towards the base, short in the middle and here mainly black on the black parts. Venter yellowish or æneous black, shining, with long, pale hairs, shorter towards the end. Legs black or blackish and yellow; front femora yellow at apex, and at the base on the anterior side, and also with a pale patch on the posterior side inclosing two black spots; front tibiæ and tarsi mainly pale; middle legs with the knees and apex of tibiæ yellowish, and the tarsi pale yellowish, more or less brownish towards the end; hind legs with only the knees yellowish: sometimes the dark parts of the legs are rather brown or pale brown. Front trochanters with very short and inconspicuous, pale hairs; the front femora have on the posterior side at the base a long, white, somewhat curled hair, consisting of several united hairs, with the apex bent forwards: then

follow two more or less separated clumps of tangled, black hairs, likewise with the apex curved forwards, and after them about three black, bristly hairs; on the postero-ventral side are shorter and finer hairs; front tibiæ evenly dilated about from the base, in the apical third more suddenly dilated towards the posterior side and with the posterior apical corner produced; they are whitish, the margins black except at base, and on the ventral side there is a dark, oblique, transverse band above the middle, and a dark, longitudinal stripe below it as well as a couple of black, transverse stripes at apex towards the anterior side; the tibiæ have a short, blackish ciliation on the anterior margin, and long, black hairs above towards the posterior margin, and a couple of long hairs in the middle of the postero-ventral margin; the metatarsus is dilated, as broad as the end of tibia, not three times as long as the second joint and about as long as the three following joints; these latter decrease evenly in breadth and are subquadrate; the metatarsus is whitish, somewhat blackish below with a transverse, whitish band in the middle; the other joints are more yellow; the blackish ciliation on the anterior margin of tibiæ is produced along the margin of metatarsus. The middle trochanters have a brush of short, black bristles below; the middle femora have a row of black bristles below, and at the apex a single, fine, recurved hair; they have further some long, yellow hairs below about the middle, and shorter, yellow and black hairs on the posterior side; the middle tibiæ are simple, mainly short-haired, but with a few longer hairs ventrally at the base, a couple on the postero-dorsal side in the middle and some curved, bristly hairs ventrally at the apex; hind femora with long hairs on the anterior side, short, erect hairs on the posterior side, hind tibiæ short-haired, with some long hairs on the antero-dorsal side about and below the middle, the latter dark or yellow, all the others pale; hind metatarsi very slightly thickened. Wings hyaline to a little brownish tinged. Squamulæ whitish or brownish white, with a darker margin and a yellow fringe. Halteres yellowish, the knob more or less brownish.

Female. Frons and epistoma broad, the former bluish with two small side dust spots; the hairs dark, only pale above the antennæ; epistoma with white hairs, shorter than in the male. Thorax bluish black, shining, short-haired. Abdominal spots blue, second and third

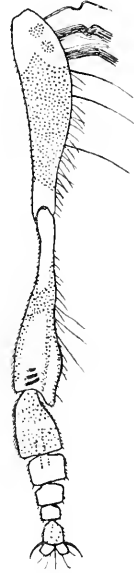


Fig. 103.
P. albimanus ♂.
right front leg
from below.
× 20.

pairs a little hoary and more transverse than in the male; fifth segment without spots. Anterior legs with femora and basal part of tibiae yellow, also apex of tibiae, especially middle tibiae, yellow; tarsi blackish or brownish; sometimes the legs much paler as the dark parts are brownish or paler, especially on the anterior legs; the front femora have the peculiar, white hair at the base, but it is straight or almost straight and small. Squamulae white. Halteres yellow.

Length 7—9 mm.

The pupa is whitish, of a length of about 6 mm; it is slightly transversely corrugated and has a short posterior spiracular process.

This species is in the male sufficiently distinguished by the characters on the front legs and the colour of the abdominal spots; the female is also easily known by the bluish abdominal spots, yet it may bear no slight resemblance to *scutatus* when this has the spots somewhat hoary, but it is distinguished by the broader frons and epistoma, the much smaller side dust spots and the darker legs, especially by the hind femora being not pale on the basal part.

P. albimanus is common in Denmark; Copenhagen in gardens, Lersø, Vesterfælled, Damhussø, Charlottenlund, Ordrup Mose, Ermelund, Dyrehaven, Lyngby Mose, Ruderhegn, Birkerød, Tyvekrog, Nordskoven at Jægerspris; on Lolland at Maribo, Bremersvold, in Dødemose, Kældskov and at Kærstrup west of Nysted; on Langeland at Lohals; in Jutland at Horsens, Frijsenborg, Gjerlev near Randers Fjord and Thisted. My dates are $\frac{9}{5}$ — $\frac{19}{9}$. It occurs in fens and on meadows in grass and low herbage, and not rarely on salt marshes. I found the pupa in a garden under old leaves on $\frac{22}{4}$, it developed in the first part of May, and the species was bred from larvæ in flood refuse in Ruderhegn and at Randers, the imagines developing in May (Schlick).

Geographical distribution:— All Europe, towards the north to northern Sweden, in Finland, Siberia and on the Faroe islands and Iceland: it also occurs in North America.

6. *P. scambus* Stæg.

1843. Stæg. Naturh. Tidsskr. IV, 326. — 1849. Zett. Dipt. Scand. VIII, 3147, 51—52 et 1859. XIII, 6002, 51—52 (*Scaeva*). — 1901. Verr. Brit. Fl. VIII, 248, 9, fig. 246. — 1907. Kat. paläarkt. Dipt. III, 45. — *Scaeva clypeata* p. p. 1838. Zett. Ins. Lapp. 606, 31 et 1843. Dipt. Scand. II, 748, 51.

Male. Frons and epistoma greenish black, somewhat densely yellowish brown pruinose, most thinly on frons; the central knob not pruinose, but not or slightly shining; vertex yellow-haired, only just at the apex some black hairs; frons black-haired. Epistoma with

yellow or sometimes black hairs: it is rather flat, the central knob slightly prominent. Occiput yellowish or greyish yellow pruinose, with yellow hairs, among which are no black. Antennæ black, not small, third joint somewhat broad, almost square; arista about as long as the antennæ. Thorax æneous, shining, clothed with not long, yellow hairs, longest on scutellum. Abdomen dull black, a little shining at the very base and apex; it has three pairs of large, yellow or reddish yellow spots; the first pair placed on the middle of the segment, its inner margin slopes outwards towards the base so that the spot is somewhat triangular, the second and third pairs are placed towards the front margin and are rectangular: the spots leave only a narrow middle line and transverse lines at the hind margins black: the fifth segment has large spots at the basal corners. Abdomen is clothed with yellow hairs, long at the sides towards the base; on the middle line and partly on the transverse lines are black hairs. Venter somewhat translucent, yellowish, generally darker towards the end, with long, yellow hairs, short on fourth segment. Anterior legs yellow, only front femora a little obscured behind and middle femora with a brown spot below at base; hind legs black with base and apex of femora and tibiæ yellow, or they may be termed yellow with broad, black rings on femora and tibiæ; hind tarsi black with the apical part of the three first joints yellow, or the middle joints all yellow and the two apical joints slightly darkened. Front trochanters with inconspicuous, dark yellow or brown spines below; front femora with a row of isolated, long, black bristles behind, and below them with yellow hairs, but quite below with some black or yellow bristly hairs: there is no peculiar white hair at the base; front tibiæ thin at the base but then evenly dilated, the posterior apical corner drawn somewhat out and in the middle of the posterior margin a slight incurvation; they are somewhat whitish at the apex, and below on the anterior part at the apex are some small, black lines and towards the posterior side a dark longitudinal stripe; they have short, pale hairs, only above the incurvation at the posterior margin are generally darker to black hairs; the front tarsi are moderately dilated and evenly decreasing towards the end but with all joints dilated: metatarsus about of the length of the two following joints, it has two dark longitudinal markings below, and a black line stretches down the middle of second and third to the base of fourth joint. Middle trochanters with short, black spines at the apex; middle femora with short, black bristles on the anterior side towards below, stopping before the apex; below the apex one to three of the curious, recurved hairs, on the ventral side about the middle a row of four or five long, black, bristly hairs, the

posterior side with longish, yellow or towards the apex blackish hairs; middle tibiæ curiously shaped, flat or slightly canaliculated below, dilated in the middle and here bent a little forwards and the apex again bent a little backwards and inwards and somewhat twisted; they are haired with short, yellow hairs, but the ventral margins have generally blackish hairs in the basal half, longest on the posterior side; hind legs mainly with short, pale hairs, only longer below the femora, and some few, generally dark hairs about the middle on the antero-dorsal side of the tibiæ; the tibiæ are a little undulated; hind metatarsi somewhat thickened. Wings slightly to rather strongly brownish tinged. Squamulæ brownish white to brownish with a yellow fringe. Halteres yellow.

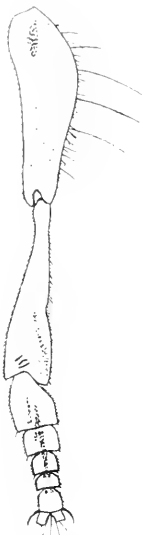


Fig. 104.
P. scambus ♂.
right front leg
from below.
× 20.

Female. Frons broad, æneous, with two triangular, yellow side dust spots, connected at the eye-margin with the pruinosity on epistoma: it is yellow-haired, only just in front of the ocelli are darker hairs. Epistoma with somewhat short, whitish hairs. Thorax short-haired. Abdominal spots about as in the male, the pair on fifth segment large and distinct, and the sixth segment quite or partly yellow. Legs much paler than in the male, hind femora and tibiæ with only small and often faint, blackish rings, and metatarsus and the two apical joints also often slightly darkened; the middle tibiæ show very slight traces of the same shape as in the male. The hairs behind the anterior femora rather short and front femora as in the male with no white hair at the base. Squamulæ yellow.

Length 8—9 mm.

P. scambus is not common in Denmark; Copenhagen in a garden, Amager, Lersø, Damhusmosen, Dyrehaven, Lyngby Mose, Søllerød, Bagsvær, Hillerød, Donse, Jægerspris and at Roskilde; in Jutland at Sminge near Silkeborg. My dates are $^{30/5}$ — $^{30/8}$. It occurs in fens and meadows, and I have especially taken it flying in high grass.

Geographical distribution:— Northern and middle Europe down into Bohemia and Styria; towards the north to northern Sweden, and in Finland; as it has hitherto generally not been correctly recognised it will probably prove to be as widely distributed as the other species: according to Verrall *P. chuetopodus* Will. is a synonym, and the species should thus occur also in North America.

7. *P. immarginatus* Zett.

1849. Zett. Dipt. Scand. VIII, 3149, 52—53 (*Scaeva*). — 1862. Schin. F. A. I, 296. — 1901. Verr. Brit. Fl. VIII, 287, 10, fig. 247. — 1907. Kat. paläarkt. Dipt. III, 44. — *Scaeva ferruginea* var. c. 1843. Zett. Dipt. Scand. II, 749. — *Scaeva podagrata* Zett. p. p. 1843. l. c. II, 751. — *P. podagratus* 1862. Schin. F. A. I, 296.

Male. Frons and epistoma greenish black, brownish yellow pruinose, somewhat thinly on the frons; the central knob shining. Vertex yellow-haired, at the front angle dark hairs; frons black-haired. Epistoma with not long, yellow hairs, it is rather flat, the central knob slightly prominent. Occiput yellowish pruinose, with yellow hairs, among which no black. Antennæ rather short, shorter than in *scambus*, third joint

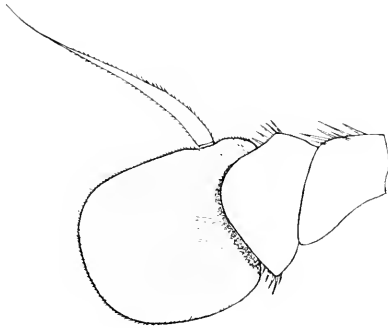


Fig. 105. Antenna of *P. immarginatus* ♂, from the inside. $\times 85$.

quadrate, not at all longer than broad; arista short and thick, shorter than the antennæ. Thorax greenish æneous, shining, with somewhat short, yellow hairs. Pleura with long, yellow hairs. Abdomen very extensively yellow as only the base, a narrow middle line and very narrow hind margins of second to fourth segments are black; fifth segment quite yellowish with a black middle line. Abdomen is clothed with short, yellow hairs, longer at the sides towards the base; on the middle line are some black hairs. Venter yellowish, translucent, with longish, pale hairs, short on fourth segment. Anterior legs yellow, only front femora somewhat darkened behind and with two spots below at base, and middle femora darkened below; hind legs as in *scambus* with femora and tibiæ blackish with base and apex yellow, tarsi blackish with second and third joints yellow. Front trochanters with small, yellow spines below; front femora behind at the base with a white, tangled hair with the apex curved forwards, formed of

some united hairs; after this there are about six black, isolated bristles, the basal one or two sometimes yellow; below there are shorter, yellow hairs; front tibiæ somewhat evenly dilated from the base, with the posterior apical corner drawn out; the posterior margin is almost



Fig. 106.

P. immarginatus ♂.
right front leg
from below.
× 20.

straight without any incurvation; the tibiæ are whitish towards the apex, below there are a pair of inconspicuous, blackish, longitudinal markings and just at the apex a couple of black transverse lines; the hairs are short and pale; front tarsi not much dilated and evenly decreasing towards apex, the basal joint about as long as the three following. Middle trochanters with inconspicuous black bristles at apex; the middle femora as in *scambus* with an irregular row of short, black bristles on the anterior side towards below not reaching the base; below the apex two or three of the curious, recurved hairs; on the ventral side about the middle some bristly but, at all events generally, yellow hairs and on the posterior side shorter, yellow, or towards the apex black, hairs; middle tibiæ shaped somewhat as in *scambus*, with distinct, yellow fringes on the ventral margins in the basal half, longest on the anterior side; hind femora with longish, pale hairs on the antero-ventral side, hind tibiæ short-haired; hind metatarsus a little thickened. Wings somewhat strongly brownish tinged. Squamulæ smoky with a yellow fringe. Halteres yellow.

Female. Frons broad, aeneous, with two triangular, yellowish or somewhat greyish dust spots, connected broadly at the eye-margin with the pruinosity on epistoma, the spots are not well defined such as they are in *scambus*; frons yellow-haired, with dark hairs in front of the ocelli; the hairs on epistoma short and not dense. Thorax short-haired. Abdominal spots considerably smaller than in the male, and hence the middle and transverse black lines much broader; the spots somewhat rounded inwards; fifth segment with large spots, sixth quite or almost quite yellow; the abdominal spots are smaller than in the female of *scambus*, especially the basal pair. Legs with only faint dark rings or markings on hind femora and tibiæ, hind metatarsus more or less darkened, the last two joints blackish; middle tibiæ with slight traces of the shape in the male. Anterior femora with quite short hairs behind, and front femora with the peculiar, white hair at the base, but it is straight. Squamulæ yellow.

Length 7.5–8 mm.

The larva is flat below, somewhat arched above, greyish yellow with some darker longitudinal lines; the pupa is white, 5 mm long, slightly transversely corrugated; it has a short, brown posterior spiracular process, divided at the apex.

This species is much like *P. scambus* but in the male it is easily recognised, especially by the presence of the peculiar, white hair at the base of front femora and the much more yellow abdomen; also the female is distinguished with certainty from the female of *scambus* by the white hair at the base of front femora, and further by the shorter antennæ with short arista and the smaller abdominal spots, especially the basal pair. — According to Zetterstedt (l. c. VIII, 3149, Obs. 2) Stæger has first observed that this species is different from *fulviventris (ferruginea)*, and as Zetterstedt says "Stæg. in litt." the name is originally due to Stæger. — Under *P. podagratus* Zetterstedt says, that this species had been taken at Copenhagen by Stæger; this is certainly erroneous, I think it is a confusion with the present species.

P. immarginatus is somewhat rare in Denmark; Utterslev Mose, Amager, Vesterfælled, and in Jutland at Horsens and Randers. The dates are $26\frac{1}{5}$ — $6\frac{1}{8}$. It occurs on meadows, perhaps especially on salt marshes. I found the larva on Vesterfælled in flood refuse, chiefly consisting of reeds, near the shore on $\frac{1}{4}$, it pupated soon after and the imago came in the first half of May; it has further been bred from larvæ in flood refuse in Utterslev Mose and at Randers, the imagines developing in April and May (Schlick).

Geographical distribution: — Northern and middle Europe, towards the north to northern Sweden, and on the Faroe islands; it is recorded from northern Germany by Zetterstedt, further down into Styria (*podagratus* Strobl), but the records are not sure as the species has not been well recognised.

8. *P. fulviventris* Macq.

1827. Macq. Soc. Sc. Lille, 229, 6 et 1834. Suit à Buff. I, 548, 47, ♂ (*Syrphus*). — 1838. Meig. Syst. Besch. VII, 136, 112 (*Syrphus*). — 1843. Zett. Dipt. Scand. II, 750, 53 et 1849. VIII, 3150, 53 (*Scaeva*). — 1843. Stæg. Naturh. Tidsskr. IV, 325. — 1862. Schin. F. A. I, 296. — 1901. Verr. Brit. Fl. VIII, 288, 11, fig. 248. — 1907. Kat. paläarkt. Dipt. III, 43. — *Musca mellina* 1776. De G. (nec Linn.) Ins. VI, 117. — *Syrphus ferrugineus* Macq. 1827. l. c. 229, 7 et 1834. l. c. I, 548, 48, ♀. — 1838. Meig. l. c. VII, 137, 113. — *Scaeva ferrugineu* 1843. Zett. l. c. II, 749, 52 p. p. et 1849. VIII, 3148, 52. — *Syrphus Winthemi* Meig. 1830. l. c. VI, 353, 100.

Male. Frons and epistoma greenish black, the former slightly pruinose, the latter not densely greyish yellow pruinose with the

central knob bare. Epistoma narrow, rather flat, the central knob slightly prominent. Vertex chiefly yellow-haired, frons dark brown-haired; epistoma with not dense, whitish hairs. Occiput greyish yellow pruinose, the hairs all yellow. Antennæ black or brownish black, rather large, third joint large, about square but slightly longer than

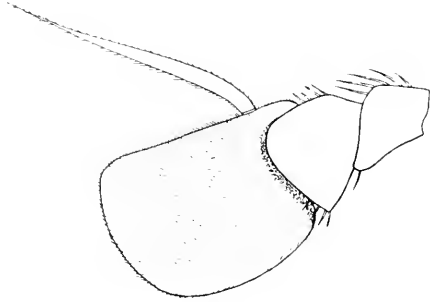


Fig. 107. Antenna of *P. fulviventris* ♂, from the inside. $\times 85$.

broad and with the upper apical angle somewhat produced; arista thickened, scarcely as long as the antennæ. Thorax dark greenish æneous or sometimes somewhat coppery, shining; it has rather short, yellow hairs. Pleura with long, yellow hairs. Abdomen extensively yellow as in *immarginatus*, the base, a narrow middle line and transverse lines at the hind margins of second to fourth segments black, fifth segment yellowish with a black middle line; the middle line is broadest on second segment, and the transverse lines are a little broader than in *immarginatus*. Abdomen is clothed with short, yellow hairs, longer at the sides towards the base; on the black lines a few black hairs. Venter yellowish, somewhat translucent, with longish, pale hairs, short towards the end. Legs yellow, only hind metatarsus and the two last joints black, the metatarsus with the apex yellow; hind tibiæ may be slightly darkened about the middle. Front trochanters with inconspicuous short, yellow bristles below; the front femora with the curious, white hair at the base and with a dense ciliation of long, black, somewhat curled hairs on the posterior side; below there are some yellow hairs; front tibiæ thin at the base, then suddenly dilated, broadest above the middle and after it again a little contracted; they are somewhat whitish towards the apex, below with a dark longitudinal line and at the apex a couple of small, black, transverse lines; pubescence short, yellow, at the upper part of the posterior margin a short fringe; front tarsi moderately dilated, evenly and only

slightly decreasing outwards and all joints dilated; first joint a little longer than the two following; the two first joints are a little blackish marked below on the anterior side. Middle trochanters with short, black bristles at the apex; the middle femora with short, yellow hairs on the antero-ventral side and with a little longer fringe behind, longest and generally dark towards the apex, but with no recurved hairs below apex; middle tibiæ very slightly dilated about the middle, with a short fringe on the basal half of the ventral margins, longest anteriorly; hind legs mainly with short, yellow hairs, a little longer on the antero-ventral side of the femora, and with a fringe on the anterior side of tibiæ, longest about the middle; hind metatarsi distinctly thickened. Wings somewhat strongly brownish tinged. Squamulæ yellow to brownish, with a yellow fringe. Halteres yellow.

Female. Frons narrower than in *immarginatus*, aeneous, with two somewhat small, yellowish grey side dust spots, connected at the eye-margin with the pruinosity on epistoma; it is yellow-haired but with dark hairs across in front of the ocelli. Antennæ as in the male. Thorax short-haired. Abdominal spots as in the male or slightly smaller, fifth segment with two large spots or quite yellow, sixth quite yellow. Legs coloured as in the male, hind tibiæ quite yellow and hind metatarsus less darkened. The hairs behind front femora all short, at the base is the peculiar, white hair, but is straight and somewhat short; the hairs behind middle femora longish towards the apex and here blackish. Squamulæ yellow.

Length 7.5—9 mm.

The pupa is quite similar to that of *immarginatus*.

This species is as usual easily known in the male by the shape of the front tibiæ and the ciliation behind front femora; in the female it is known from the two preceding species by the quite yellow hind femora and tibiæ, and from *scambus* by the presence of the white hair at the base of front femora; in both sexes the antennæ are characteristic and have the arista shorter than in *scambus* but longer than in *immarginatus*. — It would seem that the pubescence on epistoma and legs may vary somewhat in colour (as in most other species), as Verrall describes epistoma as usually black-haired and the fringe on hind tibiæ as black.

P. fulviventris is rare in Denmark; Lersø, Dyrehaven (Stæger).

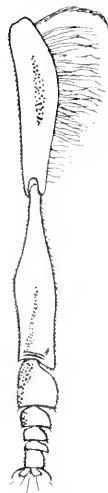


Fig. 108.
P. fulviventris ♂,
right front leg
from below.
× 20.

Damhusmosen, Utterslev Mose (Schlick), Ordrup Mose, Lyngby Mose, Bagsvaer, Frederiksdal, Ørholm (the author); on Lolland in Kældskov and Dodemose west of Nysted (L. Jørgensen). My dates are $20/6$ — $30/8$. It occurs in fens and on meadows, and I haven taken it flying in high grass. It has been bred from larvæ in flood refuse from Damhusmosen and Utterslev Mose, the imagines came in May (Schlick).

Geographical distribution:— Northern and middle Europe, and recorded down into Italy; towards the north to middle Sweden, but rare, and in Finland and Siberia.

9. *P. clypeatus* Meig.

1822. Meig. Syst. Besch. III. 335, 90 (*Syrphus*). — 1843. Zett. Dipt. Scand. II, 748, 51 et 1849. VIII, 3145, 51 et 1859. XIII, 6001, 51 (*Scaeva*). — 1843. Stæg. Naturh. Tidsskr. IV, 323. — 1862. Schin. F. A. I, 296. — 1901. Verr. Brit. Fl. VIII, 293, 13, figs. 252—253. — 1907. Kat. paläarkt. Dipt. III. 43. — *Scaeva albimana* p. p. 1817. Fall. Dipt. Suec. Syrph. 46. — *Syrphus dilatatus* Macq. 1834. Suit. à Buff. I, 547, 45. — 1838. Meig. l. c. VII. 138, 115.

Male. Frons and epistoma greenish black, the former almost not pruinose, the latter somewhat thinly grey pruinose, the central knob bare. Epistoma rather flat, the knob slightly prominent. Vertex yellow-haired or with a few darker hairs quite in front; frons and epistoma black-haired or the latter paler-haired, especially below. Occiput greyish pruinose, the hairs all yellow. Antennæ black, somewhat large, third joint a little longer than broad; arista of the length of the antennæ or scarcely so. Thorax greenish æneous, shining, with longish, yellow hairs. Pleura with long, yellow hairs. Abdomen dull black, slightly shining at base and apex; it has three pairs of yellow or reddish yellow spots; first pair more or less small, roundish or a little triangular, lying behind the middle of the segment, second and third pairs close to the front margins, second pair rectangular, third pair shorter, more quadrate, going over the side margin, both pairs with the inner hind corner rounded; fifth segment with small or indistinct reddish spots at the basal corners. Abdomen is clothed with short, yellow hairs, longer at the sides and rather long towards the base; on the black parts partly black hairs. Venter translucent, with long, pale hairs, short on fourth segment. Legs yellowish, front femora more or less darkened behind towards above and middle femora above and below in the apical half or two thirds; hind femora black with base and apex yellow, the base sometimes indistinctly, hind tibiæ with a broad black ring and hind metatarsus and the two last joints black. Front trochanters with a row of small, inconspicuous yellow bristles below; front femora with the peculiar, white, curled hair at the base on the

posterior side, after it a row of long, fine, black hairs, decreasing in length towards the apex; some of those at the base curved forwards at the end; below there are long hairs on the basal part; front tibiæ moderately and evenly dilated from base towards tip, the posterior apical corner drawn somewhat out; they are a little brownish on the posterior margin above the middle and whitish on the apical half, below they are a little blackish towards apex, especially at the anterior corner, and with a couple of small, black, transverse lines at the apex; they are short-haired, only at the basal half of the posterior margin there is a fringe of longer, blackish or yellow hairs; front tarsi moderately dilated and slightly decreasing in breadth towards the apex, metatarsus a little longer than the two following joints; the tarsi are yellow, metatarsus white on the basal half, a little blackish at the base below and the three first joints with a more or less distinct dark point below. The middle trochanters have short, black bristles at the apex; middle femora with short, inconspicuous, yellow hairs on the anterior side and usually more or fewer about the middle towards below are black and bristly, but these may also be wanting; on the postero-ventral side there is a conspicuous fringe of long, black or chiefly black hairs, and below some stronger, bristly hairs, but there are no recurved hairs below the apex; middle tibiæ very slightly undulated, with a fringe of long, somewhat curled, blackish hairs on the antero-ventral margin, longest towards the base, and with a short fringe on the postero-ventral margin in the basal half; hind femora with relatively long, yellow hairs on the antero-ventral side; hind tibiæ short-haired, with a short, inconspicuous antero-dorsal fringe; hind metatarsus only slightly thickened. Wings slightly to rather strongly brownish tinged. Squamulæ dirty whitish to brownish, with a yellow fringe. Halteres yellow.

Female. Frons rather broad (but varying in breadth), æneous or bluish æneous, with greyish side dust spots, connected at the eye-margins with the pruinosity on epistoma: it is pale-haired with dark hairs across in front of the ocelli. Epistoma white-haired. Thorax brightly shining, short-haired. Abdominal spots mainly as in the male, the fifth segment with distinct, not small spots, sixth segment black. Anterior legs yellow, hind legs coloured as in the male, but not rarely much paler with only slight and faint dark markings on the middle

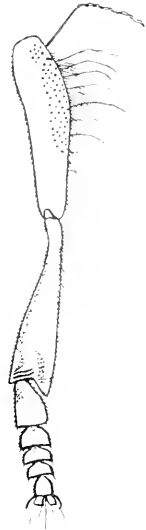


Fig. 109.
P. clypeatus ♂.
right front leg
from below.
× 20.

of femora and tibiæ. Front femora with the peculiar, white hair at the base, and it is often curved at the apex; the hairs on the postero-ventral side not short, and they increase in length towards the base; also the hairs on middle femora somewhat long, and more or less dark towards the apex.

Length 6.8—9 mm.

The larva is flat below, somewhat arched above; it is greyish yellow with a dark longitudinal dorsal stripe and some reddish markings shining through the dermis; along each side is a paler reddish stripe; it has, when full grown, a length of 10 mm. The puparium is dirty white to pale yellowish, slightly transversely corrugated, with a short, divided, brownish posterior spiracular process; it has a length of 5 to fully 6 mm.

This species is in the male known by the hairs on front femora and middle tibiæ and the shape of the front tibiæ and tarsi: the female bears resemblance to *scambus*, *immarginatus* and *fulviventris*; it has often much darker hind legs, but sometimes this character is not present, though *fulviventris* always may be known from it by the quite yellow hind legs; for the rest it can be distinguished with certainty from *scambus* by the presence of the white hair at the base of front femora and the other hairs being longer, and also by the smaller basal abdominal spots; from *immarginatus* by the longer hairs on anterior femora and those on front femora being longest towards the base, while they are of the same length in *immarginatus*, and further it has larger antennæ with the third joint longer and the arista not quite so short; from *fulviventris* it is likewise known by the hairs on front femora being longer and longest at the base, and finally it differs from all three by the black sixth abdominal segment. — The species varies in the male somewhat with regard to the hairiness of the front and middle femora, as sometimes the stronger, curved hairs on the front femora are less conspicuous, and as already stated, the middle femora may have more or fewer small bristles on the front side, or none at all.

P. clypeatus is common in Denmark and may be taken on suitable localities, fens, meadows and in woods in all parts of our country. My dates are $^{12}/_5$ — $^{30}/_8$. I have taken the larva on Vesterfælled in flood refuse of reeds on $^4/_1$, and in Utterslev Mose on $^{12}/_4$, they pupated soon after and the imagines came in the first part of May; further I took a larva in the same way in Damhusmosen on $^{24}/_3$, it pupated on $^5/_1$ and developed on $^{12}/_1$, and it was taken in Ruderhegn on $^9/_2$, pupating on $^{13}/_1$ and developing on $^{20}/_1$ (Kryger); finally the species has been bred from larvæ taken in flood refuse in Damhusmosen.

Utterslev Mose, Vesterfælled, Ruderhegn and at Randers, the imagines developing in April and May (Schlick).

Geographical distribution: — All Europe down into Spain and Italy, towards the north to northern Sweden, in Finland, Siberia and on the Faroe islands and Iceland. Verrall suggests that it occurs in North America as he thinks *hyperboreus* Willist. (nec Stæg.) a synonym. *P. hyperboreus* Stæg. from Greenland is a good species with hoary æneous or bluish abdominal spots.

10. *P. angustatus* Zett.

1843. Zett. Dipt. Scand. II, 762, 64 et 1849. VIII, 3154, 64 et 1855. XII, 4661, 64 et 1859. XIII, 6005, 64 (*Scaeva*). — 1860. Malm, K. V. och V. Samh. Göteborg Handl. VII, 42 (*Scaeva*). — 1901. Verr. Brit. Fl. VIII, 295, 14, 679, figs. 254—255. — 1907. Kat. paläarkt. Dipt. III, 42. — *P. quadratus* 1843. Stæg. (nec Macq.) Naturh. Tidsskr. IV, 324.

This species is very much like *clypeatus*, but it is narrower and generally smaller. Male. Head and thorax as in *clypeatus*: abdomen narrow, the basal spots larger and longer than in *clypeatus*, more or less subquadrate and closer together; those of the of second pair long, about twice as long as broad and likewise closer together than in *clypeatus*; fifth segment with indistinct or no spots at the basal corners. Legs coloured mainly as in *clypeatus*, hind tibiæ with a well defined black ring and hind tarsi with the middle joints more or less black; the legs are haired as in *clypeatus*.

Female. This seems more distinct than the male, at all events in its extreme forms. Frons and epistoma narrower than in *clypeatus*; frons bluish, with a slight transverse depression and small and indistinct dust spots. Thorax æneous or bluish. Abdomen very narrow and pointed, black, generally somewhat bluish; the basal spots are small and round, the second pair quadrate or rectangular, the third pair only represented by a very small spot at the basal corners, fifth segment always quite black. Besides this form others occur with abdomen less pointed and the spots on fourth segment larger. Legs as in *clypeatus*, but there seem always to be distinct and well defined broad, black rings on hind femora and tibiæ; middle joints on hind tarsi yellow or more or less darkened. The legs are, I think, a little less haired and shorter-haired than in *clypeatus*.

Length 6,5—8 mm.

Whether this species is distinct or it may be an extreme variety of *clypeatus* it is, I think, at present not possible to decide, but as it is understood here it is known without difficulty by the long second pair of abdominal spots in the male and the narrow, pointed abdomen

in the female with its characteristic spots and quite black fifth segment. — In Kat. paläarkt. Dipt. *quadratus* Stæg. is placed as a synonym to *scutatus* Meig. = *quadratus* Macq., but this is erroneous; Verrall says (i. c. 280) “. . . in the Copenhagen collection the exponent of *P. quadratus* was a female *P. peltatus*”; how Verrall has come to this I do not understand, but he must have committed some mistake, for in our collection (= Stæger's collection) there were eleven specimens under *quadratus*, two males and nine females, and these were all *angustatus*, except one female which was *scutatus*. Zetterstedt also mentions that he had received the species from Stæger partly as sp. n. (II, 762), partly as *quadratus* (VIII, 3155); also Stæger's description l. c. shows with full evidence that his *quadratus* is *angustatus*, but at that time he had only the female.

P. angustatus is somewhat rare in Denmark; Lersø, Ordrup Mose (Stæger), Nordskoven at Jægerspris; on Langeland at Lohals (the author) and in Jutland in Nørholm Skov at Varde (Kryger), at Frijsenborg and Thisted (the author). The dates are $\frac{4}{6}$ — $\frac{10}{8}$.

Geographical distribution: — Northern Europe and recorded down into Styria; towards the north to northern Sweden, and in Finland.

11. *P. sticticus* Meig.

1822. Meig. Syst. Besch. III, 332, 86 (*Syrphus*). — 1862. Schin. F. A. I, 292 (*Melanostoma*). — 1901. Verr. Brit. Fl. VIII, 297, 15, fig. 256. — 1907. Kat. paläarkt. Dipt. III, 46. — *P. spathulatus* Rond. 1857. Dipt. ital. Prodr. II, 121, 7. — *P. complicatus* Beck. 1889. Berl. ent. Zeitschr. XXXIII, 172, 155.

Male. Frons æneous, shining but dull or dullish black on the upper part; epistoma bluish black, very slightly dusted, shining; it is somewhat produced, a little keel-shaped with the central knob prominent. Vertex, frons and epistoma black-haired. Occiput slightly greyish pruinose, the hairs below yellow but the long hairs above all black. Antennæ blackish brown, third joint inconspicuously paler beneath the base. Thorax dark æneous, clothed with somewhat long, yellowish brown hairs. Pleura with long, dark yellow hairs. Abdomen dull black, shining at extreme base and apex, with three pairs of small, æneous, a little hoary spots; the basal spots small, somewhat indistinct, lying in the middle of the segment at the side margin, the two other pairs somewhat subquadrate, lying at the basal corners, all widely separated in the middle and confluent with the side margin; fifth segment a little æneous at the basal corners. Abdomen has short hairs, longer at the sides and towards the base; they are yellow on the spots and at the sides, but black on all the black parts. Venter

dark æneous with somewhat short, pale hairs. Legs black, the knees yellowish, narrowly on the hind legs; front tibiæ and tarsi mainly pale, middle tibiæ pale at apex and the tarsi brownish. The trochanters show no distinct bristles; front femora with a couple of long, black, bristly hairs behind, one of which is placed about the middle and one before the tip, and with some shorter hairs at the base and some below; at the base they are a little curled and tangled; front tibiæ evenly but slightly dilated towards the end; they are brownish in the middle, the apical part is whitish and has below at the apex two small, black transverse lines; they are short-haired, with only some longer hairs on the posterior margin; front tarsi likewise slightly dilated and almost not decreasing in breadth towards the end, metatarsus as long as the three following joints; the middle femora have short, black bristles in the apical half on the anterior side towards below, and a fringe of somewhat long, brownish hairs on the postero-ventral side; the middle tibiæ are simple and short-haired, with only a few a little longer hairs on the dorsal side; the hind femora have long but not dense, yellow hairs on the anterior side, and hind tibiæ a fringe of dark hairs on the antero-dorsal side, longest about the middle; hind metatarsi very slightly thickened. Wings brownish tinged. Squamulæ brownish with a yellow fringe. Halteres with a yellow peduncle and a blackish brown knob.

Female. Vertex rather narrow, about one fifth of the breadth of the head, somewhat rapidly increasing downwards; vertex and frons bluish black, punctate and dullish above; frons with small, grey side dust spots, and from them grey along the eye-margins down to epistoma; the hairs black, a little yellowish across the middle. Epistoma pale-haired. Thorax bluish, shining, with short, pale hairs. Abdominal spots larger than in the male and bluish hoary; on fifth segment a pair of indistinct spots. Anterior legs yellowish, the tibiæ with a broad dark ring below the middle, on front tibiæ nearly to the apex; anterior tarsi darkened, brownish, middle metatarsi yellow; hind legs blackish brown, apex of femora and basal part of tibiæ yellow. Legs simple and simply haired. Squamulæ whitish. Halteres yellow.

Length 5,5 to about 6 mm.

This species is easily recognised by its small size, and in the male by the æneous abdominal spots, dark halteres and slightly dilated front tibiæ and tarsi; the female shows rather great resemblance to *albimanus* but besides by its smaller size it will be known by its



Fig. 110.
P. sticticus ♂.
right front leg
from below.
× 20.

much narrower and dull vertex, and the want of a peculiar, white hair at the base of front femora. Meigen only knew the male; Verrall records that in Meigen's collection stood a female along with the male, but he does not think that it belonged to *sticticus*; the female was thus hitherto unknown. — If the above synonymy is certain the species varies in size: my specimens, which quite agree with Verrall's description, are 5.5 to nearly 6 mm, Meigen gives $2\frac{1}{2}$ lin., Verrall 6.5 mm. Rondani 8 mm and Becker 7—8 mm.

P. sticticus is very rare in Denmark, we have only four specimens, three males and a female, one male taken at Nyraad near Vordingborg on $\frac{11}{5}$ 1908 and one at Lohals on Langeland on $\frac{1}{7}$ 1909 (J. C. Nielsen), and in 1914 I took, likewise at Lohals, a female on $\frac{24}{7}$ and a male on $\frac{26}{7}$, both taken on the same place.

Geographical distribution: — The species seems to be distributed down into Italy; it is not known north of Denmark but occurs in England; it is everywhere a rare species, only about eight specimens, all males, were hitherto known; with my four specimens we get thus in all about a dozen, of which one female.

10. **Pyrophaena** Schin.

This genus is nearly allied to, and in most respects similar to *Platychirus*. The ocellar triangle is somewhat large and elongated with the ocelli placed on its anterior half. The central knob and lower part of epistoma moderately protruding. Epistoma entirely black. The eye-facets in the male are very slightly enlarged above. Scutellum æneous. Abdomen flat, a little narrow at the base, increasing in breadth backwards, most in the female; it has the same number of segments in both sexes as in *Platychirus*, and the small genitalia are of the same shape; in the female the sixth segment is often hidden. The abdomen has either extended reddish markings or only one pair of spots. Legs without any special hairiness, and they are upon the whole somewhat short-haired and especially there are no longer hairs on anterior or antero-ventral side of hind femora. In the male of one species the anterior tarsi are peculiarly dilated, in the other species simple (the third species, *platygastra* Loew is only known in the female sex); for the rest the legs are simple with no such dilatation of front tibiæ as in *Platychirus*. Wings not long, as long as or shorter than abdomen.

The genus is distinguished from *Platychirus* and allied genera especially by the shape of abdomen and its markings and the not

long wings; also the large ocellar triangle and the short-haired hind femora without the usual longer hairs on the anterior side are somewhat characteristic.

With regard to the developmental stages Hennecke has mentioned the development of *P. rosarum* (*Syrphus rosae*) (Ber. naturw. Ver. Harzes, IV, 1845, 40) but I have not seen this paper. I have myself examined larvæ and pupæ of *P. granditarsa* and a pupa of *rosarum*. The larva resembles that of *Platychirus* both in shape and colour, only it is, I think, a little broader; the dermis is likewise chagreened and corrugated, and there are the same swellings below; the small bristles which are placed quite as in *Platychirus*, are stronger and more conspicuous. There are distinct mouth hooks and small, brown or black anterior spiracular tubercles on prothorax. The posterior spiracular process is very low, almost not protruding, only forming a transversely oval wart, and by this character the larva may be known from the larva of *Platychirus*. When full grown the larva has a length of about 10 mm. The pupa is yellow, but the empty puparium pale yellowish or whitish; it also quite resembles the pupa of *Platychirus*, but may likewise be known by the low posterior spiracular process and more conspicuous spinules; it has likewise very small, scarcely detectible anterior spiracular tubes, though they are slightly larger than in *Platychirus*; the pupa has a length of about 7 mm.

The larva lives in the same way as that of *Platychirus*; it has been taken in flood refuse in fens in February and April, and the pupa (of *granditarsa*) in July; a larva of *granditarsa* taken on $\frac{9}{12}$ pupated on $\frac{13}{4}$ and the imago came $\frac{21}{5}$; other larvæ of the same species taken in April developed in May and June; the larva of *rosarum* was taken on $\frac{11}{4}$, it developed on $\frac{18}{5}$. The larva thus hibernates and pupates in spring; it is no doubt carnivorous either feeding on Aphides or in some other way.

The species of *Pyrophaena* occur in fens and on meadows in the same way as *Platychirus*, often near water.

Of the genus three species are known from the palæarctic region (and there seem in all to be no more); two of them occur in Denmark, the third is only known from Siberia.

Table of Species.

1. Abdomen reddish orange except at base and tip; anterior tarsi quite or mainly black, remarkably dilated in the male 1. *granditarsa*.
- Abdomen with only a pair of spots or a band on third segment; anterior tarsi yellow, simple in the male 2. *rosarum*.

1. *P. granditarsa* Forst.

1781. Forst. Nov. sp. Ins. Cent. I, 99 (*Musca*). — 1901. Verr. Brit. Fl. VIII, 300, 1, figs. 257—259. — 1907. Kat. paläarkt. Dipt. III, 47. — *Syrphus ocyani* Fabr. 1794. Ent. Syst. IV, 309, 114 et (*Scaeva*) 1805. Syst. Antl. 252, 18. — 1822. Meig. Syst. Besch. III, 337, 93, ♀. — *Scaeva ocyani* 1843. Zett. Dipt. Scand. II, 754, 57 et 1849. VIII, 3152, 57. — 1843. Stæg. Naturh. Tidsskr. IV, 326. — *P. ocyani* 1862. Schin. F. A. I, 297. — *Syrphus lobatus* Meig. 1822. l. c. III, 336, 92 et 1830. VI, 353, ♂.

Male. Frons and epistoma black or bluish black, shining; frons with velvet black dust above and epistoma a little greyish pruinose towards the sides and below. Vertex and frons black-haired; epistoma with scattered, erect, black hairs at the sides. Frons somewhat protruding; central knob somewhat pointed and more protruding than the mouth edge. Occiput bluish black, greyish pruinose at the eye-margin, the hairs white. above more yellowish. Antennæ black, not small and with the third joint somewhat large, about square with the upper end corner somewhat angular; arista shorter than the antennæ, indistinctly pubescent. Thorax æneous black, somewhat shining, with three abbreviated dull black stripes; it is clothed with short, pale yellow hairs, longest behind and on scutellum, especially at the margin. Pleura with a little longer, yellowish hairs. Abdomen orange or yellowish red, dull, first and fifth segment æneous, shining; the basal third of second and the apical half or more of fourth segment black; the black colour at both ends generally prolonged a little triangularly in the middle: sometimes the apical corners of second and third segments a little black, and the side margin of second segment is æneous; the fifth segment may be a little reddish at the basal corners. Abdomen is clothed with short hairs, longer at the basal part of the side margin, especially at the basal corners; in colour the hairs follow the ground colour. Venter coloured about as dorsum, clothed with short, pale hairs, at little longer at the base. Legs black, about the apical third of front femora and basal half of tibiæ yellow, and similarly on the middle legs but the yellow colour less extended; hind legs with the extreme apex of femora and basal part of tibiæ yellowish. The anterior tibiæ are a little dilated after the base and slightly excised below near the tip; front metatarsus curiously shaped; it is almost as long as the following joints, its anterior margin is in the lower half prolonged inwards and curved downwards into a long, triangular process which is short-haired at the margin and apex; the other joints only slightly broad; the middle tarsus is still more curiously shaped, the basal joint is very broad with the anterior margin prolonged into a long, tongue-shaped, but inwards curved process, the three next

joints are also very broad and the second about as long as the first; hind metatarsus somewhat thickened. The femora have rather short hairs behind, dark on front femora, chiefly yellowish on posterior femora; the front femora have a row of short, black, bristly hairs below in the basal two thirds and middle femora some similar hairs at the base; tibiæ short-haired. Wings more or less to rather strongly brownish tinged, most about the middle. Squamule yellowish with a darker margin and a yellow fringe. Halteres yellow.

Female. Frons broad, bluish black and black-haired, with only indications of side dust spots. Antennæ a little larger than in the male. Thorax æneous, brightly shining, without stripes. Abdomen about as in the male, but the markings more red, the sides or apical corners of second and third segments dark and the fifth segment red at base and sides; sometimes the dark markings on second and third segments more extended. Legs yellow, coxæ and trochanters black, hind tibiæ with a black ring near apex; tarsi black with middle metatarsus yellow; front tarsi somewhat broad and flat, and also middle tarsi except metatarsus a little broadened.

Length 8,5—9,5 mm.

The larva and pupa are described above.

P. granditarsa cannot be termed common in Denmark, and is generally only taken in one or a few specimens at a time; Lersø, Amager, Utterslev Mose, Ordrup Mose, Dyrehaven, Lyngby Mose, Ruderhegn, Boserup at Roskilde, Egebæks Vang; on Lolland at Strandby west of Nysted; on Langeland at Lohals, and in Jutland at Horsens, Sminge near Silkeborg, Randers and Frederikshavn. My dates are $11/6$ — $29/8$. It occurs in fens and on open places in woods on flowers, often near water. The larva was found in flood refuse in Utterslev Mose, Ruderhegn and at Randers in April, it developed in May and June (Schlick); further it was found in the same way in Ruderhegn on $9/2$, it pupated on $13/4$ and developed on $21/5$ (Kryger); the pupa was found in Utterslev Mose in July (Schlick).

Geographical distribution:— Northern and middle Europe down into France; towards the north to northern Sweden, and in Finland; it occurs also in North America.

2. *P. rosarum* Fabr.

1787. Fabr. Mantis. Ins. II, 341 et 1794. Ent. Syst. IV, 307, 109 (*Syrphus*) et 1805. Syst. Antl. 251, 11 (*Scaeva*). — 1822. Meig. Syst. Besch. III, 338, 94 (*Syrphus*). — 1843. Zett. Dipt. Scand. II, 755, 58 et 1849. VIII, 3152, 58 (*Scaeva*). — 1862. Schin. F. A. I, 298. — 1901. Verr. Brit. Fl. VIII, 392, 2, fig. 260. — 1907. Kat. paläarkt. Dipt. III, 47.

Male. Frons and epistoma bluish black, shining; frons velvet black pruinose above. epistoma slightly greyish pruinose towards the sides. Vertex and frons black-haired; epistoma with erect, black hairs at the sides; the central knob moderately produced, the mouth edge rather retreating. Occiput bluish black, greyish at the margin; the hairs pale yellowish. Antennæ smaller than in *granditarsa*, third joint longer than broad, rounded at the end; they are black or blackish, third joint more or less pale beneath at base, sometimes indistinctly; arista about as long as the antennæ, distinctly but short-pubescent. Thorax æneous, somewhat shining, with three dull black, abbreviated stripes; it is clothed with somewhat short, yellow hairs, longest at the margin of scutellum. Pleura with a little longer and partly darker hairs. Abdomen dull black, first and fifth segments somewhat shining; on third segment there are two transverse or subquadrate yellow or pale spots at the front margin, narrowly separated in the middle and sometimes meeting here in front; at the basal corners of fourth segment are indications of small spots, at all events represented by æneous, shining spots. Abdomen is clothed with short hairs, longer at the sides towards the base; they are yellow on the greater part of second segment, except at the hind margin, and on the pale parts of third segment and also at the front margin and corners of the fourth segment, for the rest they are black; sometimes there are some pale hairs just at the front corners of the fifth segment. Venter with the anterior part of the segments shining bluish, the hind part dull black, but on third segment the anterior part more or less whitish yellow; it is clothed with longish, pale hairs on the anterior part, short, black behind. Legs simple, front tarsi a little flattened; femora black with the apical part yellow, most broadly on anterior femora; anterior tibiæ yellow with a more or less distinct, blackish ring near the apex, and the tarsi yellow: hind tibiæ black with the basal part yellow and hind tarsi black except the yellow last joint; hind metatarsi very slightly thickened. The legs haired about as in *granditarsa*, but the hairs behind the femora a little longer, and there are no bristly hairs; the hairs are mainly dark. Wings rather tinged with brownish, especially about the middle. Squamulæ smoky with a darker margin and a yellow fringe. Halteres orange.

Female. Frons moderately broad, bluish black, black-haired, with small but distinct side dust spots. Hairs on epistoma pale. Antennæ a little larger than in the male. Thorax shining, without stripes. Abdomen as in the male but the spots often confluent, sometimes they are rather obscure and bluish æneous, and the front margin or front corners of fourth and fifth segments with similar, narrow spots,

on the fourth segment sometimes slightly yellowish; also on second segment may be a pair of very small spots. Legs as in the male but the front tarsi a little broader and the middle tarsi with the four last joints somewhat broad and flattened. Squamulæ whitish. Halteres whitish yellow.

Length 9—9,5 mm.

The pupa is quite similar to that of *granditarsa* and has the same quite short posterior spiracular process.

The type to this species, a male, is present in the collection of Tönder Lund, where I have examined it.

P. rosarum is like the preceding not common in Denmark; Lersø, Ordrup Mose, Dyrehaven, Lyngby Mose, Geel Skov, Ruderhegn, Hille-rød, Nyrup Hegn; on Lolland in Kældskov; on Funen at Veflinge; in Jutland in Greisdal at Vejle, Horsens, Laven near Silkeborg, and on Bornholm in Almindingen. My dates are $1/6$ — $23/9$. It occurs on similar localities as the preceding species. The larva was taken in Ruderhegn on $11/4$, it developed on $18/5$ (Schlick).

Geographical distribution:— Europe down into Italy; towards the north to middle Sweden, and in Finland; it occurs also in North America.

11. **Melanostoma** Schin.

Also this genus is nearly allied to *Platychirus* and similar in size, shape and colours. Head about semiglobular, or sometimes in the male a little higher than broad; it is broader than thorax. Eyes bare, touching in the male, separated in the female; the facets in the male a little enlarged in the upper half. Antennæ inserted lower down than in *Platychirus*, about in the middle or a little above (in *ambiguum* higher above); they are small, third joint oval; arista sometimes pubescent. Epistoma with the central knob slightly produced, the mouth edge retreating, not prominent; the epistoma is entirely black or æneous, sometimes pruinose, and with scarce, erect hairs on the sides. Jowls slightly descending. Scutellum æneous. Abdomen elongated, parallel-sided, in the female a little more oval; it has three or four pairs of yellow spots; in some species the spots may be bluish or entirely absent. The number of the abdominal segments show a distinguishing character from *Platychirus* as in the male the fifth dorsal segment is small or very small and not quite symmetrical, and there are only four normal ventral segments, the fifth being hidden and only represented by a thin chitinous rim, while the sixth to ninth may be seen as in *Platychirus*; in the female the number of segments is the same as in *Platychirus*. Legs slender, quite simple and simply

haired in the usual way, only in *ambiguum* and *dubium* (the latter not Danish) with a curled hair near the tip of front femora in the male.

The genus is distinguished from *Platychirus* by the quite simple legs in the male; also in the female this character may be used, as the females of *Platychirus* have the front tarsi slightly broadened; this is also the case in *Melanostoma* but to a very slight degree and less than in *Platychirus*, but the character is, however, slight. With regard to the Danish species the distinction is, however, easy, as the peculiar triangular abdominal spots in the females of the two of our species of *Melanostoma* are never found in *Platychirus*, and in our third species the female has the abdomen almost unicolorous. — The genus is very nearly allied to *Platychirus*, in fact, I think, so nearly, that the species *ambiguum* (and *dubium* and *fimbriatum*) with the special hairs on the anterior legs in the male, the broader head with the antennæ placed higher above and the not quite small fifth abdominal segment in the male almost stands as an intermediate form, as also noted by Loew about this species (*monochaetum*) and *fimbriatum* (Beschr. eur. Dipt. II, 224, Anm., 226, Anm.).

The developmental stages of *M. mellinum* are well known, and Zetterstedt (Dipt. Scand. II, 1843, 756) bred *M. transfugum* from a pear-shaped, dirty whitish pupa with black dorsal stripes and lateral points; it was found on a leaf of *Abies* and developed on $\frac{20}{5}$. The larva of *M. mellinum* is mentioned by Giard (Bull. Soc. Ent. de Fr. 1896, 234) and described as light green with a whitish dorsal stripe. They were found in September on the umbels of *Daucus carota*, where they attacked and sucked specimens of *Musca domestica* and *Chortophila pusilla*, always attacking the prey in the neck between head and thorax; when collected they did not quit the prey before the next or following day; they pupated and the imagines came after twelve days. The author states that there were no Aphides on the *Daucus*, and he mentions, that he has found the same species on *Chenopodium album*, feeding on Aphides, and he thinks that it is only exceptional, that the larva takes other prey; he thinks that the larvæ were only able to attack the flies when these were less mobile in the cold morning. Chapin mentions (Ent. Month. Mag. 2, XVI, 1905, 150) the larva bred from eggs found on *Veronica chamaedrys*; these larvæ fed on Aphides, among which the eggs were found, but they took also *Tortrix*-larvæ, when supplied with them and deprived of Aphides. Grünberg (Die Süßwasserf. Deutschl., Heft 2, A, 1910, 206) records that the larva of *M. mellinum* lives on Phragmites, probably of Aphides, and that it hibernates within the reeds and pupates next spring.

I have myself examined the pupa found sitting on stalks of *Carduus* on ²¹/₇, they developed on ²⁵/₇ and ²⁶/₇, and others from larvæ in flood refuse, which latter developed in April and May. The empty puparium is whitish, translucent, similar to that of *Platyichirus* but more tapering behind and more drop-like; the posterior spiracular process is short as in *Platyichirus*; I have not been able to decide whether there are small anterior spiracular tubes as in *Platyichirus* or not. The pupa has a length of 6 mm. According to the above the larva is carnivorous, either feeding specially on Aphides and only exceptionally on other prey, or perhaps upon the whole taking various prey. According to Grünberg the larva hibernates, which would be in accordance with the facts found by me in *Platyichirus*, and the above mentioned pupæ developing in April and May indicate the same, but Girard found the imagines developing in September, and some of my pupæ developed at the end of July; it seems thus, that the hibernating of the larva is no fixed rule; probably there are more than one brood in the year, or the development is upon the whole somewhat irregular (which may be the case also with *Platyichirus*), and then it is most probable, that the larva (of one brood) hibernates in a younger or older stage.

The species of *Melanostoma* occur on similar localities as those of *Platyichirus*; the genus is widely distributed and goes far towards the north, one species (*ambiguum*) being found in Greenland. — Also in this genus so-called hermaphroditic specimens occur; Villeneuve mentions (Feuille des jeunes Nat. V, 42, 1912, 111) two females, one of *scalare* and one of *mellinum*, both with a rather narrow frons; both specimens were melanoid.

Of the genus 8 species are known from the palæarctic region; 3 occur in Denmark.

Table of Species.

1. Abdomen in the male with greyish hoary spots, in the female almost unspotted; front femora in the male with a peculiar, curled hair near the tip 1. *ambiguum*.
- Abdomen in both sexes with yellow spots; front femora of the male without any peculiar hair near the tip 2.
2. Frons and epistoma not or almost not pruinose; arista almost bare; abdomen not specially long 2. *mellinum*.
- Frons pruinose or with large dust-spots and epistoma distinctly pruinose; arista slightly pubescent; abdomen rather long. . . 3. *scalare*.

1. *M. ambiguum* Fall.

1817. Fall. Dipt. Suec. Syrph. 47, 21 (*Scaeva*). — 1843. Zett. Dipt. Scand. II, 757, 60 et 1849. VIII, 3153, 60 (*Scaeva*). — 1845. Stæg. Naturh.

Tidsskr. 2, 1, 361, 29 (*Syrphus*). — 1862. Schin. F. A. 1, 291. — 1898. Lundb. Vid. Meddel. Nat. For. Kjøbenh. 300, 90. — 1901. Verr. Brit. Fl. VIII, 304, 1, figs. 261—262. — 1907. Kat. paläarkt. Dipt. III, 48. — *Syrphus monochactus* Loew, 1871. Besch. eur. Dipt. II, 224, 120.

Male. Head a little broader than high and epistoma broad, considerably broader than the diameter of the eye. Frons and epistoma bluish black, somewhat whitish pruinose, the central knob shining. Vertex, frons and epistoma with black hairs; the central knob small, a little prominent. Occiput bluish black, a little pruinose, the hairs yellow: above there are besides long, black hairs. Antennæ inserted well above the middle, black, third joint brownish or blackish, paler beneath at the base; arista apparently bare. Thorax æneous or bluish black, shining, clothed with long, white hairs. Pleura likewise with long, white hairs. Abdomen dull black, just the base and the fifth segment bluish shining; its markings much resemble those of *P. albi-manus* as there are three pairs of greyish, hoary spots; the spots are somewhat subquadrate but broadest at the lateral margin, rounded inwards; the spots on second segment are smallest, somewhat triangular and lying on the middle; on the third segment the spots are near the front margin and on fourth segment close to the front margin. Abdomen is clothed with whitish hairs, longest at the sides, especially towards the base; along the middle are some black hairs. Venter bluish, shining, with longish, whitish hairs, shortest towards the end. Legs mainly blackish, on the anterior legs the apex or apical part of femora and the basal third or half of tibiæ yellowish; hind legs with only the knees narrowly pale. Front femora a little thickened towards the base; below on the basal part are about three or four bristles which are black or mixed black and yellow; on the posterior side are long, black, bristly hairs, arranged in a row outwards and ending before the tip with a curious, long hair with the end curved round or rolled; the hairs at the base yellowish; front tibiæ with short, scattered, yellow hairs and on the posterior side with a row of some long, black or yellow hairs below the middle; the middle femora have some long, black, bristly hairs on the antero-ventral side at the base, and long hairs on the posterior side which are dark but more or less pale towards the base; just below there are a couple of long hairs before the middle; the middle tibiæ have short, scattered, yellow hairs and long hairs behind; the hind legs are haired as usual with long hairs on the anterior side of femora, for the rest short-haired but with a fringe of longer hairs above tibiæ; the hairs are all pale; hind metatarsus somewhat strongly swollen. Wings a little brownish

tinged, most on the anterior part. Squamulæ dirty whitish, with a whitish or yellowish fringe. Halteres with the knob more or less darkened.

Female. Vertex and frons broad, bluish or somewhat purplish, shining, the latter with small side dust spots. Epistoma greyish pruinose and more densely than in the male. Vertex with black, frons with yellow hairs; epistoma with short, pale hairs. Antennæ longer than in the male, especially the third joint longer. Thorax shining, with short hairs. Abdomen not similar to that in the male; it is dull black, with curious, dark purplish, shining, but not very conspicuous markings; the markings consist of a pair of large spots on second segment close to the front margin; on third and fourth segments the spots are similar but united to a band from which a narrow prolongation goes to the hind margin; the hind margin of the fourth segment and the fifth and following segments are quite shining; abdomen may accordingly also be described as dark purplish, shining, with a middle line and hind margin on second segment dull black. and with dull black, transverse spots at or near the hind margins of third and fourth segments. Legs much paler than in the male, the anterior quite pale with only the apical part of tibiæ and the tarsi more or less darkened; hind femora with a broad, black ring and the tibiæ with the base yellow. The legs are short-haired, and the hairs all pale.

Length 6,5 to about 7,5 mm, the female the larger.

The above description of the male is made from specimens from Greenland; in Danish specimens probably the legs would be somewhat paler. (I may here note, that *M. ambiguum* from Greenland is doubtful in so far as the female of it differs a little from European *ambiguum*, see Stæger l. c. and Lundbeck l. c.).

This species is at once known from the other two Danish species; it is no doubt the species which (together with *dubium* and *fimbriatum*) on account of its specially haired anterior legs in the male, the broader head with the antennæ placed rather high, and the larger fifth abdominal segment in the male stands nearest to *Platychirus*.

M. ambiguum seems to be very rare in Denmark, we have only two specimens, both females, taken in Hillerød in a garden in this year (1915) on ²³/₅. It is a spring species, and it will probably be found more common, when sought for in spring.

Geographical distribution: — Northern and middle Europe down, into Corsica; towards the north to middle Sweden; further it occurs in Greenland, and according to Verrall also in North America.

2. *M. mellinum* L.

1758. Linn. Syst. Nat. X, 594 et 1761. Fn. Suec. 1821 (*Musca*). — 1805. Fabr. Syst. Antl. 251, 12 (*Scaeva*). — 1822. Meig. Syst. Besch. III, 331, 85 (*Syrphus*). — 1843. Zett. Dipt. Scand. II, 759, 62 et 1849. VIII, 3153, 62 et 1855. XII, 4661, 62 (*Scaeva*). — 1862. Schin. F. A. I, 292. — 1901. Verr. Brit. Fl. VIII, 309, 3, fig. 263. — 1907. Kat. paläarkt. Dipt. III, 49. — *Syrphus scalaris* Panz. (nec Fabr.) 1797. Fn. Germ. XLV, 20. — 1822. Meig. l. c. III, 330, 83. — *Syrphus mellarius* Meig. 1822. l. c. III, 328, 81 et 1838. VII, 131, 81. — *Syrphus melliturgus* Meig. 1822. l. c. III, 329, 82. — *Syrphus minutus* Macq. 1827. Soc. Sc. Lille, 234, 13. — 1838. Meig. l. c. VII, 136, 10. — *Syrphus unicolor* Macq. 1827. l. c. 236, 17. — 1838. Meig. l. c. VII, 136, 11. — *M. unicolor* 1862. Schin. F. A. I, 292. — *Syrphus laevigatus* Meig. 1838. l. c. VII, 134, 105. — *M. laevigatum* 1862. Schin. F. A. I, 292.

Male. Head not broader than high; epistoma much narrower than in *ambiguum*. Frons and epistoma blackish æneous, shining, practically not pruinose except at the extreme eye-margin. Vertex and frons with blackish or brown hairs; epistoma with sparse, yellow hairs; central knob slightly prominent. Occiput blackish, greyish yellow pruinose at the eye-margin, the hairs yellow, brown above. Antennæ inserted in the middle of the head, blackish or brownish black, third joint more or less yellow below at the basal part and second generally yellow below; arista often yellow at the base, very short-pubescent, almost microscopically. Thorax æneous, shining, with short, yellow hairs, a little longer at the margin of scutellum; in dark specimens the hairs may be brownish to almost blackish. Pleura yellow-haired. Abdomen not much narrower than thorax, about four times as long as broad, dull black or brownish black, shining at apex, with three pairs of not small, yellow spots; the first pair smallest, subcircular or triangular, the second largest, elongate, the third quadrate; second and third pairs, especially second, with the inner margin longer than the outer; the first pair lie behind the middle of the segment, the other at the front margin, and they are generally continuous with the side margin; the spots may vary somewhat in size. Abdomen is clothed with short hairs, longer at the sides, especially on the basal part; they are yellow and black, mainly following the ground colour but yellow at the sides. Venter yellowish or darker to almost quite æneous, with pale hairs. Legs varying in colour, from almost quite yellow with only the tarsi darker towards the end, to considerably blackish with the femora blackish with yellowish apex, tibiæ with blackish rings, largest on hind tibiæ, and hind tarsi almost quite blackish. Legs haired as usual, the hairs behind anterior femora and on anterior side of hind femora not long, they are yellowish, in dark

specimens they may be darker on the anterior femora; also the short hairs on tibiæ may vary in the same way; hind metatarsi slightly thickened. Wings more or less brownish tinged. Squamulæ smoky to blackish, with a darker margin and a yellow or brown fringe. Halteres yellow.

Female. Frons broad, shining, with very small side dust spots; the hairs are yellow, brownish in front of the ocelli. Antennæ longer than in the male, as the third joint is longer. Abdomen shining; the spots of second and third pairs are on the outside sloping inwards from the basal corner to the end so that they are more or less triangular; at the base of the fifth segment are a pair of transverse, narrow spots. Legs in so far paler than in the male as they are never so dark as in the most dark-legged males, and often almost quite yellow with only the ends of the tarsi darkened.

Length 6 to about 8 mm.

M. mellinum is very common in Denmark and has been taken in all parts of our country; my dates are $^{13}/_5$ — $^8/_9$. It occurs in fens, on commons and meadows and also in woods. The pupæ were taken in Ermelund, sitting on stalks of *Carduus* on $^{21}/_7$, they developed on $^{25}/_7$ and $^{26}/_7$ (Kryger), and larvæ were taken in flood refuse at Donse and in Jutland at Randers, developing in April and May (Schlick).

Geographical distribution: — All Europe, towards the north to northern Sweden, in Finland and on the Faroe Islands; further it is known from the Canary Islands and Madeira; it is also recorded from North- and Central America.

3. *M. scalare* Fabr.

1794. Fabr. Ent. Syst. IV, 308, 117 (*Syrphus*) et 1805. Syst. Antl. 252, 14 (*Scaeva*). — 1843. Zett. Dipt. Scand. II, 760, 63 et 1849. VIII, 3154, 63 (*Scaeva*). — 1901. Verr. Brit. Fl. VIII, 311, 4, fig. 264. — 1907. Kat. paläarkt. Dipt. III, 51. — *Syrphus gracilis* Meig. 1822. Syst. Besch. III, 328, 80. — 1862. Schin. F. A. I, 292. — *Syrphus maculosus* Meig. 1822. l. c. 330, 84, ♀.

This species is much like the preceding, but it is larger and abdomen longer. Male. Frons and epistoma distinctly yellowish pruinose, the central knob shining. Vertex and frons with yellow or brownish hairs; the whitish hairs on epistoma more scarce than in *mellinum*. Antennæ inserted above the middle of the head, yellow with the apex and upper margin of third joint brown or blackish; arista yellowish or brown, distinctly though short-pubescent. Thorax shining, yellow-haired, the hairs longer than in *mellinum*. Abdomen narrower than thorax, about six times as long as broad, the three

middle segments about twice as long as broad; the spots as in *mellinum*, but they are all more elongate. Legs paler than in *mellinum* as the anterior legs are generally yellow; hind femora and tibiæ have generally a dark ring of which there are in the highest faint traces on the anterior legs; front and hind tarsi generally darkened. The hairs on the anterior femora a little longer, and hind femora with somewhat long, fine, almost bristly hairs below. Wings a little longer than in *mellinum*.

Female. Similar to the female of *mellinum*, but the frons with large dust spots, often united in the middle; epistoma distinctly pruinose as in the male. Abdomen longer than in *mellinum*, but this difference, however, less pronounced than in the male; the second and third pairs of spots generally more suddenly incurved on the outside just after the base, the outer margin thus more concave than in *mellinum* and the spots narrower on the hind part; fifth segment with a pair of transverse spots at the base. Legs as in the palest specimens of *mellinum*, either almost quite yellow or with more or less distinct dark rings on hind femora and especially tibiæ, and front and hind tarsi more or less darkened.

Length 8—8,7 mm.

This species is in general distinguished from *mellinum* by its larger size, more elongated shape and the distinctly pruinose frons and epistoma; further by the paler antennæ and legs; when these characters should not be sufficient, the distinctly pubescent arista of *scalare* will, when carefully examined, decide the question.

M. scalare is almost as common in Denmark as the preceding and found on similar localities in all parts of the country. My dates are 19/5—26/8.

Geographical distribution:— All Europe, towards the north to northern Scandinavia, in Finland and on the Faroe Islands; further in North Africa down to Kilimandjaro.

Obs. Melanoid specimens of the females of both the latter species are recorded as not uncommon; I have seen Danish specimens with the spots small, dark and rather inconspicuous, but I have never seen any quite melanoid specimen from Denmark.

12. **Xanthandrus** Verr.

This genus, which was separated from *Melanostoma* by Verrall in 1901 is very nearly allied to that genus in the most essential characters. Eyes bare; the facets slightly enlarged above in the male. Antennæ inserted about in the middle of the head, third joint con-

siderably longer than broad; arista apparently bare. Epistoma entirely black; it is a little retreating downwards, the central knob moderately prominent. Jowls slightly descending. Scutellum æneous. Abdomen large, flat, somewhat elliptic, at its broadest part fully as broad as thorax; it has extensive orange markings, largest in the male. The number of abdominal segments as in *Melanostoma*, the fifth dorsal segment in the male likewise small and unsymmetrical, and the fifth ventral segment quite small and hidden. Legs simple; all tarsi a little flattened in both sexes.

As said the genus is very near to *Melanostoma* and chiefly separated by the shape of abdomen, yet it may be convenient to keep it.

The developmental stages are well known. The larva was first mentioned by Peragallo (Ins. nuis. Agricult. II, 1885, 140, fig. 8); it was found feeding on the larva of *Prays citri*. Next, Chapman mentions and describes it (Entom. Month. Mag. XLI, 1905, 151 and XLII, 1906, 14); he found the larva at Hyères in the south of France on *Asphodelus microcarpus*, where it fed on a *Tortrix*-larva (*Hastula hyerana*), and on Sicily feeding on larvæ of *Acrolita consequana* on Euphorbia, and again at Lautaret on larvæ of *Ancylys derasana*? on *Rhamnus*. The larva and pupa are further described and figured by Silvestri (Boll. del Laborat. di Zool. Gen. et Agrar. in Portici, II, 1908, 112), who found them in Italy on Olive trees feeding on larvæ of *Prays oleellus*. I have myself examined two pupæ, one taken as larva on *Populus* between Aphides on ¹⁸/₈, it pupated and developed at the end of the month, and one found sitting on a *Betula* on ¹¹/₁₀, developing on ¹⁵/₁₀. — According to the descriptions the larva is green with lateral markings of yellow and central of brown, the colour being due to translucence, as the skin seems to be almost colourless; the larva is otherwise similar to many *Syrphus*-larvæ; the length is about 12 mm. The pupa is of a somewhat curious shape, high and somewhat globular in the anterior two thirds, behind falling suddenly off to a flattened posterior part which at the end has a short, longitudinally divided posterior spiracular process. The pupa is nearly flat below; it is very slightly transversely corrugated and I could detect no spinules; the posterior part is a little keel-shaped along the middle, and at the margin this part is expanded into a relatively broad, delicate brim. The empty puparium is brownish yellow above, with indistinct darker lateral stripes and a broad middle stripe; below it is white; it has a length of about 8 mm, and the thick anterior part is 4 mm in diameter. Chapman also describes the pupa and mentions, that it may vary much in colouring, from pale green without markings or with three pairs of black dots, to being darker, and there may be brownish or

reddish dorsal and lateral lines; towards the time for the emerging the paler, more transparent pupæ show the imago with its markings, curiously shortened in the nearly round case; he adds that the pupa illustrates more strongly than usual how the dried larval skin, when forming the puparium, expands greatly at the narrow cephalic end, and shrivels to a mere scrap at the wide anal end, and this is in accordance with my above description.

According to the observations the larva feeds on Tortricid larvæ; Chapman placed larvæ in a box with larvæ of *Hastula hyerana*, and he saw them attack and suck the larvæ and no doubt it was their natural food. When full grown they pupated and the imagines came at the end of April and the beginning of May. As they emerged so early he naturally concludes, that there must be a second brood and this must feed on some other prey, perhaps Aphides; on Sicily he also found the larvæ in spring, and the imagines emerged from $^{15}/_4$ and further on, but at Lautaret he found the larvæ on $^{8}/_8$ and they were bred some weeks later; Silvestri found his larvæ in spring. With us and in other northern climates the species is exclusively autumnal as imago, my dates of capture are $^{12}/_7$ — $^{19}/_9$ and the first date is more early than is commonly the case, and as noted above my pupæ developed at the end of August and on $^{15}/_{10}$; I therefore think we have only one brood, and probably the larva hibernates in a younger or older stage, and also when more than one brood occurs it is probably the larva that hibernates. The larva is very voracious, Silvestri thinks that one larva may during its life-time devour no less than 100 larvæ of *Prays oleellus*. The food of this larva seems thus to be Tortricid larvæ; Chapman suggests however, as remarked, that they may perhaps at certain times in the season feed on Aphides, and one of the pupæ I mentioned above was taken as larva between Aphides.

Of the genus two palæarctic species are known, our *X. comtus* and *X. parhyalinatus* Big. which latter is only known from Madeira.

1. *X. comtus* Harr.

1776. Harr. Expos. engl. Ins. 105, Pl. XXXII, fig. 47 (*Musca*). — 1901. Verr. Brit. Fl. VIII, 317, 1, figs. 266—267. — 1907. Kat. paläarkt. Dipt. III, 51. — *Scaeva hyalinata* Fall. 1817. Dipt. Suec. Syrph. 43, 13. — *Syrphus hyalinatus* 1822. Meig. Syst. Besch. III, 312, 56. — *Scaeva hyalinata* 1843. Zett. Dipt. Scand. II, 722, 25. — *Melanostoma hyalinata* 1862. Schin. F. A. I, 290.

Male. Frons and epistoma black or bluish black, yellowish pruinose except on a space above the antennæ and the central knob. Vertex

and frons with dark brown or blackish hairs, the frons bare on the shining space; epistoma with yellowish hairs on the sides; it is somewhat retreating downwards, the central knob moderately prominent, less than the frontal prominence. Occiput greyish pruinose, the hairs all yellow. Antennæ not small, third joint considerably longer than broad; they are brownish red, the end and upper margin of third joint more or less darkened and sometimes the joint rather darkened; arista brownish. Thorax greenish æneous, shining, somewhat finely punctate; it has a double pubescence of somewhat long, erect and short, more decumbent hairs, all yellow; the hairs are longest behind and on scutellum. Pleura somewhat pruinose, yellow-haired. Abdomen dull, a little shining at the extreme base and at apex; it is black with extensive orange markings; second segment with two circular orange spots behind the middle, third and fourth segments each with a pair of anteriorly united, orange spots or a broad band against the front margin, strongly incised in the middle of its hind margin; the band on third segment largest, reaching near to the hind margin, that on fourth segment reaching beyond the middle. Abdomen clothed with short hairs, longer at the side margin towards the base; the hairs mainly follow the ground colour, but the hairs at the side margin are yellow or only black on the hind part of third and fourth segments. Venter yellow, the first segment, a prolongation on the middle of the second and the apex dark; the hairs long, yellow. Legs brownish yellow, anterior femora blackish on the basal part or half, hind femora quite brownish black; anterior tibiæ with a somewhat indistinct dark ring near the apex; hind tibiæ quite darkened or a little paler at the base; tarsi blackish; all tarsi with the last three joints a little broad and flat. Femora haired as usual, the hairs somewhat long, yellow; tibiæ short-haired, the hairs dark, hind tibiæ a little fringed on the antero-dorsal side. Wings yellowish tinged. Squamulæ whitish yellow, with a dark yellow margin and fringe. Halteres with the peduncle yellow, the knob brownish.

Female. Frons not broad, but widening from the vertex downwards; it is bluish black, shining, with a large dust band on the middle; the hairs blackish. Thorax haired as in the male, but the erect hairs shorter. Abdomen with the markings often paler, more yellow, and they are more restricted, those on second segment small, sometimes almost or quite disappearing, and on third and fourth segments the markings are a pair of transversely quadrate spots at the front margins, well separated in the middle; the fifth segment is generally obscurely reddish at the front corners. Tarsi a little flattened as in the male. Wings not or almost not tinged.

Length 10.5—12 mm.

X. contus is not common in Denmark: Copenhagen in a garden, Charlottenlund. Ordrup Mose, Dyrehaven, Donse, Hillerød, Trørød, Tisvilde; on Lolland in Kældskov; on Funen at Veflinge and Hoffmansgave, and in Jutland at Frederikshavn. My dates are $^{12}/_7$ — $^{19}/_9$. It occurs on meadows and in woods. The larva was taken at Donse on a *Populus* between Aphides on $^{18}/_8$, it pupated and developed at the end of August, and the pupa was taken at Tisvilde sitting on *Betula* on $^{11}/_{10}$, it developed on $^{15}/_{10}$ (Kryger). The species is, as seen, an autumn species.

Geographical distribution:— All Europe down to Sicily; towards the north to middle Sweden, and in Finland.

13. **Melangyna** Verr.

This genus is somewhat similar to *Melanostoma*, but in other respects more allied to *Syrphus*. Head semiglobular but broader than high and broader than thorax. Eyes distinctly hairy, touching in the male and with the upper facets a little enlarged. Antennæ inserted above the middle. Occiput somewhat puffed out downwards. Frons and epistoma very broad, the latter with a moderately protruding central knob, retreating at the mouth edge; the epistoma is entirely black in both sexes and with long hairs on the sides. Jowls somewhat descending and with a distinct pit between them and epistoma. Scutellum not quite black but somewhat pale on the disc. Abdomen narrow, parallel-sided, with pairs of yellow spots on third and fourth segments in the male, but quite black in the female (or with only indications of spots); the fifth abdominal segment in the male is normally developed both on dorsal and ventral side, but small. Legs simple and simply haired.

This genus is much more allied to *Syrphus* than to *Melanostoma*. The shape of the head with the very broad epistoma is quite another than in *Melanostoma*, and also the hairy eyes separate it from this genus. It stands, as Verrall remarks himself very near to one extreme of *Syrphus*, represented by species as *barbifrons* and *arcticus*, the male is even so similar to *barbifrons* that it is only distinguished by the hairy eyes. When the genera from *Chrysogaster* to *Xanthandrus* taken together are separated from *Syrphus* by the black epistoma and scutellum, *Melangyna* may well be placed with the former, though its scutellum is not quite black, but its relation is however by far nearest to *Syrphus*; the mentioned species of *Syrphus* having in the male a quite or almost quite black epistoma, only in the female it is some-

what yellow; the female of *Melangyna* has an unspotted abdomen, which is never the case in *Syrphus*, but this character is of slight value, especially as specimens of *Melangyna* may occur with traces of spots. — I have kept the genus here as the species is easily distinguished, but I think its generic value is a slight one, the most natural place of the species being in *Syrphus* nearest to *barbifrons*.

The developmental stages are not known.

Of the genus only one species is known, also occurring in Denmark.

1. *M. quadrimaculata* Verr.

1873. Verr. Ent. Month. Mag. IX, 281 (*Melanostoma*). — 1885. Kow. Wien. ent. Zeitg. IV, 201 (*Melanostoma*). — 1901. Verr. Brit. Fl. VIII, 314, 1, fig. 265. — 1907. Kat. paläarkt. Dipt. III, 48. — *Melanostoma barbifrons* 1862. Schin. F. A. I, 290. — 1871. Verr. Entom. Month. Mag. VII, 201.

Male. Frons and epistoma black, the latter slightly pruinose, somewhat shining. Vertex and frons with dense and rather long, black hairs; posteriorly on vertex may be yellow hairs; epistoma with long, black hairs on the sides. Head rather low, epistoma low and very broad, the margins a little diverging downwards; it is slightly keel-shaped on the middle, the central knob not much prominent, the mouth edge retreating. Occiput puffed out and somewhat broad below, jowls broad and somewhat descending; occiput bluish black, a little pruinose; the hairs pale yellow, but nearest to the eye-margin are black hairs which are long above. Eyes distinctly haired with short, pale hairs. Antennæ black, short but robust, third joint subquadrate; arista about as long as the antennæ, thickened in more than the basal half. Thorax dull black, clothed with long, erect hairs except just on the front margin; the hairs are whitish or yellow, but near each side are more or fewer black hairs, almost forming a longitudinal stripe; also in the præsutural depression are more or fewer black hairs. Scutellum black but brown or yellowish brown on the disc; it has very long, pale hairs at the margin, sometimes intermingled with black hairs. Pleura with long hairs, black above, more or less pale downwards. Abdomen dull black, on third and fourth segments a pair of narrow, transverse, pale yellow spots near the front margins; they are well separated in the middle and do not reach the side margin; the extreme hind margins of fourth and fifth segments obscurely reddish. Abdomen is clothed with longish hairs, longest at the sides; they are black but pale on more or less of the disc of second segment and on and about the pale spots, they are consequently black at the sides except pale tufts at the base of third and fourth segments, and sometimes there are a few pale hairs at the basal corners of

fifth segment. Venter greyish black, with or without pale spots like the dorsal, and with long, pale hairs, intermingled with some black. Legs somewhat long and slender, black or blackish; femora haired in the usual way with rather long hairs, chiefly blackish on anterior femora or yellow at the base, pale on hind femora; tibiæ short-haired with dark hairs, only hind tibiæ with some hairs a little longer about the middle on the antero-dorsal side; hind tibiæ a little thickened in the middle, and below the thickening somewhat incurvated on the posterior side. Hind tarsi rather long, metatarsus slightly thickened; the last joints on front tarsi a little broad. Wings more or less brownish tinged, sometimes almost not; stigma strongly brown. Squamulæ and fringes yellowish. Halteres with the peduncle dark, the knob yellow.

Female. Frons broad, black-haired. Thorax shining, haired as in the male, but the black hairs fewer or wanting, and pleura all pale-haired. Abdomen black, shining, without spots, only in some lights a pale pruinosity is visible at the basal corners of third and fourth segments; (Verrall has in one case found spots as in the male faintly visible); the hairs on abdomen almost all pale, only on the hind margin of third segment, on the hind part of fourth and on fifth and sixth segments black hairs. Legs haired as in the male, but the hairs all yellowish.

Length about 8—9 mm.

M. quadrimaculata seems to be rare in Denmark, and it was for the first time taken in 1909; it has only been taken in Geel Skov (Th. Mortensen) and at Tisvilde (Kryger). It is a rather early occurring species, my dates are $\frac{9}{4}$ — $\frac{23}{5}$. It was seen in some number on $\frac{9}{4}$ on the flowers of *Corylus*, it was on a sunny day but the temperature was low, not above 6° C. and it had been cold on the previous days; it has also been taken on the flowers of *Salix*.

Geographical distribution:— The species is at present only known from Denmark, England and Bohemia.

14. **Leucozona** Schin.

This genus agrees in most respects with *Syrphus* and the allied genera. The species is somewhat large and densely hairy; the colour is dark æneous and blackish with a pale basal abdominal band. Eyes touching in the male, separated in the female, densely hairy; the facets in the male slightly enlarged above. Antennæ inserted well above the middle, a little porrected, third joint longer than broad; arista slightly, almost microscopically pubescent. Epistoma a little

keel-shaped, the lower part somewhat protruding and with a protruding central knob; the sides of epistoma somewhat descending. As the lower part of epistoma is protruding and the drooping lateral angles of the mouth edge only slightly retreating, the sides of epistoma are rather broad below, and they have here a slight, oblique keel. (Mik, Wien. ent. Zeitg. XVI, 1897, 63, expresses this in the following terms: "Die Backen sind nämlich gut so breit wie der halbe verticale Durchmesser des Auges"); it is in reality the sides of epistoma which are broad, the jowls themselves are slightly descending. Epistoma is yellow but with a black middle line and also the lower side parts black; it is hairy on the sides. The mouth parts chiefly resemble those in *Syrphus*; proboscis rather long; labrum of the usual shape and likewise maxillæ; the palpi long, club-shaped and more or less recurved at the end. Thorax about quadrate; scutellum yellow, it has as fringe below the margin. There are no bristles present. Abdomen somewhat short, broadest behind the middle about the hind part of third segment; it is blackish with a broad, pale basal band or pair of spots; it has in the male the same number of not transformed segments as in *Syrphus*, viz. five, both on the dorsal and ventral side; the first is very small and likewise the fifth; but generally the fifth dorsal segment is turned a little to the right and the fifth ventral hidden, the normal shape of the segment therefore only seen, when the abdomen is stretched well out. Genitalia small. In the female there are five visible segments, the rest more or less hidden. Legs simple. Wings of usual shape, with a blackish band or blotch about the middle; medial cross-vein before the middle of the discal cell; vena spuria distinct. Squamulæ as in *Syrphus*, but blackish, the hairs on alar squamula considerably flattened. Plumula with longish, plumose hairs.

The genus was separated from *Syrphus* by Schiner in 1860, chiefly by the peculiar abdominal markings; Mik adds in 1897 (l. c.) as characters the wing band and the shape of the face; these are in reality the distinguishing characters, and I think the genus may be kept on them.

As far as I am aware the developmental stages are not known.

The species occurs on various flowers on meadows and in fens; Schiner states that it occurs especially in the mountains.

Of the genus only one species is known, also occurring in Denmark.

1. *L. lucorum* L.

1758. Linn. Syst. Nat. X, 592 et 1761. Fn. Suec. 1803 et 1767. Syst. Nat. XII, 2, 985, 36 (*Musca*). — 1775. Fabr. Syst. Entom. 766, 19 (*Syrphus*)

et 1805. Syst. Antl. 241, 37 (*Eristalis*). — 1822. Meig. Syst. Besch. III, 313, 58. Tab. XXX, Fig. 27 (*Syrphus*). — 1843. Zett. Dipt. Scand. II, 778, 1 et 1859. XIII, 6012, 1 (*Eristalis*). — 1862. Schin. F. A. I, 299. — 1901. Verr. Brit. Fl. VIII, 319, 1. — 1907. Kat. paläarkt. Dipt. III, 52. — *Syrphus asiliformis* Fabr. 1776. Gen. Ins. 306, 18—19 et 1781. Spec. Ins. II, 426, 24 et 1805. Syst. Antl. 241, 36 (*Eristalis*). — 1822. Meig. Syst. Besch. III, 314, 59.

Male. Frons greyish pruinose; epistoma yellow and yellowish pruinose, but the middle line undusted, black and shining; also the lower hinder side parts of epistoma black, shining; jowls grey. Vertex with yellow, anteriorly with black hairs, frons black-haired; epistoma with yellow hairs at the sides. The lower part of epistoma with the central knob rather protruding and the lateral mouth edges somewhat descending. Occiput grey pruinose, with yellow hairs, above besides a row of longer, black hairs, overhanging the eyes. Eyes densely and lighish hairy with black hairs, paler on the lower part. Antennæ

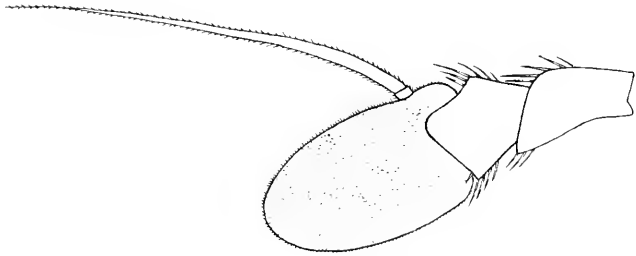


Fig. 111. Antenna of *L. lucorum* ♂, from the inside. $\times 55$.

black, somewhat long, third joint oval, longer than broad; arista fully as long as the antennæ, very inconspicuously pubescent. Thorax dull æneous, with three narrow, darker stripes, the median abbreviated about the middle, and sometimes indistinct. Scutellum yellow, only a little dark at the basal corners. Thorax clothed with erect, reddish yellow hairs, longest behind and on scutellum. Pleura bluish æneous with pale hairs. Abdomen not long, ovate, broader than thorax; the small first segment grey, the second yellow or whitish yellow with a broader or narrower, black middle line, often abbreviated behind; sometimes the line is much expanded so that the segment has only yellowish side spots, and then the line is often greyish; third segment bluish black, mostly dull; it is either quite black or just the basal margin yellow, or this colour widens to a pair of smaller or larger spots connected with the second segment; the rest of abdomen is

bluish black, shining or a little dull on the disc of fourth segment. Abdomen is thus bluish black with a broad, pale basal band, more or less divided in the middle and incised behind; it is clothed with erect hairs which are long at the basal corners; they are yellow on the second segment and generally also to a higher or lower degree on the fourth, and the apex is yellow-haired, but in dark specimens the dark parts of the second segment and all the fourth except the side margin may be dark-haired. Venter coloured chiefly as the dorsum, with long, pale hairs, more or less black towards the apex. Legs with the femora black with yellow apex; tibiæ with the basal half yellow, the apical half and the tarsi black. Hind tibiæ slightly thickened about the middle and a little excavated below the thickening on the posterior side, and here slightly curved. Legs haired in the usual way, with somewhat long hairs on posterior side of the anterior femora and on anterior side of the hind femora; tibiæ short-haired. The hairs on femora black but on hind femora more or less yellow, on tibiæ mainly yellow, except on the apical part of hind tibiæ; sometimes the hairs on hind femora and tibiæ and on the apical part of anterior tibiæ are more black. Wings hyaline, with a black or blackish blotch from the stigma down over the base of the postical fork. Squamulæ blackish with black and brownish fringes. Halteres brownish black with paler peduncle. Plumulæ brown or blackish.

Female. Frons broad, yellow pruinose, a little darker along the middle, with yellow hairs, generally dark about the ocelli; for the rest the female is quite similar to the male; the pale abdominal band never broadly interrupted.

Length 10—11,5 mm.

L. lucorum is not rare in Denmark, but generally only present in single or a few specimens; Charlottenlund, Ordrup Mose, Ermelund, Lyngby Mose, Søllerød, Fure Sø, Birkerød, Jægerspris, at Sorø; on Møen; on Lolland at Maribo, Høvænge, Kærstrup, Bremersvold, Ulriksdals Skov and Holmeskov at Saxkøbing; in Jutland in Nørholm Skov at Varde, Grejsdal at Vejle, at Horsens and at Rebbild near Skørping, finally on Bornholm in Almindingen and at Rø. The dates are $15/5$ — $29/7$. It occurs on flowers in fens and on meadows.

Geographical distribution: — All Europe, towards the north to northern Sweden, and in Finland; it occurs also in North America.

15. **Eriozona** Schin.

This genus is nearly allied to *Leucozonia* and thus also to *Syrphus*. The species is large, densely hairy, of dark colour with only scutellum

and apex of abdomen paler. Eyes touching in the male, separated in the female, but vertex and frons not broad; the eyes are hairy; the facets in the male very slightly enlarged above. Antennæ inserted well above the middle; they are porrected, a little elongated, third joint longer than the two basal together; arista apparently bare. Epistoma yellow, hairy; the central knob only little protruding, not more than the frontal prominence; the mouth edge retreating, the lateral mouth edges and the jowls only slightly descending. The mouth parts resemble those in *Syrphus*, but the proboscis is short and it and the mouth parts rather stout. Clypeus has the basal part large and the side legs not long. Labrum is relatively short, broad and stout, it has the apex of the usual shape. Hypopharynx and maxillæ are likewise strong; the palpi short, not longer than the lacinia and neither clubbed nor recurved. Labium rather short and thick, with the labella of about the same length as the basal part. Thorax about quadrate, a little broader than long; scutellum yellow, it has a fringe below the margin. There are no bristles present. Abdomen rather short and broad, somewhat roundish, it is broadest about the middle and here considerably broader than thorax; it is black with the apex reddish; the first segment very short, the second not long; there is the same number of not transformed segments as in *Syrphus* viz. five, the fifth is small; as in *Leucozona* the fifth ventral segment is partly hidden, so that it looks as if it was unsymmetrical. Genitalia small. In the female there are five visible segments. Legs simple, tarsi somewhat broad and flat, especially the last joint rather broadened; claws and pulvilli large. Schiner's statement that the femora are elongated I do not find confirmed. Wings of usual shape; medial cross-vein well before the middle of the discal cell; cubital vein a little incurved in the middle of the first posterior cell; vena spuria distinct. Squamulæ black, fringed as in *Syrphus*, the hairs on alar squamulæ considerably flattened, the fringe on the thoracal squamulæ rather long. Plumula with dense, longish, plumose hairs.

This genus was separated from *Syrphus* by Schiner at the same time as *Leucozona*, and I think it is well founded on the shape of the body and its colour.

As far as I know the developmental stages have not been observed.

Schiner states for this as well as for the foregoing genus, that the species occurs especially in the mountains; with us it occurs on flowers in fens and meadows.

Of the genus only one species is known, also occurring in Denmark.

1. *E. syrphoides* Fall.

1817. Fall. Dipt. Suec. Syrph. 36, 1 (*Scaeva*). — 1843. Zett. Dipt. Scand. II, 699, 1 (*Scaeva*). — 1862. Schin. F. A. I, 300. — 1907. Kat. paläarkt. Dipt. III, 53. — *Syrphus oestriformis* Meig. 1822. Syst. Besch. III, 315, 60 et 1838. VII, 131, 60.

Male. Frons greyish pruinose; epistoma yellow, somewhat shining, the lower hind corners and the jowls blackish. Vertex with yellow, on the front part with black hairs; frons and epistoma with yellow hairs. Epistoma with a slightly protruding central knob; the mouth edge retreating; the lateral mouth edges and the jowls almost not descending. Occiput grey pruinose, the hairs all yellow or some few black hairs above. Eyes hairy with not long, pale hairs. Antennæ black, porrected, somewhat long, third joint considerably longer than

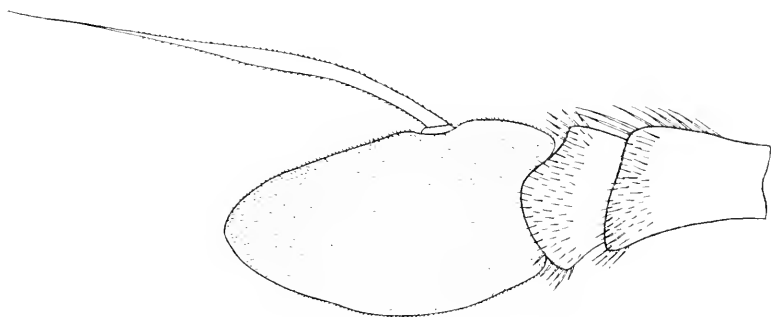


Fig. 112. Antenna of *E. syrphoides* ♂, from the inside. $\times 55$.

the two basal together; arista brown, palest at the base. Thorax black, rather dull, with three more or less distinct, darker and duller stripes, the median abbreviated about the middle; thorax clothed with erect, black hairs, more or less yellow on the front part and posteriorly just in front of scutellum. Scutellum greyish yellow, with yellow hairs, longer than those on thorax and longest towards the margin. Pleura black-haired, but the humeri with long, yellow hairs, distinctly seen from above as yellow tufts. Abdomen dull black, greyish at the base, the apex from the middle of fourth segment reddish; it is densely clothed with longish, erect hairs which mainly follow the ground colour and thus are pale at the base, black on the middle and reddish on apex and here longest. Venter coloured and haired chiefly as dorsum. Genitalia reddish yellow. Legs with the femora black or brownish black, the apical part of anterior femora yellowish; anterior tibiæ yellowish with a more or less distinct, blackish ring near the apex, hind tibiæ black, generally indistinctly pale on the basal half,

especially behind; all tarsi yellowish or brownish; hind tibiæ a little excavated and curved on the posterior side near the apex. The legs haired as usual, anterior femora somewhat densely; the hairs on femora black, the short hairs on anterior tibiæ partly pale, partly black; hind tibiæ black-haired, a little fringed above and below, longest on the antero-dorsal side. Wings very slightly yellowish tinged, blackish

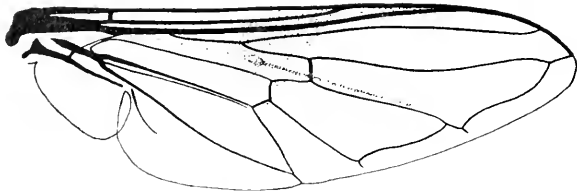


Fig. 113. Wing of *E. syrphoides* ♂.

at extreme base and with a brown, somewhat indefinite band on the middle from the basal end of the stigma down to the base of the postical fork. Squamulæ black, with black fringes. Halteres brownish with a paler peduncle. Plumula black or brown.

Female. Eyes separated but the frons not broad, it is greyish pruinose, more brownish in the middle; the hairs are dark, but more or less yellow on the anterior part. The red colour at the apex of abdomen is more restricted as it only includes the hind margin of the fourth segment and the rest of the apex. The hairs are pale yellow on the whole second segment and likewise on the whole or almost the whole fourth, so that only the third segment is black-haired, and even it may have some pale hairs on the posterior part. In the fringe on the hind tibiæ are some yellow hairs.

Length 13—15 mm.

E. syrphoides is somewhat rare in Denmark; Ordrup Mose, Donse, Tyvekrog, Frerslev Hegn, Tisvilde; in Jutland at Rebbild near Skørping. My dates are $^{28}/_5$ — $^{10}/_8$. It occurs on flowers in fens and meadows.

Geographical distribution:— Northern and middle Europe down into Austria, Hungaria and Styria, and in northern France; towards the north to northern Sweden, and in Finland.

16. *Ischyrosyrphus* Big.

This genus stands very near to *Syrphus*. The species are of large or medium size. Eyes hairy (in a foreign species, *I. liophthalmus*, only slightly hairy). Antennæ inserted above the middle; third joint

somewhat oval, a little longer than broad, about as long as the two basal joints together; arista short-pubescent. Epistoma yellow, hairy, it has a slightly prominent central knob; the mouth edge retreating, and the lateral mouth edges and the jowls slightly descending. Mouth parts as in *Syrphus*; proboscis not short, the palpi somewhat long, considerably longer than the lacinia, slightly clubbed. Scutellum yellow, or black with a more or less distinct yellow apex; it has a fringe below the margin. No bristles on thorax or scutellum. Abdomen somewhat long, with the sides subparallel; it has a broad basal band or pair of spots, and generally narrow spots on the third and fourth segments; the spots vary in colour from bluish grey to bony white. The abdomen has as in *Syrphus* five not transformed segments in the male; the first is very short and likewise the fifth; the fifth ventral segment is partly hidden under the genitalia, so that it looks as if it is unsymmetrical. In the female there are five visible abdominal segments. Legs, wings and squamulæ as in *Syrphus*, the hairs on alar squamulæ not much flattened.

The genus was separated from *Syrphus* by Bigot in 1882, then including some species not belonging here. In 1897 Mik. (Wien. ent. Zeitg. XVI, 63) founded the genus *Lagenosyrphus* with the species now included in *Ischyrosyrphus*. Bigot named as type *glaucius* L., while Mik took *liophthalmus* Schin. et Egg. as type. Verrall came then (l. c. 321), and I think correctly, to the conclusion that the name *Ischyrosyrphus* must remain.

The genus is, as said, very nearly allied to *Syrphus*, and it is a question whether it should be kept, but I have done so, as the species are easily recognised and separated from the species of *Syrphus*. It is distinguished from *Leucozona* by the not descending, quite yellow epistoma and the wings without band, from *Eriozona* by the narrow abdomen and shorter third antennal joint, and from *Syrphus* and its allies by the markings of abdomen.

The developmental stages of the genus do not seem to be known.

Four palæarctic species are considered as belonging to this genus, two of them occur in Denmark.

Table of Species.

- | | |
|--|-------------------------|
| 1. Scutellum yellow; anterior legs orange with only base of femora black; hind tibiæ orange with a more or less distinct dark ring | 1. <i>glaucius</i> . |
| — Scutellum black or with only apex yellowish; legs black with only anterior knees yellowish | 2. <i>laternarius</i> . |

1. *I. glaucius* L.

1758. Linn. Syst. Nat. X, 593 et 1761. Fn. Suec. 1813 et 1767. Syst. Nat. XII. 2, 986, 47 (*Musca*). — 1843. Zett. Dipt. Scand. II, 275, 28 (*Scaeva*). — 1862. Schin. F. A. I, 302 (*Syrphus*). — 1901. Verr. Brit. Fl. VIII, 322, 1. — 1907. Kat. paläarkt. Dipt. III, 53. — *Syrphus nobilis* Meig. 1822. Syst. Besch. III, 316, 62.

Male. Frons and epistoma yellow and yellow pruinose; above the antennæ the frons brownish or blackish; the central knob undusted in its whole length, somewhat shining; jowls more or less darkened, almost bluish but the hind part yellow. Vertex black-haired, only just behind with yellow hairs; frons with brown or blackish hairs, epistoma yellow-haired. Occiput grey pruinose, with yellow hairs, above sometimes some few black hairs. Eyes densely hairy with brown, downwards paler hairs. Antennæ black. Thorax greenish or brassy, dull, with indications of three darker lines; the præsutural depression more or less yellowish. Scutellum yellow, translucent. Thorax and scutellum clothed with long, erect, yellow hairs, longest behind and on scutellum. Pleura with yellow or pale yellow hairs. Abdomen velvet black, bluish and shining at the tip; first segment greyish or greenish; second segment with two large, isolated and approximated spots lying on the front part of the segment, close to the front margin; the spots are subquadrate with the inner hinder corner rounded; they vary in colour from bluish to bony white; the third and fourth segments each with a pair of narrow, transverse, bluish or bluish grey spots near to the front margins and going more or less distinctly over the side margins. Abdomen is clothed with longish hairs, longest at the basal corners, they follow in colour chiefly the ground colour, and hence there are black tufts at the hind corners of second, third and fourth segments. Venter coloured about as dorsum, but often the whole second segment pale and the spots united to bands lying close to the front margins and rather shining; it is clothed with long hairs, pale on the basal half, dark behind. Legs yellow with about the basal half of anterior femora and hind femora except the apex black; hind tibiæ with a more or less distinct, brownish or blackish ring in the middle. Legs haired as usual, the hairs all pale except on the front side of the black parts of hind or posterior femora and generally some few at the base of the front femora. Wings more or less yellowish tinged, most at the front margin. Squamulæ yellowish with a yellow fringe. Halteres yellow. Plumula whitish or pale yellow.

Female. Eyes separated but the frons not broad, widening somewhat rapidly downwards; it is yellow pruinose with a black middle

line; the hairs are yellow, but black in front of the ocelli, above the antennæ and more or less on the middle line; jowls yellow. The lines on thorax generally more distinct than in the male. Pleura white-haired. The basal abdominal spots bluish, and often united, as are also sometimes the other spots. Legs as in the male, the ring on hind tibiæ often faint or almost wanting.

Length 11—12 mm.

I. glaucius is an uncommon species in Denmark; Ordrup Mose (Stæger), Lyngby Mose, at Fønstrup Dam in Grib Skov (Kryger, the author), Tisvilde (Klöcker), and in Jutland in Hø Skov at Aarhus (Victor Hansen). My dates are $7/7$ — $25/8$. It occurs in fens and on meadows especially on Umbelliferæ.

Geographical distribution:— Northern and middle Europe down into France; towards the north to middle Sweden, and in Finland.

2. *I. laternarius* O. F. Müll.

1776. O. F. Müll. Zool. Dan. Prodr. 2040 (*Musca*). — 1862. Schin. F. A. I, 30 (*Syrphus*). — 1897. Mik. Wien. ent. Zeitg. XVI, 64 (*Lagenosyrphus*). — 1901. Verr. Brit. Fl. VIII, 323, 2, fig. 268. — 1907. Kat. paläarkt. Dipt. III, 54. — *Syrphus glaucius* Fabr. (nec Linn.) 1775. Syst. Entom. 770, 37 et 1781. Spec. Ins. II, 431, 53 et 1805. Syst. Antl. 243, 49 (*Eristalis*). — *Syrphus glaucus* Meig. 1822. Syst. Besch. III, 315, 61. — *Scaeva mutata* Zett. Dipt. Scand. VIII, 3140, 28—29.

Male. Frons greyish pruinose at the sides, blackish in the middle. Epistoma yellow, greyish yellow pruinose, the central knob shining, brown or blackish. Jowls grey. Vertex and frons black-haired; epistoma with black hairs at the sides, yellow towards the middle. Occiput grey with yellow, downwards whitish hairs; above there is a row of black, overhanging hairs at the eye-margin. Eyes densely hairy with brown, downwards paler hairs. Antennæ black. Thorax brownish black, dull, with two approximated greyish stripes in the middle, abbreviated behind; sometimes the sides of the disc are also greyish, so that four greyish stripes appear, separated by three black. Scutellum black with the apex more or less translucently yellowish or brownish, but sometimes all black. Thorax clothed with erect hairs, yellow in front and behind, black on the middle; they are not dense, especially not on the middle; scutellum has long, yellow hairs. Pleura with yellow hairs. Abdomen rather narrow, velvet black, a little shining at the apex; it has spots similar to those in *glaucius*, the large basal pair likewise varying from bony white to greyish or bluish, and in the latter case sometimes rather obscure; the second and third pairs more grey than bluish, and more widely separated in the middle.

Abdomen is clothed with rather long hairs, mainly following the ground colour. Venter generally with the base pale or sometimes darker, third segment black and the fourth grey, or third and fourth black with bluish front bands; the venter has long, pale hairs. Legs black, anterior femora with the apical part and anterior tibiæ with the basal part yellow, hind tibiæ with the very base a little pale; legs haired as usual, the long hairs on femora pale, except on the apical part of front femora; the short hairs on the front side of posterior femora partly black; anterior tibiæ mainly yellow-haired, hind tibiæ black-haired. Wings more or less, sometimes somewhat strongly yellowish or brownish tinged. Squamulæ brown or blackish brown, with a brownish yellow fringe. Halteres dark yellow. Plumula whitish.

Female. Ocellar triangle large and prominent. Frons not specially broad, widening downwards; it is greyish pruinose with a broad, blackish middle stripe, and all black-haired. Epistoma yellow-haired. Pleura with white hairs. Scutellum with the apex generally more pale than in the male. Abdomen with the basal spots generally bony white, and with indications of spots at the basal corners of fifth segment. Legs mainly pale-haired except above hind tibiæ.

Length 9—11 mm.

Remarks: *S. glaucius* Fabr. is commonly considered a synonym to the present species, and this may be so, I shall, however, not omit to mention that in the collection of Tönder Lund and Sehestedt, the determination of which is to a great degree due to Fabricius, a specimen stands, labelled *glaucius*, and this specimen is *glaucius* L.

I. laternarius is not rare in Denmark, though it cannot be termed common; Ordrup Mose, Gurre Vang; on Lolland in Dødemose west of Nysted; on Funen at Veflinge and Middelfart; in Jutland in Nørholm Skov at Varde, Vejle Nørreskov, Greisdal and Højenbæk Dal at Vejle, at Horsens, Laven and Funder near Silkeborg and in Hø Skov at Aarhus. My dates are $7/7$ — $15/8$. It occurs on meadows, often on meadows in woods on Umbelliferæ, I have generally taken it on *Heracleum*.

Geographical distribution:— Northern and middle Europe down into France; it was not known north of Denmark until 1907, when it was taken in Scania (Ringdahl, Entom. Tidskr. XXXII, 1911, 124); according to Verrall it probably also occurs in North America in California and Oregon, as *tricolor* Big. and *velutinus* Willist. are probable synonyms.

17. **Didea** Macq.

Like the allied genera rather near to *Syrphus*. The species are of medium or somewhat large size, with extended greenish or orange

markings on abdomen. Eyes sparingly and short-haired; the upper facets, towards the suture, a little enlarged in the male. Ocellar triangle rather large and elongate. Antennæ well above the middle, somewhat porrected, the third joint elongated, about twice as long as the two basal together, somewhat attenuated towards the apex. Arista apparently bare. Epistoma yellow, with or without a short, black middle line, hairy, with a slightly protruding central knob; mouth edge retreating; jowls almost not descending. The mouth parts resemble those in *Syrphus*; clypeus with a large basal part; proboscis rather short and stout; palpi short. Scutellum brownish or yellow, without fringe below the margin, only with short hairs just at the margin. No bristles on thorax or scutellum. Abdomen ovate, considerably broader than thorax, rather flattened; it has a distinct, somewhat raised margin (as in some species of *Syrphus*); there are three, or sometimes in the female four greenish or yellow bands, the first interrupted and sometimes also the third and fourth. In the male there are, as in *Syrphus*, five not transformed dorsal segments; on the ventral side there are likewise five normal segments, but the fifth is partly hidden under the genitalia so that it looks as if it is unsymmetrical. The genitalia are rather large, the sixth to ninth segments distinctly seen on the ventral side. In the female there are likewise five normal abdominal segments, but generally three small segments more are visible, at all events above. Legs with the hind tibiæ a little dilated in the middle, and below the middle a little incurved on the posterior side; tarsi with the four last joints flattened. Wings with a deep loop on the cubital vein above the first posterior cell. Thoracal squamula besides the marginal fringe of long, branched hairs also with long hairs on both sides, at all events towards the margin.

The genus is, as said, nearly related to *Syrphus*; it is distinguished especially by the loop of the cubital vein, which, to be sure, is present also in a few species of *Syrphus*, but less pronounced; further the antennæ are rather long with the third joint elongate, and the abdomen is flat, with a distinct, raised margin (a similar shape of abdomen is also present in some species of *Syrphus*); also there is no fringe of downwards directed hairs below the margin of scutellum.

The developmental stages are not known: Verrall suggests, no doubt correctly, that the larvæ are aphidiphagous, because *D. intermedia* was found on bushes of *Ulex* infested with an *Aphis*; the same author records that a specimen (possibly type) of *D. fasciata* Macq. in the Paris Museum was a bred specimen, but without any particulars given.

The species of *Didea* are very beautiful flies; Schiner mentions that they are more commonly seen on leaves somewhat high over the ground, than on flowers, but I have taken nearly all my specimens on humid meadows or in more dry districts in or near woods on flowers of Umbelliferæ and Compositæ. The species are nowhere common.

Of the genus 3 species are known from the palæarctic region, all 3 also occurring in Denmark.

Table of Species.

1. Abdominal bands greenish and somewhat narrow; the loop of the cubital vein rather shallow; epistoma with a short, black middle line; scutellum nearly all black-haired; abdomen in the female without spots on fifth segment 1. *alneti*.
- Abdominal bands yellow and rather broad; the loop of the cubital vein deep; scutellum more or less yellow-haired; abdomen in the female with a band on fifth segment 2.
2. Epistoma without black middle line; halteres with the knob yellow; scutellum yellow-haired or with more or fewer black hairs on the apical part; black middle line on the frons of the female reaching more or less distinctly to the antennæ 2. *fasciata*.
- Epistoma with black middle line; halteres blackish; scutellum with black hairs on the apical part; black middle line on the frons of the female stopping well before the antennæ 3. *intermedia*.

1. *D. alneti* Fall.

1817. Fall. Dipt. Suec. Syrph. 38, 4 (*Scaeva*). — 1822. Meig. Syst. Besch. III. 310, 54 (*Syrphus*). — 1843. Zett. Dipt. Scand. II, 700, 2 et 1849. VIII. 3131, 2 (*Scaeva*). — 1862. Schin. F. A. I, 314. — 1901. Verr. Brit. Fl. VIII, 326, 1, figs. 269—271. — 1907. Kat. paläarkt. Dipt. III, 54. — *Syrphus pellucidulus* Meig. 1822. Syst. Besch. III, 311, 55.

Male. Frons yellow with a more or less distinct black or brownish spot above each antenna. Epistoma yellow, slightly pruinose, the mouth edge black and this colour extends up and includes the central knob. Jowls grey. Vertex and frons black-haired, epistoma yellow-haired. Occiput yellowish grey pruinose, with yellow hairs. Eyes thinly and short-haired with pale hairs. Antennæ black. Thorax dark æneous, shining; on the sides above the wing-root it is yellowish; it is haired with erect, yellow hairs, among which more or fewer black hairs, generally forming a band across the middle. Scutellum brownish, somewhat translucent with bluish reflections, especially towards the margin; it is black-haired but with some yellow hairs at the base. Pleura with longish, pale yellow hairs. Abdomen velvet black, the hind margin of third segment and the apex shining; there are three

pairs of pale greenish or greenish yellow spots (by the exsiccation they often become more yellow); the first pair are oblique, they are rounded inwards and stretch from here upwards to the side margin, over which they extend; the second pair are connected in the middle,

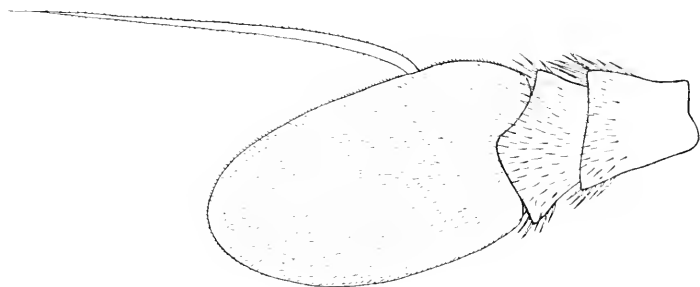


Fig. 114. Antenna of *D. alneti* ♂, from the inside. $\times 55$.

thus forming a band, lying close to the front margin and deeply excised behind; it occupies about half the length of the segment; the third pair of spots are cuneiform with the base outwards and the apex towards the middle; they lie close to the front margin of the segment and the hind margin slopes forwards from the base to the apex; the second and third pairs are separated from the side margin; the dull space on the fourth segment forms two oblique spots just behind and along the yellow spots and connected with the dull side margin. Abdomen is clothed with somewhat short, erect hairs, on the hind parts of the segments they are quite short and depressed, they follow mainly the ground colour; at the side margin the hairs are all black except on the basal spots, where they are white and long, and they are also pale at the basal corners of the fifth segment. Genitalia (eighth segment) bluish shining, but grey pruinose on the left side; they are covered with longish, pale hairs. Venter pale yellow on the basal half, with three velvet black spots on the second and a transverse band on the third segment at the hind margin; the fourth segment bluish, with a black band at the hind margin; the venter has long hairs, pale on the basal part, dark on the apical part. Anterior legs reddish, the basal part of femora black, tibiae with a more or less distinct, dark ring below the middle, tarsi black; hind legs black with the apex of the femora and the basal part of the tibiae reddish. The legs haired as usual, the hairs black, on anterior tibiae mixed with yellow hairs; on the anterior femora the hairs dense, but on hind femora they are only few; hind tibiae with a short fringe above

and below; anterior tarsi somewhat longish haired above. Wings slightly tinged: the loop of the cubital vein rather shallow and lying about in the middle. Squamulæ whitish with a yellow fringe. Halteres with the knob blackish, the peduncle paler. Plumula white.

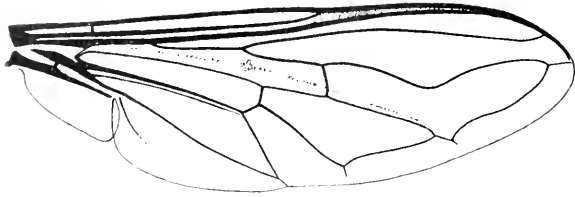


Fig. 115. Wing of *D. alneti* ♂.

Female. Vertex somewhat narrow, frons rather rapidly widening downwards. Vertex black, shining, frons yellowish pruinose, blackish above: from the vertex a black, shining middle line stretches down, which soon divides furcately and goes with a leg down to each antenna. Vertex and frons black-haired. Pleura white-haired. Abdomen as in the male, the spots a little narrower, the second band sometimes divided in the middle; the fifth segment without spots.

Length 12—14 mm.

D. alneti is rare in Denmark; Dyrehaven, at Fure Sø, Geel Skov, Donse, Grib Skov, Tisvilde and in Jutland at Silkeborg. My dates are $\frac{3}{6}$ — $\frac{13}{8}$. It occurs on meadows in or near woods and at borders of water, especially on Umbelliferæ.

Geographical distribution:— Europe down into Italy; towards the north to northern Sweden, and in Finland.

2. *D. fasciata* Macq.

1834. Macq. Suit. à Buff. I, 508, 1, Pl. XI, fig. 15. — 1838. Meig. Syst. Besch. VII, 142. — 1862. Schin. F. A. I, 314. — 1901. Verr. Brit. Fl. VIII, 328, 2, figs. 272—274. — 1907. Kat. paläarkt. Dipt. III, 55. — *Enica Foersteri* Meig. 1838. Syst. Besch. VII, 140, 1, Tab. LXVII, Fig. 30—32.

Male. Similar to *alneti*, but slightly smaller and with more extended, yellow markings. Head as in *alneti*, but the mouth edge not black, only darker yellow and the central knob yellow or only slightly darkened; jowls yellow. Thorax dark greenish æneous, with indications of two faint grey middle stripes in front. Scutellum a little paler, without bluish reflections; the hairs on thorax and scutellum all yellow, or more or fewer at the margin of the latter black. Abdomen with the markings yellow, the bands on third and fourth

segments broader, occupying the two thirds of the length of the segments and none of them interrupted (or only in very rare cases and somewhat indistinctly). The genital knob shorter haired than in *alneti*. The fourth ventral segment not bluish, but yellow, with a large, black spot at the hind margin. Anterior femora with the black colour extended more towards the apex than in *alneti*; anterior tibiæ quite yellow, or with very slight indications of rings, somewhat yellow-haired. Wings with the loop of the cubital vein considerably deeper than in *alneti*, and produced a little more towards the tip of the wing. Halteres with the knob yellow.

Female. Frons with the black middle line stretching longer down before dividing than in *alneti* and hence the legs of the furcate spot shorter, and sometimes they are somewhat indistinct. Abdomen with the markings a little narrower than in the male, but broader than in *alneti*; sometimes the bands extend somewhat over the side margin; the fifth segment with a yellow band or a pair of spots; the last (eighth) segment broader than in the other species.

Length 11,5 to fully 12 mm.

D. fasciata is perhaps a little less rare in Denmark than *alneti*: Ordруп Mose (Stæger), Nyrup Hegn (the author), Tisvilde (Klöcker, the author); on Lolland at Strandby (L. Jørgensen); on Funen at Middelfart (Th. Mortensen), and in Jutland at Silkeborg (A. Petersen, Esben Petersen) and at Rebbild near Skørping (Kryger). My dates are $2^3/6$ — $5/9$. It occurs in the same way as *alneti*, perhaps on more dry localities, and I think it frequents especially Compositæ as Hieracium, but it has also been taken on flowers of Sambucus.

Geographical distribution: — Europe down into Italy, towards the north to southern Sweden; according to Aldrich it also occurs in North America (*fuscipes* Loew).

3. *D. intermedia* Loew.

1854. Loew, Neue Beitr. II, 18, 39. — 1862. Schin. F. A. I, 314. — 1901. Verr. Brit. Fl. VIII, 331, 3, figs. 275—277. — 1907. Kat. paläarkt. Dipt. III, 55.

Male. Similar to the two preceding species, especially to *fasciata*, but smaller and with the yellow markings intermediate with regard to extent. Epistoma with the mouth edge black, and this colour extending up over the central knob; jowls grey. Thorax æneous, with faint purplish reflections (when alive, thorax is distinctly bluish or purplish, but this colour vanishes by exsiccation); thorax yellow-haired. Scutellum as in *alneti*, with yellow hairs, but black hairs at the margin

or on the apical half. Abdomen with the markings yellow, the bands are broader than in *alneti* but narrower than in *fasciata*, generally occupying a little more than half the length of the segments, the third band not interrupted. Venter as in the preceding species, but the pale parts curiously greyish white pruinose and quite dull. Anterior tibiæ with more or less distinct dark rings and with black and yellow hairs. Wings with the loop of the cubital vein deeper than in *alneti*, but not fully so deep as in *fasciata*. Halteres blackish.

Female. Frons with the black middle line dividing soon after the base as in *alneti*, but the legs of the fork not reaching the antennæ, but stopping well above them. Abdomen with the bands slightly narrower than in the male, none of them interrupted and they do not go over the side margin: the fifth segment with a yellow band or pair of spots.

Length 9—12 mm.

D. intermedia, though in no way common in Denmark, seems to be a little more numerous where it occurs than the other two species, but it has hitherto only been taken on three localities; Egebæks Vang (the author), Tisvilde (Klöcker, the author), and in Jutland at Silkeborg (A. Petersen, Esben Petersen). My dates are $^{11}/_6$ — $^{17}/_7$. I have taken it especially on Hieracium, Matricaria and Jasione.

Geographical distribution:— Europe down into Austria; towards the north to southern Sweden.

Remarks: My descriptions of the three species of *Didea* are based on a material consisting of 15 specimens of *alneti*, 39 of *fasciata* and 24 of *intermedia*, males and females in about equal numbers. I have no doubt that the species are quite good and distinct; they are distinguished by the colour and size of the abdominal markings, and the different depth of the loop of the cubital vein; *intermedia* is also well distinguished from *fasciata* by the black line on epistoma and the blackish halteres, and also the curious dull white venter is characteristic; when alive it is easily distinguished by the blue thorax. The shape of the frontal stripe of the female is characteristic for all three females, and the female of *alneti* is distinguished from the two others by the want of markings on fifth abdominal segment; on the other hand the colour of the hairs on scutellum gives no safe distinction between *fasciata* and *intermedia* as black and yellow hairs may be present to the same degree in both species, *fasciata* has, however, often a quite, or almost quite yellow-haired scutellum, which never seems to be the case in *intermedia*. Schiner gives as distinction between *alneti* and the two others three and four bands respectively on abdomen: it may be supposed that he has only examined females.

Loew also ascribes *intermedia* three bands, and he states to have known only the female; perhaps this is an error and he has only had the male.

18. **Lasiophthicus** Rond.

(*Catabomba* Ost. Sack.).

This genus is, among all the allied genera, the one which is most nearly allied to *Syrphus*. The species are of somewhat large size, with distinct, whitish or yellow lunules on abdomen. The only distinguishing character lies in the shape of the head and the eyes. The frons is in the male very broad and inflated, and it is thus produced rather much above the level of the eyes; on account of its breadth its upper angle is very obtuse, not rectangular or acute as generally in *Syrphus*, and between the upper margin and the side margin of the frons there is a somewhat rounded angle, not present in *Syrphus*: the side margins of frons and epistoma are straight, and as the frons is so broad they are parallel (in *seleniticus*) or a little converging downwards (in *pyrastris*). The eyes have in the male a part of the facets considerably enlarged, and the dividing line is distinct; the space with the enlarged facets begins at the suture and stretches as a broad band down the median part of the eye to somewhat below the middle, where it ends rounded; the other part of the eye has extremely small facets. The eyes are (on account of the very small facets) very densely hairy, the part with the larger facets naturally much less densely, and the hairs on this part stop above before the eye-suture, so that the upper part of the eyes is bare; the part along the hind margin of the eye is also bare (as also in the hairy-eyed species of *Syrphus*). In the female the frons is likewise arched and somewhat inflated and produced above the level of the eyes, and there is no indication of a transverse depression such as generally in *Syrphus*. Ocellar triangle equilateral. Mouth parts as in *Syrphus*; maxillar lacinia not long, palpi very short, about half as long as the lacinia, not clubbed, with a few bristles at the apex. Scutellum with a long fringe below the margin. Abdomen somewhat flat and marginate, with the same number of segments as in *Syrphus*; genitalia small. Wings with the cubital vein slightly and evenly incurved above the first posterior cell; the wing-membrane is somewhat glistening, and its microscopical hairiness is slight, as the hairs are very short and sparse; only on the tinged apical part of the mediastinal cell the hairs are developed in the usual way. Squamule and plumula as in *Syrphus*, the hairs on alar squamula rather broad.

I have kept the genus here because of the easy distinction of the species, but as said, it is very near to *Syrphus*, so near that I think it has no scientific value. The characters from the head and eyes are to some degree found in species of *Syrphus*, especially in *S. arcuatus*, and it is just this species which stands as connecting; Verrall would (Brit. Fl. VIII, 333) include this species under *Lasiophthicus*¹, but as it has bare eyes, a less broad and less elevated frons and much less distinction between the eye-facets, I think this not possible. As Verrall correctly remarks, *Lasiophthicus* is in no way related to the hairy-eyed species of *Syrphus*; the relation is on the contrary to another group, and just through *arcuatus* to *luniger*, *corollae* and their allies. — Girschner has (Ill. Wochenschr. f. Entom. III, 1897, 570) doubted the validity of the genus, but he says, that in *seleniticus* the frons is scarcely inflated, and the dividing line between the eye-facets wanting, and adds; “and sehe ich hier keinen Unterschied von anderen *Syrphus*-Arten.” This I do not understand for in my material the two species are quite similar in these respects, as also otherwise stated. I should be inclined to think that Girschner has had *S. arcuatus* for examination, though this species has bare eyes. There is also a paper by Osburn (Journ. of N. Y. Ent. Soc. XVIII, 1910, 58) dealing with the same question. The author comes to the conclusion that the genus is not valid, and this is no doubt correct, but the material he uses is not good, for the species he mentions as *seleniticus* is in no way this species, as is proved with certainty by his remarks and figures, it is even not a species related to *seleniticus*; *seleniticus* is with regard to the shape of the head and eyes quite similar to *pyrastris*. All the best European authors as Meigen, Loew, Zeller, Verrall and others have always consented therein that these two species are exceedingly similar; does the author think they should have done so, if there was so marked a distinctive character, as his figures would indicate?

The genus *Lasiophthicus* was founded by Rondani for all the hairy-eyed species of *Syrphus*; in 1877 Osten Sacken restricted it under the name *Catabomba* to the species now in it; with regard to the name of the genus I follow the Kat. paläarkt. Dipt. as *pyrastris* was the type of Rondani's genus.

The developmental stages of the genus have long been known; already Linné and Fabricius speak of the larva of *pyrastris* among Aphides on *Pyrus*. Further it is mentioned by Réaumur (Mém. Ins. III,

¹ I think the species mentioned by Verrall on the place cited as *S. lapponicus* from Bigot's collection is my *S. arcuatus* (see under this species) or else a similar species.

1737, Tab. XXX, Fig. 3—5, Tab. XXXI, Fig. 9—10) on *Sambucus* and *Lonicera*. De Geer (Mém. Ins. VI, 1776, 108, 5, Tab. VI, Fig. 14—21) mentions it from *Rosa* (*Musca rosae*), Meigen (Syst. Besch. III, 1822, 303) from *Sonchus oleraceus*, Vallot (Bull. Soc. ent. de Fr. 1834, LXV) from *Cannabis*, Curtis (Farm. Ins. 1857, 81) from *Brassica oleracea* at the shore in July, Schiner (Verh. zool. bot. Gesell. Wien, VII, 1857, 338) from *Carduus*; Verrall (Brit. Fl. VIII, 336) records the species as bred from *Rosa* and from larvæ feeding on *Aphis brassicæ* and *pruni*, and on an *Aphis* on *Centaurea*; one specimen emerged on $17/6$ after resting as pupa for three weeks; Aldrich (Cat. N. A. Dipt. 1905, 363) records the larva as feeding on *Siphonophora avenae*; Martelli (Boll. del Lab. di Zool. Gen. e Agrar. in Portici, V, 1911, 45) mentions it from *Aphis brassicæ*. Mr. Kryger has found the larva among Aphides on *Carex* and *Phragmites* on *Amager* on $28/7$, the imagines came in the first half of August; finally I have myself found the larva in great numbers among Aphides on *Phragmites* on *Amager* near the shore; the larvæ were taken on $3/8$, they pupated the following days, and the imagines came from $16/8$ and further on. The larva of *seleniticus* is mentioned by Ratzeburg (if correct) (Die Forstins. III, 1844, 178), and by Zeller (Isis 1842, 829) as found on *Betula*; Verrall (l. c. 337) records this species as bred from a larva found in June and developing in July, and from another larva, beaten from a tree. — The larva of *pyrastri* (and that of *seleniticus* seems to be similar) is of the usual shape of *Syrphus*-larvæ; it is not much flattened, tapering towards the anterior end, and with strong mouth hooks; it is strongly transversely corrugated, and the dermis is chagreened from densely placed small spines; on the ventral side there are seven transverse swellings, each belonging to a segment; the swellings are divided into some warts, somewhat similar to prolegs. On the dorsal side there are some longer hairs or spines, placed distantly in transverse rows on some of the corrugations, and similar are found along the sides; they are regularly placed quite in the same way as described for *Platychirus* viz. on the second to seventh abdominal segments, two on one corrugation in the middle, and on the following corrugation two on each side, besides the three lateral ones longer downwards; then follow two corrugations without spines, and hereafter the same arrangement is repeated; these segments are each divided into four corrugations and the spines are placed on the two middle ones; on the first abdominal segment and on the meso- and metathoracal segments there are six spines on each on one corrugation, and on the first abdominal segment also three at the side. At the posterior end the body terminates below with a somewhat cushion-shaped part, and above it is a cavity in which the brown

posterior spiracles lie close together, but not on any process; each spiracle shows three slits; the anterior spiracles are small, placed above the prothoracal segment on each side. The larva is green, with a yellow or whitish yellow line along the dorsum, and a narrower and sometimes less distinct line along each side. The length of the full grown larva is about 15 mm or more. The pupa is elongated ovate, broad and rounded in front, not much tapering behind; it has the same spines or hairs as the larva: the posterior end is bend a little downwards and above it are the posterior spiracles in the same cavity as in the larva. The pupa is at first green, later on it becomes more brown and more pellucid, and the enclosed fly is then distinctly seen through the puparium. The length of the pupa is about 9 mm. The pupa rests attached with the posterior end to some leaf or stalk, but Martelli (l. c. 40) records that at time for pupation the larva goes down from the plant and goes 2—3 cm into the earth and pupates here; I am inclined to think that here may be some error, as the pupa is generally stated to sit on plants, and my larvæ pupated (in captivity) on the leaves of Phragmites. The larva is aphidiphagous and feeds, as seen from the above, on various species and it is very voracious; De Geer records that larvæ found among Aphides on Rosa would not eat Aphides from Sambucus; the same author saw a larva which he had in captivity, attack a smaller one, as he had forgotten to furnish them with Aphides. Martelli states (l. c.) that a larva may eat during its life-time from 472 to 538 Aphides. Bloomfield mentions (Ent. Month. Mag. XXXVI, 1900, 244) that *pyrastri* was bred from pupæ of *Plusia jota* and *gamma*?; this, however, may be a mistake, though the observation cannot be quite neglected, especially when remembered that some Syrphid larvæ feed on Lepidopterous larvæ. With regard to the hibernation I think the species hibernates as quite young larva; the imagines are especially found in late summer and autumn, and as recorded I bred *pyrastri* in the later part of August: certainly the imago does not hibernate, and then I think it most probable that it is the young larva. With us the species has only one brood in the year, but Zeller records that farther towards the south there are two, and Martelli states that in Italy are up to seven broods in the year. According to Martelli the eggs are elliptic, 1,13—1,26 mm long, of milk-white colour, with the shell ornamented; they are deposited singly on leaves with Aphides; the same author gives (l. c.) interesting notes about the copulation and tells that the female flies with the male on the dorsum to a secured place; he gives the duration of the copulation as about three hours.

The species of *Lasiophthicus* occur on meadows and in woods.

often on Umbelliferæ; the common *pyrastri* is sometimes present in great numbers, thus it was, according to Curtis (Farm. Ins. 1857, 81) on ³⁰/₇ 1818, a very hot day, present in England in such swarms that it covered the fishermen's boats; I have also found the larva on Phragmites in very great numbers. The species has also been found joining the vast swarms of *Syrphi* sometimes occurring.

Of the genus 3 species are known from the palæarctic region, two of which occur in Denmark.

Table of Species.

1. Abdominal lunules whitish, those on third and fourth segments with their outer end farther from the front margin than the inner end; venter with large, rectangular, transverse spots 1. *pyrastri*.
- Abdominal lunules yellow, those on third and fourth segments with the inner and outer end equally near the front margin; venter with smaller, elongate middle spots 2. *seleniticus*.

1. *L. pyrastri* L.

1758. Linn. Syst. Nat. X, 594 et 1761. Fn. Suec. 1817 et 1767. Syst. Nat. XII, 2, 987, 51 (*Musca*). — 1764. O. F. Müll. Fn. Fridrichsd. 721 (*Musca*). — 1775. Fabr. Syst. Entom. 771, 42 (*Syrphus*) et 1805. Syst. Antl. 249, 3 (*Scaeva*). — 1822. Meig. Syst. Besch. III, 303, 44 (*Syrphus*). — 1843. Zett. Dipt. Scand. II, 703, 5 et 1859. XIII, 5091, 5 (*Scaeva*). — 1862. Schin. F. A. I, 301 (*Syrphus*). — 1901. Verr. Brit. Fl. VIII, 334, 1, figs. 278—279 (*Catabomba*). — 1907. Kat. paläarkt. Dipt. III, 56. — *Syrphus transfugus* Fabr. (nec L.) 1794. Ent. Syst. IV, 306, 104 et 1805. Syst. Antl. 250, 5 (*Scaeva*).

Male. The broad, inflated frons and the epistoma yellow; the extreme mouth edge darkened, and the central knob with a narrow, blackish line; the extreme hinder lower corner of epistoma black; jowls grey. Vertex black-haired, frons with very dense, black hairs, and epistoma black-haired down the sides and more or less about the central knob, for the rest yellow-haired; sometimes it is more yellow-haired. Occiput grey pruinose, with yellow hairs, above a row of black hairs, overhanging the eyes. Eyes densely hairy with longish, brownish, downwards paler hairs. Antennæ blackish, with the basal joints and the extreme lower base of the third joint reddish; sometimes the antennæ more brownish. Thorax bluish æneous, shining, a little yellowish at the sides; it is clothed with long, but not dense, yellow hairs, generally intermingled with some few black at the sides. Scutellum brownish yellow, shining bluish, with long, black hairs and at the base more or fewer yellow hairs. Pleura with longish, pale

yellow hairs. Abdomen velvet black, the extreme side margin, the hind margin of third segment and the apex shining; it has three pairs of white or yellowish white, rarely more yellow spots; the first pair transverse or a little lunulate, second and third pairs lunulate, beginning at the middle of the side and stretching inwards and curving forwards; they are most narrow in the middle, the inner end widened and rounded and going near to the front margin; the inner end thus considerably nearer the front margin than the outer end, this latter straightly cut, parallel with the side margin; all the lunules well isolated; hind margins of fourth and fifth segments narrowly pale. The hairs on abdomen are somewhat longish on the basal part and long at the corners; they are mainly yellow on the basal half and on the spots. black on the hind part of the third and on the fourth segment, but partly pale on the fifth segment; the hairs at the side margin all black, except at the base. Venter translucently yellow, with large, rectangular, transverse, black spots on the segments; the spots vary somewhat in size, sometimes almost quite covering the segments; the venter is clothed with long, whitish hairs. Legs yellow, anterior femora with the basal half black, hind femora black except the apex; tarsi black above, reddish below. Legs haired as usual, the hairs on femora rather long, on anterior femora mixed black and yellow, but most black, on hind femora yellow; the short hairs on tibiae yellow except partly on hind tibiae; these latter slightly fringed on the antero-dorsal side. Wings hyaline or nearly so. Squamulae and fringes yellowish white. Halteres yellow.

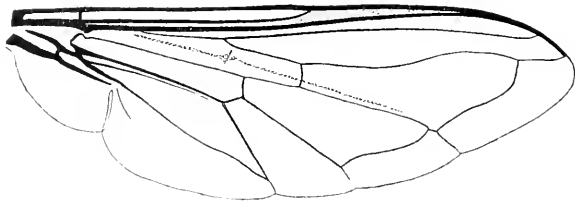


Fig. 116. Wing of *L. pyrastris* ♂.

Female. Frons somewhat broad; vertex black, frons yellow, from the vertex to the antennae runs a downwards widening darker line, it is sometimes effaced, the frons being upon the whole darker. Vertex and frons black-haired. Epistoma yellow-haired or only with very few black hairs.

Length 10—14,5 mm, specimens of the smaller size are only seen more rarely.

This species may vary a little with regard to the abdominal spots, which in rare cases may be very narrow; of the female a variety occurs with quite black abdomen (*unicolor* Curt.), but it has pale hairs on the places where the spots should be.

L. pyrastris is a common species in Denmark and has, I think, been taken in all parts of our country including Bornholm. My dates are $^{10}/_6$ — $^{24}/_9$; it is a late species and rarely met with until on the last days of July and it is especially found in August and September. It occurs on various localities, especially on Umbelliferæ. The pupa was found at Roden on Lolland on $^1/_9$ (Schlick); the larva was taken on Amager near the shore on *Carex* and *Phragmites* on $^{28}/_7$, they developed in the first half of August (Kryger); larvæ were further taken on the same locality in very great numbers on *Phragmites* infested with Aphides on $^3/_8$, they pupated in the following days, and the imagines came on $^{16}/_8$ and further on (the author).

Geographical distribution: — All Europe, towards the north to middle Sweden, and in Finland; further it occurs on the Canary islands, Madeira and in Western Africa, and also in North America and down to Chili.

Remarks: Generally both *L. pyrastris* and *transfugus* apud Fabricius are given as synonyms to this species, and this view I have followed in my synonymical list, but I have some doubts with regard to the correctness of it. Meigen says that *S. pyrastris* is in Fabricius' collection labelled as *transfugus*, but he does not say whether the species labelled *pyrastris* is the same. I think it not very probable that Fabricius has divided this rather characteristic species into two, and my view is confirmed by the determinations found in the collection of Tönder Lund and Sehestedt, even if the specimens in this collection are not those from which Fabricius' descriptions are taken. In the said collection there are two specimens, a male and a female, labelled *transfugus*, and both are *pyrastris*; further there are a male and a female labelled *pyrastris*, the male, which stands on the label, is *S. lunulatus*, the female *S. luniger*; I should be inclined to think that something similar is the case in the collection of Fabricius.

2. *L. seleniticus* Meig.

1822. Meig. Syst. Besch. III, 304, 45, Tab. XXX. Fig. 21 (*Syrphus*). — 1843. Zett. Dipt. Scand. II, 704, 6 et 1849. VIII, 3132, 6 et 1859. XIII, 5091, 6 (*Scaeva*). — 1862. Schin. F. A. I, 301 (*Syrphus*). — 1901. Verr. Brit. Fl. VIII, 337, 2, fig. 280 (*Catabomba*). — 1907. Kat. paläarkt. Dipt. III, 57.

Male. This species highly resembles *pyrastris*. Frons a little narrower, and hence epistoma with parallel margins, not decreasing in

breadth downwards as in *pyrastris*; the lower hinder corners of epistoma not black. Antennæ blacker than in *pyrastris*. Abdomen with the lunules yellow or orange; they are more strongly lunulate than in *pyrastris* as their outer end goes longer forwards and is as near the

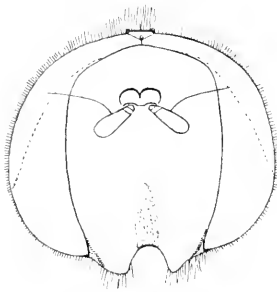


Fig. 117. *L. pyrastris* ♂.

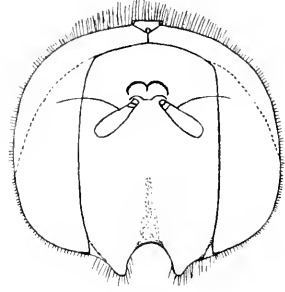


Fig. 118. *L. seleniticus* ♂.

Heads from in front.

front margin as the inner end; the outer end is also narrower and more pointed, and it goes nearer to the side margin or even touches it. The hairs on abdomen as in *pyrastris*, but in connection with the upper corners of the spots there may be some yellow hairs on the side margin, and the hairs below the side margin are more yellow. The venter shows a good character as it is yellow with elongate middle spots on the segments, the spots may vary somewhat in size, but are never similar to the transverse spots in *pyrastris*; sometimes the venter may be rather darkened and the spots then less visible. Legs as in *pyrastris*, but the anterior femora quite yellow-haired, and hind tibiæ with a brown or blackish ring on the middle.

Female. Vertex and frons narrower than in *pyrastris*, and hence the black part on vertex almost quadrate, while it is transverse in *pyrastris*; frons more generally darkened. Fifth abdominal segment with more or less distinct spots at the basal corners.

Length 12—15,5 mm, it is thus, according to my specimens, upon the whole larger than *pyrastris*.

The species is, as said, very similar to *pyrastris*, but it is certainly distinct and well distinguished by the characters given.

L. seleniticus seems to be rare in Denmark, and is also in other countries generally recorded as rarer than *pyrastris*; Copenhagen, Amager, Lersø, Ordrup Mose, Fiskebæk, Hillerød, Tisvilde; on Lolland at Fuglse; in Jutland at Horsens, Hald near Viborg, Rebbild near Skørping and Hulsig near Frederikshavn, and on Bornholm at Hammeren.

My dates are $2\frac{1}{6}$ — $6\frac{1}{9}$. I have taken it in the same way as the preceding species, and also in company with it, and Mr. Henriksen took it at Fiskebæk on $10\frac{1}{8}$ on a meadow on Umbelliferæ together with *pyrastri*, and he told me, that it was present there in some number. Zeller gives (Isis 1842, 829, 12) as possible cause to its rarer occurrence that it hovers and rests much higher above the ground than *pyrastri*, and Verrall (l. c.) records the same; this seems also to some degree to be the case, and it is in accordance herewith that I have more than once taken it in my room on third floor, attracted by flowers in an open window.

Geographical distribution:— All Europe, towards the north to northern Sweden, and in Finland; further in South-east Asia, on Madeira and in North Africa.

19. **Syrphus** Fabr.

Species of medium or somewhat large size, moderately hairy and of black colour with yellow bands or pairs of spots on abdomen. Head somewhat semiglobular, generally squarely roundish in circumference; it is as broad as, or a little broader than high, in rare cases rather low and broad, and it is as broad as, or slightly broader than thorax; behind it is somewhat excavated. Eyes touching in the male, separated in the female by a broader or narrower vertex and frons. The frons is in the male triangular, not inflated, broader or narrower, the upper angle rectangular or generally acute; only in rare cases the frons is broader, somewhat inflated, and the upper angle obtuse as in *Lasiophthicus*. Eyes bare, sometimes slightly hairy, and in a group of species with more or less long and dense hairs; in reality the eyes are in most of or all the so called bare-eyed species a little hairy, but the hairs are short and scattered, and only seen by a close examination. The eye-facets are in the male a little enlarged in the upper part¹, and in a single case (*arcuatus*) there is a distinct upper area of larger facets. Antennæ inserted above the middle; they are somewhat short, the third joint roundish, oval or elongated oval; arista inserted dorsally more or less near the base of the third joint; its basal joints very small, generally only seen by the microscope; it

¹ Osburn says (Journ. of N. Y. Ent. Soc. XVIII, 1910, 59) that in all *Syrphidae* the facets of the upper central part of the eye in both sexes are larger than those around the border and upon the lower half; in this I cannot agree: in the females the facets are, at all events practically, of the same size, while the difference in the male is distinctly observable.

is as long as or a little longer than the antenna itself; the basal antennal joints have the usual small bristles at the apical margin, the third joint and arista microscopically hairy, the latter sometimes visibly pubescent. Epistoma varying in breadth, from rather narrow (*cinctus*) to broader or very broad (*barbifrons*); it is a little hollowed below the antennæ and has a moderately prominent central knob, generally about as prominent as the antennal prominence; the front mouth edge is considerably retreating. The epistoma is yellow, often with a broader or narrower and more or less complete black middle stripe; in rare cases the stripe may be very broad, or the epistoma may be quite black in the male. The epistoma has short, erect hairs. Jowls broader or narrower, slightly or not descending; they are separated from the epistoma by a more or less complete furrow or groove, reaching upwards at the front eye-margin towards or about to the height of the central knob. Oral cone well developed with the horse-shoe-shaped clypeus lying on the front side. Proboscis of medium length. Labrum (*ribesii*) strong, somewhat high at the base, semitubular, the apical processes of usual shape, about equal in length, the median delicate, cleft to the base, with the apices diverging and each branch with fine emergences at the apex and on the inside; the upper lateral processes likewise very delicate and sharply pointed, the lower lateral processes broad, with rounded apex; along the lateral margins of labrum, on the inside is the usual row of small pipillæ or warts; hypopharynx of the length of labrum, somewhat semitubular, a little attenuated towards the end, but the apex rounded; the salivary duct distinct; maxillæ with a slightly curved, knife-shaped lacinia, and with a not long, thread-like palpus, a little longer than the lacinia, the palpus bears some long hairs or fine bristles and is beset with fine, short hairs; the lacinia is very densely beset with microscopical hairs or spines, arranged somewhat in longitudinal rows as usual. Labium with a medium long connecting membrane; the basal part of labium well chitinised, triangularly incised at each end, somewhat shorter than the rather large and broad, oval labella. Thorax quadrate or nearly so, the side margins often a little yellowish; very rarely (*guttatus*) it may have pale spots on the disc in front of scutellum. Scutellum yellow or brownish yellow, sometimes only translucently yellowish, and in rare cases almost quite black, only a little brownish on the disc; it has a fringe of hairs below the margin (only in *annulipes* indistinct). No bristles on thorax or scutellum. Pleura æneous, metapleura with short, dense hairs. Abdomen of somewhat varying shape; it may be ovate, and then either more or less arched, or rather flat and with distinctly marked, a little raised side margins;

or it may be narrow and relatively long, with parallel sides; in some species it is intermediate between these two forms. The ventral segments as a rule distinctly chitinised. In the male there are five not transformed dorsal segments, the first and fifth small, the three middle of about equal length, and there are five similar ventral segments, the fifth often partly concealed under the genitalia and in reality not quite symmetrical. The genitalia small or medium-sized, rarely rather large; they are of the usual shape, turned to the right; on the ventral side the transformed sixth to ninth segments are distinctly visible (fig. 5). In the female abdomen has six visible segments, but the sixth small, often more or less, or quite hidden; the following are retracted and hidden, the last ending with two small lamellæ. Legs simple, generally somewhat slender; hind tibiæ with the usual slight incurvation on posterior side before the apex; rarely the hind metatarsi a little thickened. The legs are haired as usual, with long or somewhat long hairs behind and below the anterior femora and on the anterior side of and below the hind femora, for the rest short-haired; sometimes the hind tibiæ a little fringed above. Claws and pulvilli well developed; empodium short, spine-shaped, hairy. Wings with the medial cross-vein well before the middle of the discal cell; cubital vein slightly curved or almost straight, in a few cases (*annulipes*, *lapponicus*) with a distinct curve about as in *Didea*, but slighter; vena spuria distinct, with a nodule below the base of the cubital vein. Alula large. Alar squamula with short, somewhat broad hairs, thoracal squamula with long, branched hairs; in a few species (of the *ribesii*-group) the thoracal squamula with long hairs on the surfaces. Plumula well developed, with plumulose hairs.

As remarked the genera from *Leucozona* to *Lasiophthicus* are all more or less nearly related to *Syrphus*, and under each I have given the distinguishing, more or less valuable characters; the most nearly allied genera are no doubt *Ischyrosyrphus* and *Lasiophthicus*, and they are, I think, not in reality generically distinct from *Syrphus*. *Leucozona* and *Eriozona* are rather well distinguished, and likewise *Didea*; for the latter the loop of the cubital vein gives a distinguishing character, and likewise the want of a fringe below the margin of scutellum; now two Danish species of *Syrphus* have a distinct curvature of the cubital vein, viz. *annulipes* and *lapponicus*, but it is, however, less deep than in *Didea*, especially in *lapponicus*; with regard to *annulipes* there is the curious fact that this species has no distinct fringe below the margin of scutellum, about as in *Didea*, and I am not sure whether it was not naturally placed in *Didea*; it has, however, not the characteristic shape of *Didea*, especially not the flat

abdomen: when placed in *Syrphus* it may be known from *Didea* by the shorter antennæ, considerably more hairy eyes, and, as said, the not flat abdomen. — About the relationship of *Melangyna* to *Syrphus* I have spoken above under the former genus.

The developmental stages of several species of *Syrphus* are known, and of some species they have been known for a long time. Already Linné and Fabricius speak of the larva of *S. ribesii* "inter Aphides". Réaumur mentions the larva of some species, I think *S. ribesii* (Mém. Ins. III, 1737, XI, 378, Pl. 30, Fig. 6—7, Pl. 31, Fig. 8) and *balteatus* (ibid. 378) among Aphides on Prunus and Ribes. De Geer describes (Mém. Ins. VI, 1776, III, 103, Pl. 6, Fig. 3—9) the larva of *S. ribesii* among Aphides on Ribes and Achillea, and the larva of *S. lunulatus?* (*Musca pinastri*) feeding on Aphides on Pinus (ibid. 113, Pl. 7, Fig. 1—7) and of *S. balteatus* (ibid. 116). The larva of *lunulatus?* was taken at the beginning of September, it pupated on 14 September, and the imago came on $26/1$ the following spring. Fallén (Dipt. Suec. Syrph. 1817, 43, 12) found the larva of *S. corollae* (*Sc. olitoria*) among Aphides on Brassica oleracea, the imago came at the middle of August. Meigen mentions (Syst. Besch. III, 1822, 307) the larva of *S. ribesii* from Brassica oleracea. Bouché (Naturgesch. d. Ins. 1834, 50—51, Tab. V, Fig. 1—3) describes the larvæ of *S. balteatus* and *ribesii*. Vallot (Bull. Soc. ent. de Fr. III, 1834, LXIV, and Mém. de l'Acad. des sc., arts et bel. let. Dijon, 1836, II, 242) mentions the larva of *S. balteatus* on Cannabis, it was found in September. Zeller (Isis 1842, 828, Tab. I, Fig. 38—43) describes the larva of *S. albostriatus*; the larvæ were found in November on stems of Betula; they pupated and developed in the following March. Zetterstedt mentions (Dipt. Scand. II, 1843, 708) larva and pupa of *S. ribesii* among Aphides on Ribes and other plants; a pupa was found on $17/6$, other pupæ developed on $12/5$ and on $12/9$; further (712) a pupa of *S. melanostoma*, found on $28/5$; pupæ of *S. arcuatus* (720) found attached to cabbage plants; larvæ and pupæ of *S. balteatus* (722 and VIII, 3139), found among Aphides on Vicia faba, Solanum tuberosum and Brassica oleracea, a larva pupated on $1/8$ and developed on $18/8$, other pupæ developed first in October; a pupa of *S. tricinetus* (725), which developed on $12/7$, and finally a pupa of *S. cinctus* (741); further he remarks of *S. grossulariae* (VIII, 3132) that the larva is aphidiphagous, so that probably he has seen this larva. Schiner (Verhandl. zool. bot. Gesell. Wien, VII, 1857, 341) mentions the pupa *S. nitidicollis* found on a humid meadow under a stone in April, it developed soon after. According to Brauer Weyenberg has (Tijdschr. v. Ent. XVII, 1873—74, 149) mentioned the developmental stages of *S. balteatus* and *corollae*. Riley (Rep. Dep. Agr. 1889,

351) mentions the larva of *S. americanus* feeding on *Siphonophora avenæ*. Verhoeff describes (Entom. Nachricht. XVII, 1891, 360) larva and pupa of *S. annulatus?* (*Zetterstedti*); the larva was found on $\frac{22}{7}$ among Aphides on *Cirsium arvense*, it pupated on $\frac{29}{7}$ and developed on $\frac{7}{8}$. Mik records (Wien. ent. Zeitg. XVII, 1898, 169) larva and pupa of *S. balteatus*; the larva was found on $\frac{20}{7}$ and pupated soon after, the imago came on $\frac{30}{7}$. Verrall mentions (l. c. 391, 399). *S. balteatus* and *auricollis* as bred from larvæ among *Aphis pruni*. Martelli records (Boll. del Lab. di Zool. Gen. e Agrar. in Portici, V, 1911, 43) the larvæ of *S. ribesii*, *bifasciatus*, *balteatus* and *auricollis* as feeding on *Aphis brassicae*. Metcalf describes (Ohio Natural. II, 1911, 341) the larva of *S. torvus* feeding on *Aphis brassicae* on Cabbage and on *Longistigma caryæ* on Sycamore. Champion (Ent. Month. Mag. XLVIII, 1912, 215) bred *S. torvus* and *luniger*; the larvæ were found among Aphides on pine-trees in May, they developed at the end of May; (the author suggests from the different habits of his *torvus* and the one mentioned by Metcalf, that perhaps the European and American species are not identical). I have myself examined the developmental stages of the following species: *S. albostriatus*, the larva was found on the ground under old leaves on $\frac{30}{1}$, the imago came on $\frac{18}{3}$; *S. venustus*, the larva found on the ground in a wood on $\frac{7}{1}$, it pupated on $\frac{8}{1}$ and developed on $\frac{8}{5}$; *S. ribesii*, larvæ found among old leaves on $\frac{30}{1}$, the imago came on $\frac{1}{3}$, others were found on $\frac{5}{3}$, they pupated and developed in April; further larvæ were found among Aphides on *Pyrus* on $\frac{4}{7}$, the imago came on $\frac{12}{7}$, on *Rosa* on $\frac{19}{7}$, on *Sambucus*, the latter pupated on $\frac{16}{8}$, and on *Urtica* on $\frac{7}{8}$, pupating on $\frac{11}{8}$ and developing on $\frac{22}{8}$; pupæ were found under a stone on $\frac{4}{7}$ and another on $\frac{24}{7}$; *S. vitripennis*, larvæ found among Aphides on *Prunus* on $\frac{3}{6}$ and on $\frac{28}{6}$, the latter pupated on $\frac{30}{6}$ and developed on $\frac{8}{7}$ — $\frac{10}{7}$, and among Aphides on *Pyrus* on $\frac{18}{6}$, developing on $\frac{28}{6}$; a pupa was found on the ground on $\frac{17}{7}$, the imago came on $\frac{18}{7}$; *S. nitens*, larvæ among Aphides on *Prunus* on $\frac{3}{6}$, they pupated on $\frac{9}{6}$ and developed on $\frac{19}{6}$; a pupa was found in flood refuse on $\frac{13}{4}$, the imago came on $\frac{14}{5}$; *S. latifasciatus*, pupæ have been found, always in flood refuse, in April and May, some found on $\frac{13}{4}$ developed on $\frac{26}{4}$ — $\frac{30}{4}$; a larva found on $\frac{13}{3}$, likewise in flood refuse, developed on $\frac{12}{4}$; *S. corollæ*, larvæ found among Aphides on *Prunus* on $\frac{3}{6}$ developed on $\frac{22}{6}$; a pupa found on $\frac{6}{8}$ developed on $\frac{14}{8}$; *S. luniger*, a pupa was found sitting on grass on $\frac{8}{8}$, it developed soon after, another found on the ground in a garden on $\frac{17}{7}$ developed on $\frac{18}{7}$; *S. balteatus*, larvæ were found among Aphides on *Sambucus* on $\frac{31}{7}$, developing on $\frac{8}{8}$, another larva was found on *Brassica* in August; pupæ have

been found between $\frac{25}{7}$ and $\frac{26}{8}$ on Rosa, Rheum, Typha and Phragmites, one found $\frac{2}{8}$ developed $\frac{7}{8}$, another found $\frac{3}{8}$ developed $\frac{6}{8}$, and a third found $\frac{14}{8}$ developed $\frac{19}{8}$; finally a pupa of *S. cinctellus* was found on the stem of a tree on $\frac{24}{7}$ and developed some days later.

The larva is always more or less leech-like: it is somewhat flattened, with a flat ventral surface, the dorsal surface more or less, generally slightly arched: the body is attenuated or pointed towards the head-end, broad behind, sometimes a little rounded; it is more or less strongly transversely corrugated so that the single segments are not easily made out. Below there are seven more or less distinct, transverse swellings, which may be more or less distinctly divided into proleg-like warts, and have small spines. The larvæ may otherwise be somewhat different; some are almost smooth above, the dermis only finely chagreened, and there are short, soft bristles on some of the corrugations and at the sides; in others the chagreened structure is developed into a clothing of fine, short and dense spines, and there are the same soft bristles; in a third group the dermis is rather coarsely chagreened, and on the dorsum of the segments are large, conical warts, and similar at the sides or here they are developed into conical filaments: the short bristles and the conical warts or filaments, which answer to each other, are present in the same number and arranged quite in the same way as described above for *Platy-chirus* and *Lasiophthicus*; there are consequently on the meso- and metathoracal segments six in a transverse row, besides a couple at the side; on the first abdominal segment there are likewise six, placed on one corrugation, and on the next six segments two in the middle on one corrugation and two at each side on the next corrugation, and on all seven abdominal segments three on each side; each segment shows four corrugations divided by furrows, and the bristles or warts are placed on the two middle corrugations of each segment. The anterior spiracles are small, lying on each side of the prothoracal segment; the posterior spiracles are placed above on the last segment on a short, slightly longitudinally divided process, more or less elliptical in a transverse section. The mouth is provided with hooks, and the head is much retractile and able to be stretched out, and the whole body is likewise very contractile, so that the larva may alter its shape to a rather high degree; when fully stretched out it is long, broad and flat, when contracted it is much shorter, higher and narrower. The colours may be various, yellowish, yellowish grey, grey, reddish grey or darker, generally more or less marmorate from darker designs and often with one or more longitudinal lines. The pupa

(puparium) is elongately ovate, arched above, somewhat flat below, broad and rounded in front, more or less tapering behind; it is sometimes longer and more droop-like (in the narrow-bodied species); it has of course the same dermal structure as the larva, only it is generally less pronounced, and the larger warts, when such are present, are smaller and more contracted. The anterior larval spiracles are generally not to be seen, but the posterior process is present as in the larva. The colour is similar to that of the larva, but it is often altered as the development of the imago proceeds, because the colours of the imago shine through the puparium. — The larvæ are all aphidiphagous and are found on the leaves and stalks of various plants among Aphides infesting these; most species may be found on many various plants and evidently feed on many different species of Aphides; De Geer mentions about *S. lunulatus?* (*pinastrî*), which he took on Pinus, that he fed it with various other Aphides. The larvæ are very voracious; I once had a larva of *S. nitens*, which in six days devoured so many Aphides that the white, empty skins of these latter formed a thick layer on the bottom of the bottle, the larva was in these days grown to the double size. It is interesting to examine the larva when feeding; it is generally sitting in a colony of Aphides, it then stretches and raises the fore part of its body and bends it down to different sides until an Aphid is touched, it then pierces it with the mouth hooks, detaches it with a jerk, and with the fore part of the body in a raised position it sucks it out by a pumping action: the Aphid is seen to become white, and is quite sucked in one or a few minutes and it is then thrown off by a small jerk and the action is repeated. Sometimes larvæ have been observed to attack and suck other larvæ of their own kind, such as is also the case with *Lasiophthicus*. The pupa is generally found on leaves or stalks, attached by some glue with the hind part; they may also sometimes be found among old leaves or in flood refuse. With regard to the hibernation it is, I think, the larva which hibernates, perhaps also sometimes the pupa as mentioned by De Geer about *S. lunulatus?* (*pinastrî*), but this was in captivity; above I have mentioned larvæ of *S. ribesii* found on $\frac{30}{1}$ and on $\frac{1}{3}$, and of *albostriatus* found on $\frac{30}{1}$. Most species have no doubt only one brood in the year, at all events with us, this is, I think, especially the case with the special spring-species such as *venustus*, *lunulatus*, *punctulatus* and *lasiophthalmus*, and likewise with the species occurring somewhat late as *corollae*, *luniger*, *balteatus* and I think also *auricollis*; others may have two broods, as *albostriatus*. Most species of the *ribesii*-group are on the other hand more or less common from early spring to late autumn, and their larvæ and pupæ may be

found at very different times, nearly through the whole year, as well as newly emerged specimens may be found from very early to quite late in the season: these species have, I think, several broods without any regularity, just as many as the length of the warmer period will allow, and they may hibernate in a younger or older larval stage, according to the setting in of the cold period. Whether hibernation may take place as egg or pupa I do not know, but I think it not probable. In southern regions the number of broods in the year may be greater, thus Martelli states that in Italy *S. balteatus* may be assumed to have up to seven broods in the year. I have never observed the eggs; according to Buckton (Mon. of Brit. Aphid. II, Roy. Soc. 1879, 119) the egg-shell is ornamented with bifurcate papillæ: the eggs are deposited singly and may often be seen on leaves of oak, fir etc. where they are placed in the midst of Aphides.

The species of *Syrphus* are beautiful and lively flies; they occur especially on localities with flowers, both in woods, in fens and on commons and meadows; they are generally seen on flowers and hovering around them, and the males of many or all species often hover more or less high in the air in sunshine, especially on sunny places in woods; they are generally exquisite hoverers; I once bred a male of *S. luniger* in a bottle, not much wider than the distance across the horizontally stretched wings, and the fly was able to hang on the wings hovering on the same spot in the middle of the bottle for a half or a whole minute. The genus goes far towards the north, thus three species occur in Greenland, two of which are our *lunulatus* and *torvus*. — Species of *Syrphus* may sometimes occur in vast swarms; Verrall records (l. c. 339) two cases from Britain, both occurred on $24/s$; the species were in one case *S. ribesii* (most numerous), *corollæ*, *luniger*, *Lasiophthicus pyrastris* and one *S. balteatus*; they “appeared to have all hatched simultaneously, and to have at once commenced buzzing about in the hot sunshine in a foolish kind of way, without caring to take food, for most of them seemed to be mere shells without any substance inside.” Mr. Verrall once had come upon the tail-end of a swarm, the individuals of which seemed nearly all to be *S. auricollis* and its variety *maculicornis*.

Of the genus about 65 species are known from the palæarctic region; 33 have hitherto been found in Denmark.

Table of Species.

1. Eyes distinctly hairy	2.
— Eyes bare or almost so (in <i>punctulatus</i> and <i>lasiophthalmus</i> slightly hairy)	8.

2. Thorax with two grey lines on the front part 1. *albostrigatus*.
 — Thorax without obvious lines 3.
 3. Band on third abdominal segment the broadest 2. *tricinctus*.
 — Abdominal bands about equal 4.
 4. Abdominal bands separated into spots (in *macularis* the spots may be just touching) 5.
 — Abdominal bands on third and fourth segments entire 7.
 5. Antennæ partly reddish; scutellum more or less yellow-haired; abdominal spots going over the margin 3. *venustus*.
 — Antennæ all or nearly all black, scutellum black-haired 6.
 6. Abdominal spots lunulate, not reaching the side-margin 4. *lunulatus*.
 — Abdominal spots somewhat semicircular, going over the side-margin 5. *macularis*.
 7. Cubital vein dipped down over the first posterior cell; thorax shining 6. *annulipes*.
 — Cubital vein not dipped; thorax dull 7. *torvus*.
 8. Abdomen more or less ovate 9.
 — Abdomen quite or almost quite parallel-sided, often somewhat long 22.
 9. Abdomen with only basal spots and one following band, (sometimes the second band may be wanting, or on the contrary a narrow third band may be present) 21. *bifasciatus*.
 — Abdomen with at least basal spots and two following bands 10.
 10. Middle bands of abdomen (normally) uninterrupted but often emarginate 11.
 — Middle bands of abdomen (normally) separated into spots (conf. *corollae*) 19.
 11. Epistoma with a black middle line; smallish species 12.
 — Epistoma without black middle line, only the central knob may be darkened 13.
 12. Antennæ more or less yellowish; anterior tarsi yellow; hind femora of female pale at base 10. *annulatus*.
 — Antennæ black; anterior tarsi dark; hind femora of female all black 11. *lineola*.
 13. Antennæ quite dark or black 14.
 — Antennæ more or less yellow, at least beneath the base of third joint 15.
 14. Frons black-haired, with a black spot above the antennæ; femora black at the base 12. *grossulariae*.
 — Frons yellow and yellow-haired; femora quite yellow 13. *diaphanus*.
 15. Thorax dullish; scutellum black-haired 16.
 — Thorax shining 17.
 16. Larger species; the short hairs on anterior side of the apical part of hind femora black; hind femora of female all yellow 8. *ribesii*.
 — Smaller species; the short hairs on anterior side of the apical part of hind femora all, or almost all, yellow; hind femora of female black with yellow apex 9. *vitripennis*.
 17. Antennæ yellow; abdomen not marginate, the bands

- almost straight, going in almost full width over the side-margin; scutellum partly black-haired 14. *nitidicollis*.
- Antennæ more or less darkened above; abdomen marginate, the bands undulated, not reaching the side-margin or only at their upper corners 18.
18. Scutellum partly black-haired; vertex in the male about as long as the eye-suture; hinder eye-margin not broad, with a row of black hairs; frons of female with side dust spots 15. *nitens*.
- Scutellum (normally) yellow-haired; vertex in the male large, longer than the eye suture; hinder eye-margin broad, without black hairs; male genitalia small; frons of female without side dust spots 16. *latifasciatus*.
19. Cubital vein somewhat dipped over the first posterior cell 19. *lapponicus*.
- Cubital vein not dipped 20.
20. Scutellum yellow-haired; abdominal spots extended over the side-margin (in the male often united); male genitalia large 17. *corollae*.
- Scutellum partly black-haired; abdominal spots isolated 21.
21. Thorax mainly æneous; frons of the male not broad and inflated, in the female with the usual transverse depression and with the black middle line from the vertex going generally below the middle; eyes of the male without an area of larger facets 18. *luniger*.
- Thorax blue, shining; frons of the male broad and somewhat inflated, of the female somewhat arched, without or with a very slight transverse depression, and with the black middle line from vertex short, often vague or almost wanting; eyes of the male with an area of larger facets 20. *arcuatus*.
22. Abdominal bands duplicated by a narrow, black line near the base 22. *balteatus*.
- Abdominal bands not duplicated 23.
23. Middle bands of abdomen uninterrupted and not deeply emarginate 24.
- Middle bands of abdomen separated into spots or very deeply emarginate 25.
24. Third joint of antennæ dark above; frons with a black, semicircular spot; scutellum dark haired 23. *cinctellus*.
- Third joint of antennæ yellow; frons yellow, or in the male with a small, transverse, lunulate, black spot; scutellum quite or mainly yellow-haired 24. *cinctus*.
25. Antennæ pale on basal joints or beneath the base of third joint 26.
- Antennæ all black 29.
26. Antennæ all or almost all reddish; scutellum yellow-haired 27.
- Antennæ more or less dark or blackish, at all events above on third joint; scutellum black-haired 28.

27. Abdominal spots isolated from the side-margin, the junction of each two segments with a small, yellow spot at the side-margin 26. *euchromus*.
 — Abdominal spots going over the side-margin; small, narrow species 27. *triangulifer*.
28. Abdominal spots somewhat triangular, sometimes united in front to a very emarginate band, at the sides their hinder corners are nearest the margin; eyes bare. 25. *auricollis*.
 — Abdominal spots more or less semicircular; eyes a little hairy 28. *punctulatus*.
29. Epistoma and frons yellow; thorax with distinctly yellow sides and generally with yellow spots in front of scutellum 30. *guttatus*.
 — Epistoma with a black middle stripe or quite black; frons more or less black; thorax not yellow at the sides 30.
30. Jowls yellow or yellowish; epistomal line not produced beyond the central knob 31.
 — Jowls black or at least with a black spot at the lower eye margin; epistomal line reaching to or almost to the antennæ 32.
31. Thorax shining; anterior tibiæ mainly yellow; basal abdominal spots large, in the female produced to the front margin; frontal dust spots large 31. *umbellatarum*.
 — Thorax dull in the male; anterior tibiæ with at least the apical half darkened; basal abdominal spots small, in the female narrow, not produced to the front margin; frontal dust spots small 32. *compositarum*.
32. Eyes slightly hairy; epistoma yellow at the sides; scutellum partly yellow-haired; abdomen in the male with three pairs of spots 29. *lasiophthalmus*.
 — Eyes bare; epistoma black in the male and also very dark in the female; scutellum black-haired; abdomen in the male with only two pairs of spots 33. *barbifrons*.

In the above table I have used the common way of dividing the bare-eyed species into two groups, according to the shape of abdomen; some species may be doubtful; thus *annulatus* and *lineola* have the abdomen not very ovate, but will easily be known as belonging to the *ribesii*-group; *bifasciatus* and *balteatus* are somewhat intermediate, but both species are so characteristic, that they are soon recognised; of the rest only *punctulatus* and *lasiophthalmus* and perhaps *euchromus* may be doubtful; of these species the two former have slightly pubescent eyes, and *euchromus* is recognised by its abdominal markings. It is thus seen that the said division is somewhat natural. For the rest

the genus falls into several groups, the species of which are evidently more nearly related to each others than to the species of the other groups. The hairy-eyed species from *albostrigatus* to *lunulatus* form one group; *macularis* is doubtful and perhaps related to *punctulatus* and *lasiophthalmus*; the *ribesii*-group includes the species from *torvus* to *diaphanus*, and I think that also *annulipes* and *nitidicollis* belong here; of these species *torvus* and *annulipes* have hairy eyes, but this character is evidently of no consequence as a group-character; the species from *nitens* to *arcuatus* likewise form one group; they have all a characteristic flat, distinctly marginate abdomen with undulated bands or lunulate spots; the margin of the wing exterior to the first posterior and discal cells is also in these species a little broader, and the wing membrane here a little more distinctly and regularly corrugated than in other species; this is similar to what is found in *Lasiophthicus*, to which genus these species are no doubt related, as also suggested by Girschner (Ill. Wochenschr. f. Entom. 1897, 570) (see also above under *Lasiophthicus*). The species *bifasciatus* and *balteatus* stand somewhat isolated; *cinctellus*, *cinctus* and *auricollis* form one group, and the *umbellatarum*-group is formed of *umbellatarum* and *compositarum* and, I think, *guttatus* and perhaps *triangulifer*; *punctulatus* and *lasiophthalmus* are nearly related; *euchromus* is less easily placed, and *barbifrons* (together with some not Danish species) would form one group. — It was seen above that the larvæ also are divided into groups, and it is very interesting to see, that these groups seem, as far as we know, to be the same as the groups mentioned above for the imagines. Of the group of the hairy-eyed species we know more or less well the larvæ of all our four species (*lunulatus* doubtful), and they are similar, all being provided with conical, pointed warts on the dorsum and at the sides. Of the *ribesii*-group we know only the larvæ of *ribesii* and *vitripennis*, which are finely chagreened. Of the next group the larvæ (or pupæ) are known of *nitens*, *latifasciatus*, *corollae* and *luniger*, all of which are similar, clothed with dense, short, fine spines (as in the larva of *Lasiophthicus*, and thus confirming that these species are related to *pyrastris* and *seleniticus*). Further we know the pupæ of *cinctus*, *cinctellus* and *auricollis*, which are smooth. A close study of a large material of larvæ and pupæ certainly would give interesting results.

1. *S. albostriatus* Fall.

1817. Fall. Dipt. Suec. Syrph. 42, 10 (*Scaeva*). — 1822. Meig. Syst. Besch. III, 317, 63. — 1843. Zett. Dipt. Scand. II, 727, 29 et 1849. VIII, 3141, 29 (*Scaeva*). — 1862. Schin. F. A. I, 304. — 1901. Verr. Brit. Fl. VIII, 344, 1, figs. 282—284. — 1907. Kat. paläarkt. Dipt. III, 57. — *Syrphus confusus* Egg. 1860. Verh. zool. bot. Gesell. Wien, X, 664. — 1862. Schin. F. A. I, 304.

Male. Vertex greyish pruinose; frons and epistoma yellow, the latter with a black middle stripe, stretching about to the antennæ; the front mouth edge may be more or less darkened to black, this colour sometimes stretching as a band up to the eye; jowls yellow. Vertex yellow-haired or just in front with some black hairs; frons with black or yellow hairs, epistoma yellow-haired. Occiput grey pruinose with yellow hairs, or some few black above. Eyes densely pale-hairy. Antennæ blackish, the basal joints and the base below on third joint more or less reddish or yellowish; arista longer than the antennæ. Thorax æneous, shining, sometimes a little purplish and sometimes bluish; on the middle of the disc there are two obvious, grey pruinose stripes, diverging behind, and here abbreviated; humeri and præsutural depression yellow pruinose and postalar callus yellow. Thorax yellow-haired. Scutellum yellow, generally more or less darkened in the middle, with long, black, at the base more or less yellow hairs. Pleura with yellow hairs. Abdomen black, dullish, a little shining towards the apex; it has three pairs of yellow, oblique, transverse spots, placed such that their outer ends are about the middle of the side margins of the segments, while their inner ends are near the front margins; the spots on third and fourth segments generally touching in the middle, thus forming arcuated bands; the spots are isolated from the side margin. The hind margins of fourth and fifth segments yellow, the latter segment also with yellow basal corners. The hairs on abdomen mainly pale on the basal part, for the rest chiefly following the ground colour; all the hairs along the sides yellow. Venter yellowish, pellucid, with black bands near the hind margins of the segments; it is clothed with long, pale hairs. Genitalia not large, black. Legs yellow with the base of anterior femora black, hind femora with a broad, black ring, sometimes leaving only base and apex yellow; hind tibiæ with a blackish ring on the middle, and hind tarsi with the three last joints blackish. Often the anterior femora are quite yellow and front coxæ more or less pale, hind femora with a smaller ring and hind tibiæ quite yellow (*confusus* Egg.). The legs are yellow-haired. Wings hyaline; stigma black. Squamulæ and halteres pale yellow.

Female. Vertex and frons bluish, shining, but the anterior part, above the antennæ yellow, on each side in the middle a large, yellow pruinose side dust spot, united in the middle and thus forming an arched band, cutting off an arched, transverse, bluish spot in front; frons mainly dark-haired. Abdominal markings a little narrower than in the male.

Length 8,5—10,5 mm.

The larva answers mainly to Zeller's description; it is flat, slightly arched above; the dermis is coarsely but not densely chagreened, and the body is strongly, transversely corrugated; on the two first (the meso- and metathoracal) segments are six small, conical warts on each in a transverse row; the following seven segments have each at the side margin three rather large, conical warts in a longitudinal row; these segments have above one of the corrugations higher than the others, and on the middle of this corrugation are two approximated or almost fused warts, and to each side of them, a little more backwards, on the next corrugation, is a small wart, and more towards the side a still smaller, rather indistinct wart; on the first of these segments (first abdominal) the warts are all placed on the same corrugation. The warts are fleshy; they are finely spined and each terminates with a small spine, the side warts with a thread; the last segment has two long, distant filaments at the hind margin; above on this segment lies the brown or black posterior spiracular process, which is nearly 1 mm long, divided in the apical third with the apices diverging; each branch terminates at the apex on the inside in a spine. The larva is grey or greyish brown, sometimes darker, and it is somewhat marmorate from darker and paler markings, along the dorsum is a row of more or less distinct, pale, dark contoured triangles, one on each segment; they have the blunt apex turned forwards; for the rest the markings form mainly more or less distinct, oblique stripes on the sides of the segments, between the middle and side warts; also a darker middle stripe may be present on the hind part. The length of the full-grown larva is about 10—11 mm. The pupa is similar to the larva, somewhat broad, the posterior part flat and not attenuated; the warts and posterior filaments present as in the larva, but shorter and more contracted; the colour mainly as in the larva. The length of the pupa is about 7 mm.

The thoracal stripes, the abdominal markings and the black stigma easily distinguish this species.

S. albostrigatus is not rare in Denmark; Copenhagen in gardens, Amager, Ordrup Mose. Charlottenlund, Dyrehaven, Lyngby Mose, Hillerød, Rørvig, Tisvilde. Nyraad at Vordingborg; on Lolland at

Maribo and in Vester Ulslev Mose; on Fæjød; on Langeland at Lohals, and in Jutland at Hald near Viborg. My dates are $1/6$ — $10/9$. All the specimens from gardens are of the var. *confusus*, but the same is the case with some of the others; generally my specimens taken late in the year belong to *confusus*. The larva was taken by Mr. Schlick in Dyrehaven on $30/1$ under old leaves on the ground, the imago came on $18/3$; he has also bred several specimens from pupæ, but they are without locality. Zeller (Isis 1842, 828) mentions the larva as common on the stems of *Betula* in November; they were of various size; one pupated and developed in March the following year; I possess also several larvæ taken on *Betula* at the end of September at Hillerød by Mr. Kryger, but as the larva is quite similar to that of *venustus* I cannot say to which of these species the mentioned larvæ belong. I think Zeller and Verrall are correct in suggesting that the species has two broods in the year.

Geographical distribution: — All Europe down into Spain and Italy; towards the north to northern Sweden, and in Finland.

2. *S. tricinctus* Fall.

1817. Fall. Dipt. Succ. Syrph. 41, 9 (*Scaeva*). — 1822. Meig. Syst. Besch. III, 310, 53. — 1843. Zett. Dipt. Scand. II, 724, 27 et 1849. VIII, 3140, 27 et 1855. XII, 4657, 27 et 1859. XIII, 5095, 27 (*Scaeva*). — 1862. Schin. F. A. I, 303. — 1901. Verr. Brit. Fl. VIII, 346. 2, figs. 285—286. — 1907. Kat. paläarkt. Dipt. III, 71.

Male. Frons black, a little pruinose, especially towards the eyes; epistoma yellow, somewhat shining, with a broad, black middle stripe, reaching near to the antennæ; the mouth edge and lower hind corners of epistoma black; jowls blackish, sometimes paler. Vertex and frons black-haired, the former with yellow hairs behind; epistoma yellow-haired, but down the sides and generally also just at the central knob are black hairs. Occiput grey pruinose, with white, above yellowish hairs, and here generally also some black hairs overhanging the eyes. Eyes densely pale-hairy with somewhat short hairs. Antennæ black, somewhat long; arista about of the length of the antennæ. Thorax dark æneous, in front of scutellum often bluish, shining; it is clothed with yellow hairs. Scutellum yellowish or brownish, pellucid, sometimes with a little bluish tint; it has black, at the base more or less yellow hairs. Pleura with yellow hairs. Abdomen dull black, a little shining towards the apex; on the second segment it has a pair of isolated, small, transverse, yellow spots, sometimes very small or quite wanting; on the third segment there is a broad band at the front margin, more or less incised behind in the middle, but generally deeply;

the fourth segment has at the front margin a narrow band, narrowly divided in the middle, sometimes almost not divided; both bands go widely over the side margin. Fourth and fifth segments have yellow hind margins, the fifth also small basal corner spots. The hairs on

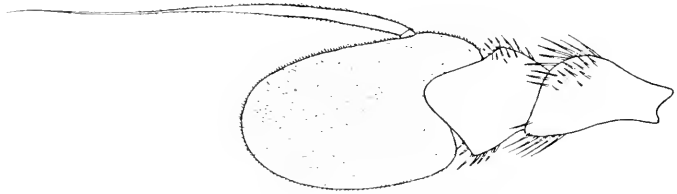


Fig. 119. Antennæ of *S. tricinctus* ♂, from the inside $\times 60$.

abdomen follow mainly the ground colour, but they are pale on the basal part of second segment; at the sides they are yellow at the base and on the bands, for the rest black. Venter black with yellow bands at the front margins on second and third segments; it is clothed with long, yellowish hairs. Genitalia somewhat large, black, black-haired. Legs orange, the basal half of anterior femora, and hind femora except the apex black; anterior tarsi with the three middle joints more or less darkened and hind tarsi with the three or four last joints blackish. The hairs on femora yellow, more or less intermingled with black hairs and on anterior femora sometimes nearly all black; the short hairs on tibiæ yellow, those on the hind femora mainly black. Wings a little yellowish tinged. Squamulæ yellow with a dark yellow fringe. Halteres yellow or orange.

Female. Frons broad, bluish black, shining, at each side a large, greyish yellow pruinose spot; the hairs black. Abdomen shining, the basal pair of spots small or wanting.

Length 11—12 mm.

The pupa is mentioned by Zetterstedt (l. c. 725) and described as: "albida, supra fusco-marmorata, postice margine et dorso mucronata", it seems thus to be similar to the pupa of *albostrigata*; the imago came on ¹²/₇.

S. tricinctus is not properly common in Denmark; Copenhagen in a garden, Ordrup Mose, Ermelund, Dyrehaven, Donse, Tyvekrogen, Tisvilde. Nystrup Hegn; on Lolland in Vester Ulslev Mose; on Lange-land at Lohals; in Jutland in Højenbæk Dal at Vejle, at Horsens, Silkeborg, Rebbild near Skørping and Jerup near Frederikshavn. My dates are ¹⁴/₅—¹/₉. It occurs on various flowers on meadows and in fens.

Geographical distribution: — Northern and middle Europe down into France; towards the north to northern Sweden, in Finland, and on Iceland.

3. *S. venustus* Meig.

1822. Meig. Syst. Besch. III, 299, 38. — 1843. Zett. Dipt. Scand. II, 728, 30 et 1849. VIII, 3141, 30 et 1855. XII, 4658, 30 (*Scaeva*). — 1862. Schin. F. A. I, 302. — 1901. Verr. Brit. Fl. VIII, 348, 3, fig. 287. — 1907. Kat. paläarkt. Dipt. III, 71. — *Scaeva hilaris* Zett. 1843. l. c. II, 729, 31 et 1849. VIII, 3141, 31 et 1859. XIII, 5097, 31. — *Syrphus hilaris* 1862. Schin. F. A. I, 302. — *Syrphus implicatus* Meig. 1822. l. c. III, 301, 42. — *Scaeva lunulata* Zett. (nec Meig.) 1838. Ins. Lapp. 600, 7 et 1843. Dipt. Scand. II, 731, 34 et 1855. XII, 4658, 34 et 1859. XIII, 5097, 34. — *Scaeva solitaria* Zett. 1838. Ins. Lapp. 603, 18.

Male. Frons æneous black, somewhat pruinose at the eye-margins; epistoma darker or paler yellow, slightly pruinose, with a broad, black and shining middle stripe, stretching up to the antennæ, but this stripe may diminish in size and also in intensity of colour until quite disappearing (*hilaris*); the mouth edge and lower side parts of epistoma black; jowls greyish black. Vertex and frons black-haired, the former with some yellow hairs behind; epistoma yellow-haired, but with more or fewer black hairs down the sides, sometimes almost quite black-haired. Occiput greyish yellow pruinose, the hairs yellow, above a row of long, generally black hairs, overhanging the eyes. Eyes with long, dense, pale hairs. Antennæ reddish or yellowish, third joint more or less brown above; sometimes the antennæ quite yellowish; third joint short ovate, shorter than the two basal joints together; arista about as long the antennæ. Thorax æneous, shining, clothed with yellow hairs. Scutellum brownish yellow or darker, pellucid and shining bluish æneous; it has long hairs which are all yellow, or more or less intermingled with black. Pleura with yellow hairs. Abdomen dull black, shining at the apex; it has three pairs of yellow lunules; the first pair less lunulate, lying about in the middle and isolated or going over the sides above, second and third pairs broader or narrower, more or less lunulate, lying near the front margin and going widely over the side margin; the fourth and fifth segments have pale hind margins, the fifth also small basal corner spots. The hairs on abdomen follow mainly the ground colour, those at the side margin rather long, alternating black and yellow according to the spots. Venter yellowish, pellucid, with a black band at the hind margins of second and third segments, fourth segment almost quite black; on second segment the band often weak or almost wanting; the venter is clothed with long, yellow hairs. Genitalia somewhat large, black.

with black and yellow hairs. Legs yellow, the basal part or half of anterior femora and the three fourths of hind femora black; hind tibiæ with a more or less distinct, blackish or brown ring; third and fourth joints of anterior tarsi a little darkened, and the three middle joints of hind tarsi blackish. The hairs on femora yellow, and likewise the short hairs on tibiæ except partly above the hind tibiæ. Wings almost hyaline or somewhat brownish tinged towards the anterior margin. Squamulæ whitish with yellow margin and fringe. Halteres yellow.

Female. Frons broad, shining black, with distinct, yellow side dust spots; it is black-haired. Abdomen somewhat shining, the spots generally narrower than in the male.

Length 8—10,5 mm.

The larva and pupa quite resemble those of *S. albostrigatus* both in shape and colour.

S. venustus is a common species in Denmark; Frederiksberg Have, Ordrup Mose, Ermelund, Dyrehaven, Lyngby Mose, Bagsvær, Ryget Skov at Farum Sø, Geel Skov, Ørholm, Donse, Birkerød, Tyvekrog, Tisvilde; on Lolland at Maribo, in Kældskov, Dødemose and at Strandby; on Funen at Middelfart, and in Jutland in Greisdalen at Vejle and at Horsens. My dates are $^{10}/_5$ — $^{3}/_7$. It is exclusively a spring species, it occurs on various flowers, especially Compositæ, in woods and on meadows and fields near woods. The larva was taken in Ermelund on the ground on $^{7}/_4$, it pupated on $^{8}/_4$ and developed on $^{8}/_5$ (Kryger).

Geographical distribution:— Europe down into France, Corsica and perhaps Italy; towards the north to northern Sweden, and in Finland.

4. *S. lunulatus* Meig.

1822. Meig. Syst. Besch. III, 299, 33. — 1862. Schin. F. A. I, 303. — 1901. Verr. Brit. Fl. VIII, 351, 4, fig. 288. — 1907. Kat. paläarkt. Dipt. III, 67. — *Scaeva arcuata* Fall. p. p. 1817 Dipt. Suec. Syrph. 42. — ? *Musca pinastri* De Geer, Mém. Ins. VI, 1776, III, 113, Pl. 7, Fig. 1—7.

Male. Frons bluish black, somewhat greyish pruinose, especially towards the eye-margins; epistoma paler or darker yellow or greenish yellow, with a broad, black middle stripe, reaching about to the antennæ, the mouth edge and the lower lateral corners black; jowls black, greyish pruinose. Vertex and frons black-haired; the former with yellow hairs behind; epistoma yellow-haired, downwards generally some black hairs. Occiput grey pruinose, the hairs white below, yellow upwards; above more or fewer black, overhanging hairs. Eyes with dense, longish, pale hairs. Antennæ black, third joint short ovate, not so long as the two basal joints together; arista about as long as

the antennæ. Thorax dark æneous or bluish, shining, with yellow hairs. The usual two grey stripes on the middle in front sometimes somewhat distinctly visible. Scutellum yellowish to brownish, pellucid, somewhat bluish æneous; it has long, black or brownish black hairs. Pleura with yellow or pale yellow hairs. Abdomen dull black with the apex shining; it has three pairs of yellow or whitish yellow lunules, placed and shaped about as in *venustus*, but they are generally more lunulate and with the inner end nearer the front margin than the outer end; they are all well isolated from the side margin; the fourth and fifth segments have the hind margins pale, but often somewhat indistinctly, and the fifth segment has pale spots at the basal corners. The hairs follow mainly the ground colour; at the sides they are long, and they are here yellow at the basal corners and on the front part of the segments and thus alternating black and yellow. Venter coloured about as in *venustus* and with long, yellow hairs. Genitalia somewhat large, black, with black and yellow hairs. Legs yellow with about the basal half of anterior femora and the hind femora except the apex blackish; the hind tibiæ have a dark ring in the middle or they are quite blackish except the base; front tarsi and the three last joints of middle tarsi darkened and hind tarsi blackish. The hairs on femora quite or almost quite yellow, and likewise the short hairs on tibiæ except above the hind tibiæ, and these latter with a dark fringe on the antero-dorsal side, the hairs of which are somewhat longish and strong about the middle. Wings hyaline or slightly tinged. Squamulæ whitish with yellow margin and fringe. Halteres pale yellow.

Female. Frons broad, bluish black, black-haired, with large, yellowish side dust spots, uniting in the middle and thus forming a curved band. Abdomen more shining than in the male, the lunules nearer the front margin of the segments.

Length 8—9,5 mm.

De Geer mentions (l. c.) the larva of his *Musca pinastri*, which species may, as explained below, be identical with the present species; the larva has soft spines, is greyish yellow with darker designs, about 11 mm long, and is, I think, somewhat similar to the larva of *S. albobstriatus*; it was taken among Aphides on Pinus, it pupated on 14th, and the imago came next spring on 26th/4.

Remarks: Zetterstedt mentions (VIII, 3142) that Stæger had sent him a single specimen of *S. obscurus*, taken at Copenhagen; this specimen we have not in our collection, but it belonged no doubt to the present species, for in our general collection we have two specimens named *obscurus*, one labelled Lapponia, the other Suecia, both sent from Zetterstedt, and they are both *lunulatus*; the specimens do

not belong to the narrow-bodied form, described by Verrall as *nigricornis* with *obscurus* Zett. as synonym, and which Verrall thinks himself is not specifically distinct from *lunulatus*. Thus Zetterstedt has no doubt *venustus* Meig. both as *venustus* and *lunulatus* (probably according to the lunules being more or less lunulate), while he described *lunulatus* Meig. as *obscurus*; this view seems also confirmed by the expressions by Malm (K. V. och V. Samh. Göteborg. Handl. 1860, 37) who has certainly also *venustus* Meig. both as *venustus* and *lunulatus*. — Fallén suggested that *S. corollae* (*olitoria*) was perhaps identical with *Musca pinastri* De G., and Verrall thinks likewise that this may be the case, and is herein followed by the Kat. pal. Dipt., but this is not possible, for the larva and pupa of *pinastri* De G. are spined, which is not the case with *corollae*. Such larvæ occur, as far as I know, only in the first group of species in the genus (*albostriatus*—*lunulatus*); the larva of *pinastri* is evidently, according to the description, somewhat similar to the larvæ of *albostriatus* and *venustus*, and according to the figure of the abdomen of the imago (Fig. 7) I think it very probable that De Geer's *M. pinastri* is *S. lunulatus*, and I have therefore included it in the synonymy, but with a query.

S. lunulatus occurs in the same localities as the preceding species, but it is rare in Denmark, I know only twelve specimens; at Copenhagen (H. J. Hansen, Stæger), Søllerød (Godskesen), Ermelund, Dyrehaven, Tyvekrog, Tisvilde (the author); on Lolland in Kældskov (S. Jørgensen), and in Jutland at Horsens (O. G. Jensen). My dates are 16/5—14/7, but it is, like *venustus*, especially found in spring.

Geographical distribution:— Northern and middle Europe down into France; towards the north to northern Sweden, and in Finland, and it goes still farther towards the north, as it occurs on Iceland and in Greenland. According to Schiner it seems to be especially a mountain species.

5. *S. macularis* Zett.

1843. Zett. Dipt. Scand. II, 730, 32 et 1849. VIII, 3141, 32 (*Scaeva*).
— 1862. Schin. F. A. I, 302. — 1885. Kow. Wien. ent. Zeitg. IV, 167.
— 1907. Kat. paläarkt. Dipt. III, 67.

Of this species I only know the female. Vertex and frons black or greenish black, with two large yellowish grey side dust spots, stretching down the sides; the hairs black. Epistoma has an indefinitely bordered, but rather broad, black middle stripe, so that only the sides are yellowish; it is somewhat pruinose at the sides, but shining; the mouth edge, the lower side parts of epistoma and the jowls black; epistoma yellow-haired, but with black hairs down the

sides. Occiput greyish pruinose, somewhat æneous and shining above, the hairs yellow, with some few black above. Eyes pale brownish-hairy, but the hairs rather short. Antennæ black, third joint very slightly pale just beneath the base; the third joint short ovate; arista as long as the antennæ. Thorax æneous, not much shining, the two greyish lines on the middle just visible; it is clothed with yellow hairs. Scutellum yellow or slightly brownish, black-haired. Pleura yellow-haired. Abdomen black, somewhat shining, with three pairs of yellow, somewhat semicircular spots; the first pair lie on the middle of the segment, they are well separated and less semicircular; the second and third pairs lie near the front margin of the segments, they have a straight or very slightly concave anterior margin and a convex hind margin, and they go very near to each other in the middle, or (in one of my specimens) really touch at the upper inner corner; they go all over the side-margin; the fourth segment has a broad, the fifth a narrow, yellow hind margin, the latter also small spots at the basal corners. The hairs nearly quite follow the ground colour, but are pale at the base; at the sides they are black unless at the base and on the bands. Venter coloured somewhat like dorsum, but pale at the base; it has longish, pale hairs. Legs blackish, anterior femora with apex or about the apical third yellow, anterior tibiæ yellowish with more or less distinct, blackish rings about the middle, and browned towards the end; the hind knees may be somewhat pale. The hairs on femora yellow, but black towards the apex of the anterior femora; the short hairs on hind femora and on the tibiæ black, on front tibiæ partly pale. Wings a little tinged. Squamulæ whitish yellow. Halteres yellow.

Length about 9,5 mm.

This species is distinguished from *lunulatus* by the not isolated abdominal spots, and from *venustus* by the blacker antennæ and black-haired scutellum; from both the short-haired eyes distinguish it.

S. macularis is rare in Denmark, I possess only two specimens, both females, taken in Tyvekrogen on 28/5 1908 (the author); they were taken on Compositæ, I believe on Taraxacum.

Geographical distribution:— Northern and middle Europe down into Austria and Bohemia; towards the north to northern Sweden. It is also recorded from North America.

Remarks: This species is not well known; Verrall thinks that the specimens mentioned by Zetterstedt in VIII, where the author says "Oculi tenuissime hirti" and mentions some variations, f. inst. with the antennæ being pale beneath, may belong to his *punctulatus*, and then only the single male specimen described by Zetterstedt in II should be

macularis. How this may be I cannot say, but it must be noted that my specimens have the eyes short-haired, but more distinctly haired than *punctulatus*, and the antennæ slightly pale beneath the third joint. I have placed the species here because of the hairy eyes, but the short eye-hairs and somewhat dark epistoma show that it has affinities to *punctulatus* and its allies.

6. *S. annulipes* Zett.

1838. Zett. Ins. Lapp. 599, 3 et 1843. Dipt. Scand. II, 702, 4 et 1849. VIII, 3131, 4 et 1859. XIII, 5091, 4 (*Scaeva*). — 1862. Schin. F. A. I, 305. — 1901. Verr. Brit. Fl. VIII, 354, 6, fig. 289. — 1907. Kat. paläarkt. Dipt. III, 58.

Male. Vertex black, rather elongate; frons yellow pruinose but black above the antennæ. Epistoma yellow, somewhat pruinose, but shining; it has a broad, black middle stripe, attenuating up towards the antennæ; the mouth edge and lower hind corners black; jowls grey pruinose. Vertex and frons black-haired, epistoma with rather long, yellow hairs and some black towards the middle stripe. Occiput yellowish grey pruinose, it is very narrow above and concealed by the eyes; the hairs white below, yellow upwards; above a row of black, overhanging hairs. Eyes with somewhat short, pale hairs. Antennæ black, third joint about as long as the two basal together; arista about as long as the antennæ, brown at the base. Thorax dark or blackish æneous, somewhat shining; it is clothed with dense, yellow hairs, more or less intermingled with black, the latter tending to form a band across the middle or more extended on the whole front part; at the sides the hairs are dark yellow. Scutellum yellow or brownish yellow, with long, black hairs, only pale just at the base. Pleura yellow-haired. Abdomen black, dull, a little shining at the hind margins of the segments and more so at the apex; it has a pair of yellow or orange basal spots and two bands, all going widely over the side margin; the basal spots large, transverse, sloping upwards towards the sides; the band on third segment placed a little from the front margin, sloping at the sides and more or less deeply emarginate in the middle of the hind margin, the band on fourth segment of the same shape but nearer the front margin; fourth and fifth segments with orange hind margins and the latter also with front and side margins pale. The hairs somewhat long, chiefly following the ground colour, but mainly pale at the base and between the basal spots; at the sides the hairs are yellow, at the base mixed with black, for the rest alternating yellow and black according to the bands. Venter coloured as dorsum, but the bands paler, the first not interrupted,

and all bands, also the first, lying at the front margins and even including a narrow hind margin of the foregoing segment; the hairs are long, pale at the base but black on the black parts of the third and fourth segments and just at the hind margin of second. Genitalia small, hidden under the fifth segment, black, chiefly yellow-haired. Legs orange, anterior femora with about the basal half or more black, hind femora black except the apical part; hind tibiæ with a black ring in the middle; all metatarsi blackish above, often only towards the apex, the four last joints blackish or generally the last more or less yellow. The long hairs on femora black, the short hairs above towards apex yellow: the hairs on tibiæ yellow, except partly above the hind tibiæ. Wings almost hyaline or somewhat yellowish tinged,

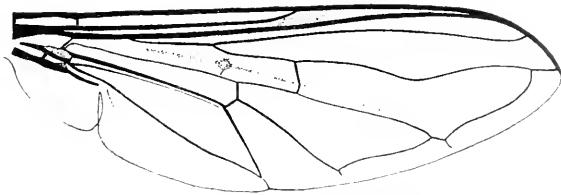


Fig. 120. Wing of *S. annulipes* ♀.

especially at the anterior margin; cubital vein curved down in the middle above the first posterior cell. Squamulæ whitish with a yellow fringe. Halteres brown or blackish.

Female. Vertex and frons somewhat narrow, bluish black, with large, yellowish pruinose side dust spots, going broadly down to epistoma so that there is in the middle a petiolated, somewhat bifurcate spot stretching from the vertex to the antennæ. The hairs black. Abdomen as in the male, not more shining; the bands a little narrower and often less emarginate; the hind margin of the fourth together with the front margin of the fifth segment form a generally conspicuous band.

Length 12—13,5 mm.

This large and beautiful species is at once recognized by the hairy eyes and the dipped cubital vein.

S. annulipes is rare in Denmark; Ordrup Mose, Ermelund, Geel Skov, Donse, Frerslev Hegn, Tyvekrog, Nyrup Hegn, Tisvilde; in Jutland at Horsens and Gessø at Silkeborg. My dates are $12/5$ — $2/8$. It occurs on Umbelliferæ on meadows, often in the vicinity of water, but also in woods; in spring it has been taken on the flowers of *Salix*.

Geographical distribution:— Northern and middle Europe down into France: towards the north to northern Sweden, and in Finland.

7. *S. torvus* Ost. Sack.

1875. Ost. Sack. Proc. Boston Soc. Nat. Hist. XVIII, 139, 1. — 1901. Verr. Brit. Fl. VIII, 356, 7. — 1907. Kat. paläarkt. Dipt. III, 70. — *Scaeva ribesii* p. p. 1817. Fall. Dipt. Suec. Syrph. 40. — *Scaeva topiaria* Zett. (nec Meig.) 1838. Ins. Lapp. 599, 4 et 1843. Dipt. Scand. II, 723, 26 et 1859. XIII, 5095, 26. — *Syrphus topiarius* 1862. Schin. F. A. I, 304.

Male. Vertex brownish grey pruinose; frons brownish yellow pruinose, above the antennæ a black, undusted, tridentate lunule, emarginate behind in the middle. Epistoma yellow, somewhat dusted towards the sides, shining in the middle, the extreme front mouth edge narrowly blackish; jowls darkened, greyish pruinose, quite behind yellow. Vertex and frons black-haired, epistoma with yellow hairs, towards the sides some black hairs, especially above, and also some black hairs towards the middle. Occiput grey or yellowish grey pruinose, the hairs yellow, above a row of some few black, overhanging hairs. Eyes distinctly and somewhat densely clothed with short, pale hairs. Antennæ black, the third joint more or less brownish beneath; the third joint ovate, longer than the two basal together; arista as long as or a little longer than the antennæ. Thorax greenish æneous, sometimes more brownish, dull, with three faint, more or less visible darker stripes; it is distinctly punctate and it is clothed with somewhat long, yellow or dark yellow hairs, darkest and most conspicuous at the sides. Scutellum yellow, with black hairs. Pleura with long, yellow hairs. Abdomen dull black, somewhat shining at the apex; it has a pair of yellow basal spots and two bands; the basal spots are transverse, placed on the middle of the segment, they are widely separated in the middle, sloping forwards at the sides and going over the margin with the upper side corner; the band on third segment lies a little from the front margin, it is incised in the middle of the hind margin and it slopes forwards at the sides, going over the margin like the spots and here touching the front margin; the anterior margin of the band is generally not straight but a little produced in the middle and slightly concave to each side, thus the band may be said to consist of two in the middle more or less broadly connected shallow lunules; the band on fourth segment is similar but nearer the front margin; the fourth and fifth segments have yellow hind margins, the latter also spots at the basal corners. The hairs on abdomen follow the ground colour, but are black at the apex; at the sides they are long and at the base yellow, for the rest

alternating black and yellow, but the yellow tufts rather small in accordance with the sloping bands. Venter translucently pale yellow, with more or less pronounced blackish middle spots; it has long, pale hairs. Genitalia somewhat small, yellow, but the eighth segment mainly greyish black; the hairs black and yellow. Legs black and yellow, anterior femora with about the basal third or more and hind femora with about the basal two thirds black; hind tibiæ with a more or less distinct, dark ring in the middle; tarsi blackish, middle metatarsi more or less palè. The long hairs on femora yellow, on the anterior femora with more or fewer black hairs intermingled and black towards apex; the short hairs on hind femora to a great extent black on the front side towards apex, and some of the more bristly hairs below the apex black, and likewise some on the middle femora just at apex; the short hairs on tibiæ yellow, but black above and partly on the anterior side of hind tibiæ, and they form here an antero-dorsal fringe. Wings hyaline or slightly yellowish tinged. Squamulæ pale yellow with a yellow fringe and the thoracal squamulæ besides the marginal fringe with long hairs above. Halteres yellow.

Female. Frons rapidly widening from the vertex downwards; vertex black, frons yellowish pruinose but black and shining above the antennæ, the hairs black. Eyes with much shorter hairs than in the male, but, however, distinctly visible. There are no black hairs above on occiput. Abdominal bands narrower than in the male, and generally less emarginate.

Length. The species varies somewhat in size, from 9,5 to 13 mm, but the smallest sizes are only rarely found.

S. torvus is common in Denmark; Copenhagen in gardens, Ler-søen, Amager, Utterslev Mose, Ordrup Mose, Dyrehaven, Geel Skov, Ruderhegn, Donse, Tyvekrog, Nordskoven at Jægerspris, Slagelse, Tis-vilde, Nyraad near Vordingborg; on Lolland in Kældskov and at Strandby; on Funen at Middelfart; in Jutland at Horsens, Rebbild near Skørping and Jerup near Frederikshavn, and on Bornholm in Almindingen. My dates are ¹²/₅—¹¹/₁₀. It occurs on various flowers on fields and in woods and for the rest on all localities, generally in great numbers.

Geographical distribution:— All Europe; towards the north to northern Sweden, and in Finland; it also occurs in North America, and it goes far towards the north as it occurs in Greenland up to 70° L. N.

Remarks: As well known *S. topiarius* Meig. is now considered as synonym to *S. vitripennis* Meig.; the first author who separated and

described the present species was Zetterstedt in 1838, and he determined it with doubt as *topiarius* Meig. Osten Sacken gave it then in 1875 the name *torvus*.

8. *S. ribesii* L.

1758. Linn. Syst. Nat. X, 593 et 1761. Fn. Suec. 1816 et 1767. Syst. Nat. XII, 2, 987, 50 (*Musca*). — 1764. O. F. Müll. Fn. Fridrichsd. 720 (*Musca*). — 1775. Fabr. Syst. Entom. 770, 41 et 1805. Syst. Antl. 248, 1 (*Scaeva*). — 1817. Fall. Dipt. Suec. Syrph. 40, 6 (*Scaeva*). — 1822. Meig. Syst. Besch. III, 306, 49. — 1843. Zett. Dipt. Scand. II, 707, 8 et 1849. VIII, 3132, 8 et 1855. XII, 4656, 8 (*Scaeva*). — 1862. Schin. F. A. 1, 310. — 1901. Verr. Brit. Fl. VIII, 366, 13, figs. 281, 291. — 1907. Kat. paläarkt. Dipt. III, 69.

This species is much like *torvus*, but the eyes are practically bare. Male. Frons with a black, tridentate lunule above the antennæ, for the rest yellow or sometimes somewhat greyish pruinose. Jowls yellow. Eyes practically bare as there are only few short and scattered, slightly visible hairs. Antennæ paler than in *torvus* as the basal joints are pale beneath and the third joint more extensively pale. Thorax with the hairs a little shorter. Abdomen as in *torvus*. Legs less black, anterior femora with scarcely or at most the basal third black and hind femora with a little more than the basal half black; sometimes the hind femora more black; front metatarsi often more or less pale, and middle tarsi more pale than in *torvus*; the ring on hind tibiæ generally slight or wanting. The long hairs on femora yellow, sometimes with some black intermingled; the short hairs on hind femora on the apical third of the front side all black, and the more bristly hairs below here likewise black; above just at the apex of middle femora generally a few black hairs; on hind tibiæ the hairs above and on the anterior side black. Wings almost hyaline or more or less yellowish or pale brownish tinged, especially towards the anterior margin.

Female. Vertex black, frons yellowish pruinose, above the antennæ a black lunule and from it a black, more or less definite triangle stretches backwards and unites with the black vertex. Abdominal bands generally narrower than in the male. Legs yellow, femora only black at the extreme base, tarsi mainly as in the male. The short hairs on the anterior side of hind femora black on about the apical half or more, and the more bristly hairs below forming a somewhat distinct row; all hairs above and on the anterior side of hind tibiæ black and the antero-dorsal fringe distinct.

Length. Rather varying, from 8.5—13 mm, but rarely below 10 mm.

The larva is transversely corrugated, finely chagreened, with the usual small, soft bristles placed in transverse rows on some of the corrugations and at the sides, and arranged in the usual way; the posterior spiracular process brown, elliptical in transverse section and a little cleft at the end, it is about 0,5 mm long. The larva is greyish yellow with some translucent yellow or reddish markings and a dark middle line. The length is about 12 mm or more. The pupa is elongated oval, broad and rounded in front, attenuated behind, somewhat flat below, arched above; it is very slightly chagreened and the bristles very indistinct; in colour it is similar to the larva, generally with a broad, serrated middle stripe. The length is 7—8 mm.

S. ribesii is very common in Denmark and occurs all over the country, and like the preceding species on all localities and in great numbers. My dates are $^{26}/_4$ — $^{18}/_{10}$. The larva has been taken by Mr. Schlick and myself in gardens and in woods among Aphides on *Pyrus*, *Rosa*, *Sambucus* and *Urtica*, and it is known to occur on several other plants; it has been taken on $^{4}/_7$, developing on $^{12}/_7$, and on $^{7}/_8$, pupating $^{11}/_8$ and developing $^{22}/_8$; I have also taken it among old leaves on the ground on $^{30}/_1$, developing $^{1}/_3$, and on $^{5}/_3$, developing first in April. Pupæ have been taken on $^{4}/_7$ and $^{24}/_7$.

Geographical distribution: — All Europe, towards the north to northernmost Sweden, in Finland, and on Iceland; it occurs also in North America.

9. *S. vitripennis* Meig.

1822. Meig. Syst. Besch. III, 308, 50. — 1843. Zett. Dipt. Scand. II, 708, 9 et 1849. VIII, 3132, 9 (*Scaeva*). — 1862. Schin. F. A. I, 310. — 1901. Verr. Brit. Fl. VIII, 370, 14. — 1907. Kat. paläarkt. Dipt. III, 72. — *Syrphus topiarius* Meig. 1822. Syst. Besch. III, 305, 47 et 1838. VII, 131, 47. — *Scaeva confinis* Zett. 1838. Ins. Lapp. 602, 14.

This species is very like the two preceding, but as a rule smaller. Male. Frons with a black lunule and above it yellow, more or less greyish pruinose. Jowls yellow. Eyes practically bare. Antennæ pale as in *ribesii*. Thorax and abdomen as in *ribesii*. Legs about as in *ribesii*, anterior femora with less than the basal third black, but hind femora more black as about the basal three fourths or more are black; hind tibiæ yellow or with only faint traces of a darkening in the middle; anterior tarsi paler, quite or almost quite yellow. The long hairs on femora all yellow, and no black hairs above the apex of middle femora; the short hairs on the apical half of hind femora quite yellow, or only some few black intermingled; the hairs on the

antero-dorsal side of hind tibiæ black, but on the anterior side all or almost all yellow. Wings more hyaline than in *ribesii*.

Female. Frons as in *ribesii*. Abdominal bands generally a little narrower than in the male. Legs chiefly as in the male and haired in the same way, thus the hind femora are not yellow as in the female of *ribesii* but with the basal three fourths black.

Length 7.5—11.5 mm.

The larva and pupa are quite similar to those of *S. ribesii*.

S. vitripennis is as common as *ribesii* and occurs in quite the same way, but it is much more common in gardens. My dates are $^{16/5-8/9}$. I have taken the larva in gardens among Aphides on Pyrus and Prunus on $^{3/6}$, $^{18/6}$, the latter developing on $^{28/6}$, and on $^{28/6}$, pupating $^{30/6}$ and developing $^{8/7-10/7}$, and I have taken a pupa on the ground on $^{17/7}$, it developed on $^{18/7}$.

Geographical distribution:— All Europe, towards the north to northern Sweden, and in Finland.

Remarks: The three preceding species are very similar, even to so high a degree that their specific value has been doubted, f. inst. by Girschner (Ill. Wochenschr. f. Entom. 1897, 570). They are also very nearly related as shown by the fact that they all have hairs on the upper surface of the thoracal squamula, but after the examination of great numbers of all three species I consent with Verrall in feeling sure that the three species are quite distinct. *S. torvus* is distinguished by the hairy eyes and darker antennæ; *ribesii* is in the male easily distinguished from *torvus* by the practically bare eyes, and in the female by the yellow femora; *vitripennis* is in the male likewise distinguished from *torvus* by the bare eyes; it is very similar to *ribesii* but has the hind femora more black, the anterior tarsi paler and the short hairs on the apical half of hind femora yellow; in the female it is distinguished from *torvus* besides by the bare eyes, by the anterior femora being less and the hind femora more black, and by the paler anterior tarsi; from *ribesii* it is distinguished by the not quite yellow femora, and from both by the short hairs on the apical half of hind femora being yellow. As seen the obviously haired eyes in the male of *torvus* easily distinguish it, while this character is less obvious in the female, and likewise the yellow femora at once distinguish the female of *ribesii*; it is thus especially the females of *torvus* and *vitripennis* and the males of *ribesii* and *vitripennis* which are difficult to distinguish, but they may be known with certainty by the characters given above. As to size *torvus* and *ribesii* are rather like, but *torvus* is, however, the larger; *vitripennis* is upon the whole smaller, but, as seen, large *vitripennis* may exceed even small *torvus*.

— I have never seen any of the three species with interrupted bands.

All three species are common, but *torvus* less common than the other two; they occur on almost all localities on leaves and flowers, and generally in company; they are often seen in woods on somewhat sunny spots hovering in the air in great numbers and resting on leaves or on the ground; I have seen them, or at all events *ribesii*, in this way as late as ¹⁸/₁₀. They all may occur in gardens, but *vitripennis* is by far the most common there. The times of the season on which I have taken larvæ and pupæ seem to show that there are more than one brood in the year, and I have taken newly emerged specimens of *vitripennis* on ⁸/₉; I am therefore inclined to think that there are so many broods as the length of the warmer period and the supply of food for the larvæ will allow, and then they hibernate no doubt in every stage of the larva which the setting in of the cold period prevents from growing further; perhaps also the pupa may hibernate though this is less probable.

10. *S. annulatus* Zett.

1838. Zett. Ins. Lapp. 604, 25 et 1843. Dipt. Scand. II, 744, 47 et 1849. VIII, 3144, 47 (*Scaeva*). — 1901. Verr. Brit. Fl. VIII, 358, 8. — 1907. Kat. paläarkt. Dipt. III, 58.

Male. Frons greyish yellow pruinose but shining black above the antennæ; epistoma rather narrow, with somewhat parallel margins; it is yellow with a broad, somewhat indefinite, black middle stripe, the yellow side parts yellow pruinose; the mouth edge, the lower lateral parts of epistoma and the jowls black. Vertex and frons black-haired, epistoma with mainly dark hairs, paler below. Occiput yellowish grey pruinose, with yellow hairs, above a few black hairs overhanging the eyes. Eyes practically bare. Antennæ blackish, yellowish or yellowish red beneath. Thorax greenish æneous, dullish, more shining towards the sides; it is clothed with somewhat long, yellow hairs. Scutellum yellow, with long, black hairs. Pleura with long, yellowish hairs. Abdomen somewhat ovate, black, dull, a little shining at the sides and at the hind margin of third segment, and more at the apex; it has a pair of yellow basal spots and two bands, rather similar to those in *ribesii*; the basal spots large, transverse, lying on the middle of the segment, they slope forwards at the sides and go over the margin; the band on third segment is a little from the front margin, it is emarginate in the middle behind, sloping forwards at the sides and going over the margin at the basal corners with about half its breadth; the third band is similar but a little nearer the front margin,

less emarginate and less sloping at the sides, going more widely over the margin: the fourth segment has a yellow hind margin, the fifth likewise but narrow, and also with the sides or basal corners yellow. The hairs on abdomen follow the ground colour; at the sides they are yellow at the base, for the rest alternating black and yellow according to the bands. Venter coloured mainly as dorsum but the pale parts translucent and whitish, and the markings somewhat indefinite; sometimes the venter is almost quite pale or on the contrary rather darkened; it is clothed with longish, pale hairs. Genitalia somewhat large, shining black, black-haired. Legs mainly yellow, anterior femora with about the basal third black, tibiæ and tarsi all yellow; hind legs black with the knees yellowish. The long hairs on anterior femora yellow on the basal part, black on the apical part, on hind femora all or mainly yellow; the short hairs on the anterior legs yellow with some black intermingled, on the hind legs mainly black; front tarsi with black spinules along the posterior side and middle tarsi black-spinulose beneath. Wings hyaline to somewhat brownish tinged; stigma pale. Squamulæ and fringes pale yellowish. Halteres yellow or pale yellow.

Female. Vertex moderately broad, frons widening downwards. Vertex black, shining; frons with large, yellowish side dust spots, connected at the sides with epistoma, thus there is above the antennæ a shining black lunule, connected by a middle stripe with the vertex; all hairs black. Abdominal bands slightly narrower than in the male, fourth and fifth segments with broader yellow hind margins. Anterior legs quite yellow; hind femora yellow at base and apex and thus with a more or less broad, dark ring near the apex, hind tibiæ, except base, and hind tarsi blackish or brownish.

Length 7—8,5 mm.

S. annulatus is rare in Denmark; Dyrehaven, Lyngby Mose, Geel Skov, Hillerød, Tyvekrog; on Lolland in Dødemose and at Kærstrup, and in Jutland at Silkeborg. My dates are $28/5-10/7$; it seems to be most common in spring. It occurs on fields and in woods; I have taken it on *Cratægus*.

Geographical distribution:— With certainty the species is only known from northern Europe with Britain, but probably it goes farther towards the south; towards the north it occurs to northern Sweden, and in Finland, but it is upon the whole not common.

Remarks: I think no error is possible with regard to the determination of this species, and Zetterstedt mentions also (l. c. VIII) specimens from Denmark, but I must note that my specimens have thorax about as dull as in *lineola*, only somewhat shining at the

sides, while Zetterstedt says about thorax "nitido" and uses this character as distinguish ingagainst *lineola* with "thorace subopaco", and Verrall compares the species with *vittiger* without speaking of a duller thorax.

11. *S. lineola* Zett.

1843. Zett. Dipt. Scand. II, 714, 16 et 1849. VIII, 3137, 16 et 1859. XIII, 5093, 16 (*Scaeva*). — 1862. Schin. F. A. I, 309. — 1901. Verr. Brit. Fl. VIII, 359, 9. — 1907. Kat. paläarkt. Dipt. III, 66.

This species is similar to *annulatus*. Male. Epistoma broader, a little increasing in breadth downwards, it has the black middle stripe narrower and not reaching up to the antennæ. Antennæ black. Thorax dull, a little shining at the sides. Abdomen as in *annulatus*, venter paler, the black parts only forming triangular middle spots, but sometimes the venter more darkened. Legs much blacker, anterior femora black with the apical part yellow, anterior tibiæ yellow with faint dark rings below the middle, tarsi black, metatarsus a little paler; hind legs quite black, only the knees indistinctly pale. Legs haired about as in *annulatus* but the apical part of the anterior femora and the middle tibiæ have the short hairs almost all black, and they are also more numerous behind on the front tibiæ. Stigma brown to blackish.

Female. Quite similar to the male, with the usual differences, and thus also to the female of *annulatus*, but with the same distinguishing characters as given for the male: usually the hind femora not yellow at the base.

Length 8 to almost 10 mm.

This species may be known from *annulatus* by the black antennæ, narrower and abbreviated epistomal stripe and dark anterior tarsi; also is the epistoma broader, which is the most obvious in the male.

S. lineola is like the preceding species rare in Denmark; Ordrup Mose, Dyrehaven, Geel Skov, Donse, Hillerød, Tyvekrog, Nyrup Hegn, Tisvilde, Nordskoven at Jægerspris; on Lolland at Maribo; on Funen at Strib; in Jutland at Silkeborg, Laurberg south of Randers and Rebbild near Skørping. My dates are ¹⁵/₅—⁸/₉.

Geographical distribution:— Northern and middle Europe down into Austria, Bohemia and Styria; towards the north to northern Sweden, and in Finland.

12. *S. grossulariæ* Meig.

1822. Meig. Syst. Besch. III, 306, 48. — 1843. Zett. Dipt. Scand. II, 706, 7 et 1859. XIII, 5091, 7 (*Scaeva*). — 1862. Schin. F. A. I, 310. —

1901. Verr. Brit. Fl. VIII, 363, 11, fig. 290. — 1907. Kat. paläarkt. Dipt. III, 64. — *Scaeva ribesii* p. p. 1817. Fall. Dipt. Suec. Syrph. 40.

Male. Vertex somewhat elongate, brownish yellow pruinose; frons yellow and yellow pruinose, with a black lunulate spot above the antennæ, shining in front, dull behind. Epistoma yellow, whitish pruinose towards the sides. Vertex and frons black-haired; epistoma rather densely yellow-haired, above at the sides of the antennæ are black hairs. Jowls yellow. Occiput yellowish grey, the hairs white below, yellow upwards; above a row of black, overhanging hairs. Eyes bare. Antennæ black; arista longer than the antennæ. Thorax brass-coloured, slightly or moderately shining, somewhat dullish, but much less than in *ribesii*, in front with faint traces of three brown stripes separated by two greyish lines, and it is slightly yellowish at the sides; it is clothed with yellow or reddish yellow hairs, densest at the sides. Scutellum yellow with black hairs, on the basal part more or fewer yellow hairs, sometimes nearly all yellow-haired. Pleura yellow-haired. Abdomen dull black, a little shining at the apex; it has yellow basal spots and two broad bands; the basal spots are large, somewhat triangular with the hind margin about straight; they are placed quite near the front margin and not broadly separated in the middle; the bands lie close to the front margins of the segments and are straight, the one on third segment occupies the half of the segment and has a little emargination just in the middle behind; the band on fourth segment occupies less than the half of the segment and has no emargination; the bands all go over the margin in full breadth; the fourth segment has a broad, yellow hind margin, the fifth is almost quite yellow. The hairs follow mainly the ground colour, but are black at the apex, and on the middle and at the hind margin of the band on fourth segment; at the sides the hairs alternate yellow and black in accordance with the bands. Venter yellow on the basal half, brown or black on the apical half; it is clothed with long hairs, mainly yellow on the basal, black on the apical part, but the basal part has some black hairs behind. Genitalia small, yellow, only the knob a little dark behind; the hairs yellow and black. Legs yellow with the base of femora black, anterior tarsi with the three middle joints darkened, hind tarsi blackish, brownish towards base; front and hind coxæ yellowish. The long hairs behind the anterior femora yellow, somewhat dense on middle femora; the hairs on the anterior side of hind femora not long, black with some few yellow below; the short hairs mainly yellow on the anterior legs, black on the hind legs, but middle femora often with many black hairs on the anterior side, and hind tibiæ with yellow hairs below. Wings hyaline or a little tinged.

Squamulæ pale yellow with a yellow margin and fringe. Halteres yellow.

Female. Vertex somewhat narrow, the frons widening downwards, it is yellowish pruinose at the sides leaving in the middle a black, elongated triangle, stretching from vertex to antennæ; the hairs black. No black hairs above at the eye-margin. Abdominal bands as in the male, slightly narrower.

Length 10—13,5 mm.

S. grossulariæ is by no means common in Denmark, or at all events rather local, and hitherto only taken on Sealand; Ordrup Mose (Stæger), Frerslev Hegn (the author), Nyrup Hegn, Tisvilde (Klöcker, the author). My dates are $\frac{4}{7}$ — $\frac{7}{8}$. It occurs in and at woods, I have taken it on flowers of *Spiræa* and *Sambucus*.

Geographical distribution:— Northern and middle Europe down into Austria, Bohemia and Styria, and also recorded from Italy; towards the north to middle Sweden, and in Finland. It occurs also in North America (*Lesueurii*, *conjungens*).

13. *S. diaphanus* Zett.

1843. Zett. Dipt. Scand. II, 711, 12 (*Scaeva*). — 1862. Schin. F. A. I, 310. — 1901. Verr. Brit. Fl. VIII, 364, 12. — 1907. Kat. paläarkt. Dipt. III, 64.

Male. Frons yellow and yellow pruinose, shining above the antennæ; epistoma yellow, whitish pruinose at the sides and the jowls likewise. Vertex with brown hairs; frons yellow-haired with some few black hairs intermingled; epistoma with yellow hairs. Occiput greyish white pruinose below, yellowish above; the hairs likewise whitish below, yellowish upwards; above only very few dark, overhanging hairs. Eyes bare. Antennæ black, a little pale at the extreme base, and very slightly so at the base beneath the third joint; arista about as long as the antennæ. Thorax æneous, dull, a little shining behind, with indications of two stripes in front; it is somewhat yellow at the sides and on the postalar calli; it is clothed with yellow hairs. Scutellum yellow, with long, yellow hairs. Pleura yellow-haired. Abdomen is somewhat narrow, dull black, a little shining at the apex; it has extensive yellow markings consisting of a pair of basal spots and two bands, and the whole apex is yellow; the basal spots are large, triangular, lying on the middle of the segments but sloping upwards at the sides and here reaching the front margin and going over the sides; the second and third bands lie close to the front margins; they are broad, occupying about two thirds of the

segments: they are deeply emarginated in the middle behind and they slope forwards at the sides, going narrowly over the margin at the basal corners, they thus form two semicircular spots connected in the middle; the hind margin of the fourth segment is broadly yellow and the whole fifth segment is yellow so that the apex is quite yellow. The hairs follow mainly the ground colour but are somewhat pale at the base, and black at the apex; at the sides they are yellow at the base, for the rest alternating black and yellow according to the bands. Venter pale yellow with dark bands at the hind margins of the segments, on the second segment divided into triangular side spots; it is clothed with long, pale hairs, more or less black on the dark parts. Genitalia small, yellow, only eighth segment a little darkened behind; they are yellow-haired. Legs yellow, middle coxæ greyish black, anterior tarsi with third and fourth joints a little brownish, hind tarsi blackish brown; all the hairs are yellow except the short hairs on the anterior and ventral side of the apical half of hind femora and on nearly all the hind tibiæ, where they are black. Wings brownish tinged. Squamulæ and fringes yellow. Halteres yellow.

Female. I do not know the female; according to the descriptions the vertex is black, frons pale yellow, the black colour of vertex slightly produced in the middle. Vertex with black, frons with yellow hairs. Abdominal bands going more widely over the side margin than in the male.

Length 10,5 mm.

This beautiful species somewhat resembles a bright *ribesii*, but it is narrower and easily distinguished by the black antennæ, yellow and yellow-haired frons and quite yellow legs.

S. diaphanus is very rare in Denmark, we have only one specimen, a male, taken on Funen between Odense and Middelfart (H. J. Hansen); no date is given.

Geographical distribution: — Northern and middle Europe, and recorded down to Italy; towards the north to middle Sweden but everywhere a rare species.

14. *S. nitidicollis* Meig.

1822. Meig. Syst. Besch. III, 308, 51. — 1843. Zett. Dipt. Scand. II, 709, 10 et 1849. VIII, 3133, 10 et 1859. XIII, 5092, 10 (*Scaeva*). — 1862. Schin. F. A. I, 310. — 1901. Verr. Brit. Fl. VIII, 375, 16, figs. 293—294. — 1907. Kat. paläarkt. Dipt. III, 68. — *Scaeva ribesii* p. p. 1817. Fall. Dipt. Succ. Syrph. 40.

Male. Vertex somewhat narrow and elongate, longer than the eye-suture, blackish; frons yellow, the upper half greyish pruinose the

pruinosity stretching narrowly down the eye-margins. Epistoma yellow or dark yellow, yellowish pruinose at the sides, the lowermost lateral parts blackish or with a blackish band across to the eye; jowls blackish. Vertex and frons black-haired; epistoma yellow-haired, above at the sides of the antennæ are black hairs. Occiput greyish white pruinose; the hairs white below, yellow upwards; above a row of black hairs overhanging the eyes. Eyes bare. Antennæ yellow or reddish yellow, third joint oval; arista black, about as long as the antennæ. Thorax dark æneous, sometimes somewhat bluish, shining, a little yellowish above the wing root and on the postalar calli; it is clothed with yellow hairs, densest at the sides. Scutellum yellow, a little æneous, with black hairs, at the base and basal corners some yellow hairs and also often along the margin. Pleura with yellow hairs, whitish downwards. Abdomen black, dull or slightly shining, but shining at the apex; it has a pair of yellow basal spots and two bands; the basal spots lie on the middle of the segment, they are large, somewhat triangular, going in full width over the side margin and stretching along it to the base; the band on third segment lies near the front margin, it occupies the half of the segment; it is more or less but generally slightly emarginate behind, a little sloping at the sides and going widely over the margin; the band on fourth segment similar but close to the front margin; fourth segment with a broad orange hind margin, fifth segment with all margins yellow and thus only with a black, transverse middle spot. The hairs on abdomen follow the ground colour but are black at apex in the middle; at the sides they are yellow at the base and alternating black and yellow down the sides according to the bands. Venter quite pale yellow and translucent, clothed with long, pale hairs, only on the fourth segment some black hairs. Genitalia not large, yellow, the end of the eighth segment black, shining, the hairs black and yellow. Legs yellow, coxæ and the very base of femora black, on hind femora sometimes indistinctly; hind tarsi generally a little brownish, especially towards the apex. The long hairs behind the anterior femora yellow, on the anterior side of hind femora mainly black, the short hairs on the anterior side of hind femora and tibiæ black, for the rest yellow. Wings yellowish to pale brownish tinged, especially at the anterior margin. Squamulæ and fringes yellow. Halteres yellow.

Female. Vertex of medium breadth, black; frons yellow above the antennæ, for the rest black, with large, yellowish side dust spots leaving a black middle line, widened below; the hairs black. Jowls greyish or more or less yellowish. Antennæ a little larger than in the male, and the abdominal bands slightly narrower. Legs

with only the coxæ blackish, and hind tarsi sometimes slightly brownish.

Length 10—12 mm.

S. nitidicollis is not rare in Denmark, though it can scarcely be termed common; Frederiksberg Have, Amager, Ordrup Mose, Dyrehaven, Lyngby Mose, Søllerød, Tyvekrog, Nordskoven at Jægerspris, at Sorø; on Lolland in Kældskov; in Jutland at Horsens, Funder near Silkeborg and Frederikshavn. My dates are $^{15}/_5$ — $^{14}/_7$. It occurs in woods and on fields on various flowers and is especially found in spring.

Geographical distribution:— Northern and middle Europe and recorded down into Italy; towards the north to northern Sweden, and in Finland.

15. *S. nitens* Zett.

1843. Zett. Dipt. Scand. II, 712, 14 et 1849. VIII, 3137, 14 (*Scaeva*). — 1901. Verr. Brit. Fl. VIII, 377, 17, figs. 295—296. — 1907. Kat. paläarkt. Dipt. III, 68.

Male. Vertex elongated triangular, as long or scarcely as long as the eye-suture, blackish; frons either quite yellow or with two black spots above the antennæ, or these spots connected to a lunule; epistoma yellow, mouth edge more or less black and likewise the lower lateral parts, and sometimes an abbreviated middle stripe black; jowls blackish. Vertex, frons and epistoma black-haired, or the latter more or less to almost quite yellow-haired. Occiput whitish grey pruinose, with white, upwards yellow hairs; above a row a black hairs overhanging the eyes. Eyes bare. Antennæ reddish, third joint more or less dark or blackish above, it is elongated oval, longer than the two basal joints together; arista not so long as the antennæ, inserted rather long from the base. Thorax blackish or bluish æneous, shining; it is slightly yellowish above the wing-root and on the postalar calli; it is clothed with yellow or reddish yellow hairs, longest and densest at the sides. Scutellum yellow, black-haired, with more or fewer yellow hairs round the margin. Pleura with long, yellow hairs. Abdomen flat, ovate, with somewhat marked side margins; it is dull black, a little shining at the hind margins of the segments and more at the apex; it has a basal pair of yellow spots and two bands; the basal spots lie on the middle of the segment, they are triangular, sloping forwards at the sides and here going narrowly over the margin; the band on the third segment is well away from the front margin, it is much undulated as its fore margin is curved in at each side and emarginate in the middle, while the hind margin is strongly emarginate

in the middle and sloping at the sides; sometimes it is almost, or actually, narrowly interrupted in the middle; the second band is similar but a little nearer the front margin; the bands go near to but do not quite reach the margin with their upper corners; fourth and fifth segments have narrow, yellow hind margins, the latter also yellow spots at the basal corners. The hairs follow the ground colour but are mainly black at apex; at the sides they are long and yellow at the base, for the rest short and black. Venter yellow with black, transverse spots on the middle of the segments; it has long, pale, on the apical half mainly black hairs. Genitalia of medium size, eighth segment black except just at base, with black hairs. Legs yellow, anterior femora with the base black, hind femora more black generally to near the apex, tarsi with the middle joints more or less brownish, hind tarsi often upon the whole darker. The long hairs on femora black and yellow or almost all black, the short hairs black on hind femora and tibiæ and also partly on middle femora, for the rest yellow. Wings hyaline or slightly tinged. Squamulæ pale yellow with a darker fringe. Halteres yellow.

Female. Vertex of medium breadth, bluish, shining; frons with two small side dust spots which cause a short, black furca to proceed from the vertex, the lower third is yellow, as in the male generally with two spots or a black lunule above the antennæ; the hairs all black. Abdominal markings somewhat narrower than in the male, the bands going over the margin just at their upper corners. Legs paler as the femora are quite yellow or only a little black at the base.

Length 8,5—10,5 mm.

The larva is as usual transversely corrugated; it is not chagreened but very densely clothed with short, fine spines, and it has the usual soft bristles placed transversely on the corrugations and at the sides on small warts; the arrangement is as in the other larvæ; the bristles are relatively long. The posterior spiracular process is quite short, a little cleft just at the end. The ventral proleg-like warts rather distinct. The colour is reddish grey with some blackish markings and a narrow, black middle line. The length is 13 mm. The pupa is of the common shape, not much attenuated behind; it is likewise finely spinulose, but the longer bristles are rather indistinct; the colour is similar to that of the larva. The length is about 7 mm.

This species has sometimes been compared with *nitidicollis*, and Strobl and Thalhammer even consider it as a variety of this species. I am quite of the same opinion as Verrall, when he says that he finds the two species very different, and does not understand that they can be considered as the same species, and like him I should think

that Strobl and Thalhhammer have not had their species correctly determined. *S. nitens* is not at all similar to *nitidicollis* and it is much more allied to the *latifasciatus-corollæ* group. It is distinguished not only by its outer appearance caused by its flatter, broader and distinctly marginate abdomen with the undulated bands, which do not reach the margin or only just at the upper corners, but besides by a multitude of minute characters, as the shorter vertex and yellow frons in the male, the darker antennæ with a longer third joint and the arista inserted farther from the base, the short, all black hairs at the margin of abdomen, the more yellow frons of the female, the markings on venter and still other characters.

S. nitens is rather rare in Denmark; Copenhagen, Lyngby Mose, Geel Skov, Ørholm, Ruderhegn, Trørød, Nyrup Hegn, Tisvilde, Jægerspris, at Sorø; in Jutland at Horsens, Laven near Silkeborg and at Rebbild near Skørping. My dates are $\frac{6}{6}$ — $\frac{18}{9}$. I have taken it in woods on flowers of Compositæ. The larva I took among Aphides on Prunus in a garden at Copenhagen on $\frac{3}{6}$, one pupated on $\frac{3}{6}$ and the imago came on $\frac{19}{6}$; a pupa was taken in Ruderhegn in flood refuse on $\frac{13}{4}$, it developed on $\frac{14}{5}$ (Kryger).

Geographical distribution: — Northern and middle Europe and recorded down into Styria; towards the north to northern Sweden, and in Finland; it seems upon the whole to be a rare species.

16. *S. latifasciatus* Macq.

1827. Macq. Soc. Sc. Lille, 1827, 242, 28 et 1834. Suit. à Buff. I, 541, 32. — 1838. Meig. Syst. Besch. VII, 132, 203. — 1901. Verr. Brit. Fl. VIII, 371, 15, fig. 292. — 1907. Kat. paläarkt. Dipt. III, 66. — *Scaeva abbreviata* Zett. 1849. Dipt. Scand. VIII, 3136, 13—14. — *Syrphus affinis* Loew, 1840. Programm Posen, 35, 11 et Isis 1840, 571, 11. — *Syrphus excisus* p. p. 1862. Schin. F. A. I, 311.

Male. Vertex large, considerably longer than the eye-suture but not specially narrow; it is black, yellowish pruinose behind; frons and epistoma yellow, mouth edge darkened and the lower lateral parts of epistoma black; the central knob may be darkened. Jowls black, greyish pruinose. Vertex and frons black-haired, the former with yellow hairs behind; epistoma with yellow hairs, at the sides above are black hairs. Occiput grey pruinose, the hairs pale yellow below, darker upwards, but there are no black hairs. Occiput is rather much puffed out above so that the hinder eye-margin is broad. Eyes bare. Antennæ blackish or brown, paler beneath, third joint oval; arista short, shorter than the antennæ. Thorax æneous, a little greenish, not much shining, generally with three more or less visible, duller

stripes; it is a little yellowish above the wing-root and on the postalar calli; it is clothed with yellow hairs, densest at the sides. Scutellum yellow or a little darkened, with yellow hairs, sometimes with some few black intermingled; in rare cases the black hairs more numerous, predominant on the disc. Pleura with long, yellow hairs. Abdomen marginate, dull black, a little shining at the hind margins of the segments and more at the apex, with a pair of yellow basal spots and two broad bands; the basal spots lie somewhat near the hind margin, they are large, triangular, at the sides sloping upwards towards the basal corners; the band on third segment lies near the front margin, its fore margin is a little undulate, behind it is more or less deeply emarginate in the middle, and at the sides it bends somewhat angularly upwards so that it is here about parallel with the side margin; it is broad, occupying more than two thirds of the segment; the band on fourth segment is similar but quite near to the front margin; the basal spots generally go over the side at the basal corners, the bands are generally isolated but may reach the sides above more or less indistinctly; the emarginations in the middle of the front and hind margins may vary in depth, and they may go quite through so the band is separated into spots, either both bands or only the one on third segment. The fourth segment has a yellow hind margin, the fifth is yellow with a black middle spot. The hairs on abdomen follow the ground colour but are black at apex; at the sides they are long and yellow just at the base, for the rest short and black. Venter yellow with large, black, transverse spots on the segments; it has long, yellow hairs, shorter and black behind. Genitalia small, sixth and seventh segments yellow, eighth mostly black, ninth yellowish or somewhat blackish; the hairs black and yellow. Legs yellow with the basal third of anterior femora and the basal half or two thirds of hind femora black; anterior tarsi with the three middle joints brownish, hind tarsi blackish, metatarsus yellowish or brownish. The hairs behind anterior femora mainly black but pale at the base, on the anterior side of hind femora yellow; the short hairs are yellow except on the anterior side of hind femora, and they are black on hind tibiæ except below. Wings a little or somewhat yellowish tinged. Squamulæ yellow with darker yellow margin and fringe. Halteres pale yellow.

Female. Vertex somewhat broad, black and shining; the frons likewise to below the middle, the rest yellow; the border of the black part a little incised in the middle; there are no dust spots; the hairs black; the hinder eye-margin broad above. Thorax more shining than in the male. Abdominal bands narrower and generally going distinctly

over the margin above. Femora paler, about the basal fourth of anterior femora black, hind femora quite yellow or black at the very base.

Length 7.5 to fully 9 mm.

The larva and pupa are similar to those of *nitens*, likewise clothed with fine spines, which are still more distinct than in *nitens*; there are also the same bristles. The pupa has a length of 6 mm.

This species is similar to *nitens*, but is as a rule smaller; when the scutellum is quite yellow-haired this distinguishes it, when not it is known in the male by the larger vertex and the broader hinder eye-margin without black hairs. The female is at once known by the want of frontal dust spots. In both sexes the abdominal bands are broader, generally less undulate, the spots on second segment lying nearer the hind margin and the fifth segment quite yellow with only a black middle spot.

S. latifasciatus does not seem to be common in Denmark; Frederiksberg, Damhussø, Utterslev Mose, Ordrup Mose, Dyrehaven, Lyngby Mose, Ruderhegn, Donse, Nyrup Hegn; on Lolland in Dødemose west of Nysted; in Jutland at Horsens and Randers, and on Bornholm at Rø. My dates are $\frac{8}{6}$ — $\frac{14}{8}$. It is curious that the imago is only taken somewhat rarely, while the pupa is more common than most other *Syrphus*-pupæ; the pupa has been taken in flood refuse in Ruderhegn on $\frac{13}{4}$, developing on $\frac{26}{4}$ — $\frac{30}{4}$ (Kryger), and in Damhusmosen, Utterslev Mose and in Jutland at Randers, developing in April and May (Schlick). A larva was taken in Ruderhegn in flood refuse on $\frac{13}{3}$, it developed on $\frac{12}{4}$ (Kryger).

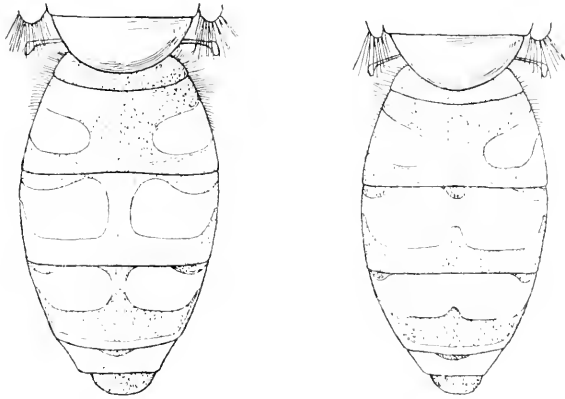
Geographical distribution:— Northern and middle Europe down into France and probably also in Italy; towards the north to northern Sweden; it occurs also in North America.

17. *S. corollae* Fabr.

1794. Fabr. Ent. Syst. IV, 306, 106 et 1805. Syst. Antl. 250, 8 (*Scaeva*). — 1822. Meig. Syst. Besch. III, 304, 46. — 1843. Zett. Dipt. Scand. II, 720, 23 et 1849. VIII, 3138, 23 et 1855. XII, 4657, 23 (*Scaeva*). — 1862. Schin. F. A. I, 306. — 1901. Verr. Brit. Fl. VIII, 381, 19. — 1907. Kat. paläarkt. Dipt. III, 62. — *Scaeva olitoria* Fall. 1817. Dipt. Suec. Syrph. 43, 12. — *S. lacerus* Meig. 1822. Syst. Besch. III, 301, 41. — *S. fulvifrons* Macq. 1827. Soc. Sc. Lille 1827, 240, 24 et 1834. Suit. à Buff. I, 540, 19. — 1838. Meig. l. c. VII, 132, 101. — *S. crenatus* Macq. 1827. l. c. 243, 29 et 1834. l. c. I, 541, 23. — 1838. Meig. l. c. VII, 133, 104. — 1862. Schin. F. A. I, 312.

Male. Vertex somewhat large, longer than the eye-suture, black, greyish behind; frons and epistoma yellow, the front mouth edge and

the central knob blackish; jowls greyish black, sometimes yellowish. Vertex and frons black-haired, the former with yellow hairs behind; epistoma yellow-haired, above, at the sides of the antennæ, with black hairs. Occiput greyish pruinose with whitish hairs, yellowish upwards, and there are no black hairs above; the occiput is somewhat puffed out at the upper eye-margin. Antennæ black or blackish, more or less reddish below the base of the third joint; arista not so long as the antennæ. Thorax greenish æneous or more brass-coloured, not much shining; postalar calli somewhat yellowish; the thorax is clothed with yellow hairs, dense at the sides. Scutellum dark yellow, sometimes bluish reflecting, with yellow hairs; there are sometimes some black hairs on the disc. Pleura with long, yellow hairs. Abdomen somewhat marginate, dull black, shining at the apex, first segment greenish, shining; there are three pairs of broad, yellow spots; the basal spots lying about on the middle, broadly separated; they are transverse, sloping forwards at the sides and going over the margin; the spots on third segment are large, lying near the front margin, they are slightly lunulate in front but straight behind and broadest inwards, as they slope away from the front margin outwards, and they go over the side margin above; they go near to each other in the



S. corallae ♂, abdomen.

Fig. 121. Typical specimen. Fig. 122. The common variety.

middle and are very often here united, forming a band excised in the middle of front and hind margins; the spots on fourth segment are similar but quite near to the front margin, and they are nearly always united to a band, which is generally incised only behind; they go widely over the margin, and as a rule the margin from here and

backwards is quite yellow; the fourth segment has a yellow hind margin and the fifth is quite yellow with a small, black middle spot. The hairs on abdomen are somewhat short, they follow mainly the ground colour but are somewhat pale at the base and between the middle spots also when these are not united; at the sides the hairs are long and yellow at the base, for the rest short and black. Venter yellow, with black, transverse middle spots on the segments, which spots vary in size and may be wanting on the hinder segments; it has long, pale hairs, short and black on fourth segment. Genitalia characteristic, they are large and swollen, sixth and seventh segments reddish, eighth large, black and shining, ninth likewise unusually large, reddish; the genitalia are pale-haired. Legs yellow with the basal third of front femora and the hind femora except the apical part black; anterior tarsi with the three middle joints brownish or the front tarsi quite brownish; hind tarsi except metatarsus blackish. The long hairs on femora yellow, more or less blackish outwards; on hind femora there are but few hairs; the short hairs black on the anterior side of hind femora and above hind tibiæ, for the rest yellow. Wings slightly tinged. Squamulæ pale yellow with yellow margin and fringes. Halteres pale yellow.

Female. Vertex somewhat broad, black, the lower two thirds of the frons yellow, above the antennæ may be a pair of dark spots; there are small, yellowish side dust spots between which the black colour may be slightly and vaguely produced; the hairs black. Abdomen with the spots narrower or much narrower than in the male and more lunulate; they are almost always separated, only in very rare cases the third or second and third pairs may be narrowly united. Legs paler, femora quite yellow, only the anterior black just at the base.

Length 7.5—10.5 mm, sometimes, but rarely, smaller specimens are found, down to 6 mm.

The larva and pupa are similar to those of *nitens*, likewise with a clothing of very fine, dense spines, and they are of about the same colour, the black markings forming longitudinal lines or rows of spots, and there is a black middle line: the pupa is 5—6 mm long.

This species varies, as seen, much, especially in the male, but it is, however, distinguished without difficulty; in the male it is at once distinguished by the characteristic large genitalia; in the female it is distinguished from *nitens* by the yellow-haired scutellum and separated abdominal lunules, and from *latifasciatus* by the presence of frontal dust spots. — The varieties of the male have sometimes given rise to confusion, and are no doubt often misunderstood, thus I got males

from abbé O. Parent in Arras determined as *latifusciatus*, but they were only the common variety of *corollae* with united spots. — Under *lunulatus* I have shown that the present species cannot be *pinustri* De Geer.

S. corollae is very common in Denmark and occurs on various flowers on nearly all localities all over the country, generally in great numbers. My dates are $7/6$ — $22/9$; it is most common in late summer and autumn. I have taken it in copula on $16/7$. The larva I have taken among Aphides on *Prunus* in a garden on $3/6$, it developed on $22/6$; Mr. Kryger took a pupa at Damhusmosen on $6/8$, it developed on $11/8$. — Verrall records that he does not remember to have seen this species hovering, I have, however often seen it so, but generally about the flowers, not high in the air.

Geographical distribution: — Very widely distributed, through all Europe, towards the north to northern Sweden, and in Finland; further in northern Africa, on the Canaries and Madeira, and in Asia down to Japan; it occurs perhaps also in North America.

18. *S. luniger* Meig.

1822. Meig. Syst. Besch. III, 300, 40. — 1843. Zett. Dipt. Scand. II, 718, 21 (*Scaeva*). — 1862. Schin. F. A. I, 306. — 1901. Verr. Brit. Fl. VIII, 385, 20, fig. 298. — 1907. Kat. paläarkt. Dipt. III, 66. — *S. nigri-femoratus* Macq. 1827. Soc. Sc. Lille. 1827, 241, 26 et 1834. Suit à Buff. I, 540, 21. — 1838. Meig. Syst. Besch. VII, 132, 102. — *Scaeva arcuata* Fall. p. p. 1817. Dipt. Suec. Syrph. 42.

Male. Vertex elongated triangular, fully as long as the eye-suture. Frons yellow, sometimes with brownish or blackish spots above the antennæ; epistoma yellow, the front mouth edge black and the central knob brown or blackish. Jowls black, grey pruinose. Vertex and frons black-haired, the former with yellow hairs behind; epistoma yellow-haired, above, at the sides of the antennæ, black hairs. Occiput greyish pruinose, with white hairs, yellow upwards, above a row of black hairs, overhanging the eyes; the occiput is a little puffed out along the upper eye-margin. Eyes bare. Antennæ blackish or brown, paler below, third joint elongated oval, considerably longer than the two basal together; arista scarcely as long as the antennæ. Thorax æneous, shining, often bluish or more brassy, or sometimes a little purplish; postalar calli slightly yellowish; the thorax is clothed with

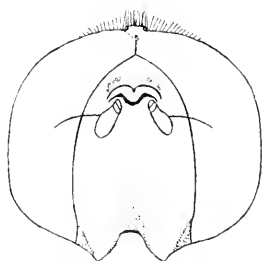


Fig. 123.
Head of *S. luniger* ♂.

somewhat long, yellow hairs, densest at the sides; scutellum dark yellowish, somewhat bluish aeneous, with black hairs, at the basal corners and at the margin yellow hairs. Pleura with long, yellow hairs. Abdomen marginate, dull black, a little shining at the hind margins of the segments especially the third, and shining at the apex; first segment bluish, shining; there are three pairs of large, yellow spots: the first pair triangular, lying on the middle, sloping at the sides and going near to the side margin at the upper corner but generally not reaching it; the second pair are near to the front margin, they are lunulate, a little oblique with the inner end nearest the front margin; the outer lower corner is angular, the outer side straight, nearer the side margin in front than behind; the third pair similar but still nearer the front margin; the spots are isolated from the side margin; the fourth segment has a yellow hind margin and the fifth is yellow with a transverse, black middle spot. The hairs on abdomen follow the ground colour, at the sides they are long and yellow at the base, for the rest short and black. Venter yellow, with black, transverse middle spots on the segments; it is clothed with long, pale hairs, fourth segment partly with short, black hairs. Genitalia small, reddish, only the eighth segment black just behind; the hairs are black, pale only at the lower margin of the eighth segment. Legs yellow with about the basal third of anterior femora and the basal half or two thirds of hind femora black; the front tarsi and the last four joints of the posterior tarsi blackish, hind metatarsi generally brownish. The long hairs on femora are pale at the base, more or less black outwards most so on front femora; the short hairs on the anterior side of hind femora and on dorsal and anterior sides of hind tibiae black, for the rest yellow. Wings hyaline or very slightly tinged. Squamulae whitish yellow with yellow margin and fringes. Halteres yellow.

Female. Vertex of medium breadth, shining black, the black space about quadrate; there are somewhat large, yellowish side dust spots, between which the black colour is produced as a small furca about half way down; there are generally dark spots above the antennae; the hairs are black. Abdominal spots generally narrower than in the male though varying in this respect, the basal spots go often over the margin at the upper corners and second and third pairs may in rare cases reach the margin just above. Anterior femora with the base black, hind femora somewhat varying, sometimes quite yellow, or with the base black or more rarely this colour is more extended stretching over the basal half or almost two thirds.

Length 9—11.5 mm.

The pupa of this species is again similar to that of *nitens* and thus with the same clothing of dense, fine spines; it is fully 7 mm long.

This species is distinguished by its isolated lunules; moreover it differs from *corollae* by the black-haired scutellum, further in the male by the small genitalia, and in the female by the larger frontal dust spots between which is a larger and distinct prolongation from the black colour; from *latifasciatus* it is distinguished by the larger size, black-haired scutellum and further by a less broad hinder eye-margin and smaller vertex, and in the female by the frontal dust spots. *S. nitens* will be the most similar species when its abdominal bands are nearly or quite interrupted, but *luniger* may, I think, be known by the hinder eye-margin being a little broader and the vertex longer, and also by the generally more yellow-haired epistoma; in the female the separated and isolated abdominal lunules seem to be a sure distinction.

S. luniger is a common species in Denmark: Copenhagen in gardens, Amager, Vester Fælled, Charlottenlund, Ørdrup Mose, Ermelund, Dyrehaven, Tisvilde, Jægerspris; on Lolland at Strandby; on Funen at Odense, and on Bornholm in Almindingen. My dates are ¹⁶/₅—¹⁸/₁₀. It occurs on flowers on various localities, often in great numbers: it seems especially to occur in late summer and autumn. I have taken the pupa in the earth in a garden at Copenhagen on ¹⁷/₇, it developed on ¹⁸/₇, and another sitting on grass in Almindingen on Bornholm on ⁸/₈, it developed a few days later.

Geographical distribution:— Europe down into Spain and Italy; towards the north to northern Sweden, and in Finland. Further it is recorded from the Canaries.

Remarks: The four last described species, *nitens*, *latifasciatus*, *corollae* and *luniger* form a natural group, as also shown by their larvæ, and they are also rather similar: when the specimens are typical the two former are separated by the uninterrupted bands from the two latter, and the two former species are separated from each other by the respectively black- or yellow-haired scutellum, and likewise the two latter, of which *luniger* moreover is separated from *corollae* by the abdominal spots being isolated from the side margin. As seen from the descriptions specimens occur, however, which are not typical in the said respects, but such specimens may, I think, be distinguished by the characters mentioned in the remarks after each species.

19. *S. lapponicus* Zett.

1838. Zett. Ins. Lapp. 598. 2 et 1843. Zett. Dipt. Scand. II, 701, 3 et 1849. VIII, 3131. 3 et 1859. XIII, 5090. 3 (*Seavea*). — 1907. Kat. paläarkt.

Dipt. III, 65. — *S. arcuatus* et var. *lapponicus* 1901. Verr. Brit. Fl. VIII, 380. fig. 297. — *S. arcuatus* p. p. 1862. Schin. F. A. I, 305.

Male. Frons yellow with a dark, bilunulate spot above the antennæ; epistoma narrower than in *luniger*, yellow with a black middle line reaching about to the antennæ, the mouth edge and lower lateral corners blackish; jowls bluish æneous. Vertex and frons black-haired: epistoma yellow-haired with some black hairs above, at the sides of the antennæ. Occiput greyish pruinose, the hairs yellow, above a few black, overhanging hairs. Eyes bare. Antennæ brownish, a little paler below; third joint oval, a little longer than the two basal together; arista as long as or a little longer than the antennæ. Thorax dark æneous or somewhat bluish, shining, postalar calli slightly brownish: thorax clothed with yellow hairs, densest at the sides. Scutellum yellow, with blackish hairs on the disc. Pleura with long, yellow hairs. Abdomen somewhat marginate, dull black, shining at base and apex. It has three pairs of yellow lunules about as in *luniger* and isolated from the side margins: the first pair transversely oblong, not sloping forwards at the sides; fourth and fifth segments with narrow, yellow hind margins. The hairs on abdomen follow the ground colour, at the sides they are long and yellow at the base, for the rest black. Venter yellowish, with large, black, transverse spots on the segments; it has long, pale hairs, towards the apex they are shorter and dark. Genitalia of medium size, black. Legs yellow, anterior femora with the basal third black, hind femora except the apex black or blackish; hind tibiæ with a faint, dark ring in the middle; tarsi with the three middle joints blackish, hind metatarsus brownish. The long hairs on femora mainly yellow, only towards

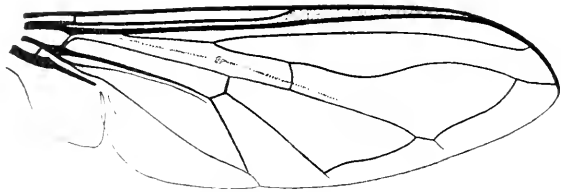


Fig. 124. Wing of *S. lapponicus* ♂.

apex some black; the short hairs dark on the anterior side of hind femora and mostly dark on hind tibiæ, for the rest yellow. Wings nearly hyaline; the cubital vein distinctly dipped down above the first posterior cell. Squamulæ pale yellow with yellow margin and fringes. Halteres yellow.

Female. Vertex broad, black and shining, the black space nearly quadrate, from it goes a black middle line forwards which soon widens and forms a large, black lunule above the antennæ; side dust spots large; the hairs black. Abdominal lunules distinctly narrower than in the male. Legs as in the male, tarsi, especially the front ones, rather obviously flattened.

Length about 10—11,5 mm.

S. lapponicus is very rare i Denmark, we have only one specimen, a male, taken by Stæger in Ordrup on 16/7 1843, no doubt just the specimen mentioned by Zetterstedt (l. c. VIII, 3131).

Geographical distribution:— By the confusion of the species in question it is not possible to give the distribution with certainty, but the species occurs in Scandinavia, towards the north to northern Sweden, in Finland and in England, and it is recorded from all Europe; it is also recorded from North America but the determination is not certain.

20. *S. arcuatus* Fall.

1817. Fall. Dipt. Suec. Syrph. 42, 11 (*Scaeva*). — 1822. Meig. Syst. Besch. III, 302, 43. — 1843. Zett. Dipt. Scand. II, 719, 22 (*Scaeva*). — 1862. Schin. F. A. I, 305, p. p. — 1907. Kat. paläarkt. Dipt. III, 58.

Male. Frons broad and somewhat inflated, almost as in *Lasiophthicus*, the upper angle obtuse; epistoma likewise broad, yellow, central knob blackish or brown and mouth edge more or less so. Jowls æneous. Vertex and frons black-haired, the latter densely but the whole front half bare; epistoma yellow-haired, above at the sides of the antennæ are black hairs. Occiput grey pruinose, the hairs white below, yellowish upwards; just above some black, overhanging hairs. Eyes bare; there is a space of large facets about as in *Lasiophthicus* but a little less pronounced. Antennæ brownish or blackish brown, pale below, third joint oval, longer than the two basal joints together; arista as long as or longer than the antennæ. Thorax blue, brightly shining, a little yellowish at the sides, especially on the postalar calli; it is clothed with yellow hairs, somewhat dense at the sides. Scutellum dark yellow, somewhat bluish, black-haired, at the basal corners and the margin are yellow hairs. Pleura with long, yellowish hairs. Abdomen marginate, dull black, shining at the apex

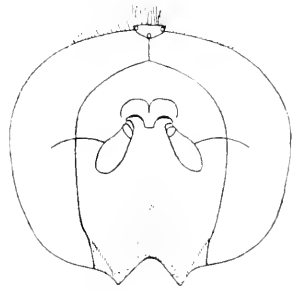


Fig. 125.
Head of *S. arcuatus* ♂.

and at the hind margin of the third segment; first segment bluish, shining. There are three pairs of yellow lunules, about as in *luniger*; the first pair triangular, not lunulate, and just reaching the side margin at the upper corner, second and third pairs isolated from the margin; the fourth segment has a yellow hind margin, the fifth likewise and also basal corner spots, or it is yellow with a black, transverse spot. The hairs on abdomen follow mainly the ground colour, but at the base and between the lunules are some pale hairs; at the sides the hairs are long and yellow at the base, for the rest short and black. Venter yellowish with black or brown, transverse spots on the segments; it has long, pale hairs, at the apex are short, black hairs. Genitalia small, black and reddish, with black hairs. Legs yellow, anterior femora with about the basal third, hind femora with about the basal half or two thirds black; tarsi brownish, last joint paler and middle metatarsus more or less yellow. The long hairs on femora considerably black but pale at the base, on hind femora only black at apex; the short hairs black on the anterior side of hind femora, and mostly on hind tibiæ, for the rest yellow. Wings hyaline; cubital vein slightly curved but not or scarcely more than in *luniger*. Squamulæ whitish with a pale yellow margin and fringe. Halteres pale yellow.

Female. Vertex black, shining, the black space about quadrate; frons somewhat arched, the usual transverse depression slight or quite wanting; there are somewhat large, yellowish grey dust spots, between which is a short and often vague or almost wanting prolongation from the black vertex, stopping long before the middle; the frons for the rest dark yellow, often with two more or less distinct, brown spots above the antennæ; the hairs black. Abdominal markings a little narrower than in the male. Legs as in the male, hind femora with only the basal third or half black; tarsi, especially front tarsi, somewhat flattened.

Length 11.5 to fully 12 mm.

This species is not unlike *L. pyrastris* or *seleniticus* but is at once distinguished by the bare eyes.

S. arcuatus is rare in Denmark, and it is curious that it seems to have been more common in earlier time, as I know about twenty specimens, all taken many years ago but none more recently; vicinity of Copenhagen (Schlick), Ordrup Mose (Stæger), at Sorø (Jacobsen) and in Jutland at Horsens (O. G. Jensen); the dates are ²⁸/₅—¹⁰/₇.

Geographical distribution: — The species occurs (if correctly determined) in Scandinavia to the northern parts, and on Iceland; it is otherwise recorded from various parts of Europe, and also from Green-

land, but according to the confusion with the preceding and other allied species the records are doubtful; I have examined specimens from Greenland, but I do not think they belong to the present species.

Remarks: The two species *lapponicus* and *arcuatus* are evidently allied to the group formed by the four foregoing species, and they are also similar to these species, especially to *luniger*; *lapponicus* is at once distinguished by the dipped cubital vein; *arcuatus* is in the male likewise easily distinguished by the broad, inflated frons and the area of enlarged eye-facets; the female will be distinguished from *luniger* only with difficulty; it may be known by its larger size, more blue thorax, and the more arched frons with the short, sometimes vague elongation from the black vertex, this elongation going in *luniger* generally below the middle of the frons.

Though *lapponicus* and *arcuatus*, in spite of their similar outer appearance, are rather different, we are, however, at present in confusion with regard to them, and I do not feel quite sure with regard to the determination. My reasons for the determination are the following: with regard to *lapponicus* Zetterstedt says that the cubital vein is more curved than in *arcuatus*, and as said the sole male I have of my *lapponicus* is mentioned by Zetterstedt; to be sure it is referred to his var. c., which is "duplo minor", but the species seems really to vary a good deal in size. The females I have described, and which no doubt are specifically identical with my male, are from Lapland, sent from Zetterstedt, and as far as we know labelled *lapponicus*; I therefore think this determination correct. My doubts are greater with regard to my *arcuatus*; it has the cubital vein slightly curved, as Zetterstedt notes, but the curvation is scarcely stronger than in *luniger*; it is upon the whole larger than *lapponicus*, but Zetterstedt calls it smaller, though he gives the same largest size, $3\frac{1}{2}$ lin. for both; that he does not mention the area of large eye-facets and the somewhat inflated frons, is, I think, of no consequence. Zetterstedt's *lapponicus* and *arcuatus* Fall. have hitherto been separated only on small characters, and have often been considered as the same species; should this prove to be the case my *arcuatus* must be an hitherto undescribed species. — Verrall has no doubt had only *lapponicus*, as he for both gives the dipped cubital vein and mentions only some colour variation of the legs. On the other hand it is evidently my *arcuatus* which Malm (K. V. och V. Samh. Göteborgs Handl. VII. 30) describes as *luniger* as seen from the description of the frons. — Verrall says (Brit. Fl. VIII, 387) that in the Copenhagen Museum he found nine specimens labelled *arcuatus*, which appeared to be *luniger*; this is correct, only that the five of them were *corollae*; further he

says that eight specimens labelled *luniger* were probably *Catabomba selenitica*, but this is not correct, these eight specimens are just my *arcuatus*: Verrall's expression shows how much the species is similar to a *Catabomba*, but he has failed to observe the bare eyes. On pag. 333—34 Verrall speaks of four specimens from North America in Bigot's collection, labelled *lapponicus*, which he considers as a bare-eyed *Catabomba*, and which he thinks may perhaps be the true European *S. lapponicus*; after the above it would be my *arcuatus*, but as shown below, it is probable that neither *lapponicus* nor *arcuatus* occur in North America. Osburn (Journ. New York Ent. Soc. XVIII, 1910, 53) records *S. arcuatus*, under which he includes both *arcuatus* and *lapponicus*, but according to his figure of the broad frons in the male and the dipped cubital vein it cannot be my *arcuatus* nor *lapponicus*. At the same place the author describes a new species, *S. perplexus*, likewise with a broad frons, but with an almost straight cubital vein; the colour of the frons of the female shows that the species cannot be my *arcuatus*. Our two species thus do not seem to occur in America, and the species from Bigot's collection mentioned by Verrall is probably one of Osburn's species. Osburn says that in both his species some males have an area of enlarged eye-facets, others not; among his specimens of *arcuatus* there were only few males with the area and none from Europe, in *perplexus* most males had the area. I do not think this possible; the character of a distinctly marked area of large facets is according to my experiences not variable in the same species; supposed that the author has separated his specimens correctly I should be inclined to think that the different condition might be due to exsiccation, which sometimes may cause an area of larger facets less easy to observe.

21. *S. bifasciatus* Fabr.

1794. Fabr. Ent. Syst. IV, 305, 101 et 1805. Syst. Antl. 248. 2 (*Scaeva*). — 1822. Meig. Syst. Besch. III, 309, 52. — 1843. Zett. Dipt. Scand. II. 713. 15 et 1855. XII, 4656, 15 (*Scaeva*). — 1862. Schin. F. A. 1, 309. — 1901. Verr. Brit. Fl. VIII, 387, 21, figs. 299—301. — 1907. Kat. paläarkt. Dipt. III, 61.

Male. Vertex elongate, black; frons yellow, with a large, black lunule above the antennæ, and behind a little dark pruinose. Epistoma yellow, the mouth edge and lower lateral parts darkened to black. Jowls black or greyish, more or less yellow behind. Vertex yellow-haired behind, black-haired in front, frons black-haired; epistoma yellow-haired, above at the sides with some black hairs. Occiput greyish yellow pruinose, the hairs yellow, upwards dark yellow; no

or a few black hairs above. Eyes bare. Antennæ blackish, pale below; arista as long as the antennæ. Thorax æneous or dark brass-coloured, shining; it is clothed with yellow hairs, densest at the sides. Scutellum yellowish brown, densely yellow-haired. Pleura with long, yellow hairs. Abdomen not very ovate, often rather parallel-sided, black or more brownish black, shining, a little dullish on second segment. It has a pair of large, triangular basal spots, widely separated in the middle, going widely over the side margin and here occupying about the whole segment; the third segment has a band at the front margin, emarginate in the middle behind or interrupted: it goes over the sides; the band may sometimes be reduced to small lateral spots or it may be quite wanting; the rest of abdomen is black. The hairs on abdomen somewhat long, mainly yellow but more or less black at the hind margins of the segments and at the apex: at the side margins they are yellow and somewhat long, longest at the base. Venter yellowish on the basal half, black on the apical half, with long, yellow hairs. Genitalia somewhat large, black, with black and some pale hairs. Legs yellow, base of femora black ranging from just the base to about the basal third; hind tarsi black, the last or two last joints more or less yellowish, front metatarsi sometimes blackish at the extreme base. The hairs on the legs all yellow, or some few black above the hind tibiæ. Wings a little tinged. Squamulæ yellowish with a darker margin and fringe. Halteres yellow or pale yellow.

Female. Vertex of medium breadth, black; frons with large, yellowish side dust spots, between which a black middle stripe down to the black lunule above the antennæ; the hairs black. Jowls yellow. The basal abdominal spots larger than in the male, going near to each other in the middle or united to a band; the second band generally uninterrupted, and there is not rarely a narrow band at the front margin of also the fourth segment (this band may also be present in the male, but I have never seen it in any Danish specimen of this sex). Legs with the femora not black at the base.

Length 9,5—11,5 mm.

As seen from the description this species varies a good deal with regard to the abdominal markings, but in spite of this it is so characteristic that it cannot be confounded with any other species. — The type to the species, a male, is present in the collection of Tönder Lund, and I have examined it.

S. bifasciatus is somewhat common in Denmark; Copenhagen in gardens, Ordrup Mose, Ermelund, Lyngby, at Sorø; on Falster and on Lolland at Maribo and Strandby; on Langeland at Lohals; in Jutland at Horsens. My dates are $^{3/5}$ — $^{1/7}$, it is thus a somewhat early

species. It occurs in woods and thickets and often in gardens, I think more often in gardens than on any other locality.

Geographical distribution:— Europa down into Spain and Italy: towards the north to middle Sweden.

22. *S. balteatus* De Geer.

1776. De Geer, *Mém. Ins.* VI, 116, 7 (*Musca*). — 1822. Meig. *Syst. Besch.* III, 317, 57. — 1843. Zett. *Dipt. Scand.* II, 721, 24 et 1849. VIII, 3149, 24 (*Scaeva*). — 1862. Schin. *F. A.* I, 309. — 1901. Verr. *Brit. Fl.* VIII, 390, 22, fig. 302. — 1907. Kat. paläarkt. *Dipt.* III, 60. — *Syrphus nectareus* Fabr. 1787. *Mantis. Ins.* II, 341 et 1794. *Ent. Syst.* IV, 309, 116 et 1805. *Syst. Antl.* 253, 22 (*Scaeva*). — 1817. Fall. *Dipt. Suec. Syrph.* 43, 14 (*Scaeva*).

Male. Head as high as broad, frons and epistoma narrow. Vertex very elongate, yellowish pruinose; frons yellow, a little greyish dusted behind; epistoma yellow, whitish yellow pruinose, the central knob shining; near the lower corner of the eye a blackish spot. Jowls grey. Vertex yellow-haired, frons with black hairs; epistoma yellow-haired, above at the sides some black hairs. Occiput greyish pruinose, the hairs whitish below, yellow upwards, no black hairs above. Eyes bare. Antennæ yellow or reddish yellow, third joint more or less dark above; the third joint oval but rather short, not longer than the two basal joints together; arista longer than the antennæ. Thorax æneous or brass-coloured, sometimes a little purplish, shining; it has three faint, greyish, longitudinal stripes, the median the narrowest; also the sides a little greyish so that between the stripes four darker stripes may be seen; the thorax is clothed with yellow hairs, a little denser at the sides. Scutellum yellow, with long, black hairs, at the basal corners a few yellow hairs. Pleura grey pruinose, somewhat sparingly clothed with pale yellow hairs. Abdomen somewhat narrow and parallel-sided, dull, somewhat shining at base and apex; it has extensive yellow markings so that it is more yellow than black; it is greenish at the base; the second segment has close to the front margin two large side spots, which on the inner side have a narrow but deep incision above the middle, and they leave the hind margin black, the part of the spot above the incision sometimes indistinct; third and fourth segments have each a broad band towards the front margin, occupying three fourths of the segments and a little emarginate behind in the middle; each of the bands has near the front margin a narrow, black band, stretching near or quite to the sides, in the latter case dividing the yellow band into two, a narrow anterior and a broad posterior; the black band is emarginate or interrupted in the middle;

the markings go more or less widely over the side margins, but are sometimes isolated; the fourth segment has a yellow hind margin, the fifth is quite yellow or with a triangular, black spot. The hairs on abdomen are short; they are mainly yellow but black just at the hind margins of second and third segments, and there are also some black hairs along the middle, and fourth and fifth segments are almost quite black-haired; at the sides the hairs are longer, longest at the base; they are here yellow, for the rest alternating yellow and black. Venter pale yellow with more or less distinct, dark, longitudinal middle spots on the segments; it has long, pale hairs, on fourth segment also short, black hairs. Genitalia not large, reddish, eighth segment with a black spot behind and ninth segment partly black; the hairs black. Legs somewhat long and slender, yellow, anterior tarsi darkened towards the end, hind tarsi brownish or blackish. The hairs on the legs yellow, black only on the apical half on the anterior side of hind femora and all round the tip, and nearly all on the hind tibiæ, which latter have a distinct antero-dorsal fringe. Wings a little brownish tinged. Squamulæ yellowish white with yellow margin and fringes. Halteres yellow.

Female. Frons and epistoma narrow; vertex and frons yellowish pruinose, vertical triangle a little æneous and from here an æneous middle stripe stretches down to a bare spot above the antennæ, which spot is yellow, a little æneous above; the hairs black. Thorax with the stripes generally more distinct than in the male. Pleura more whitish pruinose, with white hairs. Abdomen as in the male, the black hind margins of the segments sometimes broader. Legs as in the male.

Length 9,5—11 mm.

The larva is described as smooth, dirty whitish, with some stripes at the sides posteriorly; the length is 12 mm. The puparium is whitish, with more or less distinct, greyish or brownish triangles on the dorsum; it is rather attenuated behind and has here a delicate side-brim: the length is fully 7 mm.

This species cannot be confounded with any other as it has no ally in Europe; in China, India, Borneo, South America and Australia very nearly allied and very similar species occur. — The types, a male and female, to *S. nectareus* Fabr. are present in the collection of Tønder Lund, and I have examined them.

S. balteatus is a very common species in Denmark and occurs all over the country on all localities, also very commonly in gardens; it is generally seen hovering about bushes. My dates are $9/7$ — $26/10$, it is thus a late occurring species. Larvæ and pupæ are often met with:

larvæ were taken on *Sambucus* among Aphides in Dyrehaven on $31/7$, they developed on $8/s$, and on *Brassica* at Maribo in August (Schlick); pupæ have been taken on *Phragmites*, *Typha*, *Rosa* and *Rheum* between $25/7$ and $26/s$, developing between $6/s$ and $19/s$.

Geographical distribution:— Widely distributed species; all Europe, towards the north to middle Sweden, and in Finland; further it occurs in Asia to Japan, in North Africa, on Madeira and the Canaries.

23. *S. cinctellus* Zett.

1843. Zett. Dipt. Scand. II, 742, 45 et 1849. VIII, 3143, 45 (*Scaeva*).
— 1862. Schin. F. A. I, 312. — 1901. Verr. Brit. Fl. VIII, 392, 23. —
1907. Kat. paläarkt. Dipt. III, 62. — *Scaeva cincta* Fall. p. p. 1817. Dipt. Suec. Syrph. 45, 18.

Male. Vertex æneous, elongated triangular; frons and epistoma somewhat narrow, the central knob elongated; frons yellow and yellow pruinose, above the antennæ a large, very definitely marked, black and shining, semicircular spot, a little tridentate in front; epistoma yellow and yellowish pruinose, the knob shining and sometimes a little darkened; mouth edge reddish. Jowls yellow, along the eye-margin more or less grey pruinose. Vertex and frons black-haired, the latter sometimes with paler hairs; epistoma with yellow hairs. Occiput grey pruinose with white hairs below, yellow upwards; there

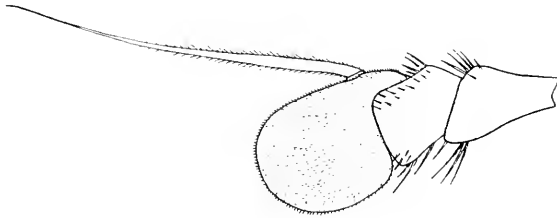


Fig. 126. Antenna of *S. cinctellus* ♂, from the inside. $\times 60$.

are no black hairs above. Eyes bare. Antennæ somewhat short, reddish, third joint more or less blackish above; the third joint short oval, not longer than the two basal joints together; arista distinctly longer than the antennæ, slightly pubescent. Thorax æneous or brass-coloured, sometimes a little greenish or coppery, shining; the præ-sutural depression yellowish pruinose; the thorax is clothed with dark yellow hairs, rather long behind, and here often brownish. Scutellum yellow with a bluish reflex and with long, black hairs. Pleura with yellow hairs. Abdomen long and narrow, narrower than thorax and

parallel-sided: it may sometimes be a little broader and a little widening backwards; it is dull black, shining just at base and apex; there are a pair of yellow basal spots and two bands; the basal spots are large, at the sides stretching from the basal corners to near the hind margin and going in on the disc as very blunt triangles but widely separated; the band on third segment occupies about the half of the length, it lies near the front margin; it is more or less but generally only slightly emarginate behind and often again a little produced in the middle of the emargination; it is likewise generally a little produced in the middle of the front margin; the band on fourth segment is similar but nearer the front margin. The bands go over the side margin, the basal spots generally only at the upper corners: the fourth segment has a yellow hind margin, the fifth has the front margin yellow or is quite yellow with a black middle spot; the hind margin of fourth and the front margin of fifth segments form together a third band. The hairs on abdomen not long, they follow partly the ground colour but along the middle are not few black hairs, and fourth and fifth segments are almost quite black-haired; at the sides the hairs are long and yellow on the basal part for the rest alternating black and yellow, but there are generally no black hairs at the hind corners of second segment. Venter yellow, as far as I could see without markings: when dark markings seem to be visible it is only the dorsal markings which shine through; the venter has long, pale hairs, at the apex shorter, dark hairs. Genitalia relatively large, reddish, eighth segment a little black behind on the right side; the hairs black. Legs slender, yellow, anterior femora quite yellow or more or less blackish at or near the base, hind femora black with the base more or less broadly yellowish and the apex yellowish; hind tibiæ blackish with the basal part and the apex more or less pale, often only slightly, hind tarsi blackish. The long hairs on femora are yellow on the basal, black on the apical part, on the front femora only few black hairs or none at all: the short hairs are black on the anterior side of hind femora, and almost all on hind tibiæ, for the rest yellow; hind tibiæ with an antero-dorsal fringe, somewhat long about the middle. Wings slightly brownish tinged. Squamulæ and halteres yellow.

Female. Vertex not broad, a little shining, for the rest the frons yellowish pruinose, with a black, shining, semicircular spot as in the male; the hairs dark. Abdomen with the basal spots more quadrate, lying close to the front margin, and often also the first segment yellow; the bands more straight than in the male, not emarginate but often a little produced in the middle behind. Legs

paler than in the male. anterior legs quite yellow and hind femora with a broad, blackish ring at or near the apex.

Length 9—10,5 mm.

The puparium is whitish, marbled with greyish brown, especially at the sides and forming triangles on the anterior part of the dorsum; also the ventral side is marbled, but along the sides is a white, undulated line; it is much attenuated behind and the attenuation is more sudden than in *balteatus*; the posterior spiracular process not long, yellow, cleft at the apex; the length is 6 mm.

S. cinctellus is not rare in Denmark, but it does not belong to the most common species; Charlottenlund, Ermelund, Bagsvær, Geel Skov, Ørholm, Ruderhegn, Donse, Tyvekrog, Tisvilde, Nyraad near Vordingborg; on Lolland in Egholm Skov and Dødemose west of Nysted; on Langeland at Lohals; on Funen; in Jutland in Greisdal and Højenbæk Dal at Vejle, at Horsens, Silkeborg, Frijsenborg and Rebbild near Skørping, and on Bornholm at Rønne and Læsaa. My dates are $\frac{7}{6}$ — $\frac{23}{9}$. It occurs in woods and thickets on leaves and flowers; I took a pupa in Charlottenlund on the stem of a tree on $\frac{21}{7}$, it developed soon after. — I possess a male specimen from Bornholm being in all respects *S. cinctellus* but with the spot above the antennæ yellow; the specimen belongs to the most pale-legged.

Geographical distribution: — Northern and central Europe down into Austria and Styria, and also recorded from Corsica and Spain; towards the north to northern Sweden, and in Finland.

24. *S. cinctus* Fall.

1817. Fall. Dipt. Suec. Syrph. 45, 18 (*Scaeva*). — 1822. Meig. Syst. Besch. III. 318, 65. — 1843. Zett. Dipt. Scand. II, 741, 44 et 1849. VIII, 3143, 44 et 1859. XIII, 5099, 44 (*Scaeva*). — 1862. Schin. F. A. I, 312. — 1901. Verr. Brit. Fl. VIII, 394, 24. — 1907. Kat. paläarkt. Dipt. III. 62. — *S. placidus* Meig. 1822. Syst. Besch. III. 322, 70. — 1862. Schin. F. A. I, 312.

This species is rather like *cinctellus* but is smaller, especially shorter. Male. Vertex more elongate than in *cinctellus* and frons and epistoma narrower, less than one third of the breadth of the head, the central knob not elongate as in *cinctellus*. Frons either quite yellow, or it has a black lunule, tridentate in front, above the antennæ, but this lunule has an orange lunule beneath not found in *cinctellus*; the frons may also be greyish pruinose above; epistoma yellow, yellowish white pruinose, the knob bare; the epistoma may be more or less darkened about the mouth edge and on the lower lateral parts. Jowls yellow or grey and in accordance with the narrow epistoma

rather narrow, much narrower than in *cinctellus*. Vertex and frons with the hairs varying from yellow to black; epistoma with the hairs yellow, or more or less black at the sides. Occiput whitish grey pruinose, the hairs white below, yellow upwards and there are generally no black hairs. Eyes bare. Antennæ short, yellow to somewhat

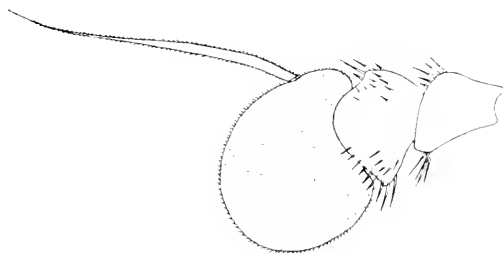


Fig. 127. Antenna of *S. cinctus* ♂, from the inside. $\times 60$.

brownish, and sometimes the basal joints blackish; third joint short, almost circular; arista shorter than in *cinctellus*, as long as the antennæ, apparently bare. Thorax æneous or more or less bright brass-coloured, sometimes somewhat greenish; it is brightly shining; in pale specimens it is distinctly yellowish at the sides; the præsutural depression not pruinose; the thorax is clothed with yellow or reddish yellow hairs, longest behind. Scutellum yellow, sometimes rather dark, a little æneous, with long, yellow hairs, in dark specimens sometimes a few black intermingled. Pleura with yellow hairs. Abdomen narrow, parallel-sided but not specially long; it is generally narrower than thorax, but sometimes as broad or slightly broader; it is dull black with the first segment and the apex shining. The yellow markings similar to those in *cinctellus*, but the bands generally not or only slightly emarginate, and often relatively broader, occupying more than the half of the segments; the basal spots are smaller and pointed inwards, and they leave the third of the breadth or more black; the yellow hind margin of the fourth and front margin of the fifth segments form together a third band; the fifth segment has also generally a yellow hind margin and is sometimes quite yellow. The hairs on abdomen follow partly the ground colour, but they are to a high degree pale on the second segment and are black at the apex; they are long at the sides, longest at the base, they are here yellow, for the rest alternating but there are no or only a couple of black hairs at the hind corners of second segment, and also on third and fourth segments they are often somewhat reduced. Venter yellowish with

more or less obvious, black side spots just at the margins of the segments; is has long, pale hairs, on the apical half also short, black hairs. Genitalia relatively large, varying in colour from almost quite black to quite reddish; the hairs black and pale. Legs varying in colour, in pale specimens quite yellow with only hind femora and tibiæ a little darkened in the middle and hind tarsi brown; in dark specimens the anterior femora have the basal part black, hind femora black with apex and often also base yellow, hind tibiæ with a black ring in the middle and hind tarsi black. The long hairs on femora are yellow, the short hairs black on anterior side of hind femora in the apical half and all round at apex, and on the dorsal and anterior side of hind tibiæ, for the rest yellow; hind tibiæ with an antero-dorsal fringe with some long hairs about the middle. Wings hyaline to rather brownish tinged. Squamulæ yellowish with yellow margin and fringes. Halteres yellow.

Female. Vertex narrow, shining black on a quadrate space; frons yellow dusted, with a black, shining middle stripe from the vertex to the bare and shining, yellow space above the antennæ, the stripe a little widened below; the hairs dark about the vertical triangle, yellow downwards. Abdomen as in the male, but the basal spots sometimes going near to each other in the middle and the bands narrower, not emarginate; the third band on the hind margin of fourth and front margin of fifth segment emarginate behind as the fifth segment has two yellow basal corner spots. Legs as in the palest forms of the male, sometimes all yellow.

Length. This species varies much in size, the length from 7 to about 10 mm.

The pupa is recorded by Zetterstedt (l. c. 741) and described as "pisiformis, inermis, albida".

As seen this species varies somewhat with regard to the colour of the frons and its pubescence in the male and the colour of the legs; the darker varieties answer to *placidus* of Meigen. It also varies much in size as seen from the given lengths, and at the same time the abdomen varies in breadth, the larger specimens being stronger and with the abdomen considerably broader. The species will generally be known from *cinctellus* by the yellow-haired scutellum, but otherwise the narrower frons and epistoma, the not elongated central knob, the shorter third antennal joint and shorter, bare arista and the shorter abdomen with the single segments generally relatively shorter will distinguish it.

S. cinctus is not rare in Denmark; at Copenhagen, Ordrup Mose, Charlottenlund, Ermelund, Dyrehaven, Bagsvær, Hareskov, Geel Skov,

Ørholm, Hillerød, Tyvekrog, Nyraad near Vordingborg, Faxø Ladeplads; on Langeland at Lohals; on Funen at Middelfart; in Jutland at Horsens, Silkeborg, Hald near Viborg and Sæby. My dates are $10\frac{1}{5}$ — $23\frac{1}{9}$. It occurs on Umbelliferæ and other flowers in woods and thickets; I have often seen the males hovering beautifully over roads in woods on somewhat sunny places, about ten feet from the ground.

Geographical distribution:— Europe down into Italy; towards the north to southern Lapland.

25. *S. auricollis* Meig.

1822. Meig. Syst. Besch. III, 318, 64. — 1843. Zett. Dipt. Scand. II, 743, 46 (*Scaeva*). — 1862. Schin. F. A. I, 311. — 1901. Verr. Brit. Fl. VIII, 397, 25, fig. 303. — 1907. Kat. paläarkt. Dipt. III, 59. — *Scaeva umbellatarum* p. p. 1817. Fall. Dipt. Suec. Syrph. 44, 15. — *Syrphus decorus* Meig. 1822. l. c. III, 319, 66. — 1862. Schin. F. A. I, 308. — *S. Iris* Meig. 1822. l. c. III, 320, 67. — *Scaeva Iris* 1843. Zett. Dipt. Scand. II, 761. — *S. modestus* Meig. 1822. l. c. III, 323, 72. — 1862. Schin. F. A. I, 308 et 311. — *S. macilentus* Meig. 1838. l. c. VII, 135, 109. — *Scaeva maculicornis* Zett. 1843. l. c. II, 736, 38 et 1849. VIII, 3142, 38 et 1859. XIII, 5098, 38. — *Syrphus maculicornis* 1862. Schin. F. A. I, 308. — *Scaeva cinctipes* Zett. 1859. l. c. XIII, 6000, 46—47. — 1860. Malm. K. V. och V. Saml. Göteborg Handl. VII, 41.

Male. Vertex elongate triangular; frons yellowish grey or more grey pruinose, sometimes a little æneous, above the antennæ a black, shining lunule with an orange lunule beneath; epistoma yellow, sometimes rather dark, all yellow or greyish yellow pruinose, the central knob brownish or blackish, somewhat shining; mouth edge and lower side corners more or less but indefinitely blackish. Jowls yellow or more or less grey. Vertex and frons black-haired; epistoma with black, downwards yellow hairs. Occiput yellowish grey pruinose, the hairs whitish below, yellow upwards; above a row of some dark, overhanging hairs. Eyes bare. Antennæ yellowish red or brown, third joint black above; the third joint is oval; arista fully as long as the antennæ, bare. Thorax greenish æneous, brightly shining, sometimes somewhat purplish; it is clothed with yellow hairs, longest behind. Scutellum yellow, a little æneous, with long, black hairs. Abdomen long and narrow, parallel-sided, generally narrower than thorax, sometimes of the same breadth; it is dull black, a little shining at base and apex; there are three pairs of yellow spots (*maculicornis*), or the spots on third and fourth segments connected in front to deeply incised bands (*auricollis*); the spots on second segment are oblique, pyriform; they begin near the lower corner and stretch forwards and inwards, at the same time being broader, ending roundly about in the

middle: the front margin of the spots is sometimes somewhat indefinite and in rare cases the segment is here somewhat yellowish so that the spots seem produced forwards and being of a triangular shape, but generally the pyriform shape may, however, be seen in certain lights: the spots on third segment lie a little from the front margin; they are somewhat triangular with the fore margin straight, the hind margin sloping forwards towards the middle, and they go near to each other in the middle, or they meet here forming a deeply emarginate band; the side margin begins near the hinder corner, it is straight but sloping inwards towards the anterior and meeting the fore margin angularly; the spots on fourth segment similar; none of the spots go over the side margin, and it is characteristic that they all have the posterior outer corner nearest the side margin; the hind margin of fourth segment yellow and the fifth segment with large basal corner spots, forming together with the yellow margin of fourth segment an emarginate band. The hairs on abdomen follow the ground colour, but are somewhat pale at the base and black at apex; also on the spots on fourth segment are some black hairs; at the sides the hairs are long and yellow at the base, for the rest alternating black and yellow but only few black at the hind corners of the second segment. Venter yellowish, with long, pale hairs, shorter and sometimes black at apex. Genitalia relatively large, reddish, black behind eighth segment on the right side; the hairs black. Legs somewhat varying, from all dark yellowish or pale brownish yellow with the tarsi a little darker towards the end, and hind femora and tibiæ with faint indications of darker colour, to more dark with the anterior femora a little darkened near the base, hind femora and tibiæ blackish with base and apex of femora and base of tibiæ paler, hind tarsi blackish and anterior tarsi blackish towards the end. The hairs on femora are rather long and conspicuous, they are yellow, but on front femora black towards apex, on middle femora in about the apical half; the short hairs are yellow, but black on the anterior side of hind femora and at the apex all round, and on dorsal and anterior side of hind tibiæ; these latter have an antero-dorsal fringe, long about the middle. Wings hyaline to slightly brownish tinged. Squamulæ yellowish with a dark yellow margin and fringe. Halteres yellow.

Female. Vertex not broad, the shining black area quadrate, from it stretches a black, often indistinct middle stripe down to a black triangle or lunule above the antennæ, below the triangle a yellow lunule; for the rest the frons yellowish pruinose: the hairs black. Abdomen sometimes less parallel-sided than in the male, the markings smaller, often somewhat hoary (*modestus*). Legs as in the male.

Length 8—10,5 mm.

This species is similar to the two preceding, especially to *cinctellus* as it has, like it, the antennæ partly black and scutellum black-haired, but it will always be distinguished by the shape of the abdominal spots, which have the posterior outer corner nearest the side margin, and especially the shape of the basal spots is characteristic.

S. auricollis is not rare in Denmark; Copenhagen in gardens, Charlottenlund, Ordrup Mose, Ermelund, Dyrehaven, Lyngby Mose, Hørsholm, Sorø, Tisvilde, Faxe Ladeplads; on Langeland at Lohals; on Funen, and in Jutland at Rebbild near Skørping. My dates are $5/7$ — $26/10$, it is thus a late occurring species; I have taken it newly emerged on $8/9$. It occurs in woods and not rarely in gardens; almost all Danish specimens have the abdominal spots separated and belong thus to the var. *maculicornis*. — Verrall records the species as bred from larvæ feeding on *Aphis pruni*; further he notes that this species seems to be the main species stored up by *Crabro varus*, as it occurs in masses in its burrows, all with their heads in one direction, while a pair of *balteatus* occurred in company.

Geographical distribution: — Europe down into Spain and Italy; towards the north to middle Sweden, and in Finland; further it is recorded from Madeira and the Canaries.

26. *S. euchromus* Kow.

1885. Kow. Wien. ent. Zeitg. IV, 167. — 1901. Verr. Brit. Fl. VIII, 400, 26. — 1907. Kat. paläarkt. Dipt. III, 64. — *Scaeva decora* Zett. (nec Meig.) 1843. Dipt. Scand. II, 738, 40 et 1959. XIII, 5098, 40.

Male. Head broader than high; vertex somewhat large, triangular, not elongate. Frons broad, blackish, a little æneous, greyish pruinose but shining just above the antennæ. Epistoma rather broad, almost half as broad as the head; it is dark yellow, somewhat pruinose, the central knob shining; the mouth edge, the lower side parts and the jowls black, the latter large, a little descending. Vertex and frons black-haired; epistoma mainly black-haired but with some pale hairs below. Occiput grey pruinose, the hairs whitish below, dark yellow upwards, above a row of black hairs overhanging the eyes. Eyes practically bare. Antennæ reddish yellow, third joint oval; arista short and rather thick, shorter than the antennæ, slightly pubescent. Thorax dark æneous or a little bluish, shining; it is clothed with yellow or dark yellow hairs, longest behind. Scutellum dark brownish yellow, distinctly bluish æneous, with yellow hairs. Pleura with long, white hairs. Abdomen as broad as or fully as broad as thorax, not long.

parallel-sided: it is dull black with base, apex and the two middle incisures shining; the shining base includes the front margin of the second segment, and the incisures the hind and front margins of second and third and of third and fourth segments and they are rather definite: there are three pairs of yellow spots, the basal spots lie behind the middle of the segment, they are triangular or more transverse, well separated in the middle and going over the side margin at their upper corners; the second pair lie well away from the front margin, they are somewhat transversely rectangular, a little oblique with the inner end more forwards than the outer; they are near to each other in the middle, isolated from the side margin; the third pair are similar; at the junctions of the four first segments there are just at the sides small, yellow spots, one at each junction; the fourth segment has a yellow hind margin, the fifth large basal corner spots and the hind margin yellow. The hairs on abdomen are somewhat long, they are mainly yellow, only black at the hind margins of the segments and at apex; at the sides they are long, longest at the base and here yellow, otherwise alternating black and yellow. Venter yellowish with long, pale hairs. Genitalia somewhat large, reddish or brown, eighth segment black on the right side; the hairs black. Legs not long, a little robust; they are yellow or reddish yellow, anterior femora blackish at the base, hind femora in about the basal half but a little pale at the extreme base; hind metatarsi distinctly thickened. The long hairs on anterior femora yellow on the base or in the basal half, black towards the apex, on hind femora yellow; the short hairs are black on the apical half of hind femora and on hind tibiæ, and may also be more or less black on middle femora and tibiæ, for the rest they are yellow. Wings slightly tinged. Squamulæ whitish with a yellow fringe. Halteres pale to reddish yellow.

Female. Vertex somewhat broad, this and the frons black and shining all down to the antennæ, with small, grey dust spots at the eye-margins; the hairs somewhat long, black. Antennæ distinctly larger than in the male. Abdominal spots very slightly smaller than in the male. Legs quite yellow, only hind femora a little black below near the base.

Length fully 8 to about 9,5 mm.

This species is characteristic by the abdominal markings, broad epistoma and robust legs with thickened hind metatarsi.

S. euchromus is rare in Denmark, I know only four specimens, Ermelund, Hillerød, Tyvekrog (the author), and one specimen from earlier time without particular locality. My dates are ²⁵/₅—¹²/₆.

Geographical distribution: — Northern and middle Europe down

into Bohemia, and also recorded from Italy; towards the north to northern Sweden, and in Finland; it seems upon the whole to be rare.

27. *S. triangulifer* Zett.

1843. Zett. Dipt. Scand. II, 737, 39 (*Scaeva*). — 1862. Schin. F. A. I, 308. — 1901. Verr. Brit. Fl. VIII, 402, 27. — 1907. Kat. paläarkt. Dipt. III, 71.

Male. Vertex triangular, slightly elongate; frons and epistoma not broad, frons somewhat arched, black, below narrowly yellowish just above the antennæ; epistoma yellow, a little greyish white pruinose, the mouth edge and lower side parts blackish. Jowls small, blackish, grey pruinose. Vertex and frons black-haired; epistoma with mainly black hairs but yellow-haired below. Occiput whitish grey pruinose, the hairs white below, yellow upwards; above a short row of overhanging hairs. Eyes bare. Antennæ short, yellowish, third joint short oval, more or less darkened above; arista about as long as the antennæ. Thorax æneous, shining, clothed with yellow hairs. Scutellum yellow, blackish just at the basal corners, with yellow hairs, slightly longer than on thorax. Pleura with longish, yellow hairs. Abdomen narrow, narrower than thorax, dull black, a little shining at base and apex; there are three pairs of not large, yellow spots; the basal spots are quite small, roundish or a little triangular; they lie about on the middle, near the side margin but not reaching it; the spots of the second pair lie at the front margin, they are triangular, the front margin straight, at the sides they occupy half the length of the segment and from here the hind margin slopes forwards, meeting the front margin in a somewhat rounded inner corner, and leaving about the fourth of the breadth black; the third pair are quite similar; the spots go in full width over the margin; the fifth segment has very indistinct, pale basal corners. The hairs on abdomen follow mainly the ground colour, but are pale at the base: at the sides they are somewhat long and all yellow. Venter, as far as I could see, dark yellowish or greyish yellow, with long, pale hairs (it has perhaps dark bands). Genitalia relatively large, black and shining, with black hairs. Legs not robust; they are yellowish, anterior femora blackish on about the basal third, hind femora black with the extreme base and the apex yellow; middle tibiæ with faint traces of a dark ring in the middle, hind tibiæ with a distinct, blackish middle ring and hind tarsi brownish or blackish; hind metatarsi very slightly thickened or almost not. The long hairs on femora yellow; the short hairs all yellow except at the apex of hind femora on the anterior side and just

above the hind tibiæ. Wings a little tinged. Squamulæ and fringes somewhat dirty whitish. Halteres whitish yellow.

Female. Vertex somewhat broad, together with the frons black, shining, just above the antennæ narrowly yellow; there are narrow but elongated side dust spots, connected downwards with the dust on epistoma; the hairs yellow at the sides, brown along the middle; epistoma quite yellow, whitish pruinose, the central knob bare. Jowls somewhat yellowish but grey pruinose. Antennæ considerably larger than in the male, third joint roundly square. Thorax a little yellowish at the sides and on the humeri, and meso- ptero- and sternopleura with yellowish spots. Abdomen as in the male, but the basal spots larger, triangular, the other likewise triangular but more transverse, going nearer to each other in the middle, and a similar pair of spots at the basal corners of fifth segment. Legs paler than in the male, anterior femora only with a slight dark spot below at base, hind femora and tibiæ with a broad, dark ring about the middle.

Length fully 7 to about 9 mm.

S. triangulifer is very rare in Denmark, only three specimens, two males and one female, are known; of the males one was taken on a field at Lohals on Langeland on ²⁷/₇ 1913 and the other in Egebæks Vang in low herbage at a streamlet on ¹⁶/₇ 1915 (the author); the female is from earlier time without particular locality (perhaps not Danish).

Geographical distribution:— Northern and middle Europe down into Austria and Bohemia, and also recorded from Spain; towards the north to middle Sweden, and in Finland.

28. *S. punctulatus* Verr.

1873. Verr. Entom. Month. Mag. IX. 254 et 1901. Brit. Fl. VIII, 404. 28. — 1907. Kat. paläarkt. Dipt. III, 69.

Male. Vertex triangular, almost not elongate; frons and epistoma rather broad, increasing downwards. Frons somewhat æneous, brownish pruinose, black above the antennæ. Epistoma obscurely yellow, dark yellowish pruinose, with a somewhat indefinite, broad, blackish middle stripe; the central knob shining; the mouth edge and lower side parts indefinitely blackish. Jowls broad, a little descending, blackish. Vertex, frons and epistoma with black hairs, the latter with some yellow hairs below. Occiput grey pruinose, the hairs pale below, yellow upwards, above a row of long, black, overhanging hairs. Eyes distinctly hairy with pale hairs, but they are short and not dense; they are especially obvious on the upper part of the eye. Antennæ short, third

joint short oval; they are black, third joint more or less, often only slightly, pale beneath at the base, the basal joints also often pale beneath; arista short, not as long as the the antennæ. Thorax greenish raneous, dullish, with indications of three duller stripes, somewhat punctate; it is clothed with longish, yellow hairs, longest behind. Scutellum dark yellowish, somewhat raneous, with long, black hairs. Pleura with long, pale yellow hairs. Abdomen not quite parallel-sided, slightly ovate; it is dull black, a little shining at base and more so at apex; there are three pairs of yellow spots, the two posterior pairs semicircular; the basal spots lie nearest the hind margin of the segment, they are triangular, sloping forwards at the sides and with the upper corner going near to the side margin but not reaching it; they are widely separated in the middle; the spots of the second pair are well away from the front margin, they are about semicircular with a straight fore margin and a convex hind margin, and they go narrowly over the side margin with their upper corners; in the middle they are somewhat near to each other; the spots of the third pair are similar, a little nearer the front margin; the fourth segment has a broad, yellow hind margin and the fifth small basal corner spots. The hairs on abdomen are somewhat long, especially towards the sides; they follow mainly the ground colour: at the sides they are rather long, longest at the base and here yellow, for the rest alternating black and yellow in accordance with the spots. Venter pale yellowish, with long, pale hairs. Genitalia somewhat large, black and shining, with black hairs. Legs black or paler or darker brownish, anterior knees broadly but somewhat obscurely yellowish, and likewise the apex of tibiæ, hind knees more or less indistinctly pale; sometimes the anterior tarsi a little pale at the base, and also the hind tibiæ at the apex; the long hairs on the anterior femora yellow on the basal part, black on the apical part, on the hind femora yellow; the short hairs on the legs are to a high degree black, especially on the posterior legs. Wings yellowish or a little brownish tinged. Squamulæ dirty yellowish, the fringes yellow. Halteres paler or darker yellow, the peduncle generally darkened towards the base.

Female. Vertex broad, bluish black, shining; there are yellowish frontal side dust spots, meeting or almost meeting in the middle and going down along the eye-margins; below the spots the frons is black, shining; the hairs black. Eyes very short-haired but the hairs still observable. Abdominal spots as in the male, but also the basal spots going over the side margin, and the other spots less deep but, however, somewhat semicircular or at all events with the fore margin straight, the hind margin convex. Legs about as in the male, or the

anterior tibiæ a little paler, sometimes together with the tarsi almost quite yellow.

Length 7—8,5 mm.

The species shows no slight resemblance to *S. macularis*, but this species is larger with much more hairy eyes, and it has a little blacker antennæ, which are larger and with a longer arista, and the abdominal spots are nearer to each other in the middle or are united.

S. punctulatus is not rare in Denmark, but has hitherto been taken only on Sealand and Lolland: Ordrup Mose (Stæger), Dyrehaven, Geel Skov, Ryget Skov at Farum Sø, Donse, Tyvekrog (the author), and at Nyraad near Vordingborg (J. C. Nielsen); on Lolland at Maribo (Sønderup). My dates are $^{1/5}$ — $^{22/6}$, it is thus an early occurring species. I have taken it in woods on leaves of bushes, the females were often seen hovering quite low on a sandy road and sitting on the road.

Geographical distribution:— The species is hitherto only recorded from England and Denmark, but according to a couple of specimens sent to me from Mr. Ringdahl, it occurs also in southern Sweden: this distribution of the species is thus at present known with certainty, but it is not improbable, as suggested by Verrall, that Zetterstedt may have included the species under *macularis*. Zetterstedt remarks (l. c. VIII, 3142) under *lasiophthalmus* that this species also occurs in Denmark, which Stæger had communicated to him, calling the species *sexstriatus* Wahlb.; specimens labelled *sexstriatus* are also found in Stæger's collection, but they belong to *punctulatus*; Zetterstedt has, however, not confused *punctulatus* and *lasiophthalmus* for, as he says, "teste D. Stæger", this shows that he had not himself seen the specimens.

29. *S. lasiophthalmus* Zett.

1843. Zett. Dipt. Scand. II, 735, 37 et 1849. VIII. 3142, 37 (*Scaeva*).
— 1862. Schin. F. A. I. 307. — 1901. Verr. Brit. Fl. VIII, 417, 33. —
1907. Kat. paläarkt. Dipt. III, 65.

Male. Vertex somewhat elongate triangular; frons and epistoma broad; frons æneous, somewhat pruinose, black and shining above the antennæ but yellow close to the antennæ; epistoma obscurely yellowish and dark yellowish pruinose; it has a black, not broad middle stripe and the mouth edge and lower lateral parts black. Jowls rather broad, a little descending, brownish black, shining. Vertex, frons and epistoma black-haired, the hairs on epistoma rather long. Occiput grey pruinose, the hairs yellow, above some long, black, overhanging hairs. Eyes distinctly hairy, but the hairs short and pale though more

dense than in *punctulatus*; they are most obvious above. Antennæ short, black, third joint short oval; arista as long as the antennæ. Thorax æneous or bluish, somewhat but not much shining, clothed with rather long, yellow hairs, longest behind; at the sides darker to blackish hairs. Scutellum dark or brownish yellow, a little æneous, with long, black, on the basal part yellow hairs. Pleura with long, pale hairs, above with some black hairs. Abdomen a little ovate, dull black, a little shining on first segment and at apex; it has three pairs of yellow spots: the basal spots are somewhat small, roundish or oval; the second pair are well away from the front margin, they are transversely subquadrate, a little rounded inwards and well separated; the third pair are quite similar; all the spots are isolated from the side margin; fourth and fifth segments with narrow, yellow hind margins. The hairs on abdomen are somewhat long, mainly following the ground colour, but somewhat pale at the base; at the sides they are long, yellow at the base, for the rest alternating black and yellow in accordance with the spots. Venter blackish with pale yellow spots almost quite as on the dorsum; it has long, pale hairs intermingled with some black. Genitalia relatively large, black and shining, with black hairs. Legs black, the anterior with apex of femora and about the basal third or half of tibiæ obscurely yellow, hind knees very indistinctly pale; hind tarsi longer than tibiæ, metatarsi a little thickened. The hairs on femora long, on anterior femora black, yellow at the base, on hind femora yellow; the short hairs black on the apical part of hind femora and on hind tibiæ except below, for the rest mainly yellow. Wings a little yellowish or greyish tinged. Squamulæ whitish with yellow margin and fringes. Halteres yellow.

Female. Vertex broad, bluish black, shining; frons likewise black and shining, with narrow, transverse side dust spots, nearly meeting in the middle and going down along the eye-margins; the hairs black. Epistoma pale-haired. Jowls orange, generally with a dark spot, or line at the lower eye-margin. Eyes very slightly haired but the hairs, however, quite visible. Antennæ larger than in the male. Scutellum with only the marginal hairs black. The abdominal markings narrower than in the male and thus more linear, and the basal spots stretching more in on the disc; the spots are extended to the side margin or just going over it; fifth segment with yellow spots at the basal corners. Legs as in the male, anterior tibiæ sometimes a little paler.

Length fully 8 to 9.5 mm.

This species is easily distinguished from *punctulatus* by the black

antennæ with a longer arista, the shape of the abdominal markings, the colour of the venter and the partly or mainly yellow-haired scutellum; it is also less punctate and more pubescent.

S. lasiophthalmus is not properly common in Denmark, though sometimes present in some number; Copenhagen in a garden, Ordrup Mose, Ermelund, Holte, Geel Skov, Donse, Hillerød, Tyvekrog, Tisvilde; on Funen between Odense and Middelfart. It occurs in early spring, my dates are $14\frac{1}{4}$ — $5\frac{1}{6}$. I have taken it hovering about the flowers of *Prunus spinosa* and *Salix*, and once I took it rather numerously on $28\frac{1}{1}$ on the flowers of *Anemone nemorosa* and *Ficaria*; it seems to be more common in some years than in others.

Geographical distribution:— Northern and middle Europe down into Austria, Hungaria and Styria, and also recorded from Italy; towards the north to northern Sweden, and in Finland.

30. *S. guttatus* Fall.

1817. Fall. Dipt. Suec. Syrph. 44, 16 (*Scaeva*). — 1822. Meig. Syst. Besch. III, 322, 71. — 1843. Zett. Dipt. Scand. II, 739, 41 et 1849. VIII, 3143, 41 et 1855. XII, 4659, 41 (*Scaeva*). — 1862. Schin. F. A. I, 307. — 1901. Verr. Brit. Fl. VIII, 407, 29. — 1907. Kat. paläarkt. Dipt. III, 65.

Of this species I know only the female. Vertex not broad, æneous, shining; frons and epistoma rather narrow, frons yellow, from the vertex an æneous black, often attenuated, middle stripe is produced to below the middle; there are no dust spots; epistoma all pale yellow, white pruinose except the central knob. The hairs on vertex and frons dark, on epistoma white. Jowls narrow, white. Occiput greyish white pruinose below, yellow above, the hairs likewise white below, yellow above. Eyes bare. Antennæ short, black, third joint roundish; arista fully as long the antennæ. Thorax bright æneous or brass-coloured, shining, along the sides a distinct, yellow line, especially distinct on the humeri and backwards to the wing-root; in front of scutellum the disc has a yellow, more or less bifid, sometimes divided spot. The thorax has yellow hairs. Scutellum yellow with yellow hairs. Pleura grey pruinose with white hairs. Abdomen narrow and linear, black, first segment yellowish grey at the sides; there are three pairs of elongated oval, transverse, white spots; the first pair are smallest and lie on the middle of the segment; the second and third pairs lie near to, or at the front margins; they are all well separated in the middle, the basal spots most widely, and they are all isolated from the side margins; the fifth segment has transversely triangular spots at the basal corners, almost meeting in the middle, and a very narrow, pale hind margin. The hairs on abdomen follow

mainly the ground colour, but there are many pale hairs on second segment; at the sides the hairs are pale at the base down to the second pair of spots, after which they alternate black and white. Venter whitish with black, transverse bands on third, fourth and fifth segments. Anterior legs yellowish, femora with a black ring near the base, tibiæ with traces of a ring below the middle and tarsi with the third and fourth joints darkened; sometimes the anterior legs paler with only small rings on femora; hind legs black with only base of femora yellow and the knees obscurely pale; the hairs all pale. Wings a little tinged. Squamulæ white. Halteres yellow.

According to the descriptions the male has a rather elongated triangular vertex, the frons yellow with just the upper angle blackish; the abdominal spots seem often to be more triangular.

Length fully 7 to about 8,5 mm.

Remarks: All the earlier descriptions of this species mention the spot or two spots on thorax in front of scutellum, and also all my specimens (females) possess them, but according to Verrall they may be wanting in both sexes, but especially in the male.

S. guttatus is rare in Denmark; Copenhagen in a garden, Lersø, Charlottenlund; on Lolland at Strandby, and in Jutland at Haarup near Horsens and at Thisted, in all only six specimens, all females. The dates are ¹¹/₇—²²/₈.

Geographical distribution:— Northern and middle Europe down into Austria, Hungary and Styria; towards the north to northern Sweden, and in Finland, but upon the whole rather rare.

31. *S. umbellatarum* Fabr.

1794. Fabr. Ent. Syst. IV, 307, 107 et 1805. Syst. Antl. 250, 9 (*Scaeva*). — 1817. Fall. Dipt. Suec. Syrph. 44, 15 (*Scaeva*). — 1859. Zett. Dipt. Scand. XIII, 5098, Obs. (*Scaeva*). — 1862. Schin. F. A. I, 308. — 1901. Verr. Britt. Fl. VIII, 409, 30. — 1907. Kat. paläarkt. Dipt. III, 71. — *S. amoenus* Loew, 1840. Programm Posen, 35, 15 et Isis 1840. 572, 15.

Male. Vertex a little elongated triangular; frons yellow pruinose, black above the antennæ but yellow just at the antennæ; epistoma yellow, bluish æneous reflecting, yellowish grey pruinose; the front mouth edge black and from here a black line extends up over the central knob. Jowls yellow. Vertex and frons black-haired, epistoma with pale hairs but black above and at the sides. Occiput grey pruinose, the hairs white below, yellow upwards; above a row of black, overhanging hairs. Eyes bare. Antennæ black, not quite short, third joint somewhat oval; arista as long as the antennæ. Thorax æneous, shining, with somewhat long, dark yellow or brownish yellow hairs,

longest behind. Scutellum brownish yellow, somewhat æneous, with long, black hairs or the hairs at the base more or less yellow. Pleura with longish, pale yellow hairs. Abdomen nearly parallel-sided, as broad as thorax; it is dull black, a little shining at base and apex, with three pairs of whitish yellow spots (in the living specimens rather whitish); the spots of the basal pair lie on the middle of the segment; they are not small, transversely subquadrate with the inner end rounded, at the upper lateral corner they are a little produced and near the margin, but not going over it; in the middle they leave about the third of the segment black; the spots of second pair are well away from the front margin, they are rectangular, a little nearer to each other than the basal spots; the third pair of spots are quite similar, a little nearer the front margin; both pairs are isolated from the side margins; fourth and fifth segments have narrow, yellow hind margins, the latter segment also more or less distinct spots at the basal corners. The hairs on abdomen follow partly the ground colour but are mainly pale on second segment except at the hind margin and on the front part of third segment; at the sides they are long and yellow at the base down to the second pair of spots, from here alternating black and yellow. Venter yellowish with more or less distinct, dark bands near the hind margins of the segments which bands are produced forwards at the lateral margins; the hairs are long and pale. Genitalia of medium size, brown or blackish, somewhat pruinose behind but shining on the right side; the hairs are black and yellow. Legs with the anterior femora black with the apical half or third yellow, anterior tibiæ yellowish with a small, blackish ring in the middle, tarsi brownish or blackish; hind legs black with the knees narrowly reddish; hind metatarsi very slightly thickened. The hairs on femora rather long, especially on hind femora; they are yellow, on anterior femora with some few black towards the apex; the short hairs are black on the apical part of hind femora and on the basal part of hind tibiæ, for the rest mainly yellow; the hind tibiæ have an antero-dorsal fringe, long about the middle. Wings slightly yellowish tinged. Squamulæ yellowish with a darker yellow fringe. Halteres yellow.

Female. Vertex somewhat broad, bluish black, shining; there are large, grey frontal side dust spots, connected in the middle and going broadly down along the eye-margins, leaving thus only a black lunule above the antennæ generally connected by a very narrow stripe with the vertex; the hairs all black. Epistoma quite white-haired. Thorax more blue and a little more shining than in the male. Pleura whitish grey pruinose and also the præsutural depression pruinose. Scutellum

more pale-haired as only a few hairs at the tip are black. The basal abdominal spots large and white, much larger than in the male as they are produced to the front margin of the segment and going in full width over the side margin; the other spots as in the male but going over the side margin. Legs paler than in the male, the anterior tibiæ with only faint or almost wanting rings, hind knees more distinctly pale.

Length 8.5—10 mm.

Remarks: Verrall describes the hairs on scutellum as mainly yellow, with only a few black hairs near the tip; about the female he says nothing; my males have scutellum quite black-haired or with more or fewer yellow hairs at the base, while the females have it almost quite pale-haired. — I have examined the type of Fabricius, which is present in the collection of Tönder Lund; it is a female.

S. umbellatarum is somewhat rare in Denmark; Ordrup Mose, at Fure Sø, Geel Skov; on Lolland at Strandby; in Jutland at Horsens and in Marselisborg Skov at Aarhus. My dates are $3/7$ — $25/8$. I have taken it in a fen on Umbelliferæ.

Geographical distribution: — Northern and middle Europe down into Austria and Styria; towards the north to middle Sweden. It is also recorded from North America but with doubt.

32. *S. compositarum* Verr.

1873. Verr. Entom. Month. Mag. IX, 254 et 1901. Brit. Fl. VIII, 412, 31, fig. 304. — 1907. Kat. paläarkt. Dipt. III, 62. — *S. umbellatarum* Meig. (nec Fabr.) 1822. Syst. Besch. III, 320, 68. — 1843. Zett. Dipt. Scand. II, 734, 36 et 1849. VIII, 3142, 36 et 1859. XIII, 5098, 36 (*Scaeva*).

This species is very similar to *umbellatarum*. Male. Epistoma with a broader, black line, produced a little higher up; the lower side parts of epistoma a little darker. Eyes not quite bare, but the hairs very short and scattered. Thorax greenish æneous, slightly shining, dull or dullish, clothed with yellowish brown hairs. Scutellum black-haired with some pale hairs intermingled. Pleura with whitish hairs. Abdominal spots more yellow than in *umbellatarum*; the basal spots small, roundish, not produced towards the margin at the upper corner; the other spots as in *umbellatarum*, all isolated. Genitalia quite greyish pruinose, with pale hairs. Legs more black than in *umbellatarum*, the anterior femora with only the apex yellow, tibiæ with the apical half dark, but, however, a middle ring darkest.

Female. Likewise similar to *umbellatarum*, but the frons considerably more black as the dust spots are somewhat narrow, forming a bow over the middle of the frons and going only narrowly down

along the eye-margins, and hence the black space above the antennæ is much larger and broader; epistoma with a larger black middle stripe, and the mouth edge considerably blackish. Thorax more shining than in the male, but perhaps a little less than in *umbellatarum*, the præsutural depression not pruinose. Scutellum with only some few dark hairs at the apex. The basal abdominal spots much narrower than in *umbellatarum*, not produced to the front edge and not broader than the other spots; all spots going over the side margin. Legs mainly as in the male and hence blacker than in *umbellatarum*.

Length 9,5 mm.

S. compositarum is very rare in Denmark, rarer than *umbellatarum*, I only possess two specimens, a male and a female, one caught in Geel Skov on $\frac{2}{5}$ 1909 and one at Tisvilde on $\frac{14}{7}$ 1907 (the author).

Geographical distribution: — The species seems to occur all over Europe down into Italy; towards the north to northern Sweden, and in Finland, if Verrall's suggestion that this species is commonly recorded as *umbellatarum* is correct.

Remarks: *S. compositarum* is without difficulty distinguished from *umbellatarum*, in the male by the duller thorax and the much smaller basal abdominal spots; in the female by the much blacker frons and the smaller basal abdominal spots, which are not produced to the front margin of the segment, and in both sexes by the darker anterior legs. The third allied species, *labiatarum* Verr. is hitherto not found in Denmark; it has the thorax dull in both sexes and is in the male known from *compositarum* by the more quadrate abdominal spots, of which the basal pair are larger, and in the female by the almost quite grey frons. All three species are very similar, but I do not doubt their specific distinctness.

33. *S. barbifrons* Fall.

1817. Fall. Dipt. Suec. Syrph. 45, 17 (*Scaeva*). — 1822. Meig. Syst. Besch. III, 338, 95. — 1843. Zett. Dipt. Scand. II, 740, 43 ♂ et 1855. XII, 4659, 43 et 1859. XIII, 5099, 43 (*Scaeva*). — 1901. Verr. Brit. Fl. VIII, 423, 25, figs. 309—310. — 1907. Kat. paläarkt. Dipt. III, 61. — *Scaeva nitidula* ♀ Zett. 1838. Ins. Lapp. 608, 39 et 1843. Dipt. Scand. II, 758, 61 et 1849. VIII, 3153, 61 et 1855. XII, 4661, 61 et 1859. XIII, 6004, 61. — *Syrphus nitidulus* 1862. Schin. F. A. I, 307.

Male. Head rather low and broad. Vertex a little elongated triangular; frons and epistoma very broad, the former a little inflated, the upper angle obtuse. Frons blackish pruinose, almost not shining; epistoma and jowls quite bluish black, shining, the jowls broad and somewhat descending. Occiput bluish black; all the head black-haired,

and the hairs rather long and dense. Eyes bare. Antennæ black, third joint short ovate; arista as long as the antennæ. Thorax black, dullish, with somewhat long, black, anteriorly more brownish hairs. Scutellum black, slightly brownish on the disc, with black hairs; also the hairs below the margin black. Pleura black-haired. Abdomen narrow, parallel-sided, dull black, a little shining at apex; there are two pairs of somewhat small, yellow spots; the first pair lie on third segment near the front margin, they are transversely oval, well separated in the middle; the second pair are similar but smaller, both pairs are isolated from the side margin. The hairs are all black. Venter blackish with similar spots as on dorsum, but somewhat indefinite; the hairs long, blackish, a little paler at the front margin of third segment. Genitalia relatively large, bluish, shining, with black hairs. Legs mainly blackish, the apex of femora and about the basal half of tibiæ obscurely reddish; the hairs all dark, only on the hind femora intermingled with yellow hairs. Wings somewhat brownish tinged. Squamulæ smoky with a yellow, not dense fringe. Halteres yellow, the peduncle darker.

Female. I do not know the female; according to the descriptions it has the epistoma orange at the sides so that there is a very broad, black middle line; the hairs pale; frons broad, all shining black, with long, black hairs, above the antennæ may be some pale hairs. Thorax and scutellum shining, with all brownish yellow pubescence. Abdomen shining, with three pairs of yellow spots, the basal spots most widely separated; the basal spots go widely over the side margin, the second pair scarcely or just going over the margin, the third pair generally going quite over it. Legs paler than in the male. Wings more hyaline.

Length 7,5 mm.

This species is easily known as it is the darkest of all species, and the only having so dark a scutellum, and in the male a completely black epistoma and only two pairs of abdominal spots; it is in the male rather similar to *Melangyna quadrimaculata* as noted under this species, but it is distinguished by the bare eyes, and besides it has the head and the thorax with scutellum and pleura quite black-haired; also is it smaller. — Verrall describes the abdomen of the male with pale hairs on the spots and on second segment where the spots might be; my specimen has a completely black-haired abdomen.

S. barbifrons is very rare in Denmark, only one specimen, a male, has been taken at Tisvilde on 19/4 1911 (Kryger); it was taken on flowers of *Salix*.

Geographical distribution: — Northern and middle Europe, pro-

bably down into Austria and Hungary; towards the north to northern Sweden, and in Finland, but everywhere rare; it is also recorded from Iceland.

20. **Sphaerophoria** St. Farg. et Serv.

Species of medium size and of unusual long and slender shape; the colour black or æneous with yellow stripes on thorax and markings on pleura, and with rather varied but extensive yellow bands or pairs of spots on abdomen. Head somewhat semiglobular, broader than thorax and a little broader than high; it is excavated behind. Eyes touching in the male, separated in the female; frons in the male with the upper angle rectangular or obtuse. Eyes bare; the upper facets in the male slightly enlarged. Antennæ inserted above the middle; they are somewhat short, third joint short oval, arista inserted near its base, apparently bare. Epistoma not broad, very slightly hollowed below the antennæ and a little keel-shaped; the central knob small, but the whole lower part of epistoma together with the knob rather protruding; the front mouth edge only slightly retreating, and also the lateral angles very little retreating, the front mouth edge curved somewhat deeply upwards. The epistoma is yellow, sometimes with a more or less distinct, dark middle stripe, and it has inconspicuous hairs. Jowls narrow, not descending, separated from epistoma by a furrow. The oral aperture narrow, but on account of the protruding epistoma somewhat long. Oral cone well developed, rather long; proboscis not long, but when the oral cone and proboscis are stretched quite out, the length of them together is considerable. Clypeus elongated horse-shoe-shaped; the mouth parts mainly as in *Syrphus*, but longer and more slender; labrum and hypopharynx somewhat long, considerably longer than in *Syrphus*, of the usual shape; maxillæ with a knife-shaped lacinia and a thread-like palpus, a little longer than the lacinia and with some bristles, for the rest lacinia and palpus as in *Syrphus*; labium somewhat slender, relatively longer than in *Syrphus*, the basal part and the elongated oval labella of equal length, the former not incised at the ends. Thorax considerably longer than broad, rectangular; it has a continuous or interrupted yellow line at each side margin, and there are extended yellow spots on pleura; metapleura with dense, but quite short hairs. Scutellum yellow, without fringe below the margin. Thorax and scutellum without bristles. Abdomen long and narrow, with parallel sides or even clavate. In the male there are five not transformed segments, the first small, the others long, as long as or longer than broad, also the fifth long; this

latter is not quite symmetrical, but its hind margin has on the right side a small, somewhat triangular outshoot (fig. 128); on the ventral side there are likewise five normal segments. The genitalia are large and rather curious; on the left side lie the small sixth and seventh segments, the eighth lies at the end, and between it and the ninth there is on the right side a somewhat large connecting membrane; the ninth segment, the hypopygium, forms a large, oval, ball-shaped part, bent in under abdomen and lying symmetrically or almost so; this part is curiously built, for while in the other genera the ninth segment is more or less deeply incised at the end and the small outer lamellæ

(tenth segment) lie in this excision, these lamellæ lie here on the dorsal (downwards turned) side of the ninth segment somewhat before the middle and quite surrounded of the ninth segment (fig. 129); this would indicate the curious fact that the tenth segment is quite im-

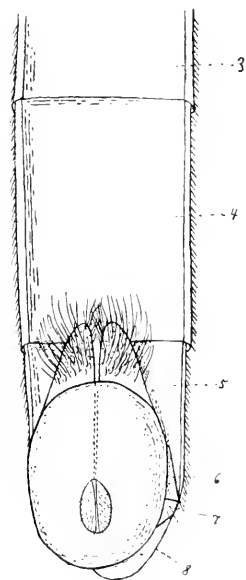


Fig. 129. *S. scripta* ♂. Apical part of abdomen with genitalia seen from below; 3—8 third to eighth segment.

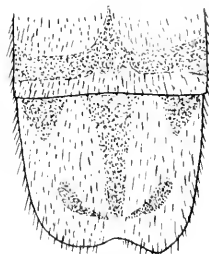


Fig. 128.
S. menthastris ♂.
Fifth dorsal abdominal segment, showing the unsymmetrical hind margin.

bedded in the ninth, no doubt a secondary development; there is also seen a suture stretching from the lamellæ to the end of the hypopygium, indicating the incision. The hypopygium has as usual at the end two clasping appendages or claws, which are here large, somewhat bifurcate with an upper branch stretching backwards and a lower branch curved downwards (when the hypopygium is stretched out backwards); the upper branch has in most species long, tufted hairs. In the female the abdomen has as a rule seven visible segments, generally also a small eighth is seen. Legs somewhat slender, simple; hind tibiæ with the usual slight incurvation towards apex on the posterior side; the legs are short-haired, also the hairs on posterior side of the anterior femora and on front side of the hind femora rather short; the hind femora have a narrow, bare stripe below, at all events at the apex, and in one species (*scripta*) the hairs on both sides of the stripe are bristly and crowded in the male. Claws and pulvilli well developed; empodium short, thread-like with a broader

base, haired. Wings a little narrow; medial cross-vein well before the middle of the discal cell; vena spuria distinct, with a nodule below the base of the cubital vein. Alula large. Squamulæ somewhat narrow, alar squamula with quite short, simple hairs, thoracal squamula with not long, fine, branched hairs. Plumula very thin and delicate, not densely haired, the hairs simple.

This genus is well characterised by its long and narrow shape and by the structure of abdomen, which in the male has the fifth segment long with the hind margin not symmetrical, and in the female at least seven visible segments; also the male genitalia are very characteristic. Verrall gives as character that the abdomen in both sexes has an unusual large number of segments and says that there are five in the male; but as seen this is not unusual, as most genera show this number of not transformed segments, only the fifth segment is here large, while in the other genera with five segments it is generally small; in the female, on the contrary, the number of seven visible segments is characteristic against the general number of five or six, though this difference is no principal one, only caused by the apex of abdomen being more protracted than usual, as the real total number of segments is of course the same. Verrall states also under his general description of the *Syrphidae* that the male genitalia of *Sphaerophoria* are symmetrical; from the above it is seen, that this is so far from being the case that on the contrary their unsymmetrical shape even influences the fifth segment; only the large ninth segment lies about symmetrically thus to some degree giving an impression of a symmetrical shape of the genitalia.

The developmental stages of several species are known. Rösel (Ins. Belust. II, 1749. Musc. 31, Tab. VI) describes larvæ and pupæ of *S. scripta*, found on plants among Aphides in April and May. The stages of *S. menthastri* (*taeniata*) are described by Bouché (Naturg. d. Ins. 1834, 51, Tab. V, Fig. 4—6); the larva was found among Aphides on Compositæ. Zetterstedt mentions (Dipt. Scand. II, 1843, 766) larvæ and pupæ of *S. scripta*, the larva was aphidiphagous, and (770) of *menthastri*, the larva among Aphides on *Vicia faba*, the imagines developed on $\frac{2}{8}$ — $\frac{10}{8}$. I have myself examined larva and pupa of *S. scripta* and *menthastri* and the pupa of *flavicauda*; the larva of *scripta* I took on a plant among Aphides on $\frac{6}{7}$, it pupated on $\frac{9}{7}$ and developed on $\frac{16}{7}$; Mr. Kryger took the pupa on grass on $\frac{22}{8}$, it developed on $\frac{29}{8}$; the larvæ of *menthastri* I took on $\frac{4}{4}$ in flood refuse of reeds, they developed on $\frac{21}{5}$; Mr. Schlick took larvæ in the same way, they developed in May; finally Mr. Schlick took larva of *flavicauda* in flood refuse near the shore in late autumn, they developed in the following spring. — The larva (of *S. menthastri*) is of the usual

shape of a *Syrphus*-larva; it is corrugated above, the dermis is finely chagreened, and there are very small bristles on the dorsum and at the sides, arranged quite as in *Syrphus*; below there are slight, transverse swellings; the posterior spiracular process is not quite short, black, with a longitudinal dividing furrow above and below, and the apex cleft with the points a little diverging. The larva is light green with two whitish, longitudinal dorsal stripes (Bouché describes it as grey with two whitish stripes, Zetterstedt as green). The length is 8 mm or more. The pupa is broad and rounded in front, attenuated behind and thus drop-like; the spiracular process as in the larva; it is green during the first part of the development, later the imago shines through, and the empty puparium is whitish; the length is 6 mm.

The larvæ are aphidiphagous; they evidently hibernate, as my larvæ found in flood refuse in late autumn and early spring show; but as I also found a larva on ⁶/₇, developing on ¹⁶/₇, and as Zetterstedt mentions it developing as late as ¹⁰/₈, and the above recorded pupa developed on ²⁹/₈ I am inclined to think that there are, or may be, more than one brood in the year. At the pupation the larva attaches itself by the posterior part to a leaf or stalk, and in this condition the pupa remains.

The species of *Sphaerophoria* are characteristic and easily recognizable flies; they occur on various localities, not rarely near water and also near the shore, on various flowers. The genus goes high towards the north, one species, our *scripta* (*strigata*) occurring in Greenland. — The species have been very troubling on account of their strongly varying or tending to produce local races, and a very large number of varieties, especially of *scripta* and *menthastri*, have been described as separate species (each of these species have been described about as 14 species). Already Malm suggested in 1860 that the species should be much reduced, and Kowarz in 1885 reduced eight species to the two well known *scripta* and *menthastri*. Finally Verrall undertook a radical reduction, and I quite follow him. The characters which were given for the many species were only taken from variations in the abdominal markings and the colour of the legs, as it is only with regard to these that the species vary, and many other Syrphids are more or less varying in this respect. The two species specially in question, *scripta* and *menthastri*, are in spite of their varying well recognizable as good species, showing several constant plastic characters proving them to be only two, and two well distinguished, species.

The number of species in the palæarctic region is now about 10, and of these only 4 are European, all also occurring in Denmark.

Table of Species.

- | | |
|---|-------------------------|
| 1. Thorax dull or dullish, the yellow side margin continuous to the scutellum | 2. |
| — Thorax shining, the yellow side margin interrupted at the transverse furrow | 3. |
| 2. Abdomen rather elongate, in the male longer than the wings; scutellum quite or nearly quite yellow-haired; hind femora with a bare space at the base on the postero-ventral side, and in the male the hairs crowded on the apical part and here short and stubby on the posterior side: larger species | 1. <i>scripta</i> . |
| — Abdomen less elongate, about of the length of the wings; scutellum usually black-haired or mainly so; hind femora without a bare postero-ventral space at the base, the hairs not crowded nor stubby and equally distributed | 2. <i>menthastris</i> . |
| 3. Antennæ quite or mainly yellow | 3. <i>flavicauda</i> . |
| — Antennæ black | 4. <i>Loewii</i> . |

1. *S. scripta* L.

1758. Linn. Syst. Nat. X, 594 et 1761. Fn. Suec. 1820 et 1767. Syst. Nat. XII, 2, 987, 54 (*Musca*). — 1764. O. F. Müll. Fn. Fridrichsd. 723 (*Musca*). — 1775. Fabr. Syst. Entom. 772, 45 (*Syrphus*) et 1805. Syst. Antl. 252, 17 (*Scaeva*). — 1822. Meig. Syst. Besch. III, 324, 73 (*Syrphus*). — 1843. Zett. Dipt. Scand. II, 766, 1 et 1849. VIII, 3157, 1. — 1862. Schin. F. A. I, 316 (*Melithreptus*). — 1901. Verr. Brit. Fl. VIII, 428, 1, figs. 311—314. — 1907. Kat. paläarkt. Dipt. III, 76.

var. *dispar* Loew, 1840. Programm Posen, 37, 5, Fig. 53—54 et Isis 1840, 573, 5 (*Melithreptus*). — 1843. Zett. Dipt. Scand. II, 767 p. p. var. b. et 1849. VIII, 3157, 1—2. — 1862. Schin. F. A. I, 317 (*Melithreptus*).

var. *nigricoxa* Zett. 1843. Dipt. Scand. II, 767, 2 et 1849. VIII, 3158, 2.

var. *strigata* Stæg. 1845. Naturh. Tidsskr. 2, I, 362. — 1849. Zett. Dipt. Scand. VIII, 3159, 2—3. — 1862. Schin. F. A. I, 316 (*Melithreptus*).

Male. Vertex triangular: frons and epistoma yellow, shining, the front mouth edge darkened, and sometimes the central knob, or a narrow middle line more or less darkened. Jowls yellow. Vertex black-haired anteriorly, with yellow hairs behind; frons yellow-haired, epistoma with slight, pale hairs. Occiput greyish pruinose, the hairs whitish below, about the middle rather coarse and somewhat silvery, yellow above. Antennæ yellow, third joint generally more or less darkened above: arista brown. Thorax dull æneous, in front there are two approximated, faint greyish stripes, separated and inclosed by three narrow, darker, dull lines; at each side is a somewhat broad, yellow line from the humerus to scutellum, it is clearest yellow anterior to the transverse furrow, just above the wing-root is a blackish spot: the thorax is clothed with yellow or brownish yellow

hairs. Scutellum yellow, with yellow hairs, at the apex generally a few black hairs. Pleura æneous, shining, a spot above front coxæ, the greater part of meso- and pteropleura, metapleura and the upper part of sternopleura yellow; the pleura are sparingly clothed with yellow hairs. Abdomen long and narrow, distinctly longer than the wings; it is dull black with yellow markings, the first segment and the apex shining; the side margin all yellow; the second segment has a yellow band in the middle, which may be more or less emarginate and sometimes narrowly interrupted, at the sides it slopes backwards and reaches the margin with the hinder corners; the second band is similar but nearer the front margin and broader, it is not or slightly emarginate, and likewise sloping at the sides and reaching the yellow margin; the third band is likewise broad but for the rest rather varying, generally it is emarginate in front and thus bilunulate, and also rather deeply emarginate behind and here produced on each side of the emargination; sometimes the described shape is less pronounced, and the band may be interrupted thus forming two lunulate spots; its hind corners reach the side margin; the hind margin of the fourth segment is indistinctly orange; fifth segment orange with an abbreviated and pointed black middle line on the front part, and two somewhat triangular spots at the basal corners, one at each side, and two triangles inwards to the hind corners; hence the yellow colour, besides the margin, forms something like an **M**; or the two spots on each side are larger and united, and then the pale colour forms a **V**; sometimes the markings on the last segments are less definite, the black and yellow colour running somewhat together, and the yellow colour more extended. The hairs on

abdomen are short, they follow to some degree the ground colour, but are black along the dorsum and at apex: at the sides they are long at the base and yellow, at the hind corners of second and third segments are some black hairs and on the apical half they are black. Venter yellowish, sometimes partially darkened, with longish, pale hairs. Genitalia large, reddish yellow, the eighth segment has two black spots, one above the other, and the ninth segment two blackish spots at the base: the ninth segment, the hypopygium, is oval, considerably longer than broad; the apical appendages or lamellæ are less distinctly bifurcate, the lower branch

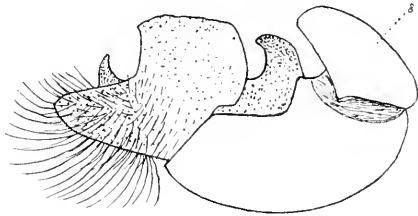


Fig. 130. *S. scripta* ♂; hypopygium and eighth segment (8).

broad, the upper chagreened with long, somewhat tufted, yellow hairs. Legs in typical *scripta* all yellow, sometimes with the tarsi more or less browned; the hairs on femora almost all black, or yellow on the anterior side of front femora and at the base of middle femora; below the hind femora the hairs are crowded in the apical part on both sides of the bare channel, and on the posterior side they are very dense and short and stubby, while a basal space on the postero-ventral side is almost bare; the quantity of the short, stubby bristles varies much; the hind coxæ have long, yellow hairs, more or less intermingled with black ones; the hairs on front tibiæ are yellow, sometimes with a couple of black, on posterior tibiæ mainly black, though the middle tibiæ may have many yellow hairs. Wings hyaline or a little yellowish tinged. Squamulæ and halteres yellow.

Besides the variations mentioned the species may vary still more; the described form is the true *scripta*, which is the most common in Denmark; it is the palest form; the next variety is similar but has the anterior coxæ black, the hind coxæ partly so, and the trochanters more or less darkened (var. *dispar* Loew). Then comes a still darker form with all coxæ and trochanters black, the jowls blackish grey, the abdominal bands very much sloping and first and third abdominal bands emarginate or interrupted, and often only a yellow **V** on fifth segment; the genital appendages are more or less black (var. *nigri-coxa* Zett.). The darkest variety has likewise coxæ and trochanters, and also sometimes base of femora, black and the jowls black; the abdominal bands are generally interrupted and do not reach the yellow side margin; the fifth segment with only a yellow **V**; the genital appendages more or less black (var. *strigata* Stæg.).

Female. Vertex broad, black and shining; frons yellow, shining, from the vertex a broad, black middle stripe stretches down to, or almost to the antennæ; the hairs black on the upper half, paler downwards. Thorax with the three dull stripes more obvious than in the male. Scutellum generally with more or fewer black hairs. Abdomen shorter; it has the side margin and four, somewhat narrow and arched bands yellow; the bands may vary somewhat, the first, or the first and third, or the three first may be narrowly interrupted; they are somewhat shelved off at the sides but reach the yellow margin; the fourth band is always interrupted, and the spots produced forwards and backwards at their inner end and thus somewhat hammer-shaped; the sixth segment is orange with three, often more or less connected black spots; seventh and eighth segments blackish or obscurely orange, with paler margins. The hairs mainly black except the long hairs on the sides at the base and some way down the

sides. Legs always quite yellow with only the tarsi more or less darkened; the hairs below the hind femora are not crowded, nor bristly or stubby, but there is as in the male a bare postero-ventral space at the base.

The female varies, as seen, somewhat with regard to the abdominal markings, but varieties as in the male cannot be distinguished, only a rare variety with dark abdomen with all bands narrow and interrupted has been interpreted as var. *strigata*.

Length about 8 to fully 11 mm, the female the smaller.

The above mentioned varieties may be distinguished in the following way (but it must be remembered that all intermediates occur):

1. Legs all yellow, also coxæ and trochanters *scripta*.
— Legs with coxæ and trochanters more or less black 2.
2. Anterior coxæ blackish, hind coxæ partly so *dispar*.
— All coxæ and trochanters blackish 3.
3. Abdominal bands sloping, but reaching the yellow side margin *nigricoxa*.
— Abdominal spots not reaching the side margin *strigata*.

The larva quite resembles that of *menthastri* and is green (Rösel describes it as yellowish with grey longitudinal stripes); the puparium is whitish.

S. scripta is common in Denmark and has been taken all over the country, though it seems to be more common in some years than in others. My dates are $^{14}/_5$ — $^{14}/_9$, but it is most common in the later part of the summer. It occurs on many various localities, often in great number. I took the larva at Valby on a leaf with Aphides on $^{6}/_7$, it pupated on $^{9}/_7$ and developed on $^{16}/_7$; the pupa was taken at Holte on $^{22}/_8$, sitting on grass, it developed on $^{29}/_8$ (Kryger). Of the varieties *scripta* is by far the most common in Denmark. — In Kat. paläarkt. Dipt. *Musca fasciata* O. F. Müll. (Fn. Fridrichsd. 757) is given as synonym with the present species; it is no doubt the female of this or the following species, but of which it is impossible to say.

Geographical distribution: — All Europe, towards the north to northern Sweden, in Finland and in Iceland; further in Egypt, on the Canaries and Madeira; it occurs also in North America and in Greenland (from which Stæger described *strigata*).

2. *S. menthastri* L.

1758. Linn. Syst. Nat. X, 594 et 1761. Fn. Suec. 1819 et 1767. Syst. Nat. XII, 2, 987, 53 (*Musca*). — 1764. O. F. Müll. Fn. Fridrichsd. 722 (*Musca*). — 1775. Fabr. Syst. Entom. 771, 43 (*Syrphus*) et 1805. Syst. Antl. 251, 13 (*Scaeva*). — 1822. Meig. Syst. Besch. III, 325, 77 (*Syrphus*). — 1843. Zett. Dipt. Scand. II, 769, 4 et 1849. VIII, 3160, 4. — 1862. Schin.

F. A. I, 317 (*Melithreptus*). — 1901. Verr. Brit. Fl. VIII, 434, 2. — 1907. Kat. paläarkt. Dipt. III, 74. — *Scaeva interrupta* Fabr. 1805. Syst. Antl. 252, 16 ♀.

var. *dubia* Zett. 1849. Dipt. Scand. VIII, 3162, 7—8 et 1859. XIII, 6009, 7—8.

var. *picta* Meig. 1822. Syst. Besch. III, 326, 77 (*Syrphus*). — 1843. Zett. l. c. II, 772, 7 et 1849. VIII, 3161, 7 et 1859. XIII, 6007, 7. — 1862. Schin. F. A. I, 317 (*Melithreptus*). — *Sph. abbreviata* Zett. 1859. l. c. XIII, 6007, 7—8.

var. *philanthus* Meig. 1822. l. c. III, 327, 79 (*Syrphus*). — 1843. Zett. l. c. II, 773, 8 et 1849. VIII, 3163, 8. — *Syrphus melissae* Meig. 1822. l. c. III, 326, 76. — *Sph. melissae* 1843. Zett. l. c. II, 770, 5 et 1849. VIII, 3161, 5. — *Melithreptus melissae* 1862. Schin. F. A. I, 318. — *Syrphus hieroglyphicus* Meig. 1822. l. c. III, 327, 78. — *Melithreptus incisus* Loew, 1840. Programm Posen, 57, 4, Fig. 55 et Isis 1840, 573, 4, Fig. 55. — 1862. Schin. F. A. I, 318. — *Sph. multipunctata* Zett. 1859. l. c. XIII, 6009, 10. — *Sph. insignita* Zett. 1859. l. c. XIII, 6010, 11.

var. *taeniata* Meig. 1822. l. c. III, 325, 74. Tab. XXX, Fig. 35—36 (*Syrphus*). — 1943. Zett. l. c. II, 768, 3 et 1849. VIII, 3160, 3. — *Melithreptus taeniatus* 1862. Schin. F. A. I, 318.

Male. Vertex triangular; frons and epistoma yellow, shining, the front mouth edge narrowly black and often the central knob blackish, or a blackish middle stripe present. Jowls yellow or greyish, or even darker. Vertex black-haired; frons and epistoma yellow-haired, on the latter the hairs short, sparse and inconspicuous. Occiput greyish pruinose, the hairs whitish below, yellow upwards, in the middle somewhat strong, but not so much as in *scripta*. Antennæ yellow, third joint generally more or less darkened above; arista brown. Thorax æneous, dull or dullish, with three more or less visible, duller stripes, the greyish lines between them very faint or not visible; at the sides there is a yellow line from the humeri to scutellum, but it is darker and less distinct behind the transverse furrow. The thorax is clothed with somewhat long and dense, yellow or brownish yellow hairs, denser than in *scripta*. Scutellum yellow, black-haired and the hairs rather dense and somewhat strong, distinctly stronger than in *scripta*; often the hairs are more or less yellow on the basal part, sometimes to some extent. Pleura æneous, shining, with yellow spots as in *scripta*, and with longish, yellow hairs. Abdomen shorter than in *scripta*, about of the length of the wings or slightly longer; it is dull black with yellow markings, but rather shining at the sides and generally more or less at the incisures, and somewhat shining at base and apex. The second segment has a yellow band on the middle, which is narrowly interrupted and much sloped off at the sides so that the hind corners only indistinctly reach the side margin or not at all; the band on third segment is broader, nearer the front margin

and more or less emarginate in front and behind; it is likewise much sloped off at the sides, and isolated or reaching the side margin indistinctly; the band on fourth segment is somewhat similar but still nearer the front margin, and it is often a little produced in front and behind on each side of the emargination, in rare cases interrupted; the fourth segment has an indistinct orange hind margin; the fifth segment is yellow, it has a triangular, black spot at each front corner, and in the middle a narrow, black line, stretching backwards and here connected with a transverse, black spot on each side, thus forming a black anchor, which does not reach the hind margin; (it will be seen that the arrangement is principally the same as in *scripta*, the difference is caused by the black spots being smaller and the middle line connected with the hinder spots); sometimes the flukes of the anchor are connected with the spots at the front corners (answering to the presence of the **V**-shaped figure in *scripta*). The whole side margin of abdomen is narrowly and more or less distinctly yellow. The hairs follow to some degree the ground colour, but are black along the dorsum and at apex; at the sides they are all yellow, and long at the base, sometimes they are black on the hinder part. Venter chiefly yellowish, with longish, pale hairs. Genitalia large, yellow, eighth segment with two black spots, one above the other, ninth segment with two blackish, transverse spots at the base; the ninth segment, the hypopygium, is shorter than in *scripta*, almost globular; the apical appendages or lamellæ more distinctly bifurcate than in *scripta*, the lower branch much narrower, the upper shorter and less chagreened, with tufts of yellow hairs; the lower branches are exised towards the ends

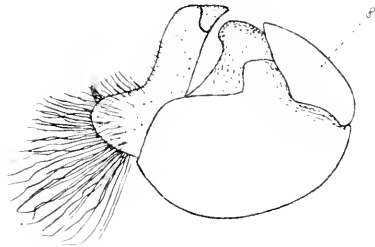


Fig. 131. *S. menthastris* ♂; hypopygium and eighth segment (8).

and somewhat fitting into each other. Legs yellow or dark yellow, the tarsi more or less darkened to blackish, and sometimes the coxæ darkened; the hairs on femora all or almost all black, on the hind femora a bare channel below as in *scripta* but less pronounced, and there are no stubby or crowded bristles, the hairs being uniformly distributed and of the same length and strength, and there is no bare space at the base; the hind coxæ have long, yellow and black hairs; the tibiæ likewise black-haired, the front tibiæ with more or fewer yellow hairs. Wings nearly hyaline to somewhat brownish tinged. Squamulæ pale yellow to yellow. Halteres yellow.

Also this species varies much, especially with regard to the abdominal markings; the described form should answer to the true *menthastri*; the next variety has the first abdominal band entire but is otherwise similar; the abdominal bands reach the margin or are isolated: the legs pale or more or less dark at the base; epistoma with a slight or without middle stripe (var. *dubia* Zett.). Then comes a form with the abdominal bands all interrupted, the spots quite isolated or more or less reaching the side margin; the epistoma with a generally distinct, black middle stripe and the mouth edge and jowls black; coxæ and trochanters, and also base of femora black or blackish (var. *picta* Meig.). A quite similar form has the legs all yellow, the tarsi paler; only a slight epistomal stripe and the jowls paler (var. *philanthus* Meig.). Finally a form occurs with scutellum quite or almost quite yellow-haired, and also sometimes the vertex more or less yellow-haired; the abdominal bands are entire and broad or very broad; they may reach the margin or be more or less isolated; the fifth segment yellow with small spots, and the black middle line often interrupted; the legs are pale or somewhat dark or blackish at base, the tarsi rather pale, and the front tibiæ generally much yellow-haired (var. *taeniata* Meig.).

Female. Vertex broad, black and shining, from it a broad, black stripe goes down to the antennæ; the hairs black, but paler above the antennæ. Abdomen with four yellow, somewhat narrow bands, shelved off at the sides but generally reaching the margin; the first band narrowly interrupted, second and third entire, sometimes more or less emarginate behind, and rarely the third band interrupted; the fourth band is interrupted and the spots are produced a little forwards and backwards at the inner end, and thus somewhat hammer-like; the side margins of abdomen are very narrowly yellow; the sixth segment is yellow with a black middle spot at the base and two lateral spots near the hind margin, the spots often connected, and sometimes the side spots reaching the front margin; seventh segment orange, more or less black on the middle; the hairs on abdomen short, all black, also at the margin except at the basal corners. Legs all yellow, only the tarsi more or less darkened; hind femora as in the male with no bare space at the base.

The female varies mainly in the same way as the male, i. e. with regard to the abdominal markings, but as the legs are always yellow the varr. *philanthus* and *picta* cannot be discerned from each other.

Length 6,5—9 mm.

The varieties may be distinguished in the following way:

1. Scutellum mainly black-haired 2.
- Scutellum quite or mainly yellow-haired *taeniata*.
2. All or some of the abdominal bands entire 3.
- Abdominal bands all interrupted 4.
3. Abdominal bands all entire *dubia*.
- First abdominal band interrupted *menthastræ*.
4. Legs black at base (♂) *picta*.
- Legs all yellow (♂) *philanthus*.

The larva and pupa were described above under the genus.

This species is known from *scripta* by its smaller size, by the shorter abdomen which is not or almost not longer than the wings, and by the hind femora which in the male have no short and stubby bristles and in both sexes no bare space at the base, but the hairs all equal and evenly distributed; further it has generally a black-haired scutellum with the hairs stronger, and the front tibiæ more black-haired. The shape of the hypopygium and its appendages gives a certain distinction for the males, as seen from the descriptions and figures.

S. menthastræ is like the preceding species common in Denmark all over the country, and it occurs in the same way. My dates are $15/5$ — $8/9$. The varieties are about equally common. I have taken it in copula on $11/6$ and $2/8$. The larva was taken in flood refuse, chiefly of Phragmites, on Vesterfælled on $1/4$, it developed on $21/5$ (the author); further it was taken in flood refuse at Randers in spring, developing in May (Schlick).

Geographical distribution:— All Europe, towards the north to northern Sweden, in Finland and in Siberia; further on the Canaries, and it is also recorded from Japan, and from North America.

Remarks: *Scaeva interrupta* Fabr., which has hitherto never been interpreted, is, according to the type in the collection of Tønder Lund, a female of *S. menthastræ*.

3. *S. flavicauda* Zett.

1843. Zett. Dipt. Scand. II, 771, 6 et 1849. VIII, 3161, 6. — 1901. Verr. Brit. Fl. VIII, 441, 3, figs. 315—317. — 1907. Kat. paläarkt. Dipt. III, 73. var. *nitidicollis* Zett. 1849. Dipt. Scand. VIII, 3163, 8—9 et 1859. XIII, 6009, 8—9. — 1862. Schin. F. A. I, 318 (*Melithreptus*).

Male. Vertex æneous, somewhat large, triangular, a little elongated; frons and epistoma yellow, shining, the central knob brown and the mouth edge narrowly black or brown. Jowls blackish grey. Vertex with black hairs anteriorly, pale hairs behind; frons and epistoma pale-haired, on the latter the hairs inconspicuous. Occiput grey pruinose,

more æneous above, the hairs white, slightly yellowish above; about the middle they are rather coarse and silvery. Antennæ yellow, third joint more or less brown above. Thorax æneous, shining, especially towards the sides: it has two approximated, grey lines in front, separated by a blackish, dull line, stretching to the scutellum; the yellow side line is interrupted above the wing-root, the postalar callus yellow. The thorax is clothed with pale yellow hairs. Scutellum yellow with the extreme basal corners black, it has pale yellow hairs. Pleura æneous, shining, with the usual yellow spots, and with whitish yellow hairs. Abdomen not at all longer than the wings; it is distinctly clavate as it is narrowest about the third segment, the fifth being the broadest; the third, fourth and fifth segments relatively shorter than in the foregoing species; abdomen is black and shining, with yellow markings, it is somewhat bluish towards the sides, only dull on just the disc of second, third, fourth and fifth segments; at the basal corners are small, yellow spots; on the second segment there are a pair of oblique, yellow spots, stretching from about the hinder corners up to the middle of the segment, well separated, or connected to a somewhat emarginate band; the third segment has a similar band, likewise beginning at the hinder corners and arched forwards; it is quite entire or somewhat emarginate; the band on fourth segment similar, generally slightly interrupted, and here produced a little forwards and backwards; the fifth segment has black spots at the basal corners and a black middle line connected with two black spots at the hind margin to a somewhat anchor-shaped spot, the hind margin narrowly orange, and likewise the side margins; the side margins of abdomen are otherwise not yellow, or very narrowly so, but all the spots go over the margin. The hairs on abdomen follow chiefly the ground colour, but are pale at the base and black along the dorsum; at the sides they are pale, and at the basal corners long. Venter bluish black with yellow hind margins to the segments, and with short, yellow hairs. Genitalia large, yellow or brownish yellow; sixth and seventh segments larger than in the foregoing species; eighth segment with two, more or less connected, black spots, one above the other; ninth segment with two black spots at the base, sometimes much extended but then indefinite; the appendages are not long, they are haired but the hairs not long, nor forming tufts. Legs with coxæ and trochanters more or less darkened, greyish yellow to black; femora with the basal part black, on hind femora the basal half; sometimes the femora still more black, anterior femora with the basal half or more black and hind femora with only the apex yellow, but the femora have the extreme base yellow; tibiæ yellow, sometimes

the hind tibiæ somewhat darkened; tarsi more or less darkened, hind tarsi the most. The hairs on anterior femora varying from more or less yellow to almost quite black, on hind femora they are black; the hairs on tibiæ yellow, on hind tibiæ varying to quite black; hind trochanters more hairy than in the foregoing species. Wings somewhat tinged. Squamulæ pale yellow. Halteres yellow.

Female. Vertex moderately broad, shining æneous, sending a middle stripe down towards the antennæ; the hairs black above, yellow below. Abdomen broader than in the male and less clavate but, however, distinctly so; it has the basal corners and four arched bands yellow; the first band more or less widely interrupted, the second entire, emarginate or interrupted, the third generally interrupted, the fourth interrupted and the inner end of the spots produced slightly forwards and backwards, and the segment with a narrow, orange hind margin; the sixth segment orange with a black basal middle spot and a pair of spots at the hind margin, the spots more or less connected; the bands reach the side margin, the first and second sometimes indistinctly. Venter paler than in the male, quite or almost quite yellow. Legs yellow, only hind tarsi more or less darkened.

The form now described answers to the var. *nitidicollis* Zett.; as seen it varies somewhat with regard to the abdominal markings. Besides *nitidicollis* there is a var. *flavicauda* Zett. distinguished by the legs, also of the male, being all yellow, but this variety I have never seen from Denmark. As to the synonymy of these varieties *flavicauda* was founded by Zetterstedt in 1843 on a single female which seems to be an extreme form, with the abdominal markings small and isolated and, except on third segment, separated and consisting of small spots, and this form has never been mentioned since, except by Verrall, who likewise mentions a single specimen. Zetterstedt described later on, in 1849, the other var., *nitidicollis*, as a new species (sent him under this name as a new species from Stæger), but the male with yellow legs was not described, I think, until Verrall, or perhaps it was this form, which Schiner had. The fact is thus that Zetterstedt first described a rare and extreme variety as *flavicauda*, and later on a more common variety as *nitidicollis*, while the paler form with yellow legs in both sexes, which seems to be the normal form, remained undescribed for a long time. It is curious that only the var. *nitidicollis* seems to occur in Denmark, while otherwise the form with yellow legs in both sexes (which may be termed *flavicauda*, but of which, as said, the specimen described by Zetterstedt was an extreme form with small abdominal spots, this variety otherwise having

the yellow markings more extended than in *nitidicollis*) seems to be the most common; perhaps it is a more southern variety.

Length 6—6.5 mm.

The pupa resembles the one of the two preceding species.

This species is easily known from the two foregoing species by the shining thorax with the yellow marginal line interrupted, and the clavate abdomen, and in the male by the genital appendages without hair tufts.

S. flavicauda is rare in Denmark; Vesterfælled (Schlick), Charlottenlund, Vedbæk (Stæger), Hillerød (Godskesen), and in Jutland at Aalborg in a garden (the author) and at Frederikshavn (H. J. Hansen). The dates are in July. Verrall states that there is some connection between this species and the common *Asparagus*. Zetterstedt records that it is especially found near the coast, and on such localities are Stæger's specimens taken, as also those from Frederikshavn; this occurrence, Verrall thinks, may be due to the presence of *Asparagus* here. The larva was taken on Vesterfælled (also a shore-locality) in flood refuse in late autumn; the imago developed in spring (Schlick).

Geographical distribution:— Northern and middle Europe, and, as it seems, down into Austria and Hungary, and also recorded from Italy and Spain; towards the north to middle Sweden.

4. *S. Loewii* Zett.

1843. Zett. Dipt. Scand. II, 774, 9 et 1855. XII, 4662, 9. — 1907. Kat. paläarkt. Dipt. III, 74. — *Melithreptus formosus* Egg. 1859. Verh. zool. bot. Gesell. Wien, IX, 406. — 1862. Schin. F. A. I, 317.

Male. Vertex large, elongated triangular, considerably longer than the eye-suture; it is æneous, somewhat shining; frons and epistoma yellow, the latter somewhat whitish pruinose, the central knob shining, a little brownish; the front mouth edge much more retreating than in the other species, and hence the central knob looking more prominent and the front end of the lateral mouth edge lying more backwards. Jowls whitish yellow. Vertex with yellow hairs, anteriorly somewhat brownish; frons and epistoma pale-haired. Occiput grey pruinose, the hairs white below, yellow upwards, about the middle somewhat coarse and silvery. Antennæ black, third joint somewhat large. Thorax æneous or greenish æneous, shining, without stripes; the yellow marginal line abbreviated at the wing-root, postalar callus yellowish; thorax with yellow, not long hairs, longest behind. Scutellum dark yellow or brownish orange, just the basal margin bluish; it is yellow-haired. Pleura bluish æneous, shining; the yellow spots somewhat restricted as, besides the spots above front coxæ, on the

upper part of sternopleura and on metapleura, only the hinder part of mesopleura and the upper part of pteropleura are yellow; the hairs are yellow. Abdomen about of the length of the wings, somewhat depressed and band-shaped, narrowest in the middle and thus slightly clavate; it has the segments shorter than in *scripta* and *menthastri*, the fifth segment much broader than long and only slightly unsymmetrical, as the hind margin is only very slightly prolonged on the right side of the middle; abdomen is æneous black, shining, only dull on the disc of second segment, and with a narrow, longitudinal, dull spot on the dorsum of third and fourth segments; the basal corners are yellow, this colour stretching a little in on second segment, and there are three pairs of yellow or orange, triangular spots, stretching from about the middle of the side in on the segments; they have the front margin straight, the hind margin sloping forwards; the basal spots are small, widely separated, but the spots increase in size backwards, the third pair being the largest and at the side margin occupying the whole length of the segment; the side margins of abdomen are yellow and the spots go in full width over the margin; the spots may vary in size, being sometimes rather small and not triangular but forming oblique stripes at the sides, with the inner end directed forwards and very widely separated in the middle; the fourth segment has a narrow, orange hind margin; the fifth segment black, with the sides more or less broadly and the hind margin very narrowly orange. The hairs on abdomen are black along the middle of the dorsum, the black hairs more extended on the apical part; at the hind margins of the segments they are black; towards the sides they are pale, and likewise at the side margin, where they are long at the base. Venter bluish black with pale hind margins to the segments, and with pale hairs. Genitalia large, orange or dark orange; eighth segment with two black spots, one above the other, often uniting; ninth segment with two smaller or larger black spots at the base, and sometimes with some dark markings below; the appendages not long, with somewhat short hair tufts. Legs relatively robust with the tarsi a little broad; they are yellow, femora with a black ring near the base, largest on hind femora; the hairs on femora somewhat short; all hairs yellow except on the dorsal and anterior side of the hind tibiæ, where there are some black hairs. Wings a little pale brownish tinged. Squamulæ and halteres yellow.

Female. Vertex of medium breadth, shining æneous, a median stripe of the same colour stretching down the yellow frons to the antennæ; the hairs yellow, above more brownish. Abdomen as in the male a little clavate and band-shaped, and it is relatively broader:

it has likewise pairs of triangular or more elongated oblique spots at the sides, smallest on second segment and increasing in size backwards; the side margin is yellow: the sixth and seventh segments yellow with a more or less triangular, black middle spot. The spots may vary in size, being more or less widely separated, or the hinder ones almost touching. Legs yellow, hind femora with a faint ring near the base and anterior femora with only an indistinct patch.

Length 7.5—8.5 mm.

This species is at once known both by its black antennæ and the retreating front mouth edge, and by the abdominal markings; it seems to vary rather much with regard to these latter according to Zetterstedt's and Schiner's descriptions, especially Schiner describes the abdomen in the male with the third and following segments yellow with indistinct brown markings, and in the female with yellow bands of which only the first is interrupted, and the last segment quite yellow.

S. Loewii is very rare in Denmark, we have only four specimens, taken many years ago at Lersøen in June by Stæger; it is recorded to occur at the borders of water on water-plants, according to Schiner especially on *Butomus umbellatus*; Zetterstedt records it also from the shore on *Scirpus* and *Triglochin*.

Geographical distribution: — Northern and middle Europe down into Austria: towards the north to middle Sweden.

21. **Xanthogramma** Schin.

Species of medium size and of black colour with yellow stripes on thorax and markings on pleura, and with yellow, band-shaped spots on abdomen. The genus is nearest allied to *Sphaerophoria*, but at once distinguished by its broader shape. Head semiglobular, a little broader than thorax, excavated behind. Eyes touching in the male, separated in the female, but the vertex rather narrow. Frons somewhat protruding, the upper angle in the male acute. Eyes not quite bare, with scattered, inconspicuous hairs; the upper facets in the male slightly enlarged. Antennæ inserted in the middle or nearly so; they are short, third joint roundish, the basal joints not quite small; arista somewhat short, apparently bare; the antennæ are larger in the female than in the male. Epistoma not broad, more or less narrowing downwards; it is a little hollowed below the antennæ, the central knob not small, but not much protruding; the front mouth edge considerably retreating and almost not curved upwards; the epistoma is yellow and hairy. Jowls very narrow, and not at all

descending; the oral aperture large but not long. Mouth parts chiefly as in *Sphaerophoria*, but relatively shorter and stouter, labrum and hypopharynx considerably shorter; palpi short. Thorax rectangular, with a yellow stripe at the side margin, and with one or more yellow spots on pleura; metapleura with quite short, dense hairs. Scutellum yellow with the basal part darkened or black; is has no marginal fringe below. Abdomen ovate, a little restricted towards the base; it is distinctly marginate; in the male there are five not transformed segments both on dorsal and ventral side, the fifth not quite small, larger than in *Syrphus* (and hence with distinct yellow markings). Genitalia small, of usual shape. In the female abdomen has likewise five distinctly visible segments, but generally one to three more, but small, are seen. Legs simple and quite short-haired, also the hairs behind anterior femora rather short, and hind femora not at all with longer hairs. Wings with the medial cross-vein well before the middle of the discal cell; cubital vein with a distinct, though slight curve about the middle; the basal part of the radial vein to the base of the cubital vein with very fine, bristly hairs; vena spuria not strong. Alula large. Squamulæ blackish, still narrower than in *Sphaerophoria*, especially the thoracal squamula; alar squamula with short, simple hairs, thoracal squamula with somewhat long, branched hairs. Plumula somewhat thin and delicate, with not dense, plumose hairs (Girschner says "einfachen oder nur undeutlich gegabelten Härchen", I find them distinctly plumose).

The developmental stages of *X. ornatum* are mentioned by Beling (Arch. für Naturg. 48, 2, 1882, 232, 38). The author found some larvæ in the ground under turf (in einem beraseten Erdhaufen) on $^{30}/_8$; in the same place he took larvæ the following year on $^{20}/_1$; they pupated towards the end of May, and the imagines came on $^{12}/_6$ — $^{29}/_6$. The following year larvæ were again taken in the same place on $^{28}/_2$, they pupated on $^{21}/_5$, but gave only parasitical Hymenoptera. Two larvæ taken in the ground on a meadow on $^{25}/_5$ pupated on $^1/_6$ and developed on $^{29}/_6$ — $^4/_7$. I have myself had the larva of *X. ornatum*, it was taken by Mr. Kryger, who found it sitting on an *Ononis procurrens*, in September; it hibernated quite motionless, and next spring on $^{22}/_3$ it contracted and took the pupal shape, and on $^{25}/_3$ it was a pupa; the imago came on $^{12}/_4$; further I possess a specimen of *X. citrofasciatum* bred from a pupa found under a stone on $^{10}/_4$ and developing in May. — The larva of *ornatum* is described as somewhat flat below, arched above with a shallow, longitudinal furrow; the body divided into 30—36 corrugations; the second, third and fourth corrugations each with a transverse row of distinct, brown tubercles ending in a short hair.

(This description is, as seen, quite in accordance with my descriptions of the larvæ of the foregoing genera, which have likewise a single, transverse row of spinules on the meso- and metathoracal and the first abdominal segments; as Beling mentions no spinules on the following segments, the named anterior spinules are probably relatively large, the others small). The posterior spiracular process brown, somewhat prominent. The mouth with distinct hooks, each furcate and bidentate. The colour is yellowish white, with blackish, translucent intestine. Length to 10 mm. Pupa similar to the quite contracted larva, but of light brown colour, 8 mm long. — I did not examine my larva more closely, but it was mainly agreeing with Beling's description; the pupa has no anterior spiracular tubes.

Brauer has, in his work over the larvæ, on account of Beling's observation suggested that the larva lives in ants' nests; I might think that they are aphidiphagous as those of the related genus *Sphaerophoria*, and perhaps living in the same way; I may, however, note that Mr. Kryger told me that there were plenty of ants on the place where he took the larva of *X. ornatum*. The larva evidently hibernates, as shown by Beling's observations and by my bred specimens.

The species of *Xanthogramma* are beautiful and characteristic flies by their bright markings strongly contrasted towards the black colour: they occur especially on meadows on flowers and generally flying rather low.

Of the genus 4 species are known from the palæarctic region, 2 occurring in Denmark.

Table of Species.

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|--|----------------------------|
| 1. Basal abdominal spots triangular, equilateral; hind femora and tibiæ with more or less distinct, dark rings | 1. <i>ornatum</i> . |
| — Basal abdominal spots narrow and linear; legs quite yellow | 2. <i>citrofasciatum</i> . |

1. *X. ornatum* Meig.

1822. Meig. Syst. Besch. III, 298, 37 (*Syrphus*) et 1838. VII, 130, 3 (*Doros*). — 1843. Zett. Dipt. Scand. II, 693, 3 et 1849. VIII, 3127, 3 (*Doros*). — 1862. Schin. F. A. I, 319. — 1901. Verr. Brit. Fl. VIII, 448, 1, fig. 318. — 1907. Kat. palæarkt. Dipt. III, 79. — *Scaeva festiva* Fall. p. p. 1817. Dipt. Succ. Syrph. 38. — *Doros decoratus* Zett. 1843. Dipt. Scand. II, 694, 4 et 1849. VIII, 3127, obs. 2 et 1859. XII, 5088, obs.

Male. Vertex black, frons and epistoma dull yellow; jowls black; epistoma distinctly decreasing in breadth downwards. The hairs on vertex, frons and epistoma yellow or more or less brown, or mixed with black hairs, at the anterior apex of vertex a tuft of black hairs.

Occiput grey pruinose, with yellowish, upwards darker hairs, and above also with black hairs. Antennæ reddish, third joint generally slightly darkened at the upper margin; arista blackish brown, the base yellow. Thorax black or æneous black, somewhat shining, with three faint dull stripes in front, the lateral often scarcely traceable; the side margin has a somewhat broad, bright yellow stripe; the disc is clothed with dense, dark yellow or brown hairs. Scutellum yellow with the basal half black, and with yellow or brown hairs. Pleura black, the hind margin of mesopleura with a yellow or whitish spot, and sometimes a faint spot or trace of a spot below it and a similar on meta-pleura; the hairs yellow or brown. Abdomen increasing in breadth from the base to about the end of the third segment; it is dull black, shining just at base and apex, with four pairs of yellow or orange spots; the basal spots are large, triangular and about equilateral, they lie on the front part of the segment, touching the front corners, and are broadly separated in the middle; the second pair form narrow stripes at the front margin, sloping a little backwards towards the sides, and approximated in the middle; the third pair are similar, but more curved and sloping at the sides, and the fourth pair are still more curved, and in front disappearing under the margin of the fourth segment; the fourth and fifth segments have a narrow, orange hind margin; the spots are going over, or just to, the side margin. The hairs are quite short; they follow the ground colour, only at the base they are yellow and longer; at the sides they are all short and black except at the base, where they are long and yellow from the beginning of the yellow spot. Venter coloured about as dorsum, but with only three bands, the third generally consisting of a pair of spots.

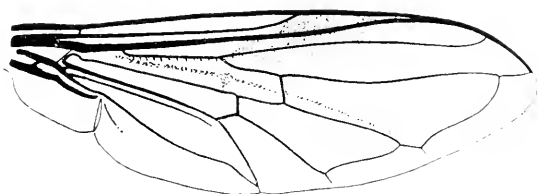


Fig. 132. Wing of *X. ornatum* ♂.

often more or less united in the middle; it has longish, mainly yellow hairs on the two first segments, short and black on the rest. Legs yellow with coxæ and trochanters black; tarsi more reddish; hind femora with a more or less distinct, dark ring near the apex, hind tibiæ reddish brown with a faint dark ring in the middle, and hind

tarsi more or less dark brown. The legs short-haired, the hairs yellow except generally a row behind the middle femora, and the hairs at the apical part of hind femora and all on hind tibiæ, which are black. Wings a little brownish tinged and rather so at the front margin; stigma blackish brown and below it a blackish spot, seaming the radial vein to the base of the cubital vein. Squamulæ with the fringes, and plumula blackish brown. Halteres yellow with the peduncle brown.

Female. Vertex narrow, black; frons increasing in breadth downwards, yellow with a black middle stripe from vertex to antennæ, likewise widening downwards. The hairs black and short on the middle stripe, for the rest mainly yellow and longer. Antennæ larger than in the male. The hairs on thorax and scutellum quite short. The abdominal bands a little narrower.

Length 10.5–12 mm.

X. ornatum is somewhat rare in Denmark; Amager, Ermelund, Dyrehaven, Ruderhegn. Faxe Ladeplads; on Lolland at Maribo, Christianssæde and in Kældskov; on Langeland at Lohals. My dates are $6/7$ – $10/8$. It occurs on flowers on meadows. The larva was taken in Ruderhegn, sitting on *Ononis procurrens*, in September; it pupated the next spring on $25/3$ and developed on $12/4$ (Kryger).

Geographical distribution:— Europe down into Spain and Italy; towards the north to middle Sweden, and in Finland.

2. *X. citrofasciatum* De Geer.

1776. De Geer. Mém. Ins. VI, 118, 9 (*Musca*). — 1862. Schin. F. A. I, 319. — 1901. Verr. Brit. Fl. VIII, 450, 2, fig. 319. — 1907. Kat. paläarkt. Dipt. III, 78. — *Syrphus festivus* Fabr. (nec L.) 1775. Syst. Entom. 769, 34 et 1805. Syst. Antl. 242, 46 (*Eristalis*). — 1817. Fall. Dipt. Suec. Syrph. 38, 3 p. p. (*Scaeva*). — 1822. Meig. Syst. Besch. III, 297, 36 (*Syrphus*) et 1838. VII, 130, 2 (*Doros*). — 1843. Zett. Dipt. Scand. II, 692, 2 (*Doros*).

This species is very similar to *ornatum*. Male. Epistoma a little less decreasing in breadth downwards; frons and epistoma more black-haired. Thorax more short-haired, and the hairs more decumbent. Scutellum with the dark basal part broader, so that only a smaller or larger tip is yellow; the basal part is brownish or sometimes yellowish, with only the basal corners black. There is always a distinct yellow spot also on metapleura. Abdomen more regularly ovate; the basal spots forming narrow bands, about three times as broad as long at the side; the following bands a little narrower than in *ornatum* and a little less arched, the second and third straight; the hairs at the base of the side margin shorter. Legs quite yellow, ex-

cept the black coxæ and trochanters; anterior femora with more or fewer black hairs, but hind femora and tibiæ all or almost all yellow-haired. Wings more brown and hence the stigma and the spot below it less marked; cubital vein a little less curved.

Female. Likewise similar to the female of *ornatum*, and differing from the male in the same way as this, only the abdominal bands are not narrower than in the male.

Length 10—11,5 mm.

X. citrofasciatum is like the preceding somewhat rare in Denmark; Amager, Damhusmosen, Ordrup Mose, Ermelund, Ruderhegn; on Lolland in Kældskov and Høvænge Skov west of Nysted; in Jutland at Horsens. My dates are $^{13}/_5$ — $^8/_6$; it is thus in contrast to *ornatum* a spring species; it occurs otherwise in the same way. The pupa was found under a stone on Amager on $^{10}/_4$ and it developed in the same month (Worm Hansen).

Geographical distribution:— Europe down into Italy; towards the north to southern Sweden, and in Finland.

22. **Doros** Meig.

Species of rather large size and somewhat long and narrow shape, somewhat similar to an *Eumenes*; the colour is black with yellow side stripes on thorax and small markings on pleura, and with narrow bands on abdomen; the body is slightly hairy. The genus is nearest allied to *Xanthogramma* and also somewhat similar to it, but at once distinguished by the narrow abdomen; otherwise it agrees with it in most respects. Head similar; eyes bare. Antennæ with the arista very slightly pubescent. Epistoma with the central knob smaller, it is yellow with a black middle stripe leaving the knob yellow, or more black with only the side margins yellow. Thorax as in *Xanthogramma*; scutellum brownish yellow, no fringe below the margin. Abdomen somewhat long and narrow, constricted at the base and thus clavate; it is semicylindrical as the dorsum is arched, the venter flat; the second segment is somewhat long and narrow, the others decreasing in length but increasing in breadth. In the male there are five not transformed segments, the fifth not specially small. Genitalia small, of usual shape. In the female there are likewise five normal abdominal segments, but three small apical segments are generally seen. Legs with the femora a little thickened towards the base; hind tibiæ with the incurvation on the posterior side before the apex rather strong, and the anterior tibiæ with indications of the same structure; hind tibiæ moreover a little dilated about the middle; anterior tibiæ sulcated

on the postero-dorsal side and hind tibiæ on the antero-dorsal side (also, but to a slighter degree, present in other genera). Legs short-haired as in *Xanthogramma*. Wings relatively long and a little narrowed: radial vein without perceptible bristly hairs; cubital vein nearly straight. Squamulæ narrow as in *Xanthogramma*, fringed in the same way. Plumula small, with relatively short, partly simple, partly singly branched hairs.

The developmental stages are mentioned by Mik (Verh. zool. bot. Gesell. Wien, XIV, 1864, 797); the larva is described as leech-like, yellowish orange, smooth; the length is given to about 9 mm. The pupa is of the size of the larva, yellowish brown, somewhat cylindrical, equally rounded at both ends and somewhat depressed in the middle, not unlike larger pupæ of ants. The author found the larva under moss at the foot of oak-trees on $25/3$, it pupated fourteen days later, and the imago came first in May. Bremi (Isis 1846, 164) says that the larva lives in trees inhabited by ants, but without giving any further elucidation, and Scholtz states (according to Brauer) the same (Ent. Zeitschr. Breslau, 1848—49). Mik's observation shows that the larva hibernates.

The single species of *Doros* is a large, characteristic, Wasp-like fly.

Of the genus only one species is known from the palæarctic region, also occurring in Denmark.

1. *D. conopseus* Fabr.

1775. Fabr. Syst. Entom. 786, 26 (*Syrphus*) et 1805. Syst. Antl. 195, 29 (*Milesia*). — 1822. Meig. Syst. Besch. III, 296, 35 (*Syrphus*) et 1838. VII, 130, Tab. LXVIII, Fig. 7. — 1843. Zett. Dipt. Scand. II, 691, 1 et 1859. XIII, 5087, 1. — 1862. Schin. F. A. I, 320. — 1901. Verr. Brit. Fl. VIII, 453, 1, fig. 320. — *Doros conopseus* Zell. 1842. Isis, 830. — 1907. Kat. paläarkt. Dipt. III, 80.

Male. Frons yellow, but with a large, black, triangular spot from the top angle to the antennæ, and on the sides stretching a little below them; the spot is so large that only the narrow side margin is yellow, so that the frons may be termed black with a narrow, yellow side margin. Epistoma yellow with a horse-shoe-shaped blackish middle part, surrounding the yellow central knob and below united with the broadly black mouth edge; sometimes also the knob black so that epistoma only is yellowish at the sides and below the antennæ. Jowls black. Vertex and frons with yellow hairs, the latter with short, black hairs anteriorly; epistoma with pale yellow hairs. Occiput greyish pruinose, the hairs yellow; as far as I could see no black hairs above. Antennæ reddish brown, the basal joint blackish; arista

brown. Thorax black or brownish black, shining, punctate and clothed with short, decumbent, brownish yellow hairs; on the postalar calli longer, pale hairs; there is a yellow line along the side margin, narrowed behind, and sometimes indistinct behind the transverse furrow. Scutellum brownish or yellowish brown, with somewhat long, pale hairs. Pleura black, shining, with a more or less distinct, yellow spot above the front coxæ and at the upper margin of the sternopleura; the hairs are longish, whitish, only present on meso- and on the anterior part of pteropleura. Abdomen narrow, constricted on the basal part; it is black, a little shining, with a pair of basal spots and three narrow, yellow bands; the basal spots are linear, beginning at the basal corners and stretching obliquely backwards and inwards about to the middle, but broadly separated; the bands lie close to the front margins of the segments, the middle band is the narrowest; the last is somewhat curved, and it is partly formed of the yellow hind margin of the fourth segment and this margin is a little triangularly produced in the middle; the basal band of fifth segment may be quite hidden under the yellow hind margin of the fourth, so that the third band is formed only of this margin; the hind margin of the fifth segment is narrowly yellow. All the bands go over the side margin. The hairs on abdomen are short and mainly following the ground colour, but partly brown on the black parts and mainly black at the yellow hind margin of fourth segment; at the base and basal corners they are longer and pale, and likewise along the sides of second segment. Venter mainly coloured as dorsum, but with four bands as the hind margin of the first segment is yellow but second segment without spots; it is clothed with short hairs, pale on the basal half, dark towards apex; just at the base they are long. Legs reddish yellow, femora black at the base, on the posterior side the black colour often stretching towards the apex, hind femora a little pale at the base; tibiæ with more or less complete, blackish rings below the middle, most distinct on hind tibiæ; tarsi with the last two or three joints brownish or blackish. The legs are short-haired, only behind the anterior femora the hairs are a little longer; they are all pale. Wings relatively long, somewhat brownish tinged, the whole anterior margin strongly brown, the brown space bounded behind from the base to the medial cross-vein by the discal vein, and outwards by the cubital vein. Squamulæ greyish or blackish yellow with a brown fringe. Halteres orange with a darker peduncle.

Female. Vertex narrow, black; frons rapidly widening to the antennæ, yellow with a black middle stripe from vertex to antennæ, widening evenly downwards so that only the side margins of the

frons are yellow; the hairs yellow. Antennæ a little larger than in the male. Thorax and scutellum all quite short-haired. Abdomen with the basal spots larger and broader than in the male, less widely separated. The dark rings on anterior tibiæ quite small.

Length about 15 mm.

This species is very similar to a *Conops* or *Physocephala*, perhaps especially to *P. nigra*, and also to an *Eumenes*; Verrall thinks that both the Conopid and the *Doros* have independently mimicked the Wasp, though it is not possible to see the reason for this with regard to the *Doros* such as perhaps with regard to the Conopid. — As seen the species may vary somewhat, especially with regard to the colour of epistoma: no doubt therefore the *D. destillatorius* Mik (Wien. ent. Zeitg. IV, 53) and the *D. conopseus* var. *bipunctatus* Mik (Verh. zool. bot. Gesell. Wien, XXXV, 328), which the author thinks may perhaps be a distinct species, are only varieties, as already declared by Verrall, who possessed the types to both species.

D. conopseus is rare in Denmark, I know only five specimens, all females: Sealand, without particular locality (Løvendal), Bøllemosen (Schlick), Brede, Tyvekrog (Godskesen), and on Lolland at Maribo (Schlick). The dates are $^{20}/_5$ — $^8/_7$.

Geographical distribution:— Europe down into Italy; towards the north to middle Sweden; it is everywhere rather rare.

23. **Baccha** Fabr.

Species of not small size but of very elongate and slender shape; the colour dark æneous with small, yellow abdominal bands. Head somewhat long, especially in the male and here almost conical; it is considerably broader than thorax, excavated behind. Eyes very large, touching for a rather long distance in the male, somewhat narrowly separated in the female; frons and epistoma rather narrow. Eyes bare, the facets distinctly enlarged above in the male. Antennæ inserted in the middle of the head; they are short, third joint roundish; arista thickened at the base, apparently bare; the antennæ slightly larger in the female than in the male. Epistoma evenly retreating; it is not hollowed below the antennæ and has a small central knob, below which it is again retreating; the oral aperture is simply elongated as the front edge is not curved upwards and there are no lateral angles between the front and the side mouth edges. The epistoma is black, at most a little yellow at the mouth edge or on the sides below; it has short, fine hairs. Jowls very small and narrow, in front of them a little pit. Oral cone somewhat short; clypeus

horse-shoe-shaped, the basal part rather arched, somewhat prominent, the side prolongations very delicate. Proboscis short. Labrum somewhat strong, high at the base; it is of the usual shape, the median process cleft and divided into fine emergences, the upper lateral process very thin and delicate, pointed and also a little branched, the lower process broad and rounded at the apex; below, along the side margin labrum has the usual row of small warts or papillæ; maxillæ short, knife-shaped, palpi short, slightly longer than the lacinia, a little clubbed; towards the apex they have some bristles and they are beset with fine hairs; the lacinia has, as usual, very fine, microscopical hairs, arranged somewhat in rows; hypopharynx as long as labrum, a little attenuated but with the apex rounded. Labium with the basal part a little shorter than the broad labella, not strongly chitinised, of yellow colour. Thorax slightly rectangular, somewhat arched; scutellum æneous, without fringe below the margin. No bristles present. Pleura without yellow markings, at most somewhat vaguely pale; metapleura with very short hairs: in contrast to the foregoing genera there is a distinct, chitinised metasternum behind the hind coxæ (or this part is formed of the metathoracal pleura). Abdomen elongated and narrow, a little widened behind and thus somewhat clavate; it is about four times as long as thorax; first segment short, broad at the base, narrowed behind, short conical; second and third segments long and narrow, of about equal length, fourth shorter, widening backwards, and fifth much shorter, about one third of the length of the fourth and the broadest of all; the first ventral segment about quadratic and a little arched; in the female the abdomen is more clubbed than in the male, but pointed again towards the apex and the broadest part lying more forwards as the third segment is widening backwards and shorter, the fourth the broadest, the rest decreasing in breadth. In the male there are five not transformed segments; the genitalia are of usual shape, relatively large; in the female there are five segments of length about as in the male, but the small sixth to eighth segments are generally also distinctly seen, and at the apex are a pair of small lamellæ. Legs slender and long, especially the hind legs; hind tibiæ with the usual incurvation near apex on the posterior side; hind metatarsi somewhat thickened. The legs are very inconspicuously haired, and the hairs all short except a row of long hairs on the postero-ventral side of middle femora. Claws and pulvilli normally developed, not large; empodium small, very short, bristle-shaped and hairy. Wings somewhat elongate; medial cross-vein well before the middle of the discal cell; the cubital vein terminates below the apex of the wing; vena spuria well developed; axillary lobe slightly pro-

nounced, broadly rounded. Alula very narrow, almost wanting. Squamulae very narrow, especially the thoracal squamula; alar squamula with short, simple hairs, thoracal squamula with not dense hairs, partly simple, partly somewhat branched, especially towards the angulus. Plumula very short, almost rudimentary, with the hairs partly simple, partly branched from the base.

The developmental stages of *B. cochenillivora* from Guatemala are mentioned by Guérin-Méneville (Ann. Soc. Ent. de Fr. 2, VI, 1848, Bull. 79 and Revue Zool. XI, 1848, 350): the larva feeds on cochineal and is destructive to them. The larva of *B. elongata (tabida)* has been described by Snellen v. Vollenhoven (Handl. d. Nederl. Ent. Ver. 1854), but I have not seen this paper. The larva is said to be similar to a *Syrphus*-larva, and to be aphidiphagous. Osten Sacken has recorded (Stett. Ent. Zeitg. 1862, 412) the facts then known about the *Baccha*-larva, and he mentions here a *Baccha* from the southern United States, feeding on *Coccus* infesting orange-trees. *B. elongata* is mentioned as bred by Bradley (Entom. Month. Mag. XXXII, 1896, 256); in the case, in which the pupa was, a larva of *Mamestra persicaria* had been, and it was suggested, that the *Baccha* was possibly bred from it. Morley mentions (Ent. Month. Mag. XLVI, 1910, 192) *B. obscuripennis* depositing eggs between Aphides (*A. pruni*) on the leaf of a bullace in the beginning of July. I have myself examined a pupa of *B. obscuripennis?* taken as larva in flood refuse in a fen on $^{27}/_4$, it pupated $^{30}/_4$ and developed on $^{15}/_5$. The pupa is of a rather curious shape; it is elongate, the anterior part high and rounded and curved somewhat downwards, the rest low; along the middle this low part is a little arched, but along each side is an impressed line or longitudinal furrow, the side margins being again a little raised; above at the apex is a short spiracular process, directed upwards and a little divided at the end; the pupa is attached by its posterior part and is here flat; it is yellowish brown with some darker brown markings on the anterior part. The length is nearly 7 mm. To judge from the time on which the larva was found it hibernates.

The species of *Baccha* are very characteristic flies by their long and slender shape; they occur in woods and thickets, on shaded and more or less humid places and are here seen hovering; they are indefatigable hoverers and their flight is a nice view, especially the male of *B. obscuripennis* with its dark wings forms a pretty sight; they are also seen resting on plants.

Of the genus 4 species are recorded from the palæarctic region, but only 2 are European (see below under the remarks after the species), both also occurring in Denmark.

Table of Species.

1. Frons of the male grey pruinose, of the female with a black stripe from vertex downwards, but stopping before the antennæ, the frons here quite pruinose; wings not or slightly brown 1. *elongata*.
 — Frons of the male not pruinose, shining, in the female with a black stripe from vertex to antennæ, widening above the antennæ; wings in the male strongly brown 2. *obscuripennis*.

1. *B. elongata* Fabr.

1775. Fabr. Syst. Entom. 768, 29 (*Syrphus*) et 1805. Syst. Antl. 200, 6. — 1822. Meig. Syst. Besch. III, 197, 1, Tab. XXVIII, Fig. 13. — 1843. Zett. Dipt. Scand. II, 893, 1. — 1862. Schin. F. A. I, 324. — 1901. Verr. Brit. Fl. VIII, 458, 2, fig. 321. — 1907. Kat. paläarkt. Dipt. III, 81. — *B. scutellata* Meig. 1822. l. c. III, 198, 2, ♀. — *B. sphegina* Meig. 1822. l. c. III, 198, 3. — *B. tabida* Meig. 1822. l. c. III, 199, 5. — *B. abbreviata* Meig. 1822. l. c. III, 200, 6. — *B. nigripennis* Meig. 1822. l. c. III, 200, 7, ♂. — 1862. Schin. F. A. I, 324. — *B. vitripennis* Meig. 1822. l. c. III, 200, 8, ♀. — *B. Klugii* Meig. 1830. l. c. VI, 349, 9, ♂.

Male. Vertex æneous, a little pruinose; frons greyish or whitish pruinose, a little shining above the antennæ; epistoma likewise grey pruinose, the central knob shining. Jowls greyish black, but the side mouth edges more or less yellowish. Vertex, frons and epistoma all white haired. Occiput bluish, grey pruinose, with a single row of longish, whitish hairs which are directed backwards. Antennæ yellow or more or less brown to blackish brown: arista longer than the antennæ, dark, thickened just at the base. Thorax æneous or greenish æneous, sometimes bluish, brightly shining, the humeri somewhat brownish or dark yellowish; thorax is clothed with short, whitish hairs. Scutellum with quite short, whitish hairs. Pleura slightly pruinose, with quite short, pale pubescence. Abdomen æneous black or dark æneous brown, shining, first segment bluish: at the front margins of third and fourth segments a larger or smaller, yellow band, sometimes the first, or both bands incised in the middle; at the front corners of the fifth segment may be yellow spots, but they are often wanting, and also the band on third segment may be quite small, divided into spots, or, but more rarely, quite wanting; the bands are sometimes somewhat hoary. Abdomen is clothed with short, inconspicuous hairs, mainly following the ground colour, but they are pale at the base and at the sides and here long on the whole second and on the front half of third segment; at the sides of the first segment they are longest. Venter coloured chiefly as the dorsum, with short mainly dark hairs. Legs yellow, posterior coxæ more or less darkened to blackish, and hind tarsi more or less darkened; hind

femora and tibiæ may be a little brownish or have faint brownish rings, and also anterior femora may be a little brownish; the hairs are inconspicuous and all pale, only middle femora with a row of longer hairs below. Wings slightly yellowish or brownish tinged;

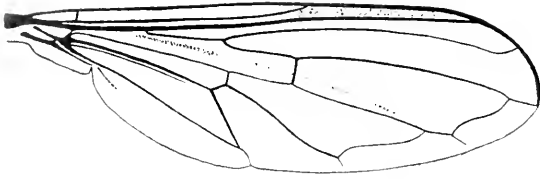


Fig. 133. Wing of *B. elongata* ♂.

stigma brown, or paler and then slightly marked; the cross-veins as a rule a little infuscated and likewise the apex of the wing above the discal vein. Squamulæ and fringes whitish or pale yellow. Halteres yellowish white, the knob often with the apical part darkened.

Female. Vertex somewhat narrow, black, shining; frons grey pruinose but from the vertex a narrow, black line stretches downwards, it ends, however, about one third before the antennæ so that the space above the antennæ is quite pruinose; the pubescence white. The mouth edge more yellow than in the male, also the front edge yellow. Antennæ yellow or with only the margin of third joint dark. The hairs on thorax shorter; scutellum generally blue. Pleura more pruinose than in the male and with more pubescence, only the lower corner of mesopleura polished; the greater part of meso- and pteropleura yellowish. Abdomen coloured mainly as in the male, the spots on fifth segment seem always to be present.

Length 7—10,5 mm.

As seen this species may vary somewhat, among others with regard to the abdominal markings; this is the reason for the many species distinguished by Meigen, and also the fact that he has treated males and females as separate species.

B. elongata is common in Denmark; Ordrup Mose, Ermelund, Dyrehaven, Lyngby Mose, Egebæks Vang, Tisvilde; on Lolland at Strandby; on Langeland at Lohals, and in Jutland in Vejle Nørreskov, Grejsdal and Højenbæk Dal at Vejle, at Horsens and at Jerup near Frederikshavn. My dates are $\frac{9}{16}$ — $\frac{9}{18}$; it is most common in late summer and autumn. It occurs in woods and thickets, generally hovering on shaded and somewhat humid places.

Geographical distribution:— Europe down into Spain and Italy; towards the north to northern Sweden, and in Finland.

Remarks: In the collection of Tönder Lund and Sehestedt there are two specimens, a male and a female, labelled *B. elongata*; both are *obscuripennis*; yet I have made no alteration, for I am not certain that the said specimens are the types; Fabricius says: "Habitat in Dania", but he does not expressly refer to the collection of Tönder Lund and Sehestedt; the specimens are labelled "e Gentofte" which is a place near Copenhagen, but Fabricius may possibly have described his species from Danish specimens in his own collection. Further I should not be inclined to any alteration of the name, as the distinctness of the two species *elongata* and *obscuripennis* is scarcely quite beyond doubt.

2. *B. obscuripennis* Meig.

1822. Meig. Syst. Besch. III, 199, 4. — 1843. Zett. Dipt. Scand. II, 894, 2 et 1849. VIII, 3196, 2. — 1862. Schin. F. A. I, 326. — 1901. Verr. Brit. Fl. VIII, 456, 1. — 1907. Kat. paläarkt. Dipt. III, 82.

Male. This species is highly similar to *elongata*. Vertex more black; frons æneous, shining, not pruinose; epistoma somewhat shining, slightly pruinose. The hairs on vertex, frons and epistoma dark or black, on the latter paler below. Occiput grey pruinose below but black above, and the hairs above more or less dark. Antennæ with the basal joints blackish, the third more or less dark brown. Thorax with the humeri not or almost not pale; the hairs slightly shorter than in *elongata*, blackish or brown. Pleura not pruinose, the pubescence brownish, somewhat distinct. Abdomen not bluish at the base, the markings darker and less distinct than in *elongata*, otherwise varying in the same way; the long hairs at the sides often dark. Legs darker, often more or less brownish, especially the hind pair; also the hairs generally darker, often mainly brown. Wings strongly brown; stigma more or less blackish. Squamulæ smoky with the fringes brownish yellow. Halteres more or less brownish.

Female. Still more similar to *elongata*, but the frons with a black, shining middle stripe, which goes down to the antennæ and here is widened. Antennæ with the third joint generally darker than in *elongata*. Pleura as a rule less, or not at all, pale. Abdomen with the markings more distinct than in the male, and the hairs always pale. Legs paler than in the male. Wings not strongly tinged, about as in the female of *elongata*.

Length 7—10.5 mm.

This species is in the male distinguished by the not pruinose frons and the strongly brown wings, and it is also darker haired on head and thorax, while the colour of the hairs on abdomen and

legs gives no sure distinction, as it is varying. The female is only distinguished by the entire black middle stripe on the frons.

B. obscuripennis is about as common in Denmark as the preceding species: Copenhagen in a garden, Charlottenlund, Ordrup Mose, Ermelund, Lyngby Mose, Geel Skov, Trørød, Tisvilde, Faxe Ladeplads, Skelskør; on Lolland in Dødemose west of Nysted; on Langeland at Lohals; on Funen at Odense and Strib; in Jutland in Vejle Nørreskov and Greisdal, at Horsens, Hald and at Rebbild near Skørping. My dates are $^{21/5}$ — $^{15/9}$. It occurs in the same way as *elongata* and also in company with it. The larva (as far as could be determined of this species) was found in Lyngby Mose in flood refuse on $^{27/4}$, it pupated on $^{30/4}$ and the imago came on $^{15/5}$ (Schlick).

Geographical distribution:— Europe down into Italy; towards the north to middle Sweden, and in Finland.

Remarks: The two species of *Baccha* are, as seen, rather similar, and the distinguishing characters, especially for the females, slight; Verrall records both species, but he is not sure, and says that there is perhaps only one, variable European species. I think, however, the species are distinct, but I do not feel quite sure. Strobl describes three species, as he takes *nigripennis* Meig. as distinct, but of this species he knew only the male; the characters he gives I cannot use on my material, and I can quite agree with Verrall when he says that "it will be quite time enough to accept these so-called species when long series in both sexes can be contrasted and clearly differentiated"; especially I think that copulated pairs will be necessary for a sure judgement.

24. **Sphegina** Meig.

Species of somewhat small size and of a slender, elongate shape; the colour is black with somewhat obscure reddish markings on abdomen, sometimes quite wanting. The genus is somewhat allied to *Baccha*, but differing from it in many respects. Head somewhat semi-globular, broader than high and a little broader than thorax; it is not excavated behind but flat or a little arched, only in the upper third there is a somewhat sudden excavation. Eyes separated in both sexes, in the female a little more than in the male; vertex, frons and epistoma are equally wide. The eyes are bare; the facets just in front, towards the margin, are a little enlarged in the male. Antennæ inserted a little above the middle; they are short, the third joint slightly longer than broad, broadest towards the end; arista rather long, a little pubescent. Epistoma considerably hollowed below the antennæ, with-

out central knob, but with the mouth edge very produced; especially the front mouth edge is protruding as a small knob, the lateral angles somewhat retreating, but not descending; the epistoma is grey above but pale on about the lower half; it is not haired. Jowls small and narrow, the oral margin a little descending. Oral cone somewhat long. Clypeus horse-shoe-shaped. Proboscis longer than in *Baccha*; labrum somewhat long, the apex characteristic; it is deeply and broadly cleft in the middle, so that the median process is quite divided and each half forced towards the side in such a way that there is in reality a cleft upper lateral process at each side; it is rather delicate; the lower lateral process as usual broad and rounded at the end; the usual row of small warts or papillæ present at the sides below. Hypopharynx nearly as long as labrum, pointed at the apex; maxillæ knife-shaped, likewise not short, a little shorter than hypopharynx, with microscopical hairs in rows; the palpus longer than the lacinia, a little clubbed, microscopically haired and with some bristles. Labium with the basal part a little longer than the somewhat broad labella, it is yellow, not strongly chitinised. Thorax rectangular; scutellum black, without hairs below the margin; there are no thoracal bristles, but scutellum has a pair of fine apical bristles; metapleura very short-haired. The hind coxæ are inserted on a downwards protruding part, and there is a large metasternum behind and above them, lying perpendicularly (or this part is more probably formed partly or quite of the metathoracal pleura in accordance with the facts in *Neoscia*); it is triangularly incised above and its upper corners are prolonged as two points, stretching in under the halteres, these points are densely short-haired. Abdomen is narrow, elongate and clavate; the first segment is not quite small, broad at the base, somewhat tapering behind, second segment is long and narrow, narrowest about the middle, a little widened behind, third and fourth segments are shorter and broader, the third broadest behind; in the female abdomen is similar but second segment broader behind and third and fourth segments broader, while the fifth is narrower and tapering, the abdomen thus pointed. In the male there are four not transformed dorsal segments; on the ventral side the sternites are relatively small, so that there are large, membranous parts; the first sternite lies in the excision of metasternum and is small, the second sternite is narrow, but much shorter than the tergite, it has a separate small chitinisation at its front end; third and fourth sternites are likewise considerably smaller than the tergites, the fourth lying under the front half of the tergite. The genitalia are large, forming a thick knob, the apical appendages of the ninth segment long and with a styliiform apex. In the female

there are five normal segments, the sternites of which are more like the tergites in size, only much narrower; at the end two or three small segments may be more or less visible, the last terminating with two small lamellæ. Legs with the hind femora thickened and clavate, hind tibiæ somewhat dilated and curved towards the end, and hind metatarsi thickened. Legs short-haired, hind femora with bristles below. Claws and pulvilli small; empodium not quite short, bristle-shaped and with microscopical bristles. Wings somewhat long; medial cross-vein well before the middle of the discal cell; upper marginal cross-vein with a round curve below, but the upper angle rectangular, the lower cross-vein oblique with the lower angle obtuse; cubital vein ending below the apex of the wing; radial vein issuing rather basally; vena spuria very weak, almost not visible behind the medial cross-vein; no anal fold discernible. Alula very narrow, almost wanting. Squamulæ narrow, the alar squamula with short, simple hairs, the thoracal squamula very narrow at the base, a little triangularly dilated towards the angulus; it has long hairs, which are simple on the basal part, but towards the angulus long and divided furcately several times. Plumula very small, almost rudimentary, with simple hairs (as far as I could see).

The developmental stages are not known.

The species of *Sphagina* are characteristic by their narrow, somewhat *Ichneumon*-like shape; the genus is, as said, somewhat related to *Baccha*, but differs in many characters as the separated eyes in the male, the epistoma without central knob, the perpendicular metasternum, only four not transformed abdominal segments in the male, the thickened hind femora and the wing-venation. The species occur in woods and thickets on somewhat shaded, humid places, where they are found in low herbage; their flight is not quick.

The species are somewhat varying, 6 are recorded from the palæarctic region, but one or two, at least, are doubtful; Verrall says: "I should not be surprised if the whole genus resolved itself into one species, *S. clunipes*". In Denmark certainly only one species, *S. clunipes*, occurs.

1. *S. clunipes* Fall.

1816. Fall. Dipt. Succ. Syrph. 12. 10 (*Milesia*). — 1822. Meig. Syst. Besch. III, 194, 1, Tab. XXVIII, Fig. 5. — 1843. Zett. Dipt. Scand. II, 891, 1 et 1849. VIII, 3196, 1 et 1859. XIII, 6043, 1 — 1862. Schin. F. A. I, 323. — 1901. Verr. Brit. Fl. VIII, 464, 1, figs. 326—327. — 1907. Kat. palæarkt. Dipt. III, 83. — *S. nigra* Meig. 1822. l. c. III, 195, 2. — 1843. Zett. l. c. II, 891, 2 et 1849. VIII, 3196, 2. — *S. nigricornis* Macq. 1827. Soc. Sc. Lille, 166, 2 et 1834. Suit. à Buff. I. 576, 2. — 1838. Meig. l. c.

VII, 109, 3. — *S. flava* Macq. 1834. Suit. à Buff. I, 577, 4. — 1838. Meig. l. c. VIII, 109, 4.

Male. Vertex and frons greyish brown pruinose, especially downwards. Epistoma hollowed below the antennæ, with the front mouth edge very protruding; it is grey but the lower part more or less yellow or whitish, the side mouth edge and the jowls black or blackish grey. Vertex and frons with quite short, yellowish hairs, epistoma, besides the pruinosity, not haired. Occiput grey pruinose, with very short, pale hairs. Antennæ with the third joint somewhat large, broadest

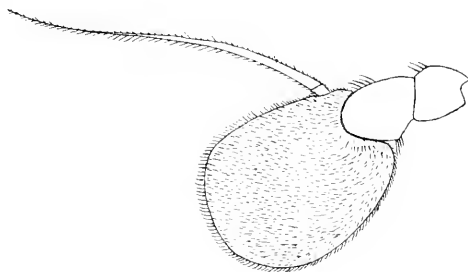


Fig. 134. Antenna of *S. clunipes* ♂, from the inside. $\times 65$.

towards the end; they are brown or blackish brown, third joint sometimes paler; arista longer than the antennæ, a little pubescent. Thorax black, somewhat shining, the humeri often brown; about the humeri and in the præsutural depression somewhat pruinose; postalar calli more or less brown; thorax is clothed with short, depressed, brownish yellow hairs; scutellum with a pair of fine apical bristles. Pleura black, a little pruinose, with quite short, pale hairs. Abdomen narrow and clavate; it is black and shining, the base of the third segment with a broad, reddish band, generally occupying about two thirds of the segment; fourth segment with a narrow band at the base, or with small basal corner spots; rarely the band on third segment divided in the middle; the markings for the rest somewhat variable and lighter or darker. Abdomen is clothed with short hairs, which are mainly pale, but dark on the black part of third and on the disc of fourth segment; along the sides at the base and the anterior two thirds of the second segment they are long but not dense; the large genitalia are pale-haired. Venter with the two basal segments black, the two apical brown (the chitinised parts); the hairs short, pale, at the slightly incised hind margin of fourth segment a small tuft of longer hairs. Legs whitish yellow, hind femora black with

the basal third yellow, hind tibiæ with a brown ring below the base and with the apical part black; anterior tarsi brownish towards the end, hind tarsi black; often the anterior femora and tibiæ have faintly brownish markings. The hind femora thick and clavate, hind tibiæ a little dilated and curved at the end, hind metatarsi thickened. The legs with short, yellow hairs, only below the base of anterior femora slightly longer hairs; hind femora with two rows of black bristles below on the apical half. Wings more or less brown. Squamulæ and fringes whitish. Halteres yellow.

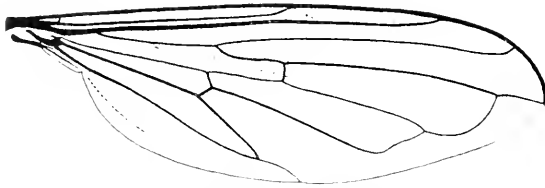


Fig. 135. Wing of *S. clunipes* ♂.

Female. Similar to the male; frons and epistoma a little broader; third joint of antennæ slightly larger. Abdomen broader behind and thus more clavate; it is either quite black or more or less reddish brown, or brown on third, fourth and fifth segments, and also sometimes on the hind part of second segment.

Length 5,3 to about 7 mm.

S. clunipes is not common in Denmark; Charlottenlund, Ermelund, Dyrehaven, Bagsvær Sø, Egebæks Vang, Herlufsholm; in Jutland in Grejsdal at Vejle. My dates are $\frac{4}{6}$ — $\frac{9}{9}$, it is most common in autumn. It occurs in low herbage in woods on shaded, humid places; I have taken it on various flowers f. inst. on *Rubus*.

Geographical distribution:— Europe down into Italy; towards the north to northern Sweden, and in Finland.

25. **Neoascia** Willist.

(*Ascia* Meig.).

Small, narrow species similar to *Sphegina*, but smaller and the abdomen less narrowed at the base. The colour is black or æneous with or without one or more yellow bands or pairs of spots on abdomen, not rarely the male with bands, the female unicolorous. The genus is very nearly related to *Sphegina* and in most respects similar to it. The head is relatively less broad and only slightly broader

than thorax; it is flat behind, the excavation above much smaller. Eyes separated in both sexes, a little more in the female than in the male. Antennæ more or less elongated, sometimes rather short, the third joint from a little longer than broad to twice or more than twice as long as broad, but it is narrower than in *Sphegina*; arista considerably shorter, and apparently bare. Epistoma less hollowed below the antennæ, more evenly but fully so much protruding; it is grey pruinose, a little haired below. Jowls small and narrow. The mouth parts mainly as in *Sphegina*, but the oral cone and proboscis relatively longer, and also the palpi slightly longer; the shape of the apex of labrum is different, the median process is much shorter than the others, cleft in the usual way and not as in *Sphegina*; the upper lateral process is long, thin and pointed, the lower of the usual broad shape; the basal part of labrum is more chitinised and dark. Scutellum without apical bristles. There is no such process bearing the hind coxæ as in *Sphegina*, but the pleura of metathorax stretch in behind the hind coxæ and are almost or quite meeting in the middle below; upwards they divide triangularly and the upper pointed corners stretch in under the halteres as in *Sphegina*, but they are here directed outwards so that there is a protruding apex at each side at the base of abdomen. Abdomen is narrow and clavate, but less than in *Sphegina*; it is otherwise shaped in the same way, and there are likewise four not transformed segments in the male, the sternites of which are, however, of usual shape, not small as in *Sphegina*, and there are thus no such membranous spaces as in this genus. The genitalia are relatively smaller, the apical appendages of the ninth segment short, with various processes and some spines. In the female there are five normal abdominal segments. Legs as in *Sphegina*, hind femora likewise thickened and clavate, and hind metatarsi a little thickened. Hind femora likewise with rows of bristles below, but besides with long hairs above, and middle femora with a row of long hairs below, and also the hairs below the front femora not quite short; hind tibiæ with a short, dense fringe below in the apical half. Wings somewhat elongate; the medial cross-vein longer before the middle of the discal cell than in *Sphegina*; subcostal vein somewhat short; radial vein a little undulated; the marginal cross-veins both perpendicular, and their lower angles rectangular or the angle at the upper cross-vein a little rounded, but less than in *Sphegina*; vena spuria very weak, only visible to the medial cross-vein; no anal fold. Alula almost wanting. Squamulæ narrow, the alar squamula with short, simple hairs, the thoracal squamula with long, partly simple, partly slightly branched hairs. Plumula rudimentary.

The developmental stages were hitherto not known, but I have examined larvæ and pupæ of *N. floralis* and *geniculata*; they are quite similar, the following description is taken from *floralis*. The larva is not leech-like; it is somewhat flat, the dorsal side the most arched; the head-end is rounded, the sides of the body almost parallel; behind it tapers into an attenuated tail-shaped part terminating with

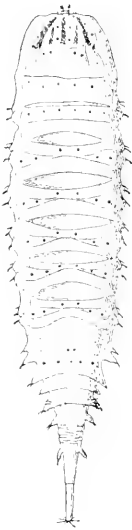


Fig. 136.

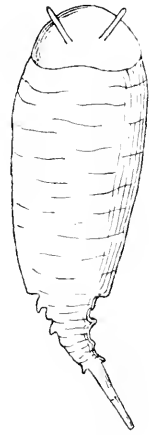
Fig. 137.
N. floralis.

Fig. 138.

Fig. 136. Larva from above. Fig. 137. Larva from below. Fig. 138. Pupa.
× 10.

a thin, cylindrical, rode-shaped spiracular process of brown colour with the posterior spiracles on the end, surrounded by very fine, stellately arranged, feathery threads. The head is retracted; the mouth has no hooks but only a pharyngeal skeleton; above the mouth is a small process bearing two two-jointed papillæ, the antenna-like papillæ, the last joint of which ends with two small points. At the hind margin of the prothoracal segment lie the anterior spiracles as two small, black, approximated hooks, directed upwards. There seem to be in all twelve segments; the body is transversely corrugated above so that each segment shows about three corrugations; the whole dermis is chagreened from quite small, recurved spinules, among which some slightly larger on the corrugations and especially at the sides; these larger spinules are more or less distinct: they are

arranged in the same way as in the *Syrphus*-larva. On the tapering hind part of the body there are some brushes of spinules along each side, and a little anterior to the spiracular process there is on each side a small papilla directed backwards and terminating with one or two hairs. On the ventral side the spinules of the dermis are smaller, but on the abdominal segments there is here on each side a little proleg-like group of small hooks on each segment. The colour of the larva is dark yellowish or yellowish brown; the total length is 6—7 mm. The pupa is similar to the larva, of the same size and colour, but more arched, and with the dorsal side falling somewhat abruptly downwards at the front end. Near the anterior end (on the first abdominal segment) there are two cylindrical, yellowish white spiracular tubes, nearly 0,5 mm long; they are somewhat approximated, directed forwards and diverging. Just at the anterior margin of the pupa the small larval spiracles are seen. The pupa is attached to some object with the hind part of the ventral surface just before the attenuating part.

The larva of *N. geniculata* was sifted from flood refuse in fens on $^{12}/_4$ and $^{29}/_4$, it pupated and developed first in May; the larva of *floralis* was taken in the same way at the end of April, it likewise developed first in May; other larvæ were taken in the same way on $^5/_4$, but as they were not bred I cannot say, to which species they belong. According to the above dates the larva evidently hibernates, but according to the dates of capture of the imagines and of copulation of the various species it seems probable that there are more than one brood in the year. I do not know what the larvæ feed upon, probably microorganisms, for as there are no mouth hooks they cannot. I think, feed on Aphides. The posterior spiracular process is able to be telescopically drawn out and in, and the places where the larvæ were taken were, to be sure, also humid, but the larvæ were not in water. The larva is rather interesting, and there is all reason to think that *Sphagina* has a similar larva, as these two genera are so nearly related. On the other hand the larva seems to show that these genera are in no way nearly related to *Baccha*, which has a leech-like larva similar to the *Syrphus*-larva.

The species of *Neoascia* are characteristic by their narrow, somewhat elongated shape; the genus contains the smallest of our Syrphids. They occur in woods, thickets and fens on shaded, humid places, but also on meadows, and they generally hover here in the low herbage.

The species have been somewhat confused, at present 5 species are recorded from the palæarctic region, of which 4 occur in Denmark.

Table of Species.

1. Cross-veins dark seamed; antennæ with the third joint at least twice as long as broad 1. *podagrica*.
 — Cross-veins not seamed; antennæ shorter 2.
2. Antennæ with the third joint short, somewhat ovate; all tarsi with the last two joints darkened 4. *geniculata*.
 — Antennæ with the third joint longer; front tarsi with the last joints yellow 3.
3. Epistoma protruding as in *podagrica*; abdomen (normally) in the male with two bands, the second broad, not reaching the front corners of the segment, in the female with four spots; second abdominal segment narrowest at the front end, in the female evenly and not much widened backwards; hind femora black to the apex; upper marginal cross-vein with the angle below nearly rectangular 2. *floralis*.
 — Epistoma less protruding; abdomen in the male with one narrower band, going in full width to the margin, in the female (normally) unspotted; second abdominal segment narrowest behind the front end, in the female abruptly and strongly widened backwards; hind femora yellow at apex; upper marginal cross-vein with the lower angle rather curved 3. *dispar*.

1. *N. podagrica* Fabr.

1775. Fabr. Syst. Entom. 768, 30 (*Syrphus*) et 1805. Syst. Antl. 198, 10 (*Merodon*). — 1822. Meig. Syst. Besch. III, 186, 1 (*Ascia*). — 1843. Zett. Dipt. Scand. II, 884, 1 (*Ascia*). — 1862. Schin. F. A. I, 321 (*Ascia*). — 1901. Verr. Brit. Fl. VIII, 468, 1, figs. 328–331 (*Ascia*). — 1907. Kat. paläarkt. Dipt. III, 87. — *Ascia lanceolata* Meig. 1822. l. c. III, 187, 2. — 1862. Schin. F. A. I, 321. — *Ascia maculata* Macq. 1827. Soc. Sc. Lille, 169, 3 et 1834. Suit. à Buff. 574, 3. — 1838. Meig. l. c. VII, 108, 11.

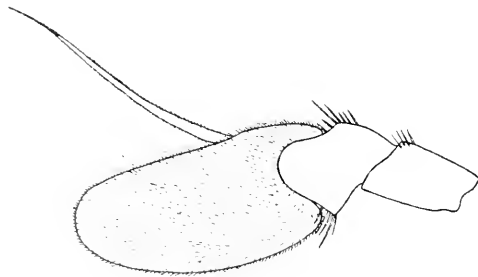


Fig. 139. Antenna of *N. podagrica* ♂. from the inside. $\times 90$.

Male. Vertex black or purplish black, frons æneous black with a longitudinal furrow. Epistoma yellowish grey pruinose; jowls black. Vertex and frons with short, brownish black hairs, just above some

yellowish hairs. Epistoma with very inconspicuous, pale hairs below. Occiput black or bluish black, with whitish hairs below, yellow above. Antennæ somewhat elongate, third joint twice as long as broad; they are black or brownish black, third joint more or less yellow beneath at base; arista not longer than third joint. Thorax æneous, densely punctate, somewhat shining; it is clothed with quite short, yellowish, on the disc brownish, hairs. Pleura more shining, with a little longer, paler hairs. Abdomen with the second segment narrowest behind the front end, the sides evenly incurved; the abdomen is black or a little bluish black, densely punctate, shining; it has two yellow bands, one on the middle of second segment, the other at the front margin of third segment, occupying about the front half of the segment; the band on second segment is broader or narrower, it may be more or less incised in the middle and sometimes divided, and generally it slopes backwards at the sides, either going over the side margin or abbreviated; the second band is only rarely a little incised or in single cases narrowly divided. Abdomen is clothed with short hairs, they mainly follow the ground colour, but are pale at the basal corners of fourth segment; they are likewise pale and a little longer at the side margins of second segment, and somewhat long and whitish at the basal corners of abdomen. Venter coloured as dorsum, and similarly haired with quite short hairs. Legs yellow or reddish yellow, anterior femora often more or less indistinctly blackish or brownish about the middle; anterior tibiæ with a small, blackish or brownish ring in the middle; hind femora black with the basal third or fourth yellow, hind tibiæ with a broad, black ring below the middle, sometimes leaving

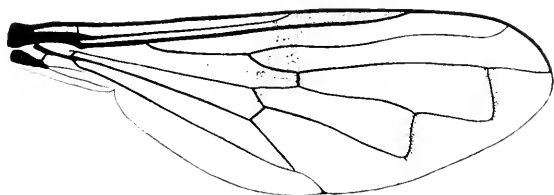


Fig. 140. Wing of *N. podagrica* ♂.

only base and apex yellow; hind metatarsus and the two last joints black or brown, generally also the front metatarsi more or less dark above, and likewise the last joints of the middle tarsi. Legs short-haired, middle femora with a row of longer hairs below, and hind femora with long hairs above; hind tibiæ with a short but dense fringe below in about the apical half; the hairs are pale, only on the

posterior side of hind femora and partly on hind tibiæ darker; hind femora with rows of black, spine-like bristles below. Wings more or less but as a rule slightly tinged, the cross-veins dark seamed and below the stigma a slight cloud stretches downwards; the upper marginal cross-vein straight with the angle below rectangular. Squamulæ and fringes whitish. Halteres whitish yellow.

Female. Frons and epistoma a little broader than in the male. Third joint of antennæ longer. Abdomen with the second segment abruptly dilated after the middle; it has the first band always divided into spots, and the second either with a large, quadratic incision in the middle or divided into spots; fourth and fifth segments more or less æneous.

Length 5,3 to fully 6 mm.

N. podagrica is a very common species in Denmark and occurs all over the country; it is present during the whole season, my dates are $14/5$ — $25/9$. It occurs both on fields, in woods and fens, and also in gardens, generally in great numbers, flying in low herbage. I have taken it in copula on $20/6$, $20/8$ and $25/9$.

Geographical distribution:— Europe down into Spain and Italy, and on Madeira; towards the north to northern Sweden but here rare, and in Finland.

Remarks: In the collection of Tönder Lund and Sehestedt there are two specimens, both females, labelled *Merodon podagricus*, they both belong to the present species, but I do not know whether they are types; Fabricius says "Habitat in Daniæ floribus", but he does not refer to the said collection.

2. *N. floralis* Meig.

1822. Meig. Syst. Besch. III, 188, 3 (*Ascia*). — 1843. Zett. Dipt. Scand. II, 886, 2 et 1849. VIII, 3193, 2 et 1859. XIII, 6041, 2 (*Ascia*). — 1862. Schin. F. A. I, 321 (*Ascia*). — 1901. Verr. Brit. Fl. VIII, 472, 3 (*Ascia*). — 1907. Kat. paläarkt. Dipt. III, 85. — *A. hastata* Meig. 1822. l. c. III, 189, 5. — 1843. Zett. l. c. II, 890, obs. — *A. quadripunctata* Meig. l. c. III, 189, 6. — 1843. Zett. l. c. II, 887, 4 et 1855. XII, 4676, 4 et 1859. XIII, 6042, 4. — 1862. Schin. F. A. I, 321. — *A. nitidula* Meig. 1822. l. c. III, 191, 8. — 1843. Zett. l. c. II, 889, 6. — 1862. Schin. F. A. I, 322. — *A. aenea* Meig. 1822. l. c. III, 191, 9. — 1862. Schin. F. A. I, 322. — *A. bifasciata* Zett. 1838. Ins. Lapp. 583, 4.

Male. This species is rather similar to *podagrica*. Antennæ with the third joint shorter about one and a half times longer than broad; arista a little longer than third joint. Thorax less punctate, more shining and with the hairs darker. Abdomen broader at the base and less clubbed than in *podagrica*, the second segment narrowest just at

the front end, its sides almost straight; abdomen is black or bluish black with the fourth segment æneous, and it is a little less punctate than in *podagrica*; there are two yellow bands, the first as in *podagrica*,

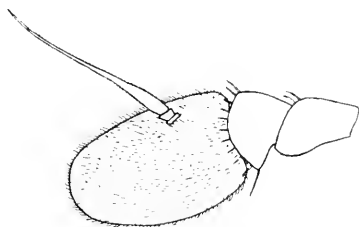


Fig. 141. Antenna of *N. floralis* ♂, from the outside. $\times 90$.

the second broad, generally occupying more than the basal half of the segment and sloping obliquely at the sides so that it reaches to or near to the sides only with the hind corners; the first band may be very narrow, sometimes divided into small stripes or spots, or almost quite wanting; the second is only in rare cases narrowly divided. Fourth segment almost quite pale-haired; the venter yellow on the whole middle part. Legs black and yellow, anterior femora black to near the apex, hind femora with the basal fourth yellow; anterior tibiæ with blackish rings below the middle, hind tibiæ generally with only base and apex yellow; tarsi as in *podagrica*, hind metatarsi less dilated; sometimes the anterior femora have only more or less narrow, black middle rings and these may even be ill defined and somewhat weak. Wings more or less brownish tinged, the cross-veins not

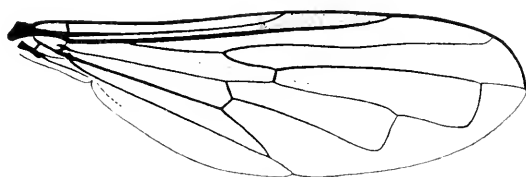


Fig. 142. Wing of *N. floralis* ♂.

seamed; the upper marginal cross-vein a little curved with the lower angle a little obtuse and less angular than in *podagrica*.

Female. Frons and epistoma a little broader. Abdomen with the second segment evenly and not much dilated backwards, the sides slightly incurved or almost straight; abdomen has four larger or smaller spots, the second pair lie behind the front margin of the

segment: the spots may be very small and obsolete and in rare cases the first or both pairs may be quite wanting.

Length 4—5 mm.

The larva and pupa are described above.

N. floralis is less common in Denmark than *podagrica*; {Amager, Utterslev Mose, Ermelund, Dyrehaven, Lyngby Mose. Fure Sø, Ørholm,

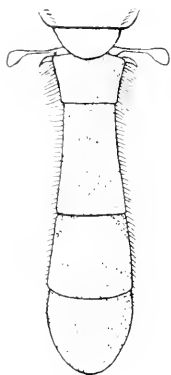


Fig. 143.

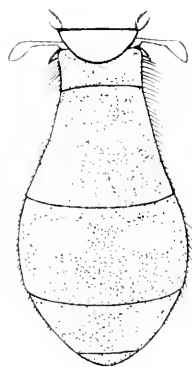


Fig. 144.

Abdomen of *N. floralis*.

Fig. 143. Male. Fig. 144. Female.

Geel Skov, Ruderhegn, Hillerød; on Lolland in Kældskov, Dødemose and at Strandby west of Nysted; in Jutland at Hald near Viborg. My dates are $^{10}/_5$ — $^{14}/_8$, but it seems especially to occur in May and June and again in August as noted by Stæger in Zetterstedt VIII, 3194. It occurs in the same way as *podagrica*; I have taken it in copula on $^{11}/_6$ and $^{16}/_6$. The larva was taken in Utterslev Mose in flood refuse at the end of April, it developed first in May (Schlick).

Geographical distribution: — Northern and middle Europe down into France, and probably also to Italy; towards the north to northern Sweden, and in Finland. It occurs perhaps also on the Canaries (*analis* Macq).

3. *N. dispar* Meig.

1822. Meig. Syst. Besch. III, 188, 4, Tab. XXVII, Fig. 27—28 (*Ascia*). — 1843. Zett. Dipt. Scand. II, 887, 3 et 1849. VIII, 3194, 3 et 1855. XII, 4676, 3 (*Ascia*). — 1862. Schin. F. A. I, 321 (*Ascia*). — 1901. Verr. Brit. Fl. VIII, 470, 2, fig. 332 (*Ascia*). — 1907. Kat. paläarkt. Dipt. III, 85.

Similar to *floralis* but, however, distinctly different. Male. Vertex and frons æneous green, with no or a slight longitudinal furrow; the

hairs pale, dark only in front of the ocelli. Epistoma less protruding. Antennæ with the third joint a little longer, nearly twice as long as broad; arista about of the length of the third joint. Thorax æneous green, a little more densely punctate, but shining; it is clothed with



Fig. 145. Wing of *N. dispar* ♂.

yellow hairs, only a little darker on the middle of the disc, sometimes more brownish. Abdomen with the second segment narrowest behind the front end, the sides slightly incurved; abdomen is æneous or æneous green, not bluish, and it is more densely punctate than in *floralis*, especially the second segment, which is a little transversely

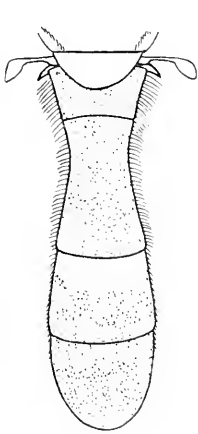


Fig. 146.

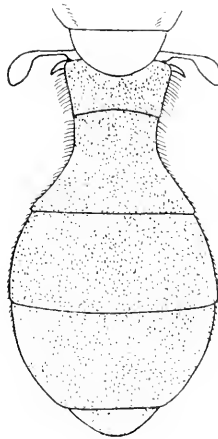


Fig. 147.

Abdomen of *N. dispar*.

Fig. 146. Male. Fig. 147. Female.

rugose; there is only one yellow band, lying at the front margin of the third segment, it is narrower than in *floralis*, not reaching over half the length of the segment, and it is not obliquely cut at the front corners but going to the margin in full width or sloping a little forwards. Venter coloured as dorsum. Legs with the anterior femora

black in the basal half, tibiæ with a more or less distinct, often faint or almost wanting brown ring in the middle; hind femora black with the basal third or fourth yellow and also with the tip yellow, hind tibiæ with a sharply defined black ring below the middle, on the ventral side just the two side margins are black from the ring to the base, thus forming two narrow stripes; front metatarsus with a dark spot above, last joint of middle tarsi not dark, hind metatarsus and the two last joints blackish. Wings hyaline or almost so; the lower angle at the upper marginal cross-vein more roundly curved than in *floralis*; the veins somewhat pale at the base.

Female. Frons a little broader than in the male. Abdomen is relatively narrower at the base than in *floralis*, with the second segment abruptly dilated backwards, almost twice as broad at the apex than at the base and with the sides strongly incurved, and abdomen is broader behind and much more clubbed than in *floralis*; it is not bluish but quite æneous and more coarsely punctate, and it has no spots. Wings slightly tinged.

Length 4—5.5 mm.

N. dispar is about as common in Denmark as *podagrica*; Ordrup Mose, Ermelund, Dyrehaven, Lyngby Mose, Ørholm, Ryget Skov at Farum Sø. and i Jutland at Hald near Viborg. My dates are $1/5$ — $26/6$; it seems thus in contrast to *floralis* to occur only in spring and early summer. It occurs on the same localities as the other species, and in the first part of the season also in company with them. I have taken it in copula on $17/5$ — $27/5$, on $6/6$ and $12/6$.

Geographical distribution:—Europa as it seems down into Italy; towards the north to northern Sweden, and in Finland (if Zetterstedt's *dispar* is really this species, see below under Remarks).

Remarks: The two species *floralis* and *dispar* are rather similar, but as seen from the descriptions distinguished without difficulty and with certainty; *dispar* differs from *floralis* by only one band on abdomen in the male and the immaculated abdomen in the female; when specimens of *floralis* occur which in this respect are similar to *dispar*, the shape and breadth of the band on third segment in the male are characteristic; a never failing character is the shape of second segment, which in *floralis* is narrowest at the front end but in *dispar* behind the front end; this is especially the case in the female which also has abdomen relatively narrower at the base and much more clubbed and broader behind in *dispar*, but also in the male the character is distinctly present; further characters are found in the epistoma, the colour and punctuation of the body and in the legs, of which in *dispar* the last joint of middle tarsi is yellow, the hind femora yellow at apex

and hind tibiæ with a relatively narrow ring, while in *floralis* the last joint of middle tarsi is darkened, hind femora black to apex and hind tibiæ broadly black; the colour and venation of the wings are likewise different. I think the two species as interpreted here are identical with those of Meigen as they are quite in accordance with his descriptions, only he mentions females of *dispar* with abdominal spots, such I have never seen. I have mainly followed the synonymy in the Kat. paläarkt. Dipt., but, of course, it is not certain. According to Zetterstedt (VIII, 3194, Obs., 3195, Obs.) Stæger was of opinion that Zetterstedt's *floralis* and *dispar* were varieties of *floralis* Meig., and Zetterstedt himself adds "non sine ratione", but this question can only be settled by examination of Zetterstedt's whole material. Wahlgren (Ent. Tidskr. XIII, 1907, 57) unites these species together with others under *floralis*; it is, however, certain that *dispar* occurs in Sweden, at all events in the southern parts, for in our general collection we have specimens of true *dispar* sent from Malm. The species mentioned by Verrall I cannot interpret, they seem somewhat diverging from typical, continental specimens.

4. *N. geniculata* Meig.

1822. Meig. Syst. Besch. III, 192, 10 (*Ascia*). — 1843. Zett. Dipt. Scand. II, 890, 8 et 1849. VIII, 3195, 8 (*Ascia*). — 1862. Schin. F. A. I, 322 (*Ascia*). — 1901. Verr. Brit. Fl. VIII, 473, 4 (*Ascia*). — 1907. Kat. paläarkt. Dipt. III, 86. — *Ascia aenea* 1838. Zett. (nec Meig.) Ins. Lapp. 583, 6 et 1843. Dipt. Scand. II, 889, 7 et 1849. VIII, 3195, 7.

Similar to the other species. Male. Vertex and frons æneous black, black-haired, with a more or less distinct longitudinal furrow. Epistoma protruding as in *podagrica*, yellowish grey pruinose, with

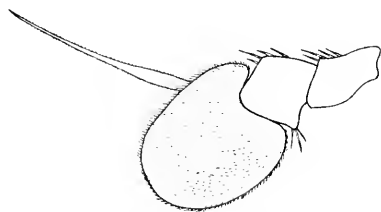


Fig. 148. Antenna of *N. geniculata* ♂, from the inside. $\times 90$.

pale hairs. Occiput black or bluish black, with whitish hairs below, black above. Antennæ with the third joint short, somewhat ovate, almost not or slightly longer than broad; arista longer than third joint. Thorax æneous, densely punctate, shining; it is clothed with short,

black hairs. Pleura with longer, whitish yellow hairs. Abdomen with the second segment narrowest behind the front margin; the abdomen is bluish black with fourth segment æneous, and it is densely punctate, the three first segments slightly shining, the fourth more brightly shining; there is one yellow band at the front margin of the third segment, occupying about the half of the segment. Abdomen is clothed with short hairs, mainly following the ground colour but pale at the basal corners of fourth segment; they are longer and likewise pale at the side margins of second segment and at the basal corners. Venter coloured as dorsum and with short hairs. Legs with the anterior femora black to near the apex, anterior tibiæ with a blackish ring below the middle; hind femora black with yellow base and the apex narrowly yellow, hind tibiæ with a broad, black ring below the middle prolonged on the ventral side as a narrow stripe at each margin to the base; front and hind metatarsi blackish, and likewise the two last joints on all tarsi; sometimes also the middle joints more or less darkened. The legs haired in the usual way. Wings hyaline; the upper marginal cross-vein with the lower angle about rectangular. Squamulæ and halteres whitish.

Female. Frons and epistoma broader than in the male. The hairs on thorax paler. Abdomen with the second segment not abruptly dilated, the sides somewhat incurved; the abdomen is bluish black, fourth and fifth segments æneous, and it has no spots, only one of my specimens shows two small spots on third segment. Wings generally a little brownish about the middle.

Length 4,5—5,2 mm.

The characters which with certainty distinguish this species are the short antennæ and the black apical joints on all tarsi. I have not followed the synonymy in the *Kat. paläarkt. Dipt.* with regard to *aenea* Zett. as I think it beyond doubt that this species is the present one, such as suggested by Stæger (*Zett. Dipt. Scand. VIII, 3195, Obs.*). The male was not described hitherto except the note on the place just cited.

N. geniculata is less common in Denmark than the other species; Lersø, Damhusmose, Utterslev Mose, Ordrup Mose, Fure Sø; my dates are from the former part of May to ¹²/₈. It occurs in the same way as the other species. The larva was taken in Utterslev Mose and Damhusmosen in flood refuse on ¹²/₄ and ²⁹/₄, they developed first in May (the author).

Geographical distribution: — Northern and middle Europe down into Austria; towards the north to northern Sweden, and in Finland.

26. **Brachyopa** Meig.

Species of medium size, somewhat Muscid-like; they are slightly hairy and of yellow or grey colour, or with thorax grey and abdomen yellow. Head not large, scarcely as broad as thorax; it is broader than high, narrowed downwards and somewhat triangular in circumference; it is distinctly arched behind but somewhat suddenly excavated above. Eyes not large, touching in the male, separated in the female. The eyes are bare, the facets in the male a little enlarged towards the front corner. Antennæ inserted in the middle of the head, they are somewhat short, third joint ovate; arista longer than the antennæ, short pubescent (in the nearly allied genus, or subgenus, *Hammerschmidtia* [non-Danish] somewhat plumose). Epistoma considerably hollowed below the antennæ; there is no central knob but the lower part with the front mouth edge is much protruding, nose-like, the lateral angles a little retreating; epistoma is reddish yellow, it has only some hairs below at the margin, for the rest it is bare. Jowls not small, somewhat descending as also the lower part of epistoma. Jowls and epistoma are separated by a longitudinal groove at the lower eye-margin. Oral cone and proboscis somewhat long. Clypeus with the upper undivided part longer than broad. Labrum and hypopharynx long, the apex of labrum of usual shape, the deeply cleft median process shorter than the others; hypopharynx pointed; maxillar lacinia somewhat shorter than labrum, the slightly clubbed palpus a little longer than the lacinia; the palpus and lacinia with bristles and microscopical hairs in the usual way. The basal part of labium longer than the somewhat broad labella. Thorax rectangular but a little narrowed in front and considerably behind. Scutellum red or brown, without marginal fringe below. There are (generally) some bristles or bristly hairs above the wing-base, on postalar calli, at the upper hind corner of mesopleura and at the margin of scutellum. (In some species of *Hammerschmidtia*, f. inst. *ferruginea*, they are developed as strong bristles and there are here also notopleural bristles present). Metapleura short-haired. Metathoracal epimera not specially developed and not meeting in the middle, but sending a process in under the halter. Abdomen rather short, almost not longer than thorax with scutellum; it is not narrow, broadest at the hind margin of second segment and then somewhat rapidly narrowing behind; in the male there are four not transformed segments, the first short, the others equal in length. Genitalia somewhat large. In the female there are five normal abdominal segments, the rest small and hidden, the last ending with two lamellæ. Legs somewhat stout.

short-haired, only the anterior femora with longer hairs on the postero-ventral side; hind femora setulose below; hind tibiæ as usual slightly incurved on the posterior side near apex; hind metatarsi a little thickened. Claws and pulvilli well developed; empodium spine-shaped, hairy. Wings somewhat long, considerably longer than abdomen; medial cross-vein well before the middle of the discal cell; upper marginal cross-vein somewhat angular, sometimes with small veinlets from the angles; discal vein curved somewhat strongly down at the apex of the discal cell; radial vein with fine bristles on the basal part; vena spuria distinct, in its last part quite parallel with the discal vein, and thus also curved at the end. Alula large. Scumulæ not narrow, alar squamula with short, simple hairs, thoracal squamula with long, branched hairs. Plumula developed but not long, with simple and some slightly branched hairs.

The developmental stages are relatively well known. Zetterstedt mentions pupæ of *B. (Hammerschmidtia) ferruginea* (Dipt. Scand. II, 687): they were found on a dry tree trunk on $^{17}/_6$; further (ibid. 688) the pupa of *H. vittata* found in summer. According to Brauer Scholtz has mentioned the larva of *H. conica* from exsuding sap on trees (Zeitschr. f. Entom. Breslau 1848—49). The developmental stages of *B. bicolor* are mentioned by v. Roser (Württemb. Corr. Blätt. 1834, 10) from exsuding sap on Aesculus; they are noted by Léon Dufour (Bull. Soc. Ent. de Fr. 2, IV, 1846, XLVII) and fully described by the same author (Ann. d. Sc. nat. IX, 1848, 199, Pl. 16, fig. 1—5); the young larvæ were found in April in exsuding sap on stems of Ulmus, in October they were full grown and they pupated in January and developed in April. I have myself examined the developmental stages of *B. bicolor*; the larvæ were taken in exsuding sap on stems in April and under the bark on a stub of a beech on $^{5}/_3$, developing on $^{2}/_4$, and larvæ and pupæ were found at the foot of a Populus attacked by *Cossus*-larvæ on $^{23}/_3$, they developed in April; finally larvæ were taken in holes of *Cossus* in a Poplar in August, but I do not know at what time they developed.

The larva of *B. bicolor* is flattened below, somewhat arched above; it is rounded in front, a little more tapering behind and nearly parallel-sided. Above the mouth is a process with two small, two-jointed papillæ, the antenna-like papillæ; there are no mouth hooks. At the hind margin of the prothoracal segment lie the anterior spiracles at each side as very small chitinous tubercles. There are twelve segments in all, but head and prothoracal segment retracted. The body is corrugated and the dermis chagreened; each body-segment shows two corrugations, separated by a furrow but united towards the sides; the

corrugations are at the margins densely beset with small spinules; the thoracal segments have some spines; on each of the abdominal segments is a transverse row of six spines which are bi- or trifold or still more divided and with the apices curved and spread; these spines are placed on the anterior of the two corrugations but the two lateral spines on each side are placed more backwards than the two middle ones so that the arrangement is in reality the same as in other Syrphid larvæ; likewise there are at the sides of the segments three spines, one upper and two lower, one behind the other; these side-spines are larger and generally four-rayed, between them there are small, simple spines; on the last four segments the side-spines are larger, flattened and with a number of branches on their sides. The ventral segments are chagreened and with small spines towards the sides, among which one bifid. The last segment has in the middle of the hind margin a reddish, cylindrical but somewhat flattened spiracular process, directed straight backwards; it is about 1 mm long. The larva is brown, of a length of 10—11 mm. The pupa is quite similar to the larva and of the same colour, only it is a little more arched above, the side margins more sharp and the anterior segments declining more downwards; at the anterior margin of the first abdominal segment are two yellow or brownish, short spiracular tubes, not reaching 0,5 mm in length; they are somewhat distant and a little diverging. The length of the pupa is 8—9 mm.

It will be seen that my description is in the main respects agreeing with the one given by Léon Dufour, but in the details there are several differences, as in the shape and position of the spines etc.; Léon Dufour's description and figures must be considered as rather diagrammatical; the author could not find the anterior spiracles, but this is no wonder for they are detected only with difficulty among the spinules. It is curious that he says that the small spinules at the margins of the corrugations are present only in the pupa, as I have found them even as distinct in the larva.

The habits of the larva are, according to the above, well known; they live in exuding sap on ulcerative stems and stubs of various trees as *Aesculus*, *Ulmus*, *Populus* and *Fagus*. The imagines are also found on such places. Very often, but not exclusively, the larvæ are found in stems attacked by *Cossus*. The larva feeds on the sap or perhaps on microorganisms in it, and accordingly it has no mouth hooks. The long posterior spiracular process is not pro- and retractile. The pupæ are found on the same places as the larvæ. According both to Léon Dufour's and to my observations the larva evidently hibernates, and a year is used to the development, the eggs being

laid in spring and the final development taking place in spring next year.

The species of *Brachyopa* are of a characteristic exterior among the Syrphids as they are rather like to Muscids, especially to *Scatophaga* or to some species of *Phaonia* (*Aricia*), but I should not think that this has anything to do with mimicry. They occur on ulcerative stems and trunks and may also be found flying in low herbage.

Of the restricted genus *Brachyopa* 4 species occur in the palæ-arctic region, and of *Hammerschmidtia* 3 species, thus in all 7; two have been found in Denmark, both belonging to *Brachyopa* s. str.

Table of Species.

1. Thorax with disc and pleura grey; abdomen all yellow 1. *bicolor*.
- Thorax with the disc more or less, sometimes slightly, yellow, pleura yellow; abdomen with dark base and incisures 2. *dorsata*.

1. **B. bicolor** Fall.

1817. Fall. Dipt. Suec. Syrph. 33, 2 (*Rhingia*). — 1822. Meig. Syst. Besch. III, 262, 2, Tab. XXX, Fig. 6. — 1843. Zett. Dipt. Scand. II, 690, 5 et 1859. XIII, 5087, 5. — 1862. Schin. F. A. I, 327. — 1901. Verr. Brit. Fl. VIII, 475, 1, figs. 333—335. — 1907. Kat. paläarkt. Dipt. III, 87.

Male. Vertex black, greyish or brownish anteriorly; frons and epistoma yellowish red, whitish pruinose, especially epistoma. Vertex black-haired, frons and epistoma without hairs, the latter only with some few just at the oral side margin; epistoma hollowed below the antennæ and the lower part considerably produced and a little descending. Occiput grey, the lower part and the jowls more or less ferruginous; the hairs are whitish. Antennæ yellowish red, the third joint short oval; arista short-pubescent. Thorax slate-grey, almost dull, with four darker, a little more shining stripes; the two middle stripes approximated, united in front, a little diverging behind and here abbreviated, the lateral abbreviated in front and interrupted at the transverse furrow; the humeri sometimes more or less reddish and likewise the postalar calli. Thorax clothed with short, rather dense, blackish hairs; there are as a rule some black, bristly hairs above the wing-root and on the postalar calli. Scutellum brownish red or more or less darkened in the basal part, likewise with dense, blackish hairs, and with some bristles or bristly hairs at the margin. Pleura grey with a little longer, whitish hairs; at the upper hind corner of mesopleura usually a couple of black, bristly hairs. Abdomen short, broadest a little behind the base and narrowing rapidly towards the end; it is yellow or yellowish red, sometimes a little darkened

behind, somewhat shining, and it is clothed with short, pale hairs, a little longer at the sides and longest at the basal corners; on the middle of the disc are short, black hairs and also on the hinder half of the side margin of second segment the hairs may be black. Venter yellow with short, pale hairs. Legs yellow or reddish yellow, anterior tarsi with the last joints blackish, front metatarsus also somewhat darkened above, hind tarsi dark. The legs short-haired, anterior femora with longer hairs on the postero-ventral side; the longer hairs are yellow, at the apex of the femora often some black; the short hairs on the hind femora mainly black on the anterior side; on the tibiæ the hairs are more or less black, especially above, but the hairs upon the whole varying in colour; hind femora densely black setulose below, the short bristles forming two rows towards the apex, leaving a bare space in the middle, and traces of the same may be more or less visible below the apex of the middle femora. Wings a little yellowish tinged, especially towards the anterior margin; the upper marginal cross-vein with a small angle in its lower third and sometimes here with a small veinlet inwards; the lower angle with or without a veinlet; the radial vein with fine bristles on its basal part. Squamulæ and fringes whitish yellow. Halteres pale yellow.

Female. Vertex and frons broad, dull grey, with short, pale and black hairs; the space above the antennæ red, shining and bare; the lower part of epistoma a little more protruding and descending than in the male, and epistoma pruinose only below the antennæ, the rest bare and shining. Hind femora setulose only below the apex, for the rest with fine, pale hairs.

Length 6—8,5 mm.

The larva and pupa are described above.

This species varies somewhat in size, in the presence of bristly hairs and in the colour of the hairiness. Verrall suggests the existence of a closely allied, undescribed species with the humeri scarcely reddish and no black hairs at the sides of the second abdominal segment; according to my experiences I should consider such specimens to be only varieties.

B. bicolor is rare in Denmark; Charlottenlund, Ordrup Krat, Ryget Skov at Farum Sø, Holte, Geel Skov, Hillerød, Boserup at Roskilde and Tisvilde; it is a spring species, my dates are $10/5$ — $6/6$. It occurs in woods and thickets on trunks and stems of trees with exuding sap and often on trees attacked by *Cossus*, but also on others, as also flying in low herbage; the females are very rare and only taken on trees. The larva was taken in sap in Charlottenlund in April (Schlick). in Geel Skov under the bark on a trunk of a beech on $5/3$, it developed

on $2\frac{1}{4}$, and larvæ and pupæ in Holte at the foot of a Poplar with *Cossus*-larvæ on $23\frac{1}{3}$, they developed in the midst of April (Kryger); finally larvæ were taken in Hillerød in a Poplar in the holes of a *Cossus*-larva in August, the date of development not noted (Godskesen).

Geographical distribution:— Europe down into Italy; towards the north to northern Sweden, and in Finland.

2. *B. dorsata* Zett.

1838. Zett. Ins. Lapp. 597, 3 et 1843. Dipt. Scand. II, 689, 4. — 1862. Schin. F. A. I, 327. — 1907. Kat. paläarkt. Dipt. III, 88.

Male. This species resembles *bicolor* but thorax is ferruginous at all events on the pleura, and abdomen has dark markings. Head as in *bicolor*. Thorax varying from ferruginous to almost quite cinereous, dull, with four darker stripes, two approximated in the middle, a little diverging behind and abbreviated, and two lateral, abbreviated, in front and a little interrupted at the transverse furrow; when thorax is grey the stripes are blackish, but when thorax is ferruginous the stripes, at all events the lateral, are only somewhat darker. Scutellum ferruginous. The hairs on thorax quite short, ferruginous or brown, and there are the same bristly hairs on thorax and at the margin of scutellum as in *bicolor*. Pleura ferruginous, sometimes the sterna blackish below; the hairs are longish, yellow, the upper hind corner of mesopleura with a couple of black, bristly hairs. Abdomen reddish yellow, generally with the first segment and the hind margins of the following segments blackish, and with a blackish middle stripe on second segment, stretching more or less in on the third. The hairs short, yellow or mainly yellow. Venter yellow. Legs as in *bicolor*, reddish, the last joints of tarsi blackish, front and hind tarsi quite darkened; the legs are haired quite as in *bicolor*, hind femora likewise black setulose below. Wings yellowish or a little brownish tinged, the venation as in *bicolor*. Squamulæ whitish with a yellow fringe. Halteres yellow.

Female. Vertex and frons yellow, dull, above the antennæ a shining space; the hairs short, pale. Occiput almost quite reddish, only a little grey above. Tarsi paler on the basal part than in the male; hind femora below only haired, not setulose.

Length 6–6,5 mm.

B. dorsata is very rare in Denmark, we have only two specimens, a male and a female, taken on Falster in earlier time.

Geographical distribution:— Northern and middle Europe down into Austria and Hungaria; towards the north to northern Sweden, and in Finland.

27. **Rhingia** Scop.

Species of medium size, with blackish or æneous thorax and reddish abdomen. Head a little broader than high, as broad as thorax, a little excavated behind. Eyes touching in the male for a long space, well separated in the female. The eyes are bare, the facets above slightly enlarged in the male. Antennæ inserted considerably above the middle; they are short, third joint ovate, a little pointed at the end; arista longer than the antennæ, very short-pubescent, almost bare. Epistoma of a curious shape, it is a little hollowed below the antennæ, the lower part then produced bec-like and as long as the rest of the head, but not descending; the lateral angles are more produced than the front mouth edge so that the epistoma is incised in the apex when seen from above; the epistoma is reddish or reddish brown and frons and epistoma are bare. Jowls somewhat broad and slightly descending; they are somewhat separated from epistoma by a furrow which extends upwards towards the antennæ so that the cheeks are separated as eye-margins as in *Chilosia*; the eye-margins are narrow, slightly hairy. The oral aperture is long and narrow, a little widening behind. Oral cone long and proboscis very long and slender, when stretched fully out as long as the whole body. Clypeus long and narrow and its basal part long but somewhat weakly chitinised, the stronger chitinised side lists continued up into the apical excision of epistoma. Labrum very long, not broad at the base, strongly semitubular; the median apical process not deeply cleft, unusually broad and beset with numerous spines or emergences; the upper lateral process delicate, simple and pointed, the lower lateral process rounded as usual; the row of small tubercles or papillæ along the lateral inside of labrum present as usual. Hypopharynx about as long as labrum, attenuated at the apex and pointed; maxillæ with a long, knife-shaped lacinia, slightly shorter than labrum, beset with the usual microscopical spines in rows but they are very fine; palpi long, a little shorter than the lacinia, thread-like, a little clubbed; they are beset with fine hairs and some bristles, longest at the apex, but in the basal part and up towards the apex the hairs are not present on the side which is turned towards the lacinia. Labium very long and slender with a very long basal connecting membrane, usually folded in; the basal part of labium nearly twice as long as the long and narrow labella. Thorax rectangular, nearly square. Scutellum red to dark brown with a long fringe below the margin. There are some strong hairs on the postalar calli, in the præsutural depression and above on mesopleura, but no distinct bristles; at the margin of

scutellum are some fine bristles, strongest in the female; metapleura with short hairs. Abdomen rather short, ovate, about as long as thorax and scutellum; in the male there are four not transformed segments. Genitalia of medium size. In the female there are five visible abdominal segments, the fifth small, the rest hidden, the last ends with two small lamellæ. Legs simple; hind tibiæ with the usual slight incurvation near apex; hind metatarsi somewhat thickened, especially at the base. Anterior femora with long hairs on the posterior and ventral sides, hind femora on anterior and ventral sides and also with somewhat long hairs on the posterior side, but not setulose below. Claws and pulvilli well developed; empodium spine-shaped, hairy. Wings with the medial cross-vein well before the middle of the discal cell; cubital vein curving somewhat downwards towards the end, terminating in the costal vein distinctly below the apex of the wing.¹ Vena spuria somewhat distinct. Alula large. Squamulæ not narrow, alar squamula with short, slightly flattened hairs at the margin, thoracal squamula with long, richly branched hairs. Plumula well developed, with simple hairs.

The developmental stages are not known; Réaumur mentions (Mém. Ins. IV, 1738, 233) that he had bred a single specimen from cow-dung in which were other dipterous larvæ which he wished to study, but he had not seen the larva or pupa to the *Rhingia*; the larvæ are therefore believed to live in cow-dung; I think, however, this rather doubtful, for it would be strange that in this case the larva or pupa to so common a species was not known. Schiner states, in favour of the belief that the larva lives in cow-dung, that the females are often found on fresh cow-dung, but this I have not observed.

The species of *Rhingia* are characteristic flies by their curious, bec-like snout and also by their colour; they occur in woods, fens and similar places on various flowers; their flight is somewhat heavy.

Of the genus 4 species occur in the palæarctic region, but only the three are European; two occur in Denmark.

Table of Species.

1. Thorax bluish black, in the female slate-coloured; abdominal margin not black; legs reddish, in the male the basal part of femora more or less darkened 1. *rostrata*.

¹ Verrall says that there are a few hairs on the base of the cubital vein; this is evidently an error for the radial vein: I have only been able to see a couple of fine hairs just near the base of this vein.

— Thorax æneous black, in the female more greyish; abdominal margin black; legs with the basal half of femora black in both sexes, and tibiæ with dark rings. 2. *campestris*.

1. *R. rostrata* L.

1758. Linn. Syst. Nat. X, 604 and 1767. XII, 2, 1004, 1 (*Conops*). — 1775. Fabr. Syst. Entom. 791, 1 et 1805. Syst. Antl. 222, 1. — 1817. Fall. Dipt. Suec. Syrph. 33, 1. — 1822. Meig. Syst. Besch. III, 258, 1. — 1843. Zett. Dipt. Scand. II, 684, 1. — 1862. Schin. F. A. I, 326. — 1901. Verr. Brit. Fl. VIII, 478, 1. — 1907. Kat. paläarkt. Dipt. III, 89.

Male. Vertex black; frons and epistoma reddish, the margin of the frons and the eye-margins somewhat greyish or whitish pruinose. Vertex with long, black hairs; frons and epistoma bare but the eye-margins with short, pale hairs. Occiput black, greyish pruinose, the hairs whitish below, yellow or brownish above, but along the upper eye-margin long, black hairs. Antennæ red, third joint ovate with a very slightly pronounced point at the end. Thorax black, a little bluish; it is somewhat dark bluish grey pruinose but shining, especially behind; there are four darker, more shining stripes, two approximated in the middle, abbreviated behind, and one at each side, interrupted at the transverse furrow; the humeri are brownish, grey pruinose, and also the postalar calli a little brownish. Thorax is clothed with somewhat short, brownish black hairs, brown in front; they are longest behind; on the postalar calli and in the præsutural depression they are likewise long and somewhat strong, some of them almost bristly. Scutellum red or reddish brown with black hairs; somewhat long, especially at the margin, and here somewhat bristly; just at the base are yellow hairs, and the fringe below the margin yellow. Pleura with black hairs, pale below and behind and sometimes mainly yellow. Abdomen yellow or reddish yellow, the first incisure narrowly black and on second segment an abbreviated, blackish dorsal stripe; abdomen is clothed with short, yellow hairs, but at the hind margins of the segments, at the sides and on fourth segment are more or fewer black hairs. Genitalia black. Venter reddish yellow with long, pale hairs, fourth segment with short, black hairs on the middle. Legs reddish, the basal part of femora more or less darkened and hind tarsi darkened or blackish. The long hairs on front femora black, on posterior femora yellow with some black towards the apex; all the short hairs mainly blackish. Wings a little yellowish tinged, especially at the anterior margin. Squamulæ dirty yellowish with a reddish yellow fringe. Halteres yellowish with the knob more or less brownish.

Female. Vertex and frons broad with about parallel borders, black, but red above the antennæ; the black part greyish pruinose, with yellow, at the ocelli black hairs. Thorax with the slaty grey pruinosity more distinct than in the male and hence duller; the hairs quite short, black except quite in front; scutellum likewise with short, black hairs but the marginal bristles distinct. Abdomen quite yellow with only the first incisure narrowly black. Femora quite yellowish red.

Length 9—10 mm.

R. rostrata is rare in Denmark, in earlier time it has been taken in some numbers but later only a few specimens have been captured; Ordrup Mose (Stæger), Søllerød (Godskesen); on Lolland; in Jutland at Horsens, and on Bornholm. The dates are $27/5$ — $3/9$. Zetterstedt notes that this species does not occur in company with the following; I have seen specimens of both taken on the same date and the same locality.

Geographical distribution:— Europe down into Italy; towards the north to southern Sweden.

2. *R. campestris* Meig.

1822. Meig. Syst. Besch. III, 259, 2, Tab. XXIX, Fig. 27. — 1843. Zett. Dipt. Scand. II, 685, 2 et 1849. VIII, 3124, 2 et 1859. XIII, 5086, 2. — 1862. Schin. F. A. I, 326. — 1901. Verr. Brit. Fl. VIII, 479, 2, figs. 336—337. — 1907. Kat. paläarkt. Dipt. III, 89.

This species is very similar to the preceding but darker. Male. Epistoma with the snout a little longer; third antennal joint a little more elongate and pointed. Thorax æneous black, not bluish; it is much less pruinose, more shining, and the darker, not pruinose stripes wider so that the pruinosity only forms narrow, faint, greyish stripes, one very narrow in the middle and two at each side. The hairs on thorax longer than in *rostrata*, black except just in front. Scutellum brown or blackish brown, the hairs black. Pleura with the hairs all or mainly black. Abdomen brownish red, the base, the incisures, a dorsal line and all the extreme margin black; sometimes the dorsal line is abbreviated on second segment and not present on third. The hairs on abdomen somewhat long, much longer than in *rostrata*, mainly tawny. Venter reddish, base and also often apex blackish, the hairs all pale. Legs reddish brown, femora with the basal half or more black, tibiæ with blackish rings in the middle, more or less faint on anterior tibiæ; anterior tarsi blackish towards the end, hind tarsi blackish. The long hairs on front femora black, on posterior femora pale on the basal half. Wings more or less yellowish. Squa-

mulæ brownish with a brownish yellow fringe. Halteres with the knob brown.

Female. Likewise similar to the female of *rostrata*, but thorax much more æneous, not bluish; it is more grey than in the male, the black stripes narrower but more distinct; the hairs short but

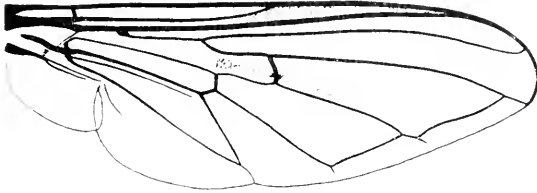


Fig. 149. Wing of *R. campestris* ♂.

longer than in *rostrata*, brown but generally more or less black in the middle behind. The bristles at the scutellar margin less strong than in *rostrata*. Abdomen either quite reddish or with an interrupted black dorsal line and narrow incisures, but always with the margin black; it is often rather darkened and brown. Legs as in the male. Squamulæ pale yellowish.

Length about 8 to 11 mm.

This species is similar to *rostrata* but distinguished with certainty by the colour of thorax and abdomen and of the legs, as also by the different hairiness of thorax.

R. campestris is common in Denmark; Charlottenlund, Ordrup Mose, Dyrehaven, Lyngby Mose, Nordskoven at Jægerspris, Sorø, Nyraad near Vordingborg; on Lolland at Bremersvold, Strandby and in Kældskov; on Langeland at Lohals; on Funen at Lundeborg on the eastern coast; in Jutland in Vejle Nørreskov, at Horsens, in Marselisborg Skov at Aarhus, at Frijsenborg and Frederikshavn, and finally on Bornholm. My dates are $^{16}/_5$ — $^3/_9$. It occurs on various flowers in woods and fens, sometimes in great numbers.

Geographical distribution:— Europe down into Italy, towards the north to northern Sweden.

II. Volucellinae.

28. **Volucella** Geoffr.

Robust species of large size, either densely pilose or more slightly hairy. The colours are rather various in the various species, thorax is dark or brown, abdomen quite or almost quite black, or with the

basal part whitish, or it is yellow with black bands; in foreign species both size and colour are much more various, the colour sometimes bright metallic; in the densely pilose species the colour of the pile is dominating, hiding the ground colour and much varied. Head a little broader than high, as broad as or slightly broader than thorax, excavated behind. Eyes touching in the male for a shorter or longer distance, narrowly or more broadly separated in the female; they are hairy in the male, bare in the female, or sometimes (*inflata*, non-Danish) also hairy in this sex; the facets in the upper front part enlarged in the male. Frons hairy, in the male small but protruding. Antennæ inserted in the middle; the basal joints are small, the third elongated, from two to three times as long as broad; arista inserted at the base of third joint, long, much longer than the antennæ, compressed and plumose with long hairs, longest above; the basal antennal joints have bristles at the apical margins, the third joint is microscopically hairy. Epistoma hollowed below the antennæ, with a large and broad central knob in the middle and below it more or less but not very retreating; it is thus somewhat protruding below and it is more or less descending, sometimes rather long and of conical shape; the lateral angles are drooping below the front mouth edge. The epistoma is reddish brown or yellowish and more or less densely haired on the front side but bare in the hollow below the antennæ. Jowls broad, a little descending; they are somewhat separated from epistoma by a groove, stretching up towards the antennæ and separating off narrow eye-margins. The oral aperture elongated; oral cone and proboscis somewhat long; clypeus elongated, the basal part somewhat long, the side lists stretching forwards are fine. Labrum long, strong and strongly semitubular; the apical processes are of equal length, the median somewhat cleft, densely beset with spines or emergences; the upper lateral process thin, cylindrical and pointed; the lower lateral processes are characteristic, they are, as usual, broad but the end is roundly incised, the inner or upper corner drawn out into a somewhat long point, the lower or outer corner also, but less, drawn out; labrum has the usual lateral rows of small tubercles or papillæ on the lower side. Hypopharynx is nearly as long as labrum, strong, attenuated and somewhat pointed; it shows the special character that it is beset with microscopical hairs in the outer part. The maxillæ have the lacinia a little shorter than hypopharynx, only slightly curved, otherwise of usual shape but the apex is rounded; they are in the usual way beset with microscopical hairs; the palpi are not long, considerably shorter than the lacinia, densely beset with hairs and with some bristles at the apex, especially two very long. Labium

has the basal part and the somewhat long and narrow labella of about equal length. Thorax square or almost so; scutellum yellow to blackish brown, without fringe below the margin. There are notopleural, supraalar and postalar bristles and marginal bristles on scutellum, and also a transverse row of bristles in front of scutellum; on the mesopleura are bristles at the upper corner. In the pilose species the bristles are less conspicuous and the supraalar bristles, those in front of scutellum and the scutellar bristles quite inconspicuous or wanting. Metapleura with short hairs. Abdomen short and broad, ovate, not longer than thorax and scutellum together, or it is less broad and more elongate. In the male there are four not transformed segments. Genitalia of relatively moderate size. In the female abdomen has five visible segments, the rest more or less hidden, the last terminating with two small lamellæ. Legs simple, the usual incurvation on the posterior side of hind tibiæ near apex more or less pronounced; hind metatarsi thickened. The legs haired in the usual way, more or less densely, the hairs on femora generally not long; one species, *inanis*, is remarkable by having small, spine-like bristles on the posterior side of anterior tibiæ, one ventral on middle tibiæ and numerous around the apex. Claws and pulvilli well developed; empodium spine-shaped, hairy. Wings with the subcostal cell closed, the subcostal vein distinct from costa quite to its end, the radial vein bending suddenly up at its end, joining the subcostal vein a little before the apex; the marginal cross-veins retracted from the margin, the upper marginal cross-vein angular, its upper part recurrent; the cubital vein bending somewhat upwards after the marginal cross-vein, terminating considerably before the apex; medial cross-vein before the middle of the discal cell; no stigmal cross-vein; the basal part of the radial vein with bristles; vena spuria slight, especially in the basal part. Alula large. Squamulæ broad, the thoracal broadest; alar squamula with somewhat long, curious, flattened hairs, thoracal squamula with long, richly and regularly branched hairs. Plumula well developed, with somewhat long but simple hairs.

The developmental stages are rather well known; already Réaumur found the larva (*of bombylans*) in nests of *Bombus*, and Réaumur and De Geer observed *V. zonaria* and *bombylans* respectively laying eggs of which larvæ hatched, which they knew as the same found in the *Bombus*-nests, though Réaumur committed some confusion of the species. Since then the larvæ have often been observed. Künckel d'Herculais has in 1875 published an elaborate monograph over the genus (*Recherches sur l'organisation et le développement des Volucelles*, Paris 1875), in which the metamorphoses and the larvæ of *V. zonaria*,

inanis, *pellucens* and *bombylans* are described: the work contains a complete list of the earlier observations and of the literature; it is here mentioned that the larva of *V. bombylans* lives in the nests of *B. lapidarius* and *muscorum*, the larva of *V. zonaria* in nests of *V. vulgaris* and *crabro*, and the larvæ of *V. pellucens* and *inanis* in nests of *V. vulgaris*. Later on has Ern  (Mittheil. schweiz. Ent. Ges. IV, 1876, 561) mentioned *V. zonaria* and *inanis* from nests of *Vespa*, and Newstead (Ent. Month. Mag. XXVII, 1891, 41) has observed larvæ of *V. bombylans* in nests of *V. germanica*; finally Verrall records (Brit. Fl. VIII, 1901, 487, 491) that Sharp has bred *V. inanis* from nests of *V. crabro*, and he mentions *V. pellucens* from nests of *V. vulgaris*. I have myself observed larvæ of *V. bombylans* and *pellucens*. The larva of *bombylans* was found in the nest of *B. subterraneus* or an allied species in September, and in the nest of an undetermined *Bombus* on $\frac{27}{8}$; the larva of *pellucens* was found fullgrown in nests of *V. vulgaris* on $\frac{1}{4}$, further on $\frac{8}{10}$ developing next spring, and on $\frac{3}{4}$ in the earth below a nest, pupating on $\frac{22}{4}$ and developing on $\frac{24}{5}$, and finally in the nest of an undetermined *Vespa* in September. We thus at present know *V. bombylans* from *B. lapidarius*, *muscorum*, *subterraneus*? and perhaps from other species, and from *V. germanica*; *V. pellucens* from *V. vulgaris*; *V. inanis* from *V. crabro* and *vulgaris* and *V. zonaria* from the same species of *Vespa*. No doubt the larvæ live only in such nests as are found in or near the ground.

The larvæ are of greyish or yellowish white colour, somewhat flattened and especially rather flat above; they are a little attenuated towards the head end; there are in all twelve segments; the head is retractile, there are a pair of small, so-called antennæ, two-jointed and ending with two small points, but there are no mouth hooks. The dermis is finely chagreened and the body is strongly transversely corrugated so that each segment shows three or four corrugations; above there are some small warts or wart-like spines on the corrugations, and along the sides there are, according to the species, shorter or longer spines, also surrounding the posterior end; all the spines are spinulose; on the ventral side there are seven pairs of prolegs, armed with hooks. At the hind margin of the prothoracal segment lie the small anterior spiracles on each side, and above on the last segment is a quite short or a little longer, brown spiracular process. — The distinguishing characters of the larvæ of the different species are the following. The larva of *bombylans* has on the two last thoracal segments and the first abdominal segment about six spines on each above in a transverse row and some at the sides; the six following

segments show each about three corrugations, on the first of those are a pair of small warts in the middle and on the following corrugation two small spines towards each side, the one at the side margin the largest; further there are on each side three short spines, one upper more posteriorly, and two lower, one behind the other more anteriorly; the ventral segments have a lateral spine at each side; the last segment has the lateral spines surrounding the hind margin as six rather long (1—1,5 mm) threads. It will be seen that these spines are arranged as in other Syrphid larvæ, but besides them there is still a small lateral spine on the corrugation which bears the two middle spines. The small hooks on the prolegs are arranged in two rows, the posterior hooks smaller than the anterior. The posterior spiracular process short. The length of the larva is about 20 mm. The larva of *pellucens* is rather different; each segment is on the dorsal side divided into four corrugations and these have each a transverse row of numerous small spinules; further the segments have on the second corrugation two wart-like spines in the middle, and on the third corrugation two towards each side, the lateral long; besides the fourth corrugation has two wart-like spines in the middle similar to those on the second corrugation, and the second corrugation has a long lateral spine; on the sides there are the usual three spines, and on each ventral segment a lateral spine; the spines surrounding the posterior margin are only slightly longer than the other lateral spines. This larva has thus, like that of *bombylans*, a lateral spine on the second corrugation not found in other Syrphid larvæ, but besides two wart-like spines on the middle of the fourth corrugation not found in *bombylans* or other larvæ. The prolegs are armed with relatively large hooks in two rows, the anterior hooks largest. The posterior spiracular process short. The size of the larva as in *bombylans*. This larva is easily known from the larva of *bombylans* by all the lateral spines being considerably longer, the six posterior on the contrary shorter, and by the transverse rows of small spinules above. The larva of *zonaria* (non-Danish) is, according to Künckel d'Herculais, quite similar to that of *pellucens* (when fullgrown), while the larva of *inanis* is more similar to that of *bombylans* but has all the spines very small, scarcely perceptible, the prolegs with only one row of hooks, a pair of somewhat well developed prolegs also on the mesothoracic segment and the posterior spiracular process lying more posteriorly and relatively long. — The pupa of the various species is rather arched, especially much arched above; it is attenuated behind, broad in front; it shows the same spines as the larva; at the anterior

margin of the first abdominal segment above are two, somewhat approximated and diverging spiracular tubes. The colour is brownish. The length of the pupa of *pellucens* (the only one I have examined) is 13 mm.

As seen above the larvæ live in the nests of *Bombus* and *Vespa*; they were originally thought to be parasitic, eating the larvæ and pupæ of their hosts, but the observations of Ern  (l. c.) and of Sharp (Cambr. Nat. Hist. VI, 1899, 500) seem to prove that they are scavengers, only feeding on deceased larvæ and pupæ; already Smith (Trans. Ent. Soc. London, I, 1851, Proc. 111) thought that the larva of *V. bombylans* in the nests of *Bombus* lived of honey and wax. Recently Sundvik has (Meddel. Soc. pro Faun. Flor. Fen. 37, 1911, 56) revived the suggestions towards their being parasitic, and has advanced the supposition that they dissolve the wasp-cocoon by a secret from glands present in the posterior end of their body; the six longer threads behind should then be used to hold the cocoon; these are, however, mere suggestions and, I think, of no value. The eggs have often been found laid in the nests. The larva hibernates as fullgrown, generally in the earth below the nests, and it pupates and develops the next spring or summer. The habits of the larvæ mentioned here hold good at all events for the European species, but with regard to the American species *V. fasciata* Macq. it is recorded that the larva feeds in the cactus *Opuntia missouriensis*.

The species of *Volucella* show, as seen, generally more or less resemblance to wasps or *Bombi*; this is especially the case with *bombylans*, the two varieties of which are similar to *B. lapidarius* and *terrestris* (or allied species). It has been thought that this was mimicry, protective against the hosts, or, as it was found that the *Volucella* is a welcome scavenger, indicating them as friends. It is, however, very doubtful whether the resemblance has anything to do with mimicry; thus *bombylans* is found also in nests of *V. germanica*, to which it has not the slightest resemblance, and *pellucens* has likewise no resemblance to *V. vulgaris*, in the nests of which its larvæ are found; moreover K nckel d'Herculais says that he has bred the varieties of *bombylans* from the same *Bombus*-nest.

The species of *Volucella* are large, beautiful flies, as said generally more or less resembling species of *Vespa* or *Bombus*; they occur in wooded districts and are found on leaves and on various flowers. The genus is especially tropical with only a few species towards the north but with a large number in southern regions.

Of the genus 12 species are known from the palæarctic region, but of these only 6 are European; 3 occur in Denmark.

Table of Species.

1. Densely pilose species; ground colour of abdomen extensively black; scutellum without marginal bristles 1. *bombylans*.
- Short-haired species; abdomen not quite black; scutellum with marginal bristles 2.
2. Abdomen black with second segment whitish 2. *pellucens*.
- Abdomen yellow with black bands 3. *inanis*.

1. *V. bombylans* L.

1758. Linn. Syst. Nat. X, 591 et 1767. XII, 2, 983, 25 et 1761. Fn. Suec. 1792 (*Musca*). — 1764. O. F. Müll. Fn. Fridrichsd. 710 (*Musca*). — 1775. Fabr. Syst. Entom. 762, 1 et 1805. Syst. Antl. 224, 4 (*Syrphus*). — 1816. Fall. Dipt. Suec. Syrph. 18, 3 (*Syrphus*). — 1822. Meig. Syst. Besch. III, 402, 1. — 1843. Zett. Dipt. Scand. II, 650, 3. — 1862. Schin. F. A. I, 329. — 1901. Verr. Brit. Fl. VIII, 483, 1, fig. 339. — 1907. Kat. paläarkt. Dipt. III, 90. — *Musca mystacea* Linn. 1758. Syst. Nat. X, 591 et 1767. XII, 2, 983, 26 et 1761. Fn. Suec. 1793. — 1764. O. F. Müll l. c. 711. — 1775. Fabr. Syst. Entom. 762, 2 et 1805. Syst. Antl. 224, 5 (*Syrphus*). — *Musca plumata* De Geer, 1776. Mém. Ins. VI, 134, 5, Tab. VIII, Fig. 4—9. — *V. plumata* 1822. Meig. l. c. III, 403, 2. — 1843. Zett. l. c. II, 648, 1 et 1849. VIII, 3110, 1 et 1855. XII, 4649, 1 et 1859. XIII, 5077, 1. — *V. vulpina* Meig. 1830. l. c. VI, 355, 7. — *V. haemorrhoidalis* Zett. 1838. Ins. Lapp. 591, 2 et 1843. Dipt. Scand. II, 649, 2.

Male. Vertex black or brownish black, palest at the anterior angle; frons brownish behind, darker forwards. Epistoma yellowish or brownish yellow on the front side, darker at the eye-margins and brownish pruinose below the antennæ; the lower side parts are quite black and shining, and likewise the jowls; the epistoma is hollowed below the antennæ, about in the middle there is a large central knob, but below this epistoma is only slightly retreating, its lower part is cone-shaped, produced much downwards and somewhat pointed. Vertex has long, yellow hairs, frons shorter, likewise yellow hairs; epistoma is densely yellow-haired on the front side, the sides have sparse, dark hairs. Eyes densely haired with long, black hairs. Occiput black, greyish pruinose, black-haired, the hairs long below and on the jowls. Antennæ with the third joint elongate, at the upper margin nearly three times as long as broad; the basal joints black, the third brownish or yellowish; arista blackish, more or less brown in the basal part, plumose with long hairs, longer above than below. Thorax black, shining, densely pilose from erect, somewhat long hairs; there are notopleural and postalar bristles, and some bristles at the upper corner of mesopleura, but they are not very conspicuous. The colour of the pilosity of the body varies very much and the species is thereby divided into two varieties. Var. *bombylans*: Thorax black-haired. Scutel-

lum yellow or dark yellowish, translucent, with black hairs. Pleura with long, black hairs. Abdomen short, ovate; it is black, shining, generally more or less dark and indefinitely reddish on the sides of second and third segments so that sometimes only a black middle line is left; it is densely haired with somewhat long hairs, longest behind; the hairs are black on the basal part but reddish or sometimes yellowish at the apex from about the middle of the third segment; at the basal corners the hairs may be a little brownish. Genitalia black-haired. Venter black, shining, with long hairs, black at the sides, yellowish brown in the middle. Var. *plumata*: The hairs on occiput generally yellow above. Thorax with only the middle front part black-haired, the sides and hind margin more or less broadly yellow-haired and scutellum yellow-haired. Abdomen with the side spots on second segment yellow and yellow-haired, stretching more or less in towards the middle, and with the fourth segment and the hind margin of the third yellow-haired, sometimes (var. *haemorrhoidalis* Zett.) more reddish-haired. Legs all black, the base of the anterior tibiae and tarsi may be more or less reddish, generally only indistinctly. The legs densely black-haired; the hairs are somewhat long on the posterior and ventral side of anterior femora and on the anterior and ventral side of hind femora; the other hairs are conspicuous and not quite short, the anterior tibiae have a moderately long fringe on the postero-dorsal side, and the hind tibiae are a little fringed all round, especially on the somewhat swollen middle part.

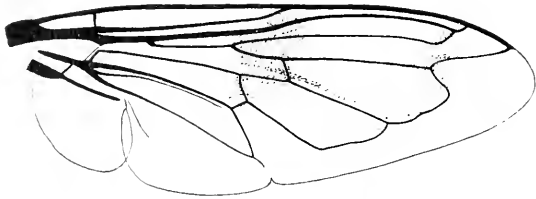


Fig. 150. Wing of *V. bombylans* ♂.

Wings yellowish tinged, the base blackish brown and there are two brown patches, one larger below the stigma down to the discal cell, the other smaller seaming the veins at the end of the subcostal and first posterior cells. Squamulae with their fringes black, and halteres black.

Female. Frons moderately broad, orange, haired with long, yellow or mixed black and yellow hairs, in var. *plumata* they are yellow. Antennae and arista longer than in the male. Eyes bare. For the

rest the female shows the same two varieties as in the male; in the female of *plumata* the thoracal disc is generally still more yellow-haired than in the male, the hairs on the middle being brown, or thorax quite yellow-haired. Abdomen with no reddish spots on third segment.

Length 11—14 mm.

As seen this species falls into two distinct varieties, so distinct that they might without hesitation be taken for distinct species, but they are now well known to be only varieties, and the two forms have often been taken together in copula. The species is very *Bombus*-like, and the var. *bombylans* is like *B. lapidarius*, the var. *plumata* like *B. terrestris*, but as said above it is rather doubtful whether this has anything to do with mimicry. Verrall states (but he says expressly that he estimates without accurate observation) that in England the species for about sixty per cent. is like *B. terrestris* (and its allies) and for about thirty eight per cent. like *B. lapidarius*, while two per cent. may be of almost any *Bombus* colouring. I think it is about the same in Denmark, at all events the var. *plumata* seems to be more common than *bombylans*. Naturally the first author, Linné, described the two varieties as distinct species (*bombylans* and *mystacea*), and the various varieties have given rise to the description of many species.

V. bombylans is common in Denmark; at Copenhagen, Ordrup Mose, Fure Sø, Geel Skov, Frerslev Hegn, Tisvilde, Nordskoven at Jægerspris and at Sorø; on Falster and on Lolland at Maribo, Bremersvold and in Kældskov; on Funen at Odense and Veflinge, and on Fænø; in Jutland in Nørholm Skov at Varde, at Horsens, Frijsenborg, Rye near Silkeborg, Rebbild near Skørping and Jerup near Frederikshavn, and on Bornholm. My dates are $^{6/6}$ — $^{28/7}$. It occurs in woods and on meadows near woods and is here generally seen on various flowers, especially on Umbelliferæ and Compositæ, thuso ften on *Carduus*. The larva was found at Tisvilde in the nest of *B. subterraneus* or an allied species in September (Weis) and in Dyrehaven in the nest of an undetermined *Bombus* on $^{27/8}$ (Schlick).

Geographical distribution: — Europe and in Asia Minor; towards the north to northern Sweden, and in Finland and Siberia; it occurs, as it seems, also in North America (*facialis* Willist. and *evecta* Walk.).

2. *V. pellucens* L.

1758. Linn. Syst. Nat. X, 595 et 1767. XII, 2, 989, 62 et 1761. Fn. Suec. 1826 (*Musca*). — 1775. Fabr. Syst. Entom. 773, 2 (*Musca*) et 1805. Syst. Antl. 224, 3 (*Syrphus*). — 1816. Fall. Dipt. Suec. Syrph. 19, 5 (*Syrphus*).

— 1822. Meig. Syst. Besch. III, 404, 3. — 1843. Zett. Dipt. Scand. II, 651. 4 et 1859. XIII. 5078, 4. — 1862. Schin. F. A. I, 329. — 1901. Verr. Brit. Fl. VIII. 490, 4, figs. 338—340. — 1907. Kat. paläarkt. Dipt. III, 94.

Male. Vertex brown, darkened at the ocelli; frons and epistoma brownish yellow, the latter a little pruinose below the antennæ; jowls black; epistoma hollowed below the antennæ, with a large central knob in the middle and below it somewhat retreating, the knob therefore more protruding than in *bombylans*, but the epistoma produced much less downwards than in this species and also less forwards. Vertex and frons with black hairs; epistoma less densely haired than in *bombylans*, the hairs black, yellow at the sides below, sometimes all or almost all yellow. Eyes touching for a long space, with dense, black hairs, shorter downwards and the eyes are bare on the hinder lower part. Occiput black, greyish pruinose, with yellow hairs, somewhat long below. Antennæ red, third joint about twice as long

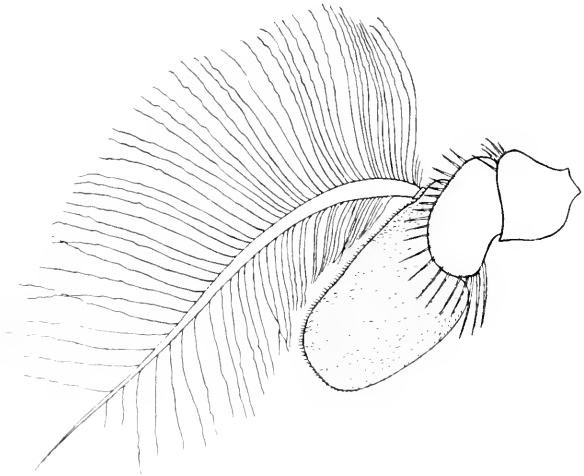


Fig. 151. Antenna of *V. pellucens* ♂, from the outside. $\times 45$.

as broad; arista black on the outer part, long black plumose, the hairs longest above. Thorax black or slightly bluish black, shining, brownish on the humeri and dark ferruginous at the side margins; it is clothed with not long, black hairs; there are strong notopleural, supraalar and postalar bristles, and a row of weaker bristles at the hind margin. Scutellum brown or blackish brown, with short, black hairs and long marginal bristles. Pleura with longish hairs and with

bristles at the upper corner of mesopleura. Abdomen short ovate; it is black, somewhat shining, second segment yellowish white, somewhat translucent, with a narrow, black middle line; abdomen is clothed with short, black hairs, longer on the fourth segment; on the second segment the hairs are yellow except at the hind margin. Venter coloured as dorsum, but the whitish band stretching in on the front half of the third segment; it is clothed with yellow and black hairs, following the ground colour. Legs less stout than in *bombylans*, black, the basal part of anterior tibiæ dark ferruginous and sometimes also just the base of the anterior tarsi. The legs are black-haired, the hairs short, somewhat longer on the femora in the usual way and there are some long, bristly hairs below the anterior femora; middle femora with some bristles behind the apex. Wings yellowish on the basal half with a large, brown middle spot and a small apical one as in *bombylans*. Squamulæ reddish yellow or darker brownish with reddish yellow fringes. Halteres with the peduncle blackish brown, the knob yellow.

Female. Vertex and frons rather narrow, a little widening downwards, yellowish or reddish brown, with black hairs. Eyes bare. Antennæ slightly larger than in the male. Thorax with the reddish side margin more conspicuous and scutellum more red; the hairs on thorax short, mixed black and yellow, especially a patch of yellow hairs in the middle in front of scutellum, often placed on a reddish spot. The blackish middle line on second abdominal segment very narrow, often abbreviated or only present at the base.

Length 12—16 mm, but the small specimens rarely seen.

V. pellucens is common in Denmark; Ordrup Mose, Ernelund, Ruderhegn, Hareskov, Donse, Frerslev Hegn, Tyvekrog, Egebæks Vang, Tisvilde; on Lolland at Maribo and in Kældskov; on Funen at Veflinge and Middelfart; in Jutland in Nørholm Skov at Varde, at Horsens, Frijsenborg, Hald near Viborg, Rebbild near Skørping and Madum Sø, and on Bornholm at Rønne. My dates are $^{12}/_6$ — $^{27}/_7$. It occurs on similar places as the preceding species and it frequents many various flowers. The larva was found in Dyrehaven in the earth beneath a nest of *V. vulgaris* on $^4/_4$, and likewise in Dyrehaven in a nest of *V. vulgaris* on $^8/_10$, these latter larvæ developed next spring, further in Geel Skov again in the earth below a nest of the same *Vespa* on $^3/_4$, pupating on $^{22}/_4$ and developing on $^{24}/_5$ (Kryger); finally it was found at Copenhagen in the nest of an undetermined *Vespa* in September (Schlick).

Geographical distribution:— All Europe, towards the north to middle Sweden, and in Finland; it is also recorded from Japan.

3. *V. inanis* L.

1758. Linn. Syst. Nat. X, 595 et 1767. XII. 2, 989, 61 et 1761. Fn. Suec. 1825 (*Musca*). — 1775. Fabr. Syst. Entom. 773, 1 et 1781. Spec. Ins. II, 435. 1 (*Musca*). — 1816. Fall. Dipt. Suec. Syrph. 19, 6 (*Syrphus*). — 1822. Meig. Syst. Besch. III, 407, 6. — 1843. Zett. Dipt. Scand. II, 652, 5. — 1862. Schin. F. A. I, 330. — 1901. Verr. Brit. Fl. VIII, 486, 2. — 1907. Kat. paläarkt. Dipt. III, 92. — *Syrphus micans* Fabr. 1794. Ent. Syst. IV, 278, 2 et 1805. Syst. Antl. 224, 2.

Male. Vertex yellow, brownish at the ocelli; frons and epistoma yellow, of the same shape as in *pellucens* but more descending; the sides of epistoma have a brown stripe from the eye downwards; jowls yellow or brownish with a dark spot at the lower eye-corner. Vertex and frons with the hairs varying from black to yellow; epistoma yellow-haired on the front side. Eyes with long, brown hairs, wanting only on a small hind part below. Occiput light grey pruinose, with yellow hairs, long below. Antennæ yellow or orange, third joint more than twice as long as broad; arista dark towards the apex, plumose with long, black hairs, longest above. Thorax black or brownish black, shining, humeri and sides broadly yellow, and generally also a brownish spot in front of scutellum and a narrow, brownish stripe on each side inwards to the side margin; thorax with not long hairs, which are yellow with a few black in front, brown or black behind; there are strong, black notopleural, supraalar and postalar bristles, and a transverse row at the hind margin. Scutellum yellow, dull, with blackish hairs and strong marginal bristles. Pleura brownish, darker below, with long, yellow hairs and black bristles at the upper corner of mesopleura and above on pteropleura. Abdomen less short and broad than in the foregoing species; it is yellow, dull, with the first segment and the hind margins of the second and third segments black or brownish black; the second segment has a similarly coloured middle line, sometimes also present behind on third segment; the fourth segment may be narrowly black at the hind margin. Genitalia black. Abdomen clothed with short hairs mainly following the ground colour, but the black hairs on the black hind margins stretching a little in on the yellow part, and fourth segment more or less black-haired just at the hind margin. Venter yellow, first segment black, third with a broad, blackish hind margin and fourth likewise but the dark colour produced triangularly forwards; the hairs on venter longish and pale on the basal part, for the rest short and mainly black. Legs reddish yellow, femora with the basal half or more black, the black part broadest on hind femora, the dark colour stretching longest towards the apex above; hind tibiæ sometimes with a faint, dark ring in the

middle; tarsi more or less darkened towards the end. Legs with short, black hairs, a little longer on the femora in the usual way; anterior tibiæ with some strong bristles on the posterior side in the basal half, middle femora with similar bristles at the apex behind, and middle tibiæ besides the posterior bristles with one ventral below the middle and numerous round the apex; middle tarsi with spinules below the apex of the joints. Wings yellow, especially on the anterior part, and with a slight cloud below the stigma and about the apex of the subcostal cell. Squamulæ with their fringes and the halteres orange.

Female. Vertex and frons somewhat narrow, but broader than in *pellucens*, widening downwards from below the middle; they are yellow with black hairs. Eyes bare. Antennæ slightly larger than in the male. Abdomen with the hind margin of fourth segment more broadly black and the hind margin of the fifth narrowly black.

Length about 16 mm.

V. inanis is very rare in Denmark, we have only four specimens from earlier time, all females, without particular locality.

Geographical distribution:— All Europe and also recorded from Syria; towards the north to middle Sweden.

III. Eristalinae.

29. **Eristalis** Latr.

Large or somewhat large species, moderately haired or sometimes densely and velvet pilose; they are of black or æneous colours, generally with yellow abdominal markings, most often as side spots, especially at the base. Head somewhat semiglobular, broader than high and about as broad as or slightly broader than thorax; it is slightly excavated behind. Eyes touching in the male for a shorter or longer distance, in one (Danish) species separated (Subg. *Eristalinus*); in the female they are broadly separated. The eyes are more or less densely hairy but the lower hinder part bare, especially in the females; in some species there are two longitudinal bands of denser hairs, or one band or only an indication of a band; in one species (*aeneus*) the eyes are hairy only just above. The eyes are unicolorous or sometimes spotted, or (in non-Danish species) with numerous transverse bands. The eye-facets are slightly enlarged above in the male. The antennæ are inserted in or slightly above the middle of the head; they are rather small, the first joint very short, the third joint generally roundish square; the second joint has small bristles above and below, the third is microscopically haired; the arista is either plumose

in the basal half, or short-pubescent or apparently bare. Epistoma broad and widening downwards; is only slightly hollowed below the antennæ, sometimes nearly straight, the central knob not large and the epistoma somewhat retreating below it and somewhat descending; the oral aperture is rather large, the front mouth edge curved upwards and the lateral angles somewhat drooping; the epistoma is pale pruinose, in rare cases all over, but generally there is a broader or narrower, black, shining middle stripe; also the mouth edge is generally black, and the lower lateral parts are always black and shining; the epistoma has somewhat long, erect or more decumbent hairs except on the middle stripe and the lower margin; the ground colour below the pruinosity is generally yellow, but sometimes black. Jowls somewhat broad but slightly descending, separated from epistoma by a furrow. The oral cone is well developed and the proboscis of some length. Clypeus is of the usual shape, the basal part relatively short and the small, separated part at the base distinct. Labrum (*arbustorum*) long and strong, semitubular, the median process cleft to the base, beset with numerous pointed emergences, the upper lateral process delicate, spine-like and pointed, the lower broad with the inwards curved apex pointed; the processes are of equal length; the usual row of small papillæ along the margin on the inside present; hypopharynx as long as labrum, slightly attenuated outwards but with the end cut, not pointed; maxillæ with a knife-shaped lacinia shorter than labrum, rather pointed and with the usual, microscopical hairs in rows on the apical part; the palpus a little longer than the lacinia, beset with microscopical hairs and with numerous shorter and longer bristles, the long placed near the apex. Labium with the basal part well chitinised, a little longer than the elongated oval, not broad labella. Thorax rectangular or almost quadrate; scutellum black in a few species, in the others yellowish or brownish and more or less translucent; it has no fringe below the margin.¹ There are no bristles present. Metapleura with dense, not quite short hairs. Abdomen shorter or longer, somewhat narrowed towards the apex, on its broadest part generally a little broader than thorax; in the male there are four not transformed segments, the first the smallest; the fifth segment present in the whole breadth, but very short and quite hidden, the following as usual lying on the left side, and the genitalia of the usual shape, turned to the right; they are moderate or some-

¹ Girschner says that there is such a fringe, but that is erroneous; the outermost marginal hairs may (in some species) be curved somewhat downwards, but there is no real fringe below the scutellar margin.

what large. In the female there are five normal segments, the rest (four) hidden, the last terminating with two not quite small lamellæ. Legs simple, sometimes the hind femora a little, or more thickened, the hind tibiæ more or less compressed and a little curved, and with the usual incurvation behind near the apex; hind metatarsi simple or somewhat thickened. The legs haired in the usual way, the hairs on posterior and ventral sides of anterior femora and on anterior and ventral sides of the hind femora long; the hairs on tibiæ not quite short, longest behind anterior tibiæ; hind tibiæ generally more or less fringed above and below; the long, solitary, bristly hair above the trochanters present and more or less distinct, generally most distinct on the anterior trochanters; the scabrous spot of squamose hairs on the anterior side at the base of the femora distinct. Claws and pulvilli well developed; empodium short, spine-shaped, hairy. Wings with the subcostal cell closed, and the subcostal vein distinct from costa quite to its end; the cubital vein with a deep loop in the middle of the first posterior cell, ending considerably before the apex of the wing; medial cross-vein at the middle of the discal cell; anal vein more or less dipped downwards about the middle; a stigmatical cross-vein present; vena spuria distinct, in some species very weak or almost wanting; in some species (subgenera) the basal part of the radial vein with very fine, but quite distinct bristles. Alula large. The wing-membrane bare. Squamulæ large, the thoracal squamula the largest and somewhat inflated at the inner end towards the scutellum; the thoracal squamula has long, elegantly furcately divided hairs, they are branched especially at and near the base, or the basal part is flat and only the outer half divided into hairs; the alar squamula has shorter but, however, rather long, curiously flattened hairs. Plumula not large, with somewhat branched hairs.

The metamorphosis is rather well known; the larvæ and pupæ have often been mentioned and were already known to Swammerdam, Réaumur and Linné. Larvæ and pupæ (probably of *E. tenax* and some other species) are mentioned and their mode of life thoroughly treated by Swammerdam (Bibl. Nat. II, 1738, Tab. XXXVIII, Fig. 9) and especially by Réaumur (Mém. Ins. IV, 1738, Pl. 20, Fig. 7, Pl. 30—32 part.). Larvæ and pupæ of *E. tenax* are mentioned, or described and figured, by Zetterstedt (Dipt. Scand. II, 1843, 662), Scholtz (Ent. Zeitschr. Breslau, 1848—49, 22), Letzner (Arbeit. schles. Gesell. 1856, 117), Schiner (Verh. zool. bot. Gesell. Wien, VII, 1857, 391), Trybom (Öfvers. Kgl. Vet. Akad. Förh. 1875, No 2, 87), Smith (Ent. Month Mag. 2, XII, 1901, 300), and very thoroughly by Batelli (Bull. Soc. entom. ital. XI, 1879, 77, Tab. I—V), and in Miall (Nat. Hist. aquat. Ins. 1895.

198), and the larva (of *tenax* and the American species *dimidiatus*) are mentioned as passing from the intestine of man (Riley and How. Ins. Life, II. 1889, 262). The developmental stages of *E. arbustorum* are described by Bouché (Naturg. d. Ins. 1834, 54, Tab. V, Fig. 14), and thoroughly described and figured by Trybom (l. c. 76, Tafl. II); Zetterstedt mentions this larva (l. c. 660) and in XI, 1855, 4651 he notes that about 50 specimens of the larva had passed from the rectum of a boy, and Wagner (Stett. ent. Zeitg. XXXI, 1870, 78) mentions a similar observation. The larva of *E. nemorum* is probably among those described by Réaumur (l. c. Tab. XXXI, Fig. 8), and it is mentioned by Meigen (Syst. Besch. III, 1822, 395). The larva of *E. horticola* is mentioned by Trybom (*flavocinctus* Fall. l. c. 76). The metamorphosis of *E. sepulchralis* is thoroughly described by v. d. Wulp (Mém. d'Entom. publ. par le Soc. Ent. de Pays-Bas, I, 1857, 18, Pl. I, fig. 1—2). I have myself, besides larvæ of undetermined species, examined pupæ of *E. sepulchralis* taken below reeds at the shore on $\frac{4}{4}$, developing at the end of April, and taken on $\frac{18}{4}$, developing in May, and pupæ taken as larvæ below sea-weed on sand at the shore on $\frac{24}{7}$, developing in August; pupæ of *E. aeneus* taken as larvæ at the same date and under the same circumstances as the latter, and likewise developing in August; further a pupa of *E. lucorum* taken in a fen on $\frac{3}{5}$ and developing in the same month; pupæ of *E. tenax* taken at horse-dung in a stable on $\frac{16}{9}$ and developing on $\frac{20}{9}$ — $\frac{27}{9}$; a pupa of *E. intricarius* taken at a ditch first in August and developing soon after; a pupa of *E. anthophorinus* taken in a fen in April and developing on $\frac{6}{5}$; pupæ of *E. arbustorum* taken in a cloaca on $\frac{6}{5}$ and developing at the middle of this month, and finally a pupa of *E. nemorum* taken at a lake on $\frac{19}{7}$ and developing soon after. The metamorphoses are thus more or less known of the following species: *sepulchralis*, *aeneus*, *lucorum*, *tenax*, *anthophorinus*, *intricarius*, *arbustorum*, *nemorum* and *horticola*.

The larvæ are of the well known shape termed rat-tailed larvæ (vers à queue de rat Réaumur). The larva (of an undetermined species, I think *arbustorum* or *intricarius*) has a cylindrical body, not attenuated in front but a little attenuated behind before it goes over into the long, thin, tail-shaped part; the body consists of twelve segments, the head included; this latter is small and retracted; above the mouth opening are two small, two-jointed organs, the antenna-like papillæ or so-called antennæ, the last joint bearing two small papillæ; there are no mouth hooks but a pharyngeal skeleton; at each side of the mouth below is a small wart with spines. The body is somewhat transversely corrugated above, and the prothoracal segment has

some longitudinal furrows. The dermis is tough and densely beset with small spinules; besides these clothing spinules there are above on the corrugations some a little larger spines or small warts but they are very slightly pronounced; they are present in the same number and arranged quite in the same way as in other Syrphid larvæ so that there are some on the prothoracal segment, a transverse row of six on second and third thoracal segments and on first abdominal segment; on the other segments there are two in the middle on one corrugation and two towards each side on the next corrugation; on the sides there are three on each segment, and one quite below on the ventral surface. On the ventral side there are a pair of proleg-like warts, beset with spines, on the prothoracal segment, and then six pairs of prolegs on the six first abdominal segments; they are beset with curved spines at the end, especially along the hind margin. The last segment terminates in the long, tail-shaped part with the posterior spiracular tube which is telescopically pro- and retractile and able to be stretched out to a very great length. The tail consists of three divisions, the foremost is a prolongation of the last segment, it is transversely wrinkled and like the other dermis beset with fine spines; at the sides of it are four small bunches of hairs at intervals, one at each side at the base, one at the apex, and two intermediate, but the distances between them are dependent on the contraction; the next division is thinner, longitudinally striated and with fine, nearly microscopical spines in rows; finally the third division is still thinner, more firmly chitinised and brown; it is very finely transversely striated, the end part smooth, and it bears at the apex the spiracles, surrounded by eight plumose hairs¹. The length of the three divisions are dependent on the degree of extension, only when fully extended they are seen in full length, and when fully retracted the intermediate part is quite hidden in the basal division and only the end of the third part is seen protruding from the first or basal part, and also this latter part may be somewhat contracted. At the hind margin of the prothoracal segment lie the anterior spiracles, they form short, brownish, a little curved horns, but they may be quite retracted and then only seen as points. Above on the first abdominal segment two somewhat circular spots are seen; these are the points through which the anterior spiracular tubes in the pupa protrude. The anus lies below in front of the tail; protruding from its opening is sometimes seen a bundle of thread-like appendices, the use of which

¹ Miall follows Réaumur in stating that there are five hairs, but, as Trybom correctly says, there are eight.

is not known; Trybom takes them to be an organ of locomotion, perhaps also of respiration. For the rest something similar is found in other Syrphid larvæ, and the organ may perhaps be homologous with the organ in the Muscid larvæ described by Pantel (Bull. Soc. Ent. de Fr. 1901, No. 4, 60, fig. 1—2). The larva is of a greyish or yellowish white colour, and of a length of about 18 mm, the tail excluded. — The pupa is brownish, its upper anterior end forms a flattened declivity, at the hinder border of which the anterior spiracular tubes protrude; these tubes are long, until 3 mm, a little curved, directed upwards and forwards and a little diverging; on the lower side they are beset with small tubercles (in other species as *tenax* these tubercles lie on the sides and above, but not below); at the front margin of the pupa the anterior larval spiracles are seen as two short horns, the pupa has thus in all four horns, two long above and two short below them. The larval tail is still found in the pupa, curved in various ways, and on the ventral side the prolegs are visible. The length is about 12 mm.

No distinguishing characters are known for the larvæ of the various species, but according to Miall such may be found in the small spinules on the dermis, these being in some species simple in others branched in various ways.

The larvæ live in stagnant and putrid waters, ditches, in manure and the like; they may be found together in very great numbers, I once took them in a putrid ditch in which they were so numerous that they were literally crowded. In the above mentioned cases of their passing from the intestine of man they had probably been swallowed with water. The tail reaches the surface for respiration, and as said it can be protruded to a great length. Réaumur experimented by filling water in a glass with larvæ, and he saw the tail extended to about six inches, then it could not become longer. With regard to the anterior spiracles Miall says that they are not in function; this is, however, very improbable as it is then not understood why they should be present; Trybom takes them to act as tracheal gills. For pupating the larva quits the water and pupates in the vicinity, generally on the earth, but they are also sometimes seen at the surface of the water. Sometimes they may be found suspended by the tail; Zetterstedt (l. c. 662) mentions that he has many times found pupæ of *E. tenax* hanging in this way, and F. Löw (Verh. zool. bot. Gesell. Wien, XVI, 1866, 949) mentions a pupa hanging on a stalk; Trybom mentions (l. c. 87) that he has taken many pupæ of *E. arbustorum* suspended on a paling in a height of up to 2,5 meter from the ground, the larvæ must thus have crept up to this height.

The pupa stage lasts from nine to twenty days or more according to the weather. Réaumur (l. c. 472) has a curious observation; he says that he saw a pupa in which the imago was ready to creep out, the imago had the posterior end forwards and must thus have turned round in the puparium, and the author thinks that this is the normal method for these flies and that they split the puparium with the posterior end; Miall thinks that this observation need be confirmed before accepted; Réaumur's observation must, of course, be due to some mistake, the imago, as I have often asserted myself, has the head forwards when ready to creep out and comes out with the head first. — The eggs are deposited a little above the surface of the water; Réaumur saw the females of several species deposit their eggs on the sides of buckets with water in his garden; the eggs are white, oblong, finely chagreened. Zetterstedt (l. c. II, 660) notes that he has seen females of *E. arbustorum* laying eggs in the mud at borders of stagnant waters, and he tells (l. c. 666) that he once saw several females of *E. anthophorinus* around a carcass of a sheep lying in water, sometimes setting down on it, he thinks to deposit the eggs. I possess a leaf of Sparganium with a heap of about half a hundred eggs of some *Eristalin*, taken on ⁵/₇.

Most or all species have no doubt more than one brood in the year, and, as mentioned above, I have seen larvæ and pupæ at very different times of the season; there is thus evidently no regularity in the time of development. With regard to hibernation the species hibernate, I think, in every stage of the larva and also as pupa; I once took on ¹⁷/₈ in a ditch a great number of larvæ in all sizes from quite small to full grown, and also pupæ; if the winter is hard the larvæ perish quite or partly. Verrall suggests that *E. pertinax* may hibernate also as imago and this may be possible for this as well as perhaps also for other species.

The species of *Eristalis* are beautiful flies, especially the velvet pilose species; they occur generally near water where they also deposit their eggs, some occur especially at the shore, and they frequent many various flowers, especially Compositæ and Umbelliferæ: most or all species are seen during the whole season from early spring to late autumn.

Of the genus about 35 species are recorded from the palæarctic region, but of these only about 25 are European; 15 have been found in Denmark.

The genus has been divided into several subgenera by Rondani and Mik, according to the hairiness of the arista, the eyes in the male being touching or separated, and the colour of the eyes, but the sub-

genera have only value as groups of species; with regard to the Danish species the following subgenera are represented:

1. Arista plumose *Eristalis* s. str. (*intricarius*, *arbus-torum*, *pertinax*, *nemorum*, *horti-cola*, *vitripennis*, *rupium*, *alpinus*).
- Arista bare or only pubescent 2.
2. Eyes unicolorous *Eristalomyia* Rond. (*cryptarum*, *lucorum*, *tenax*, *anthophorinus*, *oestraceus*).
- Eyes spotted 3.
3. Eyes only hairy above, touching in the male *Lathyrophthalmus* Mik (*aeneus*).
- Eyes quite hairy, in the male separated *Eristalinus* Rond. (*sepulchralis*).

Girschner has (Ill. Wochenschr. f. Entom. II, 1897, 589) separated the subgenera *Eristalis* and *Eristalomyia* in another way according to the presence or absence of one or two bands of denser hairs on the eyes, but also this character indicates at most groups of species.

Table of Species.

1. Arista bare or with short pubescence 2.
- Arista plumose 8.
2. Scutellum black or æneous; eyes spotted 3.
- Scutellum yellowish to brownish; eyes unspotted 4.
3. Eyes hairy, separated in the male; black species with dull velvet spots on abdomen 1. *sepulchralis*.
- Eyes only slightly haired above, touching in the male; æneous and shining species 2. *aeneus*.
4. Antennæ orange and legs mainly orange 3. *cryptarum*.
- Antennæ blackish or brownish and legs mainly black 5.
5. Densely velvet pilose species; wings with a distinct blotch, at all events in the female 6.
- Normally haired species; wings without blotch 7.
6. Scutellum yellowish; body yellow-haired; legs black with the basal part of tibiæ white 6. *anthophorinus*.
- Scutellum bony white and white-haired; body otherwise extensively black-haired; legs blackish with the posterior tarsi yellow 7. *oestraceus*.
7. Eyes simply haired; epistoma without black middle stripe 4. *lucorum*.
- Eyes with two bands of dense hairs; epistoma with a black middle stripe 5. *tenax*.
8. Densely velvet pilose species 8. *intricarius*.
- Normally haired species 9.
9. Hind tarsi black 10.
- Hind tarsi pale on the basal joints 13.
10. Epistoma without black middle stripe; anterior tibiæ somewhat long-ciliated 9. *arbus-torum*.

- Epistoma with a black middle stripe 11.
11. Anterior tarsi quite yellow 10. *peritina*x.
- Anterior tarsi not quite yellow, only pale at the base on middle or both pairs 12.
12. Wings hyaline with a very small stigmatal dot; abdominal spots partly or quite shining 11. *nemorum*.
- Wings with a more or less distinct, dark fascia, stigma longer than broad; abdominal spots dull 12. *horticola*.
13. Thorax pale pruinose on the front half, black on the posterior half; hind femora thickened; eye-suture in the male short 15. *alpinus*.
- Thorax unicolorous, somewhat shining; hind femora not thickened; eye suture in the male not short 14.
14. Hind femora pale on the basal part in the male, on the basal half in the female; wings hyaline in the male, with a narrow fascia in the female; abdomen in the female not quite shining 13. *vitripennis*.
- Hind femora in the male quite black or slightly brownish at the extreme base, in the female yellow at the base; wings with a dark middle blotch, especially large and distinct in the female; abdomen in the female quite shining 14. *rupium*.

1. *E. sepulchralis* L.

[?1758. Linn. Syst. Nat. X, 596 et 1767. XII, 2, 991, 73 et 1761. Fn. Suec. 1835 (*Musca*)]. — 1775. Fabr. Syst. Entom. 772, 49 et 1781. Spec. Ins. II, 431, 51 et 1794. Ent. Syst. IV, 303, 91 (*Syrphus*) et 1805. Syst. Antl. 245, 61. — 1822. Meig. Syst. Besch. III, 383, 1. — 1843. Zett. Dipt. Scand. II, 670, 16 (*Syrphus*). — 1862. Schin. F. A. I, 333. — 1901. Verr. Brit. Fl. VIII, 498, 1, figs. 345—347. — 1907. Kat. paläarkt. Dipt. III, 96. — *Syrphus tristis* Fabr. 1794. Ent. Syst. IV, 303, 92 et 1805. Syst. Antl. 245, 62 (*Eristalis*). — 1817. Fall. Dipt. Suec. Syrph. 29, 23 (*Syrphus*).

Male. Eyes separated, vertex narrowing downwards to a little below the middle, and from here the frons widening downwards so that the borders of vertex and frons form an angle; vertex blackish, brownish pruinose anteriorly with a dull blackish cross-band between vertex and frons; frons and epistoma whitish grey pruinose, the central knob, the upper mouth edge and the lower side margin, as well as the jowls, black. Vertex with blackish, anteriorly brownish hairs, frons with brownish or blackish, anteriorly whitish hairs, and epistoma with whitish hairs. Epistoma hollowed below the antennæ, the knob somewhat protruding and epistoma a little retreating below it; the lower part somewhat protruding and descending. Occiput bluish black, grey pruinose at the eye-margin except above, the hairs are white below, yellow above and here there is a row of black hairs. Eyes brown with numerous dark or black, circular but more or less con-

fluent spots, especially confluent to a dark space above, and the whole hind margin likewise dark: the eyes are haired with longish, brown hairs. Antennæ with the basal joints black, third joint somewhat large, roundish square, blackish or brownish, generally paler beneath; arista brown, apparently bare. Thorax black, somewhat shining, with velvet black stripes; the stripes are one, or two approximated, in the middle, two to each side, and one short and indistinct more laterally; the middle and the inner lateral stripes are generally united behind to a velvet black space in front of scutellum, and the outer lateral stripes are interrupted at the transverse furrow; the shining stripes between the middle stripe and the inner lateral stripes are more or less greyish in front; further the stripes between the two inner lateral stripes are brownish yellow in front, and likewise a stripe exterior to the outer lateral stripes, united with the greyish humeri; there are thus four more or less distinct, brownish yellow, short stripes in front. Thorax is clothed with long, yellow hairs, a little mixed with black at the sides and behind. Scutellum black, shining, with black hairs, paler along the margin. Pleura with longish, black hairs, paler behind. Abdomen rather short, æneous green, shining, second and third segments dull velvet black except at the hind margins and on a side space, prolonged triangularly inwards in the middle, fourth segment with a small, velvet triangle in the middle at the front margin. Abdomen is clothed with rather long hairs which are yellowish, but black on the hind part of second, third and fourth segments. Venter æneous black, with long, pale hairs. Legs black, the tips of anterior femora and about the basal third of the tibiæ pale yellowish, hind tibiæ yellowish just at the base; middle tarsi yellowish at the base; hind femora considerably thickened with the upper margin curved and with an impression on the anterior side after the middle; hind tibiæ somewhat compressed and curved, hind metatarsi a little thickened. The long hairs behind the anterior femora are black on the front femora except at the base, on the middle femora mainly yellow but black at apex; the hind femora are long-haired above and especially below, the hairs are black except at the base, and below they are yellow but on the apical third are shorter, dense, black, somewhat bristly hairs; the anterior tibiæ are somewhat long-haired above and behind, especially middle tibiæ, the hairs mainly dark; hind tibiæ fringed above and below, the hairs black on the basal, yellow on the apical part. Wings hyaline; upper marginal cross-vein recurrent above, the veinlets at apex of subcostal and first posterior cells turned upwards; radial vein with fine bristles on its basal part; cubital vein a little angular at the base and here often with a more or less distinct

veinlet; anal vein slightly dipped; vena spuria almost quite absent. Stigma a little elongate but only dark at the base, the rest very pale. Squamulæ and fringes whitish. Halteres yellow.

Female. Vertex and frons broad, greyish pruinose above, yellowish below, with an oval, brown or black spot in the middle; the

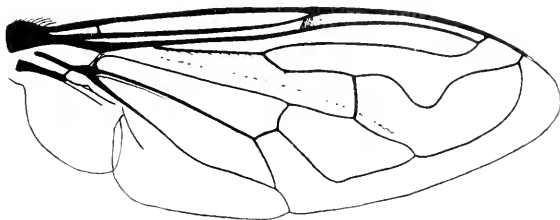


Fig. 152. Wing of *E. sepulchralis* ♂.

hairs are yellow but blackish in front of the ocelli and some few on the frons, sometimes almost all black. Thorax with the stripes, which are shining in the male, much more dull and greyish, especially the two middle ones; further the stripe dividing the velvet middle stripe, those between the lateral velvet stripes and those exterior to the outer lateral velvet stripes are all light grey pruinose and extending towards scutellum; there are thus five light grey stripes and also the transverse furrow is grey. Abdomen quite æneous shining, more or less dull only on the middle of second and third segments. Legs more yellow haired.

Length 7,5 to about 10 mm.

As known there exists some doubt with regard to the authorship of Linné for this species; it seems, however, after all, most probable that Linné has included more than one species in his descriptions and that he has had also *sepulchralis* before him.

E. sepulchralis is common in Denmark; at Copenhagen, Vesterfælled, Amager, Dragør, Utterslev Mose, Damhusmose, Ordrup Mose, Dyrehaven, Lyngby Mose, Frerslev Hegn, Frederikssund, Jægerspris and Boserup at Roskilde; on Lolland at Maribo and Nysted; on Fejø; in Jutland at Horsens, Søndervig and Lønstrup, and on Bornholm. My dates are $^{14}/_5$ — $^{15}/_9$. It occurs in fens, on meadows and commons at ponds and ditches and not rarely near the shore. The larva has been taken on Vesterfælled at the shore, on sand below sea-weed on $^{24}/_7$, it developed in August (Schlick); pupæ were taken at Boserup on $^{18}/_4$, developing in May (Schlick) and on Vesterfælled at the shore on $^4/_4$, developing at the end of April (the author).

Geographical distribution: — All Europe and down into Syria and Egypt; towards the north to middle Sweden, and in Finland.

2. *E. aeneus* Scop.

1763. Scop. Entom. Carn. 356, 967 (*Conops*). — 1794. Fabr. Ent. Syst. IV. 302, 88 (*Syrphus*) et 1805. Syst. Antl. 244, 57. — 1817. Fall. Dipt. Succ. Syrph. 28, 22 (*Syrphus*). — 1822. Meig. Syst. Besch. III, 384, 2 et 1838. VII, 143. — 1843. Zett. Dipt. Scand. II, 668, 14 (*Syrphus*). — 1862. Schin. F. A. I, 333. — 1901. Verr. Brit. Fl. VIII, 501, 2, figs. 348—349. — 1907. Kat. paläarkt. Dipt. III, 97. — *Musca punctata* O. F. Müll. Fn. Fridrichsd. 720.

Male. Eyes touching for a rather short distance. Vertex long, æneous; frons and epistoma yellowish grey pruinose, an elongate central knob black shining and likewise the side mouth edge and the jowls. Vertex with reddish, on the front half with black hairs, frons with yellow and epistoma with pale yellow or whitish hairs. Epistoma a little hollowed below the antennæ, the knob slightly protruding and epistoma a little retreating below it and a little descending. Occiput blackish æneous, grey at the eye-margin except above, the hairs white below, reddish yellow above. Eyes brown with small, circular, blackish spots which may be a little confluent and especially so above, while generally a transverse space across the suture is unspotted; the spots are smaller, more numerous and less confluent than in *sepulchralis*; the eyes bear a somewhat short, pale pubescence only on the upper part. Antennæ small, the basal joints blackish, third joint generally more or less brownish, oval; the bristles on second joint yellow except a couple above, which are black; arista bare. Thorax æneous black, shining, clothed with moderately long, reddish yellow hairs; scutellum black with similar hairs as on thorax. Pleura with paler or darker yellow hairs. Abdomen black or a little æneous or bluish black, shining; it is densely clothed with longish, reddish yellow hairs, darker to blackish at the hind margin of second segment. Venter black, shining with long, pale hairs; fourth segment a little incised in the middle of the hind margin, with a tuft of short, black, bristly hairs on each side of the incision. Legs black, apex of femora and base of tibiæ yellow, most broadly on anterior tibiæ, occupying the third or almost half part; middle metatarsi a little pale at the base; hind femora a little thickened and with an impression on the anterior side after the middle, hind tibiæ slightly compressed and curved and hind metatarsi almost not dilated; all tarsi rather broad. Legs haired as usual, the hairs yellow or reddish yellow, only above on the posterior side of front femora some black hairs and below the apex of hind

femora are black bristles. Wings more or less yellowish, towards the anterior margin more brownish, especially along the veins; upper marginal cross-vein recurrent above; the veinlets at the apex of subcostal and first posterior cells turned upwards; radial vein with fine bristles on its basal part; vena spuria visible, at all events to the cross-vein. Stigma long, yellowish or brown, darkest at the base. Squamulæ and fringes whitish yellow. Halteres yellow.

Female. Vertex and frons broad, widening downwards; vertex blackish, frons brownish yellow pruinose, with a more or less distinct, brown, longitudinal spot in the middle, and black and shining above the antennæ; the hairs are black about the ocelli, then reddish, and whitish above the antennæ. Eyes only very slightly haired just above. Thorax generally with indications of three or five narrow, greyish stripes. Abdomen quite yellow-haired.

Length about 11 mm.

This species varies only slightly in Denmark, but, as stated by Verrall, it seems to vary considerably in southern regions; I have seen specimens from Sicily which were much more bright æneous and the females had on thorax five very distinct, greyish white stripes, the three middle ones united behind.

E. aeneus is somewhat common in Denmark, but less common than *sepulchralis*; at Copenhagen, Amager, Nyraad near Vordingborg; on Lolland at Bremersvold and Strandby west of Nysted, and on Bornholm. My dates are $\frac{1}{4}$ — $\frac{19}{9}$; it may be seen during the whole summer, but it is especially present in early spring and again in late summer and autumn; I have records of it in copula on $\frac{1}{4}$. It occurs on meadows and commons and is especially found near the shore; it frequents various Umbelliferæ I have often taken it on Pastinaca; in early spring it may be seen on palings and walls. The larva was taken on Vesterfælled on sand below sea-weed at the shore on $\frac{21}{7}$, it developed in August (Schlick).

Geographical distribution:— All Europe and down into Syria, South Arabia and North Africa, and on the Canaries; towards the north to middle Sweden; it occurs also in North America.

3. *E. cryptarum* Fabr.

1794. Fabr. Ent. Syst. IV, 285, 26 (*Syrphus*) et 1805. Syst. Antl. 235, 11. — 1817. Fall. Dipt. Suec. Syrph. 29, 24 (*Syrphus*). — 1822. Meig. Syst. Besch. III, 389, 9, Tab. XXXII, Fig. 22. — 1843. Zett. Dipt. Scand. II, 667, 13 (*Syrphus*). — 1862. Schin. F. A. I, 333. — 1901. Verr. Brit. Fl. VIII, 503, 3. — 1907. Kat. paläarkt. Dipt. III, 100.

Male. Vertex and frons blackish, slightly pruinose; epistoma a little greyish pruinose but with a broad middle stripe and likewise a broad lower margin black and shining; jowls black. Vertex and frons yellow-haired, the latter with black hairs in front; epistoma with not dense, yellowish grey hairs. The epistoma is almost not hollowed below the antennæ, nearly straight down to the central knob, which is placed rather downwards about in the height of the lower eye-margin; below the knob epistoma retreats but it is only somewhat descending. Occiput black with a somewhat broad, greyish white or silvery eye-margin up to above the middle; the hairs are blackish below, yellow above. Eyes with dense, dark brown hairs. Antennæ orange, third joint somewhat square but with the upper corner rounded; arista bare. Thorax black or brownish black, slightly shining, clothed with dense, reddish yellow hairs. Scutellum yellow or orange with reddish hairs. Pleura with long, dark brown or black hairs. Abdomen black with a large, reddish yellow side spot on second segment, occupying about the whole length at the margin and produced triangularly towards the middle; third segment with larger or smaller basal corner spots, often very small, almost or quite wanting; hind margins of second, third and fourth segments yellow; abdomen is dullish but shining on the spots and on a connecting line between them, and on the middle of third and fourth segments; it is densely clothed with longish, yellow hairs, darkest on second segment, paler on third and fourth; on the hind part of second and especially on third segment, sometimes also on fourth, they may be more or less mixed with black hairs. Venter black with pale incisures, and with long, pale hairs, dark in the middle at the hind margin of fourth segment. Legs orange or yellowish red, anterior femora black to beyond the middle or to nearer the apex, hind femora black at base or in the basal third; tarsi with the two last joints blackened; hind tibiæ somewhat compressed and curved, hind metatarsi not dilated. Legs haired as usual, the hairs on femora mainly black but more or less yellow on middle femora at the apex and also above the hind femora; these latter with only a few bristly hairs below the tip; tibiæ yellow-haired, on the posterior side of front tibiæ more or fewer black hairs about the middle. Wings hyaline but yellowish at the base and along the anterior margin, with a brownish cloud from the stigma down over the base of the cubital cell. Stigma elongate, pale brownish. Squamule blackish brown with a brownish or brownish yellow fringe. Halteres brownish, the knob more orange.

Female. Frons broad, black or bluish black, with a whitish pruinose stripe at the eye-margins on each side of the antennæ; the

hairs yellow; epistoma with the sides more densely pruinose than in the male. Antennæ considerably larger. Hind femora quite orange and the anterior femora often with only the basal part black. Wings with the cloud more distinct and reaching down to the upper branch of the postical vein.

Length 10—11 mm.

E. cryptarum is rare in Denmark; one specimen is taken at Copenhagen, the other specimens are all taken in Jutland at Silkeborg, Rye near Silkeborg and Jerup near Frederikshavn. My dates are $^{28}/_5$ — $^{14}/_7$.

Geographical distribution:— Northern and middle Europe down into France; towards the north to northern Sweden and in Finland.

4. *E. lucorum* Meig.

1838. Meig. Syst. Besch. VII, 143, 23. — 1862. Schin. F. A. I, 337. — 1914. Lichtwardt, Entom. Mitteil. III, 277.

Male. This species is in almost all respects quite similar to the common *arbustorum*, so that a detailed description is unnecessary. It has the same rather flat epistoma without black middle stripe (when uninjured). The antennal arista is, on the contrary, not plumose but

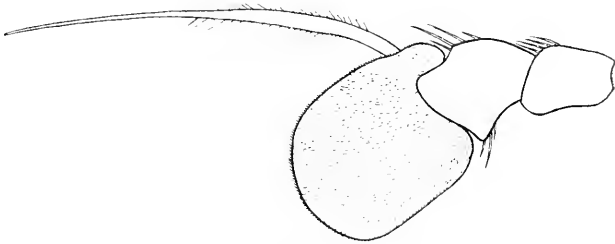


Fig. 153. Antenna of *E. lucorum* ♀, from the inside. $\times 60$.

distinctly and somewhat densely pubescent in the basal half. Thorax is pruinose as in *arbustorum* but perhaps more densely, and the stripes between the dark median stripes and the side spots are distinct and going quite to the scutellum. Abdomen as in *arbustorum*. The legs in my specimens as in the most pale-legged forms of *arbustorum*, the middle tibiæ whitish yellow to quite near the apex, or almost quite yellow; hind metatarsi somewhat thickened. The legs haired as in *arbustorum*, the anterior tibiæ with the same long ciliation; the femora with the hairs longer, especially on the posterior femora, but less dense.

Female. Similar, and likewise similar to the female of *arbustorum*, but with the same distinguishing characters as in the male. Abdomen

with the markings smaller than in the male, and they are shining, not partly dull as in *arbustorum*, and if they are obscure or wanting there are shining spots present. The femora are likewise longer haired than in *arbustorum*.

Length 8.5—11 mm.

As seen this species is very similar to *arbustorum*, but it is distinguished by two characters, the pubescent arista and the longer hairs on the femora, and also by the quite shining abdominal spots in the female.

E. lucorum seems to be rare in Denmark, but when better recognised it will probably be found more common; Utterslev Mose (the author), Hillerød (Godskesen); in Jutland at Silkeborg (Esben Petersen) and at Bovbjerg and Frederikshavn (Th. Mortensen), and one specimen from earlier time without locality; in all ten specimens but among them only one male. My dates are $17/6$ — $30/7$. The pupa was taken in Utterslev Mose on $3/5$, it developed later in the month (Schlick).

Geographical distribution: — From Lapland to Germany.

Remarks: Of this species Meigen had only the female and the male was hitherto not described. Verrall states that the sole female representative of *E. lucorum* in Meigen's collection at Paris is *pertinax*, but according to Lichtwardt (l. c.) Villeneuve has determined a specimen of the present species, taken by Riedel at Rügenwalde, as *lucorum*; this determination seems to me very probably correct, though Villeneuve, according to a communication to me, has not examined Meigen's type.

5. *E. tenax* L.

1758. Linn. Syst. Nat. X, 591 et 1767. XII, 2, 984, 32 et 1761. Fn. Suec. 1799 (*Musca*). — 1764 O. F. Müll. Fn. Fridrichsd. 716 (*Musca*). — 1775. Fabr. Syst. Entom. 765, 15 (*Syrphus*) et 1805. Syst. Antl. 238, 24. — 1817. Fall. Dipt. Suec. Syrph. 26, 17 (*Syrphus*). — 1822. Meig. Syst. Besch. III, 385, 4. — 1843. Zett. Dipt. Scand. II, 661, 7 et 1849. VIII, 3113, 7 et 1852. XI, 4301, 7 et 1855. XII, 4651, 7 (*Syrphus*). — 1862. Schin. F. A. I, 334. — 1901. Verr. Brit. Fl. VIII, 505, 4, figs. 350—352. — 1907. Kat. paläarkt. Dipt. III, 101. — *E. campestris* Meig. 1822. l. c. III, 387, 5. — *E. hortorum* Meig. 1822. l. c. III, 387, 6 et 1838. VII, 143, 6. — *E. vulpinus* Meig. 1822. l. c. III, 388, 7. — 1862. Schin. F. A. I, 334. — *E. sylvaticus* Meig. 1822. l. c. III, 388, 8.

Male. Vertex blackish æneous; frons and epistoma densely yellow pruinose, a triangular space above the antennæ and on epistoma a broad middle line and the lower side parts black, shining; jowls black. Vertex with black. frons with mixed black and yellow hairs and

epistoma with long, yellow hairs; the latter almost not hollowed below the antennæ, straight down to the slightly protruding central knob, below which it is somewhat retreating, and it is somewhat descending. Occiput quite grey pruinose, the hairs whitish below, yellow above. Eyes brown-hairy, with two longitudinal bands of denser and generally darker hairs, united above and below. Antennæ black or brownish black, third joint with the upper front corner rounded; arista brown, slightly pubescent. Thorax black or brownish black, a little shining, the front half part obscured from yellowish dust, in which traces of two median stripes and a roundish spot on each side may be seen; it is densely clothed with yellow hairs. Scutellum yellow with the base darker and with yellow hairs. Pleura with long, yellow hairs. Abdomen somewhat elongate, black, all shining, with more or less extended yellow markings; generally the markings consist of triangular side spots on second segment and the second incisure yellow; then there may be a narrow stripe on each side of third segment, or these stripes may be very broad and connected or united with the yellow front margin, at the same time the basal spots are very broad, the hind margin of third segment yellow and fourth segment with yellow markings so that abdomen is nearly yellow with dark base and apex and dorsal spots of various shape; in the darkest forms (*hortorum* Meig.) abdomen is, on the contrary, almost quite black. Abdomen is clothed with somewhat short, yellow to brownish hairs, darkest on the hind part of second and on third segment. Venter with more or less extended yellow markings on the sides, black at apex, with long, yellow hairs. Legs black, the apex of femora and a larger or smaller basal part of anterior tibiæ, until beyond the middle, and just the base of hind tibiæ, pale yellow; sometimes the basal part of hind tibiæ brownish; middle tarsi with the two first joints except the apex yellow; in the palest forms the hind femora have the basal part or half brown or yellow (*campestris* Meig.); hind femora stout, hind tibiæ compressed and slightly curved, hind metatarsus not dilated but all tarsi somewhat broad. Legs haired in the usual way, hind tibiæ fringed above and below, the fringe below being suddenly long from above the middle; the hairs behind anterior femora and on hind femora long and dense, and also on the tibiæ relatively long; the hairs are yellow, only the somewhat bristly hairs below the apex of hind femora black, and also the fringe above and below hind tibiæ except above at the base. Wings a little yellowish, especially on the anterior part, often with an indistinct cloud below the stigma, sometimes more pronounced. Stigma slightly longer than broad, brownish. Squamulæ and fringes yellow. Halteres brown.

Female. Vertex and frons broad, yellowish pruinose, the space with the ocelli and above the antennæ black; the hairs mixed black and yellow, especially black at the ocelli and above the antennæ. Abdomen generally with more restricted markings than in the male.

Length 13.5—16 mm.

E. tenax is very common in Denmark and occurs in all parts of the country. It occurs on nearly all localities especially near water and around putrid waters, and it is also often seen on various flowers, especially Umbelliferæ. My dates are $24/3$ — $18/10$, but it may occur both earlier and later, it is, however, most common in autumn. I have bred it from pupæ found at horse-dung in a stable on $16/9$, the imagines came on $20/9$ — $27/9$. The metamorphosis is often mentioned and was known already to Linné, Swammerdam and earlier authors, and has often been mentioned since. The larva lives in putrid waters, dung, cloacæ and the like and has also been found in carcasses, especially in such lying on humid ground. It is known to be very tenacious and for this reason Linné termed the species *tenax*. Several earlier authors state that the larva has occasionally been taken up with water used in paper-making, or that it has lived in the pulp of rags used in this fabrication and has been uninjured by the immense pressure; as far as I have seen these statements are taken from Linné, who seems to have had this curious experience about the larva, as he says in *Fauna Suecica*: “Habitat in aquis stagnantibus, cloacis, Bibliopegorum papo, vix preli pressione destruenda larva”. The fly is very much like a hive-bee, and this together with the fact that its larva may live in carcasses has given rise to the superstition of the ancients of the Bugonia or oxen-born bees, as it was thought that bees might originate from carcasses of oxen or other animals. This has been mentioned by many ancient authors, and curious methods are given for the best ways in which to produce bees from carcasses; Osten Sacken has thoroughly treated the question in several papers (*Ent. Month. Mag.* 1886, 97; *Bull. de la Soc. Ent. Ital.* 1893, 186; *Smithson. Rep.* for 1893, 1894, 487; On the oxen-born bees of the Ancients (Bugonia), Heidelberg 1894 and Additional notes in explanat. of the Bugonia-lore of the Ancients, Heidelberg 1895) and has proved that the Bugonia-myth is due to *E. tenax*, and at the same time that the bees of Sanson from the carcass of the lion were no doubt likewise *E. tenax*.

Geographical distribution:— Distributed all over the world; Osten Sacken has given the story of its spreading out from its original localities (*Trans. Ent. Soc. London* 1894, 489; *Ent. Month. Mag.* XXIII, 1886, 97; *Smithson. Rep.* for 1893, 1894, 498; *Proc. Davenport. Acad.*

Sc. 10, 1907, 137 and also in the papers by this author cited above). It seems originally to have been distributed over all Europe, north and central Asia, northern Africa and the islands round Africa; it does not seem to have been known in America before about 1870, and it has not crossed the Atlantic but was first known from the western coast and spread then eastwards, soon becoming very common; it immigrated into New Zealand still more recently as it was first noticed there in 1888, but already in 1890 it was widely dispersed and plentiful. It is interesting to see that this species, which in the ancient times was probably beholden to carcasses and the like, did not spread for a very long time, but when the spreading civilization offered it favourable conditions by drains, cloacæ etc. it spread with immense rapidity, following man where he settled, here finding the most favourable conditions for its development; also its tenacity has evidently been of importance for its spreading. It goes far towards the north but is, however, not known from Greenland.

6. *E. anthophorinus* Fall.

1817. Fall. Dipt. Suec. Syrph. 28, 21 (*Syrphus*). — 1822. Meig. Syst. Besch. III, 390, 11. — 1843. Zett. Dipt. Scand. II, 666, 12 et 1859. XIII, 5082, 12 (*Syrphus*). — 1907. Kat. paläarkt. Dipt. III, 99.

Velvet pilose species. Male. Vertex black, brownish pruinose; frons and epistoma yellowish pruinose, the former bare above the antennæ, the latter with a black, shining middle line, not reaching to the antennæ, and with the mouth edge and lower lateral parts black; jowls black. Vertex with yellow hairs, or just at the apex a few black; frons and epistoma with dense, pale yellow hairs. Epistoma somewhat hollowed below the antennæ and somewhat retreating below the moderate central knob; it is somewhat descending. Occiput grey pruinose, along the eye-margin it is whitish below, but reddish or brownish above; the hairs whitish below, yellow above and here there are some long, black hairs to each side of the vertex. Eyes with dark brown or blackish hairs, densest along the middle of the eye. Antennæ black or blackish, not small, third joint with the upper front corner rounded; arista brown, slightly pubescent. Thorax black, dull, with three slightly darker and duller stripes; it is densely clothed with long, pale yellow hairs; scutellum yellow with similar hairs as on thorax. Pleura with long, pale yellowish hairs. Abdomen black with large, reddish yellow side spots, occupying the sides of second and third segments and the basal part or even the whole side of fourth segment, leaving about the middle third black; they are sometimes smaller, not reaching in on fourth segment or even not to the

hind margin of third, and at the same time produced less inwards; the abdomen is dull at the base only shining on the hinder half of third and on fourth segment; it is densely clothed with long, all pale yellow hairs. as long as the hairs on thorax. Venter greyish black, dullish, with more or less pale incisures and with long, pale hairs. Legs black. the extreme apex of femora and about the basal third of tibiæ whitish yellow; hind tibiæ somewhat compressed, slightly curved, hind metatarsi not thickened. Legs haired as usual, with long, dense hairs, the long hairs on femora varying from black to more or less mixed with pale, for the rest the hairs follow the ground colour. Wings nearly hyaline, with a large, more or less distinct, brown cloud below the stigma, sometimes rather weak or almost wanting. Stigma quite small, nearly quadrate. Alar squamula rather small, blackish brown, the thoracal squamula paler; the fringes yellowish. Halteres yellowish, the knob a little darker.

Female. Vertex and frons broad, widening downwards, yellowish pruinose and yellow-haired. Abdominal spots much smaller than in the male and generally present only on second segment, sometimes obscure.

Length 10—12 mm.

This species is on account of its long, dense pile somewhat like a Humble-Bee, but less than *E. intricarius*, from which it is known at once by the not plumose arista and all pale clothing.

E. anthophorinus is not rare in Denmark but by no means of the most common species; at Copenhagen, Utterslev Mose, Ordrup Mose, Charlottenlund, Ermelund, Dyrehaven, Lyngby Mose, Fure Sø, Ørholm, Geel Skov, Hillerød, Frerslev Hegn, at Sorø; on Lolland at Maribo and in Dødemose west of Nysted; in Jutland at Horsens and Hald near Viborg, and on Bornholm. My dates are $^{16}/_5$ — $^{23}/_8$. It occurs in fens and in thickets and it is interesting that it has quite another behaviour than *intricarius*, as it never hovers in the air but flies rapidly among low herbage and in bushes. The pupa was taken in Utterslev Mose in April, it developed on $^6/_5$ (Schlick).

Geographical distribution: — Northern Europe, towards the north to northern Sweden, and in Finland; it is also recorded from Russia at St. Petersburg, but it seems to have its southern limit in Denmark.

7. *E. oestraceus* L.

1758. Linn. Syst. Nat. X, 592 et 1767. XII, 2, 985, 34 et 1761. Fn. Succ. 1801 (*Musca*). — 1851. Halid. Stett. ent. Zeitg. XII, 139. — 1907. Kat. paläarkt. Dipt. III, 100. — *Syrphus apiformis* Fall. 1817. Dipt. Succ. Syrph. 28, 20. — 1822. Meig. Syst. Besch. III, 390, 10 (*Eristalis*). —

1843. Zett. Dipt. Scand. II, 665, 11 et 1852. XI, 4302, 11 (*Syrphus*). — 1862. Schin. F. A. 1, 333 (*Eristalis*). — *Helophilus tricolor* Meig. 1803. Illig. Mag. II, 274.

Velvet pilose species. Male. Vertex a little greyish pruinose; frons and epistoma brownish black, somewhat greyish pruinose, the epistoma rather thinly; frons bare above the antennæ, epistoma with a middle stripe and all the lower part bare and shining; jowls black. Vertex with yellow hairs, just at the front angle a few black; frons with yellowish, epistoma with whitish hairs. Epistoma very slightly hollowed below the antennæ but retreating below the central knob and somewhat descending. Occiput pruinose, silvery along the eye-margin below, greyish above and with a reddish spot above the middle; the hairs blackish brown below, yellow above and here very few black hairs. Eyes with brownish black hairs, down the anterior part a band of dense hairs. Antennæ brownish, the basal joints darkest; arista distinctly pubescent on the basal part. Thorax black, dull, very densely clothed with black hairs; behind, in front of scutellum are white hairs and on the postalar calli long, likewise white hairs. Scutellum greyish white or bony white pruinose, dull, along the margin more yellowish; just at the base it is black; it has white hairs. Pleura with long, blackish brown hairs. Abdomen brownish black, dull, with shining spots on second and third segments; first segment grey; abdomen is clothed with long, dense, black hairs, the apex from the hind margin of third segment with yellow or reddish yellow hairs which are longer; the first segment is white-haired and at the basal corners of second segment are long, white hairs. Venter brownish, with long hairs, mainly coloured as on dorsum. Legs blackish, tibiæ, especially middle tibiæ, more or less, but generally slightly pale on the basal part; posterior tarsi yellow with the last joint dark; hind tibiæ compressed and a little curved, hind metatarsi not thickened. Legs haired as usual, the hairs brownish black; on the femora they are long and dense and hind tibiæ fringed. Wings hyaline. Stigma small, about quadrate. Squamulæ whitish with a white fringe. Halteres pale yellow, the knob may be a little darkened.

Female. Vertex and frons broad, greyish pruinose, darker at the vertex and black and shining above the antennæ; the hairs pale. Wings with a large, brown blotch about the middle.

Length 11—15 mm.

This species shows some resemblance to *E. intricarius*, especially to its dark varieties, but besides by the not plumose arista it is easily distinguished by the bony white and white-haired scutellum and the colour of the legs; from *anthophorinus*, with which it has the not

plumose arista in common, it is at once distinguished by the colour of the pile and of the legs.

E. oestraceus is very rare in Denmark, we have only two specimens, a male and a female, in Westermann's collection, labelled Sieland, August 1825.

Geographical distribution:— Europe down into Austria; towards the north to middle Sweden.

Remarks: As remarked under *Chilosia illustrata* it has been proved that the present species is *oestraceus* Linn. (Haliday l. c.); it was also mentioned there that *oestraceus* of Fabricius does not belong here, as thought by Verrall and followed in Kat. paläarkt. Dipt., but likewise to *C. illustrata* so that I have excluded it from the synonymy of the present species. *Musca oestracea* in the papers of Kramer and O. F. Müller is no doubt not this species, but probably the common *E. intricarius*.

8. *E. intricarius* L.

1758. Linn. Syst. Nat. X, 592 et 1767. XII, 2, 955, 33 et 1761. Fn. Suec. 1800 (*Musca*). — 1775. Fabr. Syst. Entom. 766, 17 (*Syrphus*) et 1805. Syst. Antl. 232, 3. — 1817. Fall. Dipt. Suec. Syrph. 23, 12 (*Syrphus*). — 1822. Meig. Syst. Besch. III, 391, 12. — 1843. Zett. Dipt. Scand. II, 654, I et 1855. XII, 4650, 1 et 1859. XIII, 5079, 1 (*Syrphus*). — 1862. Schin. F. A. I, 334. — 1901. Verr. Brit. Fl. VIII, 508, 5. — 1907. Kat. paläarkt. Dipt. III, 104. — *Syrphus bombylifformis* Fabr. 1794. Ent. Syst. IV, 281, 13 et 1805. Syst. Antl. 227, 12.

Velvet pilose species. Male. Vertex brownish pruinose; frons and epistoma black, rather thinly brownish pruinose, a somewhat broad median stripe not reaching the antennæ, the mouth edge and the lower lateral parts black; jowls black. Vertex and frons with reddish yellow hairs, epistoma with the hairs erect, varying from black to brownish yellow. Epistoma a little hollowed below the antennæ, then somewhat straight down to the slightly protruding central knob but below it considerably retreating and a little descending. Occiput silvery pruinose along the eye-margin below, brownish above and with a reddish spot above the middle; the hairs black below, yellow above. Eyes black-haired, most densely along the middle. Antennæ black or brownish black, third joint brownish or pale brown, it has the upper front corner rounded; arista brown, plumose on the basal half. Thorax brownish black, dull, very densely clothed with long, reddish yellow hairs, only black just at the sides behind; scutellum yellow or brownish yellow, with similar hairs as on thorax. Pleura with long, black or brownish black hairs. Abdomen black, dull on the basal half, somewhat shining on the apical half, with

larger or smaller, yellow or reddish side spots as in *anthophorinus*; it is clothed with long, dense hairs similar to those on thorax but generally paler at the apex; at the basal corners are generally more or less numerous black hairs and on the first segment are greyish white hairs. The colour of the pile may vary towards being more black on thorax and the basal part of abdomen, and there is a variety in which scutellum is darker, the abdominal spots smaller or obscure, thorax quite black-haired and first and second abdominal segments black-haired and the third with more or fewer black hairs on the front part to almost quite black-haired; (this variety may answer to var. *furvus* Verr. but this variety is described with no black hairs on abdomen). Venter black with long, blackish hairs, yellow only at the apex. Legs black, the extreme apex of femora and the basal third or more of tibiæ yellowish white, middle tarsi pale at the base; hind tibiæ somewhat compressed and a little curved, hind metatarsi not thickened; legs haired as usual, the hairs following the ground colour, those on femora somewhat long and dense. Wings hyaline, generally there is a more or less distinct fascia from the stigma downwards, mainly formed of a seaming of the veins and sometimes very indistinct. Stigma small, about quadrate. Squamulæ and fringes blackish. Halteres with the knob blackish, the peduncle paler.

Female. Vertex and frons broad, widening downwards, brownish yellow pruinose, blackish about the ocelli and shining above the antennæ; the hairs yellow. Antennæ paler than in the male. Abdomen black, without spots; generally there are grey hairs on first segment and some few reddish yellow hairs in the middle of the front part of second segment, then the hairs are black on the rest of second and on the greater part of third segment and at the apex they are pale yellow or whitish; in the dark variety mentioned under the male they are all quite or almost quite black and only reddish or whitish at the apex of abdomen. Wings generally with the fascia more distinct than in the male.

Length 11—14 mm.

This is a beautiful species and rather like a Humble Bee, and more so than *E. anthophorinus* as the pile is more velvet.

E. intricarius is common in Denmark and it occurs, I think, on all suitable localities all over the country. My dates are $^{27}/_4$ — $^{25}/_9$. It occurs in fens, meadows and woods, generally near water, and it is seen on various flowers. The pupa was taken in Gurre Vang at a ditch first in August, it developed soon after (C. Larsen). The species is an extremely good hoverer and presents a beautiful sight when it is seen hovering motionless about eight feet above the ground, and

when disturbed making a rapid, sudden jerk but returning to about the same spot.

Geographical distribution:— Northern and middle Europe down into northern Italy; towards the north to northern Sweden, and in Finland.

9. *E. arbustorum* L.

1758. Linn. Syst. Nat. X, 591 et 1767. XII, 2, 984, 31 et 1761. Fn. Suec. 1798 (*Musca*). — 1764. O. F. Müll. Fn. Fridrichsd. 715 (*Musca*). — 1775. Fabr. Syst. Entom. 765, 12 (*Syrphus*) et 1805. Syst. Antl. 236, 17. — 1817. Fall. Dipt. Suec. Syrph. 25, 15 (*Syrphus*). — 1822. Meig. Syst. Besch. III, 395, 17. — 1842. Zett. Dipt. Scand. II, 659, 5 et 1855. XII, 4651, 5 et 1859. XIII, 5080, 5 (*Syrphus*). — 1862. Schin. F. A. I, 335. — 1901. Verr. Brit. FL VIII, 510, 6, figs. 353—354. — 1907. Kat. paläarkt. Dipt. III, 103.

Male. Vertex blackish, a little pruinose; frons yellowish pruinose, epistoma grey pruinose all over without black middle stripe, only the lower side parts are black; jowls black, partly grey pruinose. Vertex with yellow, anteriorly black hairs, frons with yellow hairs and epistoma all over with pale yellowish, rather dense and decumbent hairs; the epistoma rather flat, very slightly hollowed below the antennæ, the central knob very small and below it epistoma slightly retreating and also slightly descending. Occiput whitish grey or silvery along the eye-margin to above the middle, for the rest brownish yellow pruinose, the hairs white below, yellow above and here a few black hairs. Eyes with somewhat short, brown hairs. Antennæ somewhat

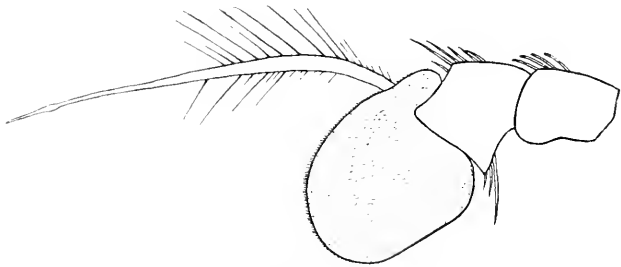


Fig. 154. Antenna of *E. arbustorum* ♂, from the inside. $\times 60$.

small, brownish black, third joint with the upper front corner rounded; arista brown, plumose on the basal half. Thorax blackish brown, a little shining on the posterior half, the front half more pruinose with indications of a pair of paler stripes (or in reality with two approximated, darker stripes in the middle and a roundish spot at each side,

but indistinct); thorax is clothed with longish, yellow hairs. Scutellum brownish yellow with similar hairs as on thorax. Pleura with long, pale yellow hairs. Abdomen black, dull, but with a transverse, shining stripe on third and fourth segments, on third segment generally only present on the black part and sometimes the stripes are divided in the middle. Abdomen has large but somewhat varying reddish yellow side spots and the hind margins of the segments are yellow; when the spots have their greatest extent they occupy all the side parts and the hind margin of second segment, leaving a black spot in the middle widening at the base, and further all the side parts and the front margin of third segment reaching backwards beyond the middle or to the hind margin, sloping outwards behind; when most restricted they form an inwards triangular side spot on second and a small basal corner spot on third segment; the spots are dull except at the sides. Abdomen is clothed with yellow or reddish yellow hairs, paler just at the base; sometimes there are some black hairs at the hind margin in the middle on second segment. Venter varying between yellowish and grey, generally with the anterior part yellowish with a darker middle stripe, the posterior part grey; it is clothed with longish, pale hairs. Legs black with apex of femora and about the basal half of front and hind tibiæ and the basal two thirds of middle tibiæ whitish yellow and the middle metatarsi except the apex of the same colour; hind tibiæ somewhat compressed and curved, and hind metatarsi somewhat thickened. The legs haired in the usual way but, however, rather characteristically; the hairs on femora are dense but not specially long, especially on front femora; on the anterior tibiæ the hairs form rather long and dense fringes on the posterior side, the hind tibiæ are moderately fringed above and below; the hairs are all whitish yellow, black only on the black apical half of hind tibiæ and some few at apex on anterior tibiæ. Wings hyaline but yellowish at the base and forwards on the anterior part to below the stigma and here often specially distinctly. Stigma elongate, blackish at the base. Squamulæ and fringes whitish yellow. Halteres yellow.

Female. Vertex and frons broad, somewhat widening downwards; the vertical part blackish, somewhat pruinose, the frontal part yellowish pruinose; the hairs yellow but there is a black-haired cross-band in front of the ocelli. Thorax much more pruinose than in the male as also the hinder half is pruinose with three elongated dark spots. Abdomen with the markings smaller than in the male, only present on the second segment as larger or smaller, inwards triangular spots, sometimes rather small, or they may be dark hoary and then slightly conspicuous; the hind margins of the segment are whitish

grey or pale yellow and broader than in the male; the pubescence short and often darker than in the male, as it may vary from all yellow to black on the hind margin of second and on almost the whole third and the front part of fourth segment. Middle tibiæ sometimes pale to near the apex.

Length 9—12 mm.

This species is characterised by the entirely pruinose and hairy epistoma without black middle stripe and by the somewhat long-fringed anterior tibiæ; these characters are found only in one other species, *lucorum*, but that species has a pubescent arista, the hairs on femora longer, and in the female the abdominal spots quite shining.

E. arbustorum is very common in Denmark over the whole country. My dates are $^{14}/_4$ — $^{19}/_9$. It occurs in fens, on commons and meadows and in woods and thickets, especially at ponds and ditches and on similar places, and it frequents many various flowers. I have taken the pupa in a cloaca in Copenhagen on $^{6}/_5$, it developed at the middle of the month.

Geographical distribution: — All Europe and down into Syria and North Africa; towards the north to northern Sweden, in Finland, Siberia and on the Faroe Islands.

10. *E. pertinax* Scop.

1763. Scop. Entom. Carn. 352, 954 (*Conops*). — 1862. Schin. F. A. I, 336. — 1901. Verr. Brit. Fl. VIII, 513, 7. — 1907. Kat. paläarkt. Dipt. III, 106. — *Syrphus similis* Fall. 1817. Dipt. Suec. Syrph. 25, 16. — 1822. Meig. Syst. Besch. III, 392, 13 (*Eristalis*). — 1843. Zett. Dipt. Scand. II, 660, 6 et 1855. XII, 4651, 6 (*Syrphus*). — *E. fossarum* Meig. 1822. l. c. III, 393, 15. — *Syrphus flavitarsis* Malm, 1860. K. V. och V. Samh. Göteborg. Handl. VII, 17.

Male. Vertex blackish, slightly pruinose; frons yellowish or greyish yellow pruinose with a black, triangular space above the antennæ; epistoma yellowish pruinose with a very or exceedingly narrow (in intact specimens) black middle stripe not reaching the antennæ and not going below the central knob, the lower side parts black; jowls black, a little pruinose. Vertex with yellow, anteriorly black hairs, frons black-haired and epistoma with yellow hairs; the latter is slightly and evenly hollowed from the antennæ to the small central knob below which it is somewhat retreating, and it is somewhat descending. Occiput greyish pruinose, whitish or silvery along the eye-margin to above the middle and then brownish black; the hairs yellow, above some black hairs. Eyes with yellowish brown hairs. Antennæ brownish to black, third joint longer than broad with the end rounded; arista

pale brown, plumose on the basal two thirds. Thorax brownish black, dull, the front half a little pale pruinose with two approximated middle stripes and a large, roundish side spot darker; it is clothed with yellow hairs. Scutellum yellow or brownish yellow, with yellow hairs, generally black on the middle. Pleura with long yellow hairs. Abdomen somewhat elongate, narrowed backwards and thus conical; it is black or bluish black, dull, third segment with a shining, transverse middle band and fourth segment quite shining or somewhat dull on the front and hind part; there are two yellow, triangular side spots on second segment, sometimes rather small, they are dull except just at the side and behind; there are more or less distinct narrow, yellow hind margins, most distinct on second segment. Abdomen is clothed with yellow hairs, pale just at the base, the hind margins of third and fourth segments more or less black-haired, and sometimes the hind margin of second segment, a large hind part of third and almost the whole fourth segment are black-haired, but at the sides the hairs are yellow. Venter grey with pale incisures, the two basal segments often pale, with grey middle spots; the venter is clothed with long, yellow hairs. Legs with the femora black with yellow apex, on hind femora very narrow, front tibiæ with the basal half or two thirds yellow, middle tibiæ quite yellow with only the apex more or less black and hind tibiæ with about the basal half yellow; anterior tarsi all yellow, hind tarsi black, more or less pale towards the apex; hind tibiæ a little compressed and curved, hind metatarsi slightly thickened. The legs haired in the usual way, the hairs all yellow, only the fringes on the apical part of hind tibiæ more or less to quite black and the bristly hairs below apex of hind femora black, generally also some few black hairs behind front femora towards the apex; the anterior, especially the middle femora, with long fringes behind. Wings more or less yellowish on the basal half towards the anterior margin, the colour especially visible below the stigma, where it may form a faint cloud. Stigma more than twice as long as broad, dark brown. Squamulæ and fringes yellowish brown. Halteres yellow.

Female. Vertex and frons broad, widening downwards; they are almost quite black with only a yellow pruinose band somewhat above the antennæ; the hairs almost all black or they are yellow across on the yellow pruinose band. The antennal arista plumose nearer to the apex than in the male. Abdominal spots about as in the male or a little smaller. Wings less tinged.

Length 11—15,5 mm.

This species resembles *E. tenax* but cannot be confused with it. *E. pertinax* is common in Denmark; at Copenhagen, Ordrup Mose,

Ermelund. Dyrehaven, at Fure Sø and Farum Sø, Donse, Frerslev Hegn, Tyvekrog, Tisvide; on Lolland in Kældskov; in Jutland at Aarhus and Lonstrup, and on Bornholm. My dates are $1/5$ — $13/10$. It occurs in fens, on meadows and in woods, especially near water, and it is found on various flowers, especially on Umbelliferae.

Geographical distribution:— Europe down into Italy; towards the north to middle Sweden, and in Finland.

11. *E. nemorum* L.

1758. Linn. Syst. Nat. X, 591 et 1767. XII, 2, 984, 30 et 1761. Fn. Suec. 1797 (*Musca*). — 1764. O. F. Müll. Fn. Friedrichsd. 714 (*Musca*). — 1775. Fabr. Syst. Entom. 764, 10 (*Syrphus*) et 1805. Syst. Antl. 234, 10. — 1822. Meig. Syst. Besch. III, 394, 16. — 1843. Zett. Dipt. Scand. II, 658, 4 (*Syrphus*). — 1862. Schin. F. A. I, 336. — 1901. Verr. Brit. Fl. VIII, 514, 8. — 1907. Kat. paläarkt. Dipt. III, 105. — *E. sylvarum* Meig. 1838. l. c. VII, 144, 24. — 1862. Schin. F. A. I, 337.

Male. Vertex blackish, pruinose, frons yellowish brown pruinose, a little shining above the antennæ; epistoma yellowish pruinose with a black, shining middle stripe, not reaching the antennæ, widening downwards, the mouth edge and the lower lateral parts black; jowls black. Vertex black-haired, quite posteriorly yellow-haired; frons and epistoma with yellow hairs; the epistoma slightly hollowed between the antennæ and the central knob, below it a little retreating and it is somewhat descending. Occiput whitish grey pruinose along the eye-margin to above the middle and then a little brownish pruinose; the hairs whitish below, yellow above and here some few, black hairs. Eyes yellowish- or brownish-hairy. Antennæ blackish brown, third joint often brown, roundish square, the upper front corner rounded; arista brown, plumose on the basal half. Thorax blackish brown, dull or slightly shining in front of scutellum; it is very indistinctly paler pruinose on the front half with traces of the usual two stripes and roundish lateral spots; it is clothed with yellow or reddish yellow hairs. Scutellum yellow or brownish with similar hairs as on thorax. Pleura with long, yellow or pale yellow hairs. Abdomen black, second segment dull, third shining except front and hind margins, fourth quite shining or with indistinct dull margins; on the second segment are two inwardly triangular, yellow side spots, and the segments have narrow, yellow hind margins, broadest on second segment; sometimes the third segment has exceedingly narrow basal corner spots; the abdominal spots are mainly shining, though dull on the front part. Abdomen is clothed with yellow hairs, paler just at the base; on the hind margins or hind parts of the segments are black hairs to a

various extent and generally the fourth segment is quite yellow-haired; at the sides the hairs are all yellow. Venter blackish grey with pale incisures and long, yellow hairs; the basal segments sometimes pale at the sides. Legs black, the apex of femora, about the basal half of front and hind tibiæ, the basal two thirds of middle tibiæ and the base of middle tarsi pale yellow; sometimes the base of hind femora more or less pale (var. *sylvarum* Meig.); hind tibiæ slightly compressed and somewhat curved, hind metatarsi a little thickened. The legs haired as usual, the hairs all yellow, only below the extreme apex of hind femora some black hairs. Wings almost hyaline or somewhat yellowish tinged on the anterior part. Stigma only a small dot. Squamulæ yellow, darker downwards the base, fringes yellow. Halteres yellow.

Female. Vertex and frons broad, widening downwards; the vertical half black, the frons yellow pruinose, shining just above the antennæ; the hairs yellow with a cross-band of black hairs about the ocelli, sometimes broad, going almost to the middle. The eye-hairs almost whitish. The abdominal markings small, generally not reaching more than half way towards the hind margin, and all shining; they are often obscured or quite wanting, but then shining spots are present; the pale hind margins narrow.

Length 10,5—12,5 mm.

E. nemorum is not rare in Denmark, but, however, less common than the preceding species; Hellerup, Ordrup Mose, Ermelund, Dyrehaven, Fure Sø, Ørholm, Ruderhegn, Tyvekrog, Tisvilde; on Lolland in Kældskov; on Funen at Middelfart, and on Fænø; in Jutland in Nørholm Skov at Varde, at Horsens, Madum Sø and Frederikshavn, and on Bornholm. My dates are $9/5$ — $13/8$. It occurs in the same way as the other species. A pupa was taken at Madum Sø in Jutland on $19/7$, it developed soon after (Kryger).

Geographical distribution:— Europe down into Italy; towards the north to middle Sweden, and on the Faroe Islands.

12. *E. horticola* De Geer.

1776. De Geer, Mém. Ins. VI, 140, 5, Tab. VIII, Fig. 13 (*Musca*). — 1822. Meig. Syst. Besch. III, 396, 18. — 1862. Schin. F. A. I, 336. — 1901. Verr. Brit. Fl. VIII, 518, 10, figs. 358—359. — 1907. Kat. paläarkt. Dipt. III, 104. — *E. flavicinctus* Fabr. 1805. Syst. Antl. 232, 5. — 1843. Zett. Dipt. Scand. II, 655, 2 et 1855. XII, 4650, 2 (*Syrphus*). — *Syrphus flavocinctus* var. *a*, 1817. Fall. Dipt. Suec. Syrph. 24, 13.

Male. Vertex black; frons somewhat thinly yellowish pruinose most at the sides, shining above the antennæ; epistoma yellowish pruinose

with a broad, black, shining middle stripe and the mouth edge and lower lateral parts black and shining; jowls black. Vertex black-haired, frons with yellow and epistoma with pale yellow hairs; epistoma slightly hollowed below the antennæ and somewhat retreating below the central knob and a little descending. Occiput silvery pruinose along the eye-margin to above the middle, above blackish, slightly pruinose; the hairs whitish below, yellow above and at the upper eye margin a row of long, black hairs. Eyes with brownish hairs. Antennæ with the basal joints blackish, the third brownish or pale brown, sometimes darker above; it is roundish square, rounded at the end; arista pale brown, rather long plumose on nearly the basal two thirds, the rays a little longer above than below. Thorax brownish black, somewhat shining, the front half part very slightly and indistinctly pruinose or almost not; thorax is clothed with yellow hairs. Scutellum yellowish to dark brownish, the hairs yellow, generally black on the middle. Pleura with long, yellow hairs. Abdomen black, second segment dull, third and fourth shining with the front and hind margins dull; on the second segment are two inwardly triangular, yellow side spots, at the sides generally occupying the whole length of the segment, and on third segment there are small or a little larger, transverse basal corner spots, generally confluent at the margin with those on second segment, but sometimes separated and sometimes rather obscured; the spots are dull; the hind margins of the segments yellow, rather narrow; abdomen is clothed with yellow hairs, pale just at the base; at the hind margin of second segment are black hairs, generally reaching to the sides, in rare cases there are also

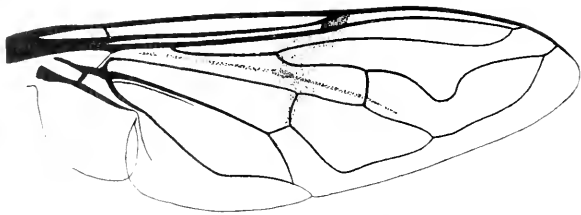


Fig. 155. Wing of *E. horticola* ♂.

black hairs in the middle at the hind margin of third segment. Venter grey with long, pale hairs, the basal segments often pale with dark middle spots. Legs with the femora black with yellow apex, hind femora with the base more or less yellow; front and hind tibiæ with

about the basal half, middle tibiæ with the basal two thirds whitish yellow; middle tarsi whitish yellow at the base, front tarsi generally with the base more or less brownish but often indistinctly; hind tibiæ a little compressed and curved, hind metatarsi not thickened. The legs haired as usual, the hairs all yellow, only behind front femora at apex generally some black hairs, and the moderate fringe on hind tibiæ black in the apical half above and more or less black below; below the apical third of hind femora a row of very short, black bristles. Wings hyaline, a little yellowish at the base, below the stigma a more or less distinct, sometimes rather weak, brown fascia down over the base of the cubital cell and the basal vein of the discal cell. Stigma a little longer than broad. Squamulæ with fringes and the halteres yellow.

Female. Vertex and frons broad, widening downwards; vertex black and shining, dullish anteriorly, the frontal part yellowish pruinose, shining above the antennæ; the hairs black on the black vertical space, yellow on frons; epistoma more descending than in the male. Antennæ generally a little paler than in the male. Thorax a little more pruinose on the front half so that the usual markings may be just traceable. Abdominal spots about as in the male, those on third segment generally small and not rarely absent. Hind femora with the basal half or more yellow; front tarsi generally paler at the base. Wings with the fascia as a rule more distinct and broader.

Length 11—14,5 mm.

This species is somewhat like *nemorum* but distinguished by the longer plumose arista, the more shining thorax, the abdominal spots larger, especially in the female, and in the male generally spots present on third segment, further by the spots being dull, the hind metatarsi not thickened, the larger wing-stigma and the wing-band, and finally the femora are generally more pale on the basal part.

E. horticola is common in Denmark; at Copenhagen, Ordrup Mose, Ermelund, Dyrehaven, Lyngby Mose, Fure Sø, Trørød, Donse, Tyvekrog, Frerslev Hegn, Tisvilde, Rørvig; on Lolland at Maribo, in Kældskov and at Strandby west of Nysted; on Funen at Odense and Middelfart; in Jutland in Nørholm Skov at Varde, Højenbæk Dal at Vejle, at Hald near Viborg, Rebbild and Madum Sø near Skørping, Thisted, Lønstrup and Hulsig near Frederikshavn. My dates are $\frac{9}{5}$ — $\frac{11}{9}$. It occurs on similar localities as the preceding species, I have taken it on various flowers, often on *Crataegus*.

Geographical distribution:— Europe down into Spain an Italy; towards the north to northern Sweden, and in Finland.

13. *E. vitripennis* Strobl.

1893. Strobl, Mittheil. Ver. Steierm. XXIX, 1893, 187. — 1907. Kat. paläarkt. Dipt. III, 107.

Male. Vertex black, somewhat dull; frons black, shining, only narrowly whitish pruinose at the sides; epistoma whitish pruinose but not densely, with a middle stripe, not reaching the antennæ, a broad mouth edge and the lower lateral parts black, shining. Vertex and frons black-haired, the latter with yellow hairs anteriorly, epistoma with white hairs. The epistoma is slightly hollowed below the antennæ, considerably retreating below the central knob and somewhat descending. Occiput silvery pruinose along the eye-margin to above the middle, for the rest black, slightly pruinose; the hairs are white below, almost quite black above but behind the ocelli are some yellow hairs. Eyes with brownish hairs. Antennæ black, third joint more or less brownish, roundish; arista brown, plumose on the basal half. Thorax brownish black, shining, not pruinose on the front half; it is clothed with yellow or reddish yellow hairs. Scutellum yellow or brownish, the larger basal part black-haired, the rest yellow-haired. Pleura with longish, yellow hairs. Abdomen black, second segment dull, third segment shining with broad, dull front and hind margins, fourth shining with front and hind margins indistinctly dullish; the second segment has two inwardly triangular, yellow side spots, often not reaching the hind margin at the sides, third segment without spots or with obscured spots at the basal corners; the spots shining; the segments have pale yellow hind margins, broadest on second segment. Abdomen is almost quite black-haired with only the base yellow-haired and the genitalia pale-haired, but at the sides the hairs are yellow or only black at the hind corners of second and third segments. Venter blackish grey with pale incisures, second segment generally pale with a dark middle spot; the venter is clothed with long, pale hairs. Legs with femora black with yellow apex, hind femora with the base, up to the basal third reddish yellow; front and hind tibiæ with about the basal half, middle tibiæ with about the basal two thirds whitish yellow; front tarsi more or less pale at the base, sometimes indistinctly, posterior tarsi with the two basal joints yellow with the apex black, on the hind tarsi darkest yellow, sometimes brownish; hind tibiæ slightly compressed, somewhat curved, hind metatarsi not thickened. The legs haired as usual, the hairs not long; they are mainly yellow but black behind the front femora on the apical part or to near the base and more or less on the apical half of hind femora; the anterior tibiæ have more or fewer black hairs on the apical part and the hind tibiæ have the short fringe above and below black on the apical half,

sometimes only below and here sometimes in the whole length. Wings hyaline. Stigma small but a little longer than broad, black. Squamulæ and their fringes yellow or pale yellow, and halteres of the same colour.

Female. Vertex and frons broad, widening downwards; the vertical space shining black, becoming dull anteriorly, the frons is dark in the middle, only whitish pruinose at the sides, it is shining above the antennæ; the hairs are black behind, yellow in front, varying so that sometimes the black, at other times the yellow hairs are most extended. Scutellum with only few black hairs. Abdominal spots sometimes as large as in the male but generally smaller, often obscured, third segment without spots; the hairs black except at the base and on the fifth segment. Hind femora generally yellow to the middle or beyond it and hind tarsi with the pale basal part clear yellow; the posterior tarsi may have the base of third joint yellow; the legs are quite yellow-haired. Wings with a fascia below the stigma about as in the male of *horticola*, sometimes broader.

Length 11—13,5 mm.

Remarks: This species is nearest allied to *E. rupium* but it is evidently distinct by the pale basal part of hind femora, the clear wings in the male and much smaller wing blotch in the female and the shorter stigma, besides by other characters. — It is with some hesitation I determine it as *vitripennis* Strobl, the sole species besides *rupium* and *alpinus* with pale base of hind tarsi; Strobl's specimens seem to have the tarsi more pale, and he gives the stigma as longer than in *horticola*, which is not the case with my specimens, but he is seen to have had only few specimens, and I think the differences are of no consequence. Lichtwardt (Ent. Mitteil. III, 1914, 278) is of opinion that *piceus* Fall. is distinct from *rupium*, but if so the present species cannot, however, be *piceus* on account of the clearer wings, paler hind femora and black-haired vertex.

E. vitripennis is not common in Denmark; Ordrup Mose, Ermelund, Lyngby Mose, Geel Skov, Tyvekrog, Tisvilde; in Jutland in Nørholm Skov at Varde, Grejsdal at Vejle, Laurberg south of Randers, Hald near Viborg and Rebbild near Skørping. My dates are ²¹/₅—¹⁵/₇; it was for the first time taken in 1907.

Geographical distribution: — The species is at present only known from Denmark and Styria, no doubt it has been confused with allied species and will prove to have a much wider range.

14. *E. rupium* Fabr.

1805. Fabr. Syst. Antl. 241, 38. — 1822. Meig. Syst. Besch. III, 397, 19, Tab. XXXII, Fig. 22. — 1862. Schin. F. A. I, 335. — 1901. Verr.

Brit. Fl. VIII, 519, 9, figs. 356—357. — 1907. Kat. paläarkt. Dipt. III, 106. — *Syrphus flavocinctus* var. β . 1817. Fall. Dipt. Suec. Syrph. 24, 13. — *Syrphus piceus* Fall. 1817. l. c. 24, 14. — 1843. Zett. Dipt. Scand. II, 656, 3 et 1855. XII, 4650, 3.

Male. Vertex black, somewhat dull, frons black, shining, narrowly yellowish pruinose at the eye-margins; epistoma whitish grey pruinose but rather thinly so that the black ground colour is just visible; it has the middle stripe, a broader or narrower mouth edge and the lower lateral parts black, shining; jowls black. Vertex and frons black-haired, epistoma with yellow hairs; the epistoma very slightly hollowed below the antennæ, somewhat retreating below the central knob and rather descending. Occiput whitish pruinose along the eye-margin to above the middle, for the rest black, slightly pruinose; the hairs are whitish or pale yellow below, dark yellow above, and there are a few black hairs at the upper eye-margin. Eyes with brown hairs. Antennæ blackish, third joint more or less brown, roundish; arista brown, plumose on a little more than the basal half. Thorax blackish brown, somewhat shining, not pruinose on the front half; it is reddish yellow-haired with somewhat long hairs. Scutellum brown with more or fewer black hairs at the base, for the rest haired as thorax. Pleura with long, yellow hairs. Abdomen black, dull, third and fourth segments with a transverse middle band shining black or bluish, fourth segment often with the dull margins less distinct; second segment has two inwardly triangular, yellow side spots, which generally do not reach quite to the hind margin at the sides; the third segment has small or no basal corner spots; the spots are shining; the segments have pale yellow hind margins. Abdomen is clothed with yellow hairs, pale just at the base, black on the hind margins, on the third segment to a great degree, the fourth segment often quite yellow-haired. Venter greyish black with pale incisures and long, yellow hairs. Legs somewhat thin and slender, black, the apex of femora yellow, on the hind femora sometimes the extreme base brownish; about the basal half of tibiæ whitish yellow, on front and hind tibiæ generally less than the half; front tarsi black or very slightly brownish at the base, posterior tarsi with the two basal joints yellow with black apex, on the hind tarsi they are sometimes brown; hind tibiæ very slightly compressed and almost not curved; hind metatarsi not thickened. The legs haired as usual, the hairs mainly yellow but blackish behind the front femora, sometimes yellow at the base, and behind apex of middle femora generally some dark hairs; hind femora more or less black-haired on the apical part, but the long hairs below pale; anterior tibiæ yellow-haired, hind tibiæ with the very short fringe above and

below more or less to quite black on the apical part. Wings yellow or brown at the base, for the rest hyaline or slightly yellowish tinged; below the stigma a brown blotch, going down over the base of the cubital vein and the basal vein of the discal cell, and it goes more or less distinctly to the medial cross-vein, but it is sometimes narrower and not reaching this vein. Stigma twice as long as broad, blackish. Squamulæ and fringes brownish. Halteres yellow.

Female. Vertex and frons broad, a little widening downwards, all black and shining down to the antennæ, or very slightly dullish across the middle, the frons only a little whitish pruinose to each side above the antennæ; the hairs are black on the vertical half, dark yellow on the frontal half, sometimes the black hairs more restricted; epistoma a little more densely pruinose than in the male. Abdomen with generally small spots at the basal corners of second segment, often obscured and not rarely quite wanting; the pale hind margins generally very narrow, often obscure or wanting; abdomen is all shining without dull margins to the segments; the hairs are black except on the basal part of second segment and on the fifth segment. Hind femora generally pale on the basal part, front tarsi often pale at the base, and hind tarsi paler yellow on the base than in the male; the legs quite or mainly pale-haired. The wing-blotch larger and more distinct than in the male, always broad and reaching the medial cross-vein.

Length 9—12 mm.

This species is, as remarked above, nearly related to *vitripennis* but distinguished with certainty by the characters given under that species; as correctly remarked by Zetterstedt the slender legs, especially in the male, are characteristic for *rupium*, and likewise the all shining abdomen of the female without dull margins on the segments.

E. rupium is not common in Denmark; Ordrup Mose, Dyrehaven, Tyvekrog; in Jutland in Grejsdal and Højenbæk Dal at Vejle, at Horsens, Silkeborg and Laurberg south of Randers. My dates are ²²/₅—¹³/₁₀. I have taken it on various Compositæ and Umbelliferæ; the male seems to be much rarer than the female, as also remarked by Zetterstedt, only five males are found in our old collection and I have myself never taken the male.

Geographical distribution:— Europe down into Italy, and also recorded from the Canaries; towards the north to northern Sweden, and in Finland.

15. *E. alpinus* Panz.

1798. Panz. Fn. Germ. LIX, 14 (*Syrphus*). — 1822. Meig. Syst. Besch. III, 398, 20 — 1862. Schin. F. A. I, 336. — 1907. Kat. paläarkt. Dipt. III, 102.

Male. Vertex somewhat large, black, dullish; frons black, shining anteriorly, a little pruinose posteriorly and greyish white or yellowish pruinose at the eye-margins; it is somewhat broad, the upper angle rectangular and the eyes touching for a short distance; epistoma somewhat broad, only slightly widening downwards, greyish white or sometimes pale yellowish pruinose, the middle stripe, the mouth edge and the lower lateral parts black, shining; jowls black, somewhat greyish pruinose. Vertex with black, posteriorly yellow hairs, frons yellow-haired; sometimes vertex and frons quite black-haired; epistoma with long, whitish or pale yellow hairs; the epistoma is somewhat hollowed below the antennæ, somewhat retreating below the central knob and rather descending. Occiput white pruinose along the eye-margin to above the middle, for the rest blackish, somewhat greyish pruinose; the hairs whitish below, yellow above with more or fewer, sometimes rather many black hairs at the eye-margin. Eyes with brown or black hairs, densest down the middle. Antennæ black, third joint short, almost higher than long; arista black or brownish, plumose on the basal half. Thorax black or brownish black, a little shining behind, distinctly greyish or yellowish pruinose on the front half with two faint, dark middle stripes and on each side a roundish spot; the pruinose stripes on each side of the middle stripes are prolonged a little backwards in on the black part; thorax is clothed with darker or paler yellow, sometimes almost whitish hairs, and sometimes there is a cross-band of black hairs just behind the middle. Scutellum yellowish brown or brown, with yellow or paler hairs. Pleura with long, pale yellow hairs. Abdomen somewhat narrow and a little conical, it is black, dull, third and fourth segments with a shining, transverse middle band and broad dull front and hind margins, generally less distinct on fourth segment; the second segment has two small, transversely triangular, yellowish side spots, lying on the front part of the segment; the spots are shining; the second segment has a yellow hind margin, on third and fourth segments this margin is very narrow and obscure or wanting. Abdomen is mainly black-haired but the hairs are pale at the base and on the basal half of the second segment, on the front margin of third and slightly on fourth segment, and on the genitalia; the hairs are also pale at the sides. Venter greyish black with pale incisures and long, pale hairs, second segment pale with a dark middle spot. Legs with the femora somewhat varying in colour, either quite black with only just the apex yellow, but generally the hind femora a little reddish at the base, or they may be more pale, and sometimes the basal half is yellow and the base of the anterior femora more or less pale; the front and hind tibiæ have

the basal part and the middle tibiæ the basal half or two thirds whitish yellow; the front tarsi have the basal joints more or less pale and the posterior tarsi have the two basal joints and generally also the base of the third joint yellow; the hind femora are considerably thickened, hind tibiæ a little compressed and distinctly curved and hind metatarsi a little thickened. The legs haired as usual, but the hairs somewhat varying in colour, sometimes the hairs behind front femora more or less black and also some black hairs present behind the apex of middle femora, but sometimes they are black only behind the apex of front femora and sometimes all pale; hind femora with the hairs all round the apical part black, sometimes only on a small part, but the bristly hairs below the apical part always black; on the tibiæ the hairs all pale except below the black part of hind tibiæ, and there may be a few black hairs behind the anterior tibiæ. Wings hyaline with a narrow, brown fascia down over the base of the cubital vein and the basal vein of the discal cell, sometimes it is rather indistinct. Stigma small, almost not longer than broad, black. Squamulæ and fringes whitish yellow. Halteres yellow.

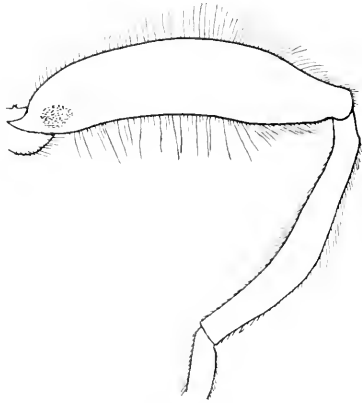


Fig. 156. *E. alpinus* ♂, hind leg from the anterior side. $\times 12$.

Female. Vertex and frons broad, a little widening downwards; the vertical space black and shining, the frontal half greyish pruinose, darker posteriorly, broadly shining above the antennæ; the hairs black behind, dark yellow in front, but varying in the extent of the colours, sometimes all black. Thorax still more pruinose on the front half than in the male and with some greyish stripes prolonged backwards. Abdomen with small spots, or only a little yellowish just at the basal corners or quite black, shining, the hind margins of the segments dull but generally indistinctly on third and fourth segments or these segments almost quite shining. The legs often more pale than in the male, the anterior femora more or less yellow on the basal part, hind femora to beyond the middle, and the tibiæ sometimes quite yellow with only the apex dark; hind femora less thickened than in the male but, however, distinctly thickened. Wings with a large, broad blotch as in the female of *rupium* or still larger.

Length 11—13 mm.

This beautiful and interesting species is at once known by the colour of thorax, the thickened hind femora and the short eye-suture in the male; the female is somewhat similar to the female of *rupium* but differs among others by the not quite shining abdomen.

E. alpinus is not rare in Denmark, though not among the most common species; Ordrup Mose, Ermelund, Dyrehaven, Lyngby Mose, Geel Skov, Hareskov, Donse, Tyvekrog, Tisvilde, Jægerspris; on Lolland at Maribo, Strandby and in Kældskov; in Jutland in Nørholm Skov at Varde, at Silkeborg, Laurberg south of Randers and Skørping. My dates are $18\frac{1}{5}$ — $13\frac{1}{8}$. I have taken it especially on the flowers of *Crataegus*. It would seem as if this species first in later time has occurred in Denmark or at all events has been more common, it was not known to Stæger and in the old collection was only one specimen (under *rupium*), though it may now not uncommonly be taken on the localities where Stæger used to collect.

Geographical distribution:— Middle Europe down into Austria, Styria and Hungary; it seems to have its northern limit in Denmark, and it is not known from England.

Remarks: *E. lucorum* Strobl (Mittheil. Ver. Steierm. XXIX, 187) cannot, as also remarked by Lichtwardt (Ent. Mitteil. III, 1914, 277) be *lucorum* Meig., which is quite another species, described above; it might perhaps be a dark-legged variety of *alpinus*, but the more hyaline wings with a longer stigma is not in accordance with this view.

30. **Helophilus** Meig.

This genus is nearly allied to *Eristalis* but differs, however, in several important characters. The species are of large to medium or somewhat small size, and the smaller species of a somewhat narrow shape, and they are more yellow marked than the species of *Eristalis*, and also with pale markings on thorax. The head broader than in *Eristalis*, considerably broader than high. The eyes are separated in both sexes, only in one palæarctic, but not Danish species (*peregrinus*, Subg. *Mesembrius*) they are nearly touching in a point in the male, but in Africa many species of this subgenus occur. The eyes are, however, more broadly separated in the female than in the male; in the latter sex the inner eye-margins are parallel down to the frons, here they form a small angle and then they are widening downwards; in the female they widen evenly from the vertex downwards. Eyes bare; the facets in the male distinctly enlarged on the upper front side towards the angle. The antennæ inserted above the middle on the somewhat, sometimes (*Liops*) rather strongly protruding frons; they

are short, third joint roundish, in the subg. *Liops* the third joint higher than long with a sharp angle above; the arista apparently bare. Epistoma a little hollowed below the antennæ, then produced to a small central knob and from it straight down to the mouth edge, not retreating except in the subg. *Liops*; its lower part is thus only slightly protruding and likewise slightly descending, but in *lineatus* it is much protruding, long and snout-like, and here no central knob is visible. The epistoma is pale pruinose, either with a black or yellow, bare middle stripe or pruinose all over; it has longish hairs. Mouth parts mainly as in *Eristalis*, sometimes (*lineatus*) the oral cone and proboscis rather long. Thorax with two (sometimes three) grey or yellowish, longitudinal middle stripes and with the side margin yellow; in some northern species the lines on thorax are very narrow or interrupted. Scutellum yellow or brownish, it has no distinct downwards directed fringe below the margin, only in the larger species the marginal hairs are curved somewhat down. Abdomen relatively longer than in *Eristalis*, and in the smaller species rather narrow; its number of segments is in both sexes the same as in *Eristalis*; in the large species (*Helophilus* s. str.) the basal ventral segments are only slightly chitinised. Abdomen is marked with rather extended yellow side spots; in the smaller, narrow species the markings are more restricted; the markings are in so far curious as they are in most cases in reality of two kinds; besides the yellow spots there are on third segment a pair of small, pruinose spots in the middle in connection with or covering a part of the yellow spots, and on fourth and (in the female) fifth segment the spots are quite or almost quite of the pruinose kind; other pruinose spots may be present at the hind margins, and in the smaller, narrower species the spots are often all pruinose. The genitalia are large, in some species (Girschner's subg. *Parhelophilus*) very large and with large appendages. Legs with the hind femora considerably thickened and sometimes with sexual ornamentations in the male as a process or wart with hairs or bristles or as a bundle of hairs below near base; hind tibiæ curved and compressed so that they have an edge below; the usual incurvation behind near apex small; hind tarsi often flattened, sometimes all tarsi. The legs haired about as in *Eristalis* but the hairs not long, the hind femora more or less setulose beneath; the trochanters have the same curious long hair above as in *Eristalis*, and also the curious, scabrous spot at the base of the femora on the anterior side is distinct. Wings differing from those in *Eristalis* by the subcostal cell being open, either somewhat narrowly or more or less broadly; anal vein generally dipped as in *Eristalis*, sometimes only slightly, it is abruptly curved just at the apex; other-

wise the venation is similar to that in *Eristalis*; the basal part of the radial vein has fine bristles but often so delicate that they are difficult to detect. Stigma either elongated and with no or an indistinct stigmatical cross-vein, or the stigma consists only of a cross-vein. Thoracal squamula with long, elegantly branched hairs, alar squamula with longish, curiously flattened hairs; the hairs in the fringes are more or less densely placed in the various species and the squamulæ show otherwise some differences; in the large species (*Helophilus* s. str.) the thoracal squamula is the larger, it is somewhat inflated inwards at the scutellum as in *Eristalis*, and it is hairy above on a part near scutellum; the fringes are very dense; in the other species the thoracal and alar squamulæ are about equal in size, the thoracal squamula is not inflated, not haired above and the fringes generally less dense. Plumula with branched hairs.¹

The developmental stages have long been known, already Linné and Réaumur were acquainted with them; they are, however, not well known and only few species have been bred. Réaumur (Mém. Ins. IV, 1738, Pl. 31, fig. 9—11) mentions a species, probably the common *H. pendulus*. Meigen (Syst. Besch. III, 1822, 374) mentions that the larva of *H. pendulus* lives in putrid water and is similar to the larva of *E. nemorum*. According to Brauer Riley has mentioned the larva of the American species *latifrons* (Amer. Entomol. II, 142). I have myself examined puparia of *H. transfugus*; the pupæ were found in flood refuse in a fen in April and May; and I have examined larvæ of *H. groenlandicus* or *borealis* from Greenland. The larva and pupa are in all respect similar to those of *Eristalis*, and at present no distinguishing characters have been found between the larvæ of these two genera. The larvæ also live in stagnant and putrid waters in quite the same way as the *Eristalis*-larva. The larvæ are, like the *Eristalis*-larvæ, very tenacious, Wilcox (Anat. Anz. XII, 1896, 278) mentions a larva (it is termed a *Helophilus*-larva but may for the rest as well have been the larva of some other Eristalin), which lived at the shore in pools with salt water, and which was able to live in various killing fluids for many hours. Several of the species have probably more than one brood in the year.

The species of *Helophilus* are beautiful flies, especially the large, bright species; some of the dark, northern (not Danish) species are rather *Eristalis*-like. The species occur in marshy districts, in fens and at borders of water, and frequent especially Umbelliferæ and also

¹ Girschner says "einfach behaart" but the species I have examined have the hairs on plumula very distinctly branched.

various Compositæ; some are generally seen on water-plants; sometimes they are seen flying low over the water in ditches. The genus goes far towards the north, two species being inhabitants of Greenland. Verrall gives (Brit. Fl. VIII, 547) an observation of the courtship in *H. lineatus*; the female rests sitting but with the wings slightly vibrating, while the male hovers above it with its head bent wonderfully downwards and its wings very rapidly vibrating, at the same time the whole body shakes "like a dog just out of the water"; I have myself observed the same in this species; this behaviour remembers of the courtship in Dolichopodids. Verrall asks whether any stridulation can go on in which the peculiar scabrous patch at the base of the femora or the ribbed anal vein take a part.

About 20 species of the genus are known from the palæarctic region; 11 have been found in Denmark.

As the species are to some degree diverging several subgenera have been established, but have given rise to different opinions; Rondani in 1875 separated *Liops* off for the species *vittatus* (then placed under *Mallota*) on account of its peculiar antennæ, and *Mesembrius* for *peregrinus* (not Danish) on account of the approximated eyes in the male and the dilated tarsi; in 1883 Bigot established *Eurinomyia* (*Eurimyia*) on *H. lineatus*, which he very curiously took for a new species and named *rhingioides*. Girschner (Ill. Wochenschr. f. Entom. 1897, 603) divides the genus into two divisions after the squamulæ; the large species have the thoracal squamula somewhat haired on the upper surface, and they have no distinct stigmatal cross-vein; here he has *Helophilus* s. str. and *Mesembrius*; the smaller species have the squamula bare above and a stigmatal cross-vein; under this second division he has the subgenera *Liops*, *Parhelophilus* with *frutetorum*, *versicolor* and *lunulatus*, and *Eurinomyia* with *lineatus* and *transfugus*; *Parhelophilus* includes thus the species of the second division not belonging to *Liops* or *Eurinomyia*, but he gave otherwise no characters for this new subgenus. Verrall is of opinion that the squamulæ in *frutetorum* and *versicolor* are hairy above as in the large species, and he rejects *Parhelophilus*, placing its species except *lunulatus* to *Helophilus*. Becker (Berl. ent. Zeitschr. LV, 1910, 219) has studied the question anew, and he declares Girschner to be right; I have also studied the squamulæ, and I can confirm Becker's statement. On the other hand Verrall is right when he separates *lunulatus* and places it to *Eurinomyia*. Becker also rejects *Parhelophilus*, but according to the squamulæ he naturally places its species in *Eurinomyia*. Now it cannot be denied that the species *frutetorum*, *versicolor* and *con-similis* are closely allied to each other and less closely to the other

species placed in *Eurinomyia*, and this had Girschner evidently seen in establishing *Parhelophilus*, but yet I think a division is at present not possible and I therefore follow Becker in the limiting of the subgenera. — For the Danish species we have then the following subgenera:

1. Third antennal joint higher than long with a sharp upper angle; abdominal spots longitudinal *Liops* Rond. (*vittatus*).
- Third antennal joint not higher than long, roundish; abdominal spots more or less transverse 2.
2. Epistoma with a distinct, bare middle stripe; wings with the stigma elongate and an indistinct or no stigmatical cross-vein; thoracal squamula hairy above on a part near scutellum *Helophilus* s. str. (*trivittatus*, *hybridus*, *affinis*, *pendulus*).
- Epistoma without bare middle stripe, at most a bare spot at the mouth edge; wing-stigma only consisting of a cross-vein; thoracal squamula not hairy above *Eurinomyia* Big. (*frutetorum*, *versicolor*, *consimilis*, *lunulatus*, *transfugus*, *lineatus*).

Table of Species.

1. Third antennal joint distinctly higher than long with a sharp upper angle; abdomen with longitudinal spots . . . 11. *vittatus*.
- Third antennal joint not higher than long, roundish; abdominal spots more or less transverse 2.
2. Epistoma with a distinct, black or yellow, bare middle stripe; antennæ black or blackish; stigma elongated, with an indistinct or no cross-vein; thoracal squamula hairy above on a part near scutellum; larger species 3.
- Epistoma without bare middle stripe, at most bare near the mouth edge; antennæ orange or brownish; stigma consisting only of a cross-vein; thoracal squamula not hairy above; moderate or smaller species 6.
3. Epistomal stripe yellow 1. *trivittatus*.
- Epistomal stripe black 4.
4. Hind tibiæ yellow on the basal two thirds 4. *pendulus*.
- Hind tibiæ yellow on only the basal third or fourth 5.
5. Front tarsi black; abdominal segments with orange hind margins 2. *hybridus*.
- Front tarsi yellow on the basal joints or more; abdominal segments without orange hind margins 3. *affinis*.
6. Somewhat broad species of moderate size with the lines on thorax rather broad 7.

- More or less narrow and smaller species with narrower lines on thorax 9.
- 7. A row of black hairs behind the upper eye-margin; hind femora in the male with a process below near base, bearing a bundle of black, bristly hairs. 5. *frutetorum*.
- No black hairs behind the eye-margin; male with no process below hind femora 8.
- 8. Front tibiæ not with black apex; epistoma less protruding than the antennal prominence; the grey lunule on first abdominal segment not, or not broadly divided in the middle; hind femora in the male with a tuft of reddish hairs below near base 6. *versicolor*.
- Front tibiæ with the apex black; epistoma with the mouth edge as much or more produced than the antennal prominence; the grey lunule on first abdominal segment broadly divided in the middle; hind femora in the male without a tuft of longer hairs below near base 7. *consimilis*.
- 9. Epistoma very much produced, pointed and snout-like. 10. *lineatus*.
- Epistoma much less produced, not pointed 10.
- 10. Abdomen in the male not very narrow; abdominal spots moderately lunulate 8. *lunulatus*.
- Abdomen in the male very narrow; abdominal spots deeply lunulate 9. *transfugus*.

1. *H. trivittatus* Fabr.

1805. Fabr. Syst. Antl. 235, 15 (*Eristalis*). — 1822. Meig. Syst. Besch. III, 373, 5, p. p. ♀. — 1843. Zett. Dipt. Scand. II, 679, 3 et 1849. VIII, 3123, 3. — 1862. Schin. F. A. I, 340. — 1901. Verr. Brit. Fl. VIII, 526, 1, figs. 360—361. — 1907. Kat. paläarkt. Dipt. III, 109. — 1910. Beck. Berl. ent. Zeitschr. LV, 216, 225. — *H. camporum* Meig. 1822. l. c. III, 372, 4. — 1846. Loew, Stett. ent. Zeitg. VII, 168, 13.

Male. Vertex dullish, black above, the rest and the frons yellow pruinose, above the antennæ a shining, reddish triangle; epistoma yellow pruinose with a bare, shining, yellow middle stripe, narrowed upwards, the mouth edge and lower side parts black. Vertex and frons yellow-haired with a black-haired cross-band above on the black part; epistoma with long, yellow hairs. The epistoma is hollowed just below the antennæ and then produced to a moderate central knob, lying rather high; below the knob it is not retracted but straight to the mouth edge, and it is only slightly descending; jowls grey pruinose. Occiput greyish white pruinose but above black towards the eye-margin; the hairs are white below, yellow above. Antennæ black, third joint roundish; arista brownish yellow. Thorax black, dull, with two longitudinal, grey stripes and with side margins greyish yellow; it is clothed with yellow hairs. Scutellum brownish yellow, paler at the margin, with yellow hairs and often black hairs

on the middle. Pleura greyish pruinose with yellow hairs. Abdomen elongated, somewhat conical, black with extended bright yellow markings; it is dull, the hind margins of second and third segments shining, the fourth segment almost quite shining, only a little dull near the base; the second segment with large side spots occupying the whole side margin, narrowing somewhat inwards, leaving only a triangular front part, a middle stripe and the hind margin black, the latter reaching to or very near to the side margins; third segment with similar large spots lying towards the front margin and leaving a broader hind margin black; their inner lower corner is protruding inwards and a little upwards as grey, somewhat pruinose spots and nearly meeting in the middle; the fourth segment has small, yellow spots just at the basal side margin, the side is grey, sending from the middle a narrow band inwards and forwards, the band from each side nearly or quite meeting in the middle and thus forming a grey, somewhat pruinose bow. The pubescence is short, longest towards the base of the segments; it mainly follows the ground colour but is pale on the front part of the segments, on second segment to near the hind margin; at the side margins it is yellow but more or less black on the hind part of second and third segments. Genitalia a little pruinose, with pale hairs. Venter pale yellow with a spot on first segment, fourth segment and the genitalia greyish black; it has long, pale hairs. Legs with the femora black, the anterior with about the apical third yellow, hind femora only slightly brownish at the apex below or on a ring just before the apex; anterior tibiæ and tarsi yellow, the front tarsi darkened on the anterior side of the two basal joints; hind tibiæ black with the basal third yellow, hind tarsi black, rather broad and flat; hind femora thickened about the middle; hind tibiæ a little curved towards the apex. Anterior femora with somewhat long hairs on the posterior side, hind femora on the antero-dorsal side and with some scattered hairs below, for the rest the legs short-haired; the hairs nearly all yellow, only partly black on the posterior side of hind femora, and there are a few black, bristly hairs below the middle femora on the apical half; hind femora black spinulose below in the apical two thirds and with some longer bristles below the apex. Wings hyaline or a little yellowish at the anterior margin from the base to the yellow stigma. Squamulæ with their fringes and the halteres yellow.

Female. Vertex broader than in the male, slightly and evenly widening downwards; frons a little darker in the middle, for the rest the head coloured and haired as in the male. Abdomen broader than in the male and more suddenly pointed, the spots narrower,

especially on third segment, and thus the black hind margins broader; on third segment the spots somewhat lunulate, though varying in shape, and generally not lying close to the front margin; the grey, somewhat pruinose spots on fourth segment forming shallow lunules and fifth segment with similar spots; the fifth segment with short, black hairs on the apical part. Legs with anterior femora more yellow, about the apical half of the front and apical two thirds of the middle femora, and also hind femora with a more distinct pale apex; front tarsi with the basal joints quite dark and also the rest often darkened, the end of tibiæ obscurely darkened.

Length 12,5—15 mm.

The type to this species, a female, is present in the collection of Tönder Lund and Sehestedt, and I have examined it.

H. trivittatus is not common in Denmark, though it may sometimes be numerous on some places; Frederiksberg, Valby, Amager, Lersø, Dyrehaven, on Egholm at Skelskør; on Lolland at Strandby and in Kældskov, and on Langeland at Lohals. My dates are ²⁶/₅—¹⁹/₉. It occurs at borders of ponds and ditches, on meadows and commons, and it seems to prefer shore districts but is also seen in woods; I have taken it on various Umbelliferæ; it may be seen flying quite low over the water in ditches and setting down on plants quite at the surface. I have only seen it numerous at a ditch in Valby but Mr. L. Jørgensen has communicated to me that it is common on Lolland at Strandby.

Geographical distribution:— All Europe and down into Persia; towards the north to middle Sweden; it has also been recorded from Mexico. Verrall records it from North America, as he takes *latifrons* Loew to be identical with it, but Becker l. c. is, after study of the American species, of opinion that *latifrons* is a distinct species.

2. *H. hybridus* Loew.

1846. Loew, Stett. ent. Zeitg. VII, 141, 6. — 1862. Schin. F. A. I, 339. — 1901. Verr. Brit. Fl. VIII, 529, 2, figs. 362—363. — 1907. Kat. paläarkt. Dipt. III, 108. — 1910. Beck. Berl. ent. Zeitschr. LV, 214, 225. — *H. Henricii* Schnabl, 1881. Wiad. nank. przyr. Warschau, I, 1. — 1883. Mik, Wien. ent. Zeitg. II, 46.

This species is very much like *trivittatus*. Male. Head as in *trivittatus* but the triangle above the antennæ more black, and the middle stripe on epistoma black; the pruinosity and pubescence darker yellow; occiput brownish yellow pruinose above and the hairs darker yellow above. Thorax with the middle stripes more yellow and also the side margin more yellow; the pubescence darker yellow, and

scutellum with more black hairs on the middle, sometimes the whole disc black-haired. Abdomen less elongate and less narrow, and the segments with dark orange hind margins, broad and palest on second segment: the spots on second segment as in *trivittatus* but confluent with the orange hind margin and consequently confluent with the spots on third segment; on second segment there is thus only a transverse black basal spot, prolonged backwards in a middle line not reaching the hind margin; the spots on third segment likewise as in *trivittatus* and also with grey or greyish yellow, somewhat pruinose spots on the inner corners, nearly meeting in the middle; at the sides the spots reach to the hind margin; the spots on fourth segment are more brownish yellow and form large and broad, somewhat pruinose lunules, curving from the side evenly inwards and quite or nearly meeting in the middle, and they occupy most of the segment; the side margin of the segment is yellow. The genitalia are densely haired with curious, curled or woolly, yellow hairs. Legs coloured about as in *trivittatus*, hind femora with a more or less complete and obscure, reddish ring just before the apex; front tibiae with the apical part black and front tarsi black; middle tarsi with apex of second joint and the following apical joints black; hind femora with the thickest part after the middle: the legs haired as in *trivittatus* but front femora more or less black-haired behind, especially towards the apex, and middle femora with numerous short, black bristles below in the apical half; hind tibiae with short, erect, black bristles below.

Female. Likewise similar to the female of *trivittatus* but the vertex less black, only quite posteriorly; the hairs black behind, yellow in front, but varying in extent, sometimes all black. On abdomen the hind margins to the segments are very obscure and the one on second segment not broad as in the male and not confluent with the spots so that there is a black margin in front of it; the spots on third segment narrower than in the male and not close to the front margin; the bands or very shallow lunules of fourth segment are for the greater part yellow, only greyish or brownish yellow and somewhat pruinose on their inner tip or on the tip half, or this colour may border the yellow colour out to the margin so that only the basal inner part is yellow; fifth segment with a pair of brownish yellow, somewhat pruinose lunules; this latter segment has short, black hairs on the apical part as in *trivittatus*, but a little longer.

Length 12,5—14 mm.

H. hybridus is rare in Denmark; at Copenhagen, Amager, Ordrup Mose, Ermelund, Dyrehaven, Lyngby Mose (the author), Søllerød (Godskesen); on Lolland at Bremersvold, in Kældskov, Egholm Skov

and Dødemose west of Nysted (L. Jørgensen); the first specimen was taken in 1899. My dates are $^{27/5}$ — $^{25/9}$. It occurs in the same way as the preceding species; in spring I have taken it on the flowers of *Prunus spinosa*.

Geographical distribution:— Northern and middle Europe down into Austria and Hungaria; towards the north to southern Sweden; it occurs also in North America (*novae-scotiae* Macq.).

3. *H. affinis* Wahlb.

1844. Wahlb. Öfvers. Vet. Akad. Förh. I. 64. — 1849. Zett. Dipt. Scand. VIII, 3119, 2—3. — 1907. Kat. paläarkt. Dipt. III, 107. — 1910. Beck. Berl. ent. Zeitschr. LV, 226. — *H. arcticus* Zett. p. p. 1838. Ins. Lapp. 595, 2 et 1843. Dipt. Scand. II, 678, 2. — *H. borealis* Siebke (nec Stæg.), 1864. Nyt Mag. f. Naturv. 166 et 1877. Enum. Ins. norveg. IV, 54, 4. — *H. Siebki* Verr. 1900. Cat. eur. Syrph. 86.

This species is very similar to the two preceding. Male. Middle stripe on epistoma black. Second abdominal segment a little shorter than in the two preceding species, and more like that in *pendulus*. The spots on second segment do not reach the hind margin but leave a relatively broad, black margin, and there are no orange hind margins to the abdominal segments; the greyish yellow, somewhat pruinose bands on the fourth segment are much narrower than in *hybridus* and less near to the front margin. Hind femora black, at most with a small pale spot below the apex; front tarsi yellow or the third and fourth joints darkened: hind femora not much thickened, the thickest part near the apex; the legs haired mainly as in *hybridus*. Wing-stigma brownish.

Female. Likewise similar to the preceding species, especially to *hybridus*, but differing as in the male by the narrower basal abdominal spots, the want of orange hind margins to the segments and the partly yellow front tarsi. The fifth abdominal segment has short, black hairs on the apical part.

Length 13,5—15 mm.

H. affinis seems to be very rare in Denmark, we have only two specimens, a male and a female; the female belongs to the specimens mentioned by Zetterstedt (l. c. VIII, 3120) and was taken by Jacobsen at Sorø; according to old notes from Jacobsen he took one male and two females on *Parnassia palustris* in August and September 1845; now we have only the one female, the two other specimens were perhaps sent to Zetterstedt; my male specimen is taken on Lolland in Vester Ulslev Mose west of Nysted on $^{18/7}$ 1914 (L. Jørgensen).

Geographical distribution:— Northern Europe, towards the north to northern Sweden, in Norway, and in Finland; it seems to have its southern limit in Denmark.

4. *H. pendulus* L.

1758. Linn. Syst. Nat. X, 591 et 1767. XII, 2, 984, 28 et 1761. Fn. Suec. 1995 (*Musca*). — 1764. O. F. Müll. Fn. Fridrichsd. 712 (*Musca*). — 1775. Fabr. Syst. Entom. 763, 7 (*Syrphus*) et 1805. Syst. Antl. 233, 7 (*Eristalis*). — 1817. Fall. Dipt. Suec. Syrph. 30, 26 (*Syrphus*). — 1822. Meig. Syst. Besch. III, 373, 6. — 1843. Zett. Dipt. Scand. II, 676, 1 et 1849. VIII, 3117, 1. — 1862. Schin. F. A. I, 340. — 1901. Verr. Brit. Fl. VIII, 531, 3, figs. 364—366. — 1907. Kat. paläarkt. Dipt. III, 109. — 1910. Beck. Berl. ent. Zeitschr. LV, 226. — *H. trivittatus* Meig. p. p. ♂, 1822. l. c. III, 373, 5.

This species again is similar to the preceding ones. Male. Vertex black above, the rest of it, the frons and the epistoma yellow pruinose; above the antennæ a black triangle and epistoma with the middle stripe, the mouth edge and the lower lateral parts black and shining. Vertex with black, frons with yellow hairs, but the extent of the two colours varying, sometimes the hairs mainly black; epistoma yellow-haired. Occiput greyish pruinose below, yellow above and here narrowly black just at the eye-margin; the hairs whitish below, yellow above. Antennæ black or blackish brown, arista brownish yellow. Thorax black, dull, with two stripes and the side margins yellow; it is clothed with deep yellow hairs. Scutellum brownish or yellowish brown, pale at the margin, the hairs extensively black, generally yellow only at the margin. Pleura yellowish pruinose with yellow hairs. Abdomen with the second segment a little shorter than in the preceding species and consequently abdomen a little shorter; it is black, dull, only slightly shining at the hind margins of the segments; the segments have distinct orange hind margins, but on second segment narrower than in *hybridus*; second segment has a pair of large, yellow spots as in *trivittatus*, leaving a somewhat broader basal triangular band, a middle stripe and a narrow hind margin black, the black hind margin not reaching the sides; the spots on third segment as in the other species, likewise with a protruding corner inwards covered with a small, yellowish, somewhat pruinose spot; at the sides the yellow spots are connected with the orange hind margin; the fourth segment has shallow, brownish yellow, somewhat pruinose lunules; they are of quite another shape than in *trivittatus*, and narrower and less near the front margin than in *hybridus* and they are not connected in the middle; the side margins of the segment are yellow. Abdomen is yellow-haired, at the hind margins of the segments black-

haired; at the sides there are black hairs on the hinder half of second and on third segment. Genitalia a little yellowish pruinose, with dense, reddish hairs; the hairs form a tuft on the right side and have their apices curved to the right. Venter pale yellow, with a spot on first segment on the fourth segment and the genitalia blackish grey; it is clothed with long, pale hairs. Legs with anterior femora black with about the apical third yellow, hind femora black with the apical third or fourth reddish; anterior tibiæ yellow, the front tibiæ with the apical part black; front tarsi quite black, middle tarsi with metatarsus and the second joint except apex yellow; hind tibiæ yellow with about the apical third black, hind tarsi black, broad and flat; the hind femora are shorter and thicker than in the other species, and they are thickest about the middle; hind tibiæ likewise shorter, more strongly and more evenly curved. The hairs on the legs yellow, behind the front femora mainly black; middle femora with short and fine, black bristles below in the whole length; hind femora with black hairs on the apical part on the anterior side, and black spinulose beneath in nearly the whole length; middle tibiæ black-haired below and hind tibiæ black-haired above on the yellow part and with very

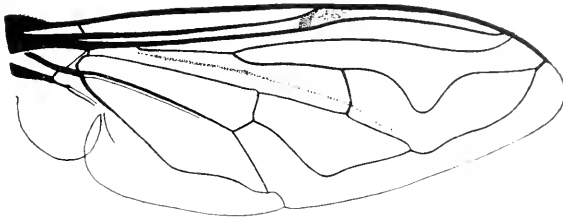


Fig. 157. Wing of *H. pendulus* ♂.

short, erect, black hairs below. Wings hyaline or slightly tinged towards the anterior margin. Squamulæ and fringes dark yellow. Halteres pale yellow.

Female. Vertex and frons broader than in the male, evenly widening downwards; vertex black and frons with a large elongated black triangle above the antennæ, often reaching to the vertex as a broader or narrower stripe; the hairs black above, yellow below in varying extent, sometimes all black. The abdominal spots narrower than in the male, especially those on third segment, and here not lying close to the front margin, and the yellowish or greyish yellow, somewhat pruinose spots at the inner end larger; fifth segment with greyish yellow, somewhat pruinose spots similar to those on

fourth segment; the fifth segment with red hairs, which are long at the apex.

Length 10—14 mm.

H. pendulus is common in Denmark and found on all suitable localities. My dates are $^{13}/_5$ — $^{2}/_{10}$. It occurs on the same localities as the preceding species and often in company with them. I have taken it in copula on $^{22}/_6$, $^{30}/_6$, $^{13}/_7$ and $^{28}/_8$.

Geographical distribution: — All Europe and on Madeira; towards the north to northern Sweden, in Finland, and on the Faroe Islands and Iceland.

Remarks: The four species now described are similar and closely allied, and they belong to a distinct group or subgenus, but they are, however, easily distinguished from each other; *trivittatus* is at once separated by the yellow epistomal stripe; of the other three *pendulus* is distinguished by the hind tibiæ being yellow on the basal two thirds and the hind femora more yellow at the apex; also the hind femora are shorter and thicker, and the hind tibiæ shorter and more curved; finally *hybridus* is distinguished from *affinis* by the quite black front tarsi and the orange hind margins on the abdominal segments. Also the abdominal markings are, though similar, characteristically different in all four species, and *trivittatus* and *affinis* have no orange hind margins on the segments while such are present in *hybridus* and *pendulus*.

5. *H. frutetorum* Fabr.

1775. Fabr. Syst. Entom. 765, 14 (*Syrphus*) et 1805. Syst. Antl. 236, 19 (*Eristalis*). — 1822. Meig. Syst. Besch. III, 374, 7. — 1843. Zett. Dipt. Scand. II, 680, 4 et 1849. VIII, 3123, 4. — 1862. Schin. F. A. I, 341. — 1901. Verr. Brit. Fl. VIII, 534, 4, fig. 367. — 1907. Kat. paläarkt. Dipt. III, 110. — 1910. Beck. Berl. ent. Zeitschr. LV, 228. — *Syrphus femoralis* Fall. 1817. Dipt. Suec. Syrph. 31, 27. — *H. versicolor* 1860. Malm, K. V. och V. Samh. Göteborg Handl. VII, 79.

Male. Vertex brown pruinose, frons and epistoma yellow pruinose, the mouth edge and a short, triangular middle spot bare, the lower side parts blackish. Vertex black-haired, posteriorly yellow-haired; frons with mixed yellow and black hairs, sometimes nearly or quite yellow-haired; epistoma with long, yellow hairs. The epistoma is very slightly hollowed below the antennæ, for the rest almost straight so that the mouth edge is not so much produced as the antennal prominence. Occiput yellow pruinose, the hairs yellow, above a row of few, long, black hairs overhanging the eyes. Antennæ bright orange. Thorax brownish black, dull, with two somewhat broad stripes and the sides

yellow; it is clothed with dense, somewhat long, yellow hairs. Scutellum yellowish with yellow hairs, mixed with some few black. Pleura yellowish grey or grey pruinose, with long, yellow hairs. Abdomen dull black, first segment with a large grey lunule, nearly occupying the whole segment, sometimes with indications of a dividing in the middle, the other segments with dark orange hind margins; second segment with large, triangular, yellow side spots, at the sides nearly occupying the whole length of the segment but not reaching the orange hind margin: in the middle of the hind margin is a small, transverse, yellow or greyish pruinose spot; third segment with similar spots, likewise not reaching to the orange hind margin, at the inner end each has a transverse, oblong, yellow or greyish pruinose spot, the two spots approximated in the middle; at the hind margin is in the middle a somewhat large, triangular, greyish or yellow pruinose spot; fourth segment almost quite greyish or yellow pruinose, darker in front of the orange hind margin; in the middle there is a shorter or longer, black longitudinal stripe from the front margin, and the front margin may be narrowly black or only towards the sides; there may also be smaller or larger, more or less distinct blackish spots to each side in front of the orange hind margin. Abdomen is clothed with somewhat long hairs, they are yellow but black at the hind margins of third and fourth segments and a few at the hind corners of second segment. Genitalia large, yellowish or greyish pruinose, with yellow hairs. Venter grey or blackish grey, somewhat shining, the genitalia of the same colour or paler to yellowish; the side-membrane pale; the venter has long, pale hairs but only at the sides, along the middle it is bare and rather shining. The genitalia are, when seen from below, very large with large, curved, reddish, claw-shaped terminal appendages. Legs with the femora black, anterior femora with the apical third or nearly the half yellow, hind femora with a yellow ring just before the apex; anterior tibiæ and tarsi yellow, the front tibiæ with a dark stripe below on the apical part; hind tibiæ yellow with the apical third black, hind tarsi yellow, darkened towards the apex or quite black; the hind femora have below near the base towards the posterior side a tubercle or process, bearing at the end a bundle or fan of black, bristly hairs. The legs haired as usual, the hairs somewhat long on femora and also behind anterior tibiæ and below the hind tibiæ; the hairs are mainly yellow, below the front femora some black may be present, especially at the apex; also the anterior tibiæ may have some single black hairs; the hind femora are black spinulose below, and the long, scattered hairs may be black. Wings hyaline or slightly yellowish tinged. Stigma quite small, consisting

only of the cross-vein. Squamulae with their fringes and the halteres yellow.

Female. Vertex and frons broad, slightly and evenly widening downwards; they are yellow pruinose, upwards more brownish or dark greyish: the hairs are black. Behind the eyes a row of black hairs as in the male. Abdominal spots mainly as in the male, the side spots on second and third segments a little narrower, the black spots on fourth segment larger so that the segment is in reality black with greyish or yellow lunules and a large triangle at the hind margin, often the triangle touching the inner ends of the lunules; fifth segment greyish or yellow pruinose with an abbreviated triangular black middle line in front. Hind femora without tubercle.

Length 8,5—10 mm.

H. frutetorum is not rare in Denmark but much less common than *pendulus*; Ordrup Mose, Dyrehaven, Lyngby Mose, Ørholm, Birkerød, Nøddebo; on Lolland at Maribo, in Merrits Skov, Alsø Skov, Kældskov and Egholm Skov. My dates are $^{25}/_5$ — $^{24}/_7$, it is thus a somewhat early species. It occurs in fens and at waters and frequents especially Umbelliferæ.

Geographical distribution: — All Europe; towards the north to middle Sweden, and in Finland.

6. *H. versicolor* Fabr.

1794. Fabr. Ent. Syst. IV, 283, 19 (*Syrphus*) et 1805. Syst. Antl. 233, 8 (*Eristalis*). — 1862. Schin. F. A. I, 341. — 1901. Verr. Brit. Fl. VIII, 537, 5, fig. 568—571. — 1907. Kat. paläarkt. Dipt. III, 111. — 1910. Beck. Berl. ent. Zeitschr. LV, 228.

This species is very similar to *frutetorum*. Male. Head and shape of epistoma like in *frutetorum*, the epistoma slightly more hollowed below the antennæ; the vertex just narrowing a little down to the narrowest point; there are no black hairs at the upper eye-margin. Abdomen with the grey lunule on first segment more or less distinctly divided in the middle, but generally only slightly and sometimes not; the spots on abdomen otherwise nearly as in *frutetorum*, but those on second and third segments longer at the sides so that they are on second segment broadly, on third segment more narrowly connected with the orange hind margin, the black, transverse band in front of the hind margin thus not reaching the sides and the spots on second and third segments connected with each other; on the side margins there is a small black spot near the hind corners on both segments, stretching more or less forwards. The terminal appendages of the genitalia are likewise somewhat claw-shaped, but they are much

broader, black or yellowish and densely chagreened. The anterior femora are paler, not fully the basal half or only the third black; hind femora with only a small protuberance on the lower posterior side near the base, beset with mostly reddish hairs.

Female. Likewise very similar to the female of *frutetorum*, especially as the abdominal side spots on second and third segments are narrower than in the male and not connected with the orange hind margins; the grey lunule on first segment more or less divided as in the male; it is distinguished from *frutetorum* by the want of black hairs behind the upper eye-margin, and the anterior femora have as in the male the yellow colour more extended, sometimes to rather near the base.

Length 9,5 to nearly 11 mm.

Verrall states that the abdomen in the female is much darker than in *frutetorum* because the black is more extended, but this I have not found to be the rule; some specimens have the abdomen darker but others not; on the other hand I find almost always the anterior femora paler to a greater extent.

H. versicolor is like the preceding species not rare in Denmark, though perhaps a little rarer than it, and it is generally found in company with it; Ordrup Mose, Lyngby Mose, Frerslev Hegn and in Jutland at Horsens. My dates are only $^{22}/_6$ — $^5/_7$.

Geographical distribution: — All Europe and in Asia Minor; towards the north to southern Sweden, and in Finland.

7. *H. consimilis* Malm.

1860. Malm. K. V. och V. Samh. Göteborg Handl. VII, 80. — 1906. Frey, Medd. Soc. pro Fn. et Flor. Fenn. XXXIII, 11. — 1907. Kat. paläarkt. Dipt. III, 110. — 1910. Beck. Berl. ent. Zeitschr. LV, 229.

This species is again very similar to the two preceding; I only know the female; according to the descriptions of the male it differs from the others by having the epistoma a little more hollowed below the antennæ and the central knob or mouth edge more produced so that it is as much or more produced than the antennal prominence. Frons with black hairs; behind the upper eye-margin no black hairs. Abdomen mainly as in *versicolor* and thus with the side spots on second and third segments confluent at the sides; the grey lunule on first segment distinctly divided. The front tibiæ blackish at the apex all round; hind femora without any process or bristles below at the base (or at all events very slightly).

Female. Likewise very similar to the females of the preceding

species, but differing by the same characters as in the male viz. the more produced epistoma, no black hairs behind the upper eye-margin and the blackish apex of front tibiæ; the grey lunule on first abdominal segments is broadly divided. I find the anterior femora yellow on more than the apical half until the two thirds as in *versicolor*, and also the hind femora have at least the apical third yellow.

Length about 10 mm.

I have examined the same Danish specimens as mentioned by Verrall and Becker; the specimen mentioned by Becker with yellow femora is not mature.

H. consimilis is very rare in Denmark, we have only three specimens, all females, two taken at Hellebæk and one in Jutland at Horsens, the latter on ²⁵/7.

Geographical distribution: — Southern Sweden, Finland and Denmark.

Remarks: The three species *frutetorum*, *versicolor* and *consimilis* are very similar and nearly allied; they form a separate group (or subgenus, *Parhelophilus* Girschner); *frutetorum* and *versicolor* are distinguished without difficulty, in the male by the secondary sexual character on the hind femora and by the differently marked abdomen, and in both sexes by the presence or want of black hairs behind the upper eye-margin; *consimilis* is in the male distinguished by the want of any sexual ornamentation on the hind femora, and in both sexes by the epistoma being a little more protruding and by the black apex on front tibiæ. The character from the divided grey lunule on first abdominal segment is, I think, not very valid, for, as seen from my descriptions, a division may be indicated or present also in the other species: in *consimilis* the lunule seems, however, to be more broadly divided. With regard to the hind femora of the male of *consimilis* Verrall says: "a faint trace of a tuft beneath the hind femora"; Frey says that there is "keine, keineswegs eine auffallende Behaarung an den Hinterschenkeln, höchstens eine Gruppe äusserst kurzer Haare an der Basis derselben"; Becker describes "— — — zeigen an den Schenkelwurzel auf der Unterseite einen runden dunklen Flecken, der sich bei genauerer Besichtigung als mit ganz kurzen schwarzen Härchen besetzt darstellt, aber ohne eine warzenförmige Erhöhung". and he says that it is also present in the female; this latter statement proves that what Becker mentions here is the curiously haired round spot present at the base below on the anterior side in both sexes of all species of *Helophilus* (and *Eristalis* and other Syrphids) and for the rest also present on the anterior femora, and this spot has nothing to do with the sexual ornamentation; perhaps it is the same which

is seen by Frey and Verrall. Had the male genitalia been described they should no doubt have given good characters. — In all three species the pruinose spots on abdomen vary from yellow to grey.

S. *H. lunulatus* Meig.

1822. Meig. Syst. Besch. III, 370, 2, Tab. XXXII, Fig. 9. — 1843. Zett. Dipt. Scand. II, 681, 5 et 1849. VIII, 3123, 5. — 1862. Schin. F. A. I, 340. — 1901. Verr. Brit. Fl. VIII, 540, 6, figs. 372—373. — 1907. Kat. paläarkt. Dipt. III, 110. — 1910. Beck. Berl. ent. Zeitschr. LV, 229.

Male. Vertex brownish black pruinose, frons yellowish pruinose, sometimes darker or greyish towards the vertex; epistoma whitish yellow pruinose, without any bare stripe or spot, the lower side parts blackish, shining; jowls grey pruinose. Vertex black-haired, posteriorly with yellow hairs, frons yellow-haired; epistoma with long, yellow hairs; the epistoma is a little hollowed below the antennæ, the knob or lower part somewhat protruding, more than the antennal prominence, and somewhat but not much descending. Occiput greyish yellow or greyish brown pruinose, the hairs whitish below, yellow above, and there are no black hairs at the eye-margin. Antennæ orange, arista darker. Thorax black, dull, with two narrow or broader, greyish yellow longitudinal stripes, and the side margin broadly of the same colour; the middle stripes may sometimes be rather narrow, especially in front, and they are here connected with an inwards prolonged part from the side stripes. Thorax is clothed with yellow hairs. Scutellum yellowish, the basal corners blackish; it is yellow-haired. Pleura yellowish grey pruinose with long, pale hairs. Abdomen linear, dull black, with the hind margins of second and third segments shining; the first segment may be more or less greyish; the second segment is greyish or greyish yellow along the side from the base to near the hind margin, and from the end sending a prolongation in on the middle of the disc, but the spots broadly separated in the middle; the third segment with somewhat similar spots but also narrowly greyish yellow at the side margin down to the hind margin; the spots are almost shaped as iron-angles with one leg along the margin, the other stretching in on the disc; on the spots on second segment the leg along the side margin longest, on the other spots short; the spots are pruinose and may be more or less yellow at the base and at the side; the fourth segment is almost quite yellowish grey pruinose, with a black, triangular middle spot, but sometimes the black is more extended so that the pale colour forms side spots about as on third segment and a triangular spot at the hind margin; the hind margins

of second, third and fourth segments orange, but generally obscure and narrow. Abdomen is clothed with not quite short hairs, which are all pale or more or less black at the hind margins of the segments. Genitalia large but smaller than in the preceding species, greyish yellow pruinose, yellow-haired. Venter blackish grey, dull, clothed with not long, pale hairs. Legs black and yellowish; anterior femora with about the apical third yellowish, but the black basal colour often only present above and below; hind femora similarly coloured but more reddish, and also narrowly pale at the base, and the reddish colour stretching along the whole length above and also often below so that the black colour form two patches, a larger behind and a smaller in front; the extreme apex is black above; anterior tibiæ yellow, the front tibiæ a little darkened at the apex, front tarsi more or less darkened, middle tarsi darkened towards the end; hind tibiæ black on the apical third and more obscurely on the basal third but the extreme base yellow, they are thus yellow with two dark rings; hind tarsi black. The legs haired as usual, the hairs all pale, middle femora with a few short, black hairs anteriorly on the apical part; hind femora black setulose below. Wings varying from nearly hyaline to somewhat brownish. Stigma consisting only of the cross-vein. Squamulæ and fringes whitish. Halteres pale yellow.

Female. Vertex and frons a little broader than in the male, evenly widening downwards; vertex blackish, frons paler pruinose; the hairs black. Abdomen broader, first segment grey; the spots with the part stretching in on the disc longer and more lunulate; fifth segment quite yellowish grey with only a very narrow, abbreviated middle stripe; the segments are only slightly shining at the hind margins or only at the sides; for the rest the hind margins are covered by grey bands, broadest in the middle, narrower towards the sides and thus somewhat triangular, almost or quite covering the orange margin. The legs are often much paler than in the male, the anterior femora only indefinitely blackish at base and the black patches on hind femora smaller.

Length 8,5 to fully 9 mm.

H. lunulatus is a rare species in Denmark; Ordrup Mose, Ermelund (the author), Fuglevad, Søllerød (Klöcker), Hellebæk (Stæger); on Lolland in Dødemose west of Nysted (L. Jørgensen); in Jutland in Nørholm Skov at Varde (Esbén Petersen), and on Bornholm in Almindingen (H. J. Hansen). My dates are $^{23}/_5$ — $^{30}/_7$.

Geographical distribution:—Northern and middle Europe down into Austria, Hungary and Styria; towards the north to southern Sweden, and in Finland. It is rare everywhere.

9. *H. transfugus* L.

1758. Linn. Syst. Nat. X, 594 et 1767. XII, 2, 987, 52 et 1761. Fn. Suec. 1818 (*Musca*). — 1822. Meig. Syst. Besch. III, 371, 13 Tab. XXXII, Fig. 8. — 1843. Zett. Dipt. Scand. II, 682, 6 et 1849. VIII, 3123, 6. — 1862. Schin. F. A. I, 342. — 1901. Verr. Brit. Fl. VIII, 542, 7, figs. 374—375. — 1907. Kat. paläarkt. Dipt. III, 112. — 1910. Beck. Berl. ent. Zeitschr. LV, 229.

Male. Vertex and frons considerably narrower than in *lunulatus*; vertex brownish yellow pruinose, blackish about the ocelli; between vertex and frons a narrow, blackish brown, slightly angular line; frons a little paler pruinose; epistoma whitish yellow pruinose, without bare spot or stripe, the lower lateral parts black and shining but grey pruinose downwards; jowls grey pruinose. Vertex black-haired, yellow-haired posteriorly; the hairs on frons mixed black and yellow to quite yellow; epistoma with long, yellow hairs. The epistoma shaped as in *lunulatus* but narrower and more widening downwards. Occiput grey pruinose, yellowish above and here with a dark spot or streak at each side behind the eye-margin; the hairs whitish below, yellow above, and no black hairs at the eye-margin. Antennæ with the basal joints brownish to blackish, third joint yellowish brown or reddish brown, arista darker. Thorax brownish black, dull, with two narrow, yellow or brownish yellow stripes and with the side margins rather indefinitely brownish; the middle stripes widen inwardly behind, in front of scutellum and are here often confluent to a somewhat greyish space; along the middle of the disc is a very fine, more or less distinct and complete line. Thorax is clothed with longish, yellow hairs. Scutellum yellowish brown, darker at the base and the basal corners, with long, yellow hairs and more or fewer black hairs on the disc. Pleura greyish or brownish grey pruinose, with yellow hairs. Abdomen narrow, much narrower than in *lunulatus*, dull black, a little shining at the hind margins of second and third segments; first segment a little greyish in the middle; second greyish or yellowish at the sides from the base to the middle and here sending a whitish grey, deeply curved lunule inwards and forwards; third segment marked in the same way but the pale colour at the sides produced to the hind margin and forming small spots at the hind corners; the lunules on the segments are widely separated in the middle and sometimes they are almost separated from the sides; both the segments have a more or less distinct, greyish or glaucous triangle in the middle on the shining hind margin; the fourth segment has similar but more shallow lunules and all the side margins and the hind margin greyish yellow, at the hind

margin triangularly produced in the middle. The spots are pruinose and may be quite whitish grey, or more yellowish at the sides. Abdomen is yellow-haired, more or less black-haired at the hind margins of the segments. Genitalia relatively large, pale pruinose and pale-haired. Venter greyish black, dull, with pale incisures and sides; it is shining just along the middle; the first segment has pale hairs, for the rest it is nearly bare, only sparingly haired at the sides. Legs somewhat as in *lunulatus* but more reddish, anterior femora a little pale at the extreme base, then black on the basal part but generally only above and below, and below often to near the apex; front tibiæ with a dark ring before the apex, and middle tibiæ with traces of a similar ring, both pairs sometimes with traces of an upper ring near the base; tarsi dark towards the apex, front tarsi also more or less on the rest; hind legs coloured as in *lunulatus*; hind femora with a wart or protuberance below near the base and hind tibiæ at the apex prolonged below into a triangular spur. Legs haired as usual, the hairs mainly yellow but behind the front femora more or fewer black hairs, and middle femora with some black hairs on the anterior side in the apical half; front tibiæ more or less black-haired above and middle tibiæ above and on the anterior side; hind femora densely and somewhat strongly black setulose below, the wart very densely. Wings a little brownish tinged. Stigma consisting only of the cross-vein. Squamulæ whitish with a yellow fringe. Halteres yellow.

Female. Vertex and frons broad, a little widening downwards, brownish yellow pruinose, blackish about the ocelli; the hairs black. Occiput with or without dark spots at the upper eye-margin. Abdomen with the spots as in the male, the grey triangles at the hind margins of second and third segments larger and more distinct; fifth segment quite grey with a small, black middle stripe at the front margin. Venter without shining middle stripe, and with long, pale hairs. Legs paler, anterior femora often with only small black spots; hind femora simple, hind tibiæ with the apical spur present but short.

Length 8,5—9,5 mm.

H. transfugus is somewhat rare in Denmark; Utterslev Mose, Ordrup Mose, Ermelund, Fure Sø, Hillerød, Hellebæk, Rørvig; on Lolland at Maribo; on Langeland at Lohals, and in Jutland at Randers. My dates are $30/5$ — $25/8$. It occurs in fens and at borders of water. The pupa has been taken in Utterslev Mose in April and May and at Randers in May, in flood refuse (Schlick).

Geographical distribution:— Northern and middle Europe down into France; towards the north to middle Sweden, and in Finland.

10. *H. lineatus* Fabr.

1787. Fabr. Mantis. Ins. 357, 2 et 1794. Ent. Syst. IV, 375, 2 et 1805. Syst. Antl. 223, 2 ♂ (*Rhingia*). — 1817. Fall. Dipt. Suec. Syrph. 31, 28 (*Syrphus*). — 1822. Meig. Syst. Besch. III, 369, 1. Tab. XXXII, Fig. 7. — 1843. Zett. Dipt. Scand. II, 682, 7 et 1849. VIII, 3124, 7 et 1859. XIII, 5085, 7. — 1862. Schin. F. A. I, 341. — 1901. Verr. Brit. Fl. VIII, 545, 8, figs. 376—377. — 1907. Kat. paläarkt. Dipt. III, 111. — 1910. Beck. Berl. ent. Zeitschr. LV, 229. — *Rhingia muscaria* Fabr. 1794. Ent. Syst. IV, 375 et 1805. Syst. Antl. 223, 3. ♀.

Male. Vertex black, frons yellowish brown pruinose, the border between the colours indefinite; epistoma brownish yellow or dark yellow pruinose, the lower lateral parts black, shining but pruinose at the margin; jowls yellowish pruinose. Vertex and frons black-haired or the latter more or less to quite yellow-haired; epistoma with long, scattered, yellow hairs but only on the basal side parts, the rest bare; sometimes the hairs are mixed with black hairs. The epistoma is of a curious shape, it is a little hollowed below the antennæ and then the lower part is produced much forwards as a somewhat pointed snout, but not very descending. Occiput yellow or greyish yellow pruinose, with yellow hairs, darkest above, and here generally some black hairs, especially towards the sides; there may be a faint dark spot a each side. Antennæ with the basal joints blackish, the third brownish red; arista dark brown. Thorax black, dull, with two narrow stripes and the sides yellowish; the stripes and the pale sides are connected at the front and hind margins; thorax is clothed with longish, yellow hairs. Scutellum brownish yellow with the base and basal corners blackish; it has yellow hairs with some few black on the disc. Pleura greyish yellow pruinose, with yellow hairs. Abdomen dull black, second segment with somewhat triangular, yellow side spots, the spots stretch at the sides from the base to somewhat near the hind margin and are produced inwards with the front margin concave, the hind margin straight but sloping a little forwards and the inner end blunt; the inner end is covered by a larger or quite small, whitish, grey or greyish yellow pruinose spot; the third segment has yellow basal corner spots with a grey or greyish yellow pruinose spot produced inwards from the lower inner corner; at the apical corners of the segment are small, yellowish spots, and in the middle of the hind margin a small greyish, pruinose triangle; the fourth segment has the sides and hind margin greyish or yellowish pruinose, and from the side a shallow lunule stretching inwards nearest the front margin; the pale hind margin is triangularly produced in the middle. The spots may vary somewhat in size, and

the pruinose spots at the inner end on second and third segments may be very small. Abdomen is yellow-haired, at the hind margins or on the hind parts of the segments are black hairs; the hairs are not short, especially rather long at the hind margin of fourth segment. Genitalia large, greyish or yellowish pruinose, yellow-haired. Venter yellowish, darker and greyish at base and apex and generally along the middle, with long, pale hairs; the terminal appendages of the genitalia reddish, densely haired at the apex and front margin. Legs about as in *lunulatus* and *transfugus* but anterior femora black all round on the basal half though often a little pale at the base; the apical third of front tibiæ black and generally a distinct ring before the apex on middle tibiæ; the upper rings on tibiæ faint or nearly wanting; hind legs quite as in the two preceding species, and likewise very varying as to the extent of the black colour on femora, this colour often present only as a black blotch above in the middle stretching down on the sides; hind femora simple but much thickened. Legs quite or mainly pale-haired, there may be some black hairs behind the anterior femora towards the apex, and the hind femora are black setulose below in the apical half. Wings somewhat strongly

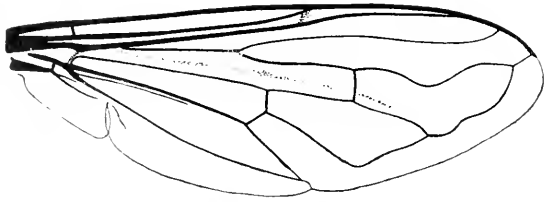


Fig. 158. Wing of *H. lineatus* ♂.

brownish²tinged, sometimes less; cubital vein with a rather shallow loop, and anal vein only slightly dipped down. Stigma consisting only of the cross-vein and it is weak. Squamulæ whitish with a yellow fringe. Halteres pale yellow.

Female. Vertex and frons broader than in the male, and rather broad, slightly widening downwards; vertex blackish, frons brownish pruinose, the hairs black. The middle lines on thorax generally broader than in the male, often widening inwardly behind and almost or quite united. The first abdominal segment with a large, grey lunule widening at the sides so that it leaves a black, semicircular spot at each side at the hind margin; the abdominal spots on second and third segments with the side parts smaller than in the male but stretching inwards as rather large, greyish or greyish yellow lunules, while the

lunules on fourth segment are narrower than in the male; the spots are sometimes quite grey; second segment with a transverse, greyish spot in the middle of the hind margin, third and fourth segments with the hind margin greyish, triangularly produced in the middle, on the third segment sometimes only a transverse triangle; fifth segment quite grey or greyish yellow, or with the front margin and an abbreviated middle line from it black; all the spots are pruinose.

Length 8—9,5 mm.

The types to this species, two males, are present in the collection of Tönder Lund and Sehestedt, and I have examined them. Also *muscarius* Fabr. is present in the collection in two females, but these are not types; it is, however, seen herefrom that *lineatus* is the male, *muscarius* the female, which also is seen from Fabricius' descriptions.

H. lineatus is common in Denmark; Ordrup Mose, Dyrehaven, Bøllemosen, Lyngby Mose, Ørholm; on Lolland at Maribo, in Merrits Skov and Prierskov; on Funen at Odense; in Jutland in Nørholm Skov at Varde, at Horsens and at Hald near Viborg. My dates are ²⁵/₅—¹⁶/₈. It occurs in fens and at borders of water on water plants. I have taken it in copula on ¹¹/₆.

Geographical distribution: — All Europe down into Italy; towards the north to northern Sweden, and in Finland; it occurs probably also in North America (*conostoma* Willist.).

11. *H. vittatus* Meig.

1822. Meig. Syst. Besch. III, 378, 1 (*Mallota*). — 1862. Schin. F. A. I, 339. — 1901. Verr. Brit. Fl. VIII, 548, 9, fig. 378. — 1907. Kat. paläarkt. Dipt. III, 112. — 1910. Beck. Berl. ent. Zeitschr. LV, 230.

Male. Vertex moderately broad, black; frons widening below, yellow pruinose; it is somewhat strongly prominent; epistoma whitish pruinose, below the antennæ to the central knob brownish pruinose; the knob black, bare down to the mouth edge; on the lower lateral part is only a small, black, shining spot; jowls whitish grey pruinose. Vertex black-haired, posteriorly yellow-haired, frons yellow-haired; epistoma with long, white hairs; the epistoma is distinctly hollowed below the antennæ, the central knob somewhat prominent and below it the epistoma retreating to the front mouth edge, the lower part thus not prominent and slightly descending. Occiput greyish, above yellow.

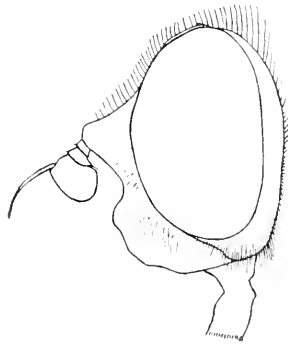


Fig. 159. Head of *H. vittatus* ♂.

lowish pruinose. the hairs whitish below, yellow above, and no black hairs at the upper eye-margin. Antennæ black, third joint of a curious shape, it is higher than long, straight above with a rectangular upper corner: arista somewhat short, rather thickened in the basal two thirds. Thorax dull black with two greyish, a little shining stripes and a narrow median stripe, abbreviated behind; the stripes are confluent behind or disappearing in a shining space in front of scutellum; the sides are broadly yellowish. Thorax is clothed with short, yellow hairs. on the postalar calli are numerous black hairs, and also some inwards to the calli. Scutellum reddish brown with the base black, and with short, yellow and black mixed hairs, longer and yellow at the margin. Pleura greyish pruinose with yellow hairs. Abdomen somewhat narrow, tapering behind and thus conical; it is black, dull, the hind margins greyish, shining; the first segment grey, the second has narrow, yellow side spots from the base to somewhat near the hind margin, and in the middle two distantly placed, greyish yellow pruinose longitudinal stripes, a little lunulate and a little oblique with the posterior end nearest the side; the third segment similarly marked but also the side spots greyish yellow pruinose; the fourth segment with a greyish yellow side margin and the middle stripes straight, not lunulate, and broadest behind (the longitudinal middle stripes are naturally to be considered as the separated inner ends of very deep lunules). Abdomen is clothed with yellow hairs, black at the apex. Genitalia yellowish pruinose, with yellow hairs. Venter blackish grey, dull, with slightly paler incisures, and with long, pale hairs. Legs black, the knees and a more or less distinct ring on the middle of the tibiæ yellowish or reddish, on front tibiæ the ring generally only seen behind; hind femora not much thickened; all tarsi rather flat and broad, especially towards the end. The legs somewhat short-haired, the hairs nearly all pale, on middle femora some very short, black hairs below on the apical half of the anterior side and middle tibiæ with some black hairs below; hind femora black-setulose below in the apical half. Wings a little brownish tinged. Stigma consisting only of the cross-vein. Squamulæ whitish with margin and fringes yellow. Halteres yellow.

Female. Vertex and frons broader than in the male, slightly widening downwards: vertex black, frons yellow pruinose, above the antennæ more greyish; the hairs black on vertex, yellow on frons. Thorax with the stripes broader, more distinct and more yellow, but not shining, the space in front of scutellum more yellowish grey and less shining, the sides more broadly yellow. Abdominal spots as in the male but larger; fifth segment pointed, greyish yellow with a

triangular, black middle stripe on the front part; the hind margins of the segments more grey but less or not shining. The anterior knees more orange.

Length 10,5—12,5 mm.

H. vittatus is very rare in Denmark, only three specimens have been caught, a male and two females, all on Amager; a male and a female were taken on $^{25}/7$ and $^9/8$ 1909 (J. C. Nielsen) and a female on $^{29}/8$ 1915 (Klöcker); they were flying rapidly but low over a ditch with water and rich herbage.

Geographical distribution:— Middle Europe down into Austria; it has its northern limit in Denmark, and occurs in England.

31. **Myiatropa** Rond.

This genus is nearly related to *Eristalis* and *Helophilus* and stands intermediate between them. The eyes are hairy and touching in the male. Antennæ inserted in the middle of the head, third joint oval; arista long, apparently bare. Epistoma a little hollowed below the antennæ, with a moderate central knob and retreating to the mouth edge; it is thus not produced, a little descending; it has a black, bare middle stripe. Thorax with curious, pale pruinose, transverse markings, more or less distinct. Abdomen rather broad, with yellow markings, similar to those in *Helophilus*, but with pruinose spots only on the last, or (in the female) on the two last segments. Genitalia of medium size. Legs simple, hind femora not thickened; the curious hair above on the trochanters present. Wings as in *Helophilus* with the subcostal cell open; I find no distinct hairs on the basal part of the radial vein. Stigma mainly consisting of a thick cross-vein. Squamulæ as in *Eristalis*. Plumula of a curious shape, divided into branches from the base, and with branched hairs.

With regard to the developmental stages De Geer suspected (Mém. Ins. VI, 1776, 101) that the larva belonged to the rat-tailed form, as he had seen the flies sitting on the mud as for depositing the eggs. Beling (Verh. zool. bot. Gesell. Wien, XXXVIII, 1888, 4) describes the larva and pupa (*H. nigrotarsatus*); he found one larva and six pupæ in decaying wood on a beech (*Fagus*) on $^{30}/4$, the imagines came $^{19}/5$ — $^{22}/5$; another pupa was found under similar circumstances on $^{27}/4$, it developed on $^{21}/5$. I have myself examined larvæ taken at a fen in a tree-stub with water on $^{22}/4$, they developed on $^{18}/5$, a pupa taken in a tree-stub with water on $^{12}/4$, developing on $^{11}/5$, and another pupa taken at a ditch on $^4/5$ and developing on $^{16}/5$. — The larva is quite similar to that of *Eristalis*, perhaps a little more flattened; the

regularly arranged and a little larger spines, described above for the *Eristalis*-larva, are distinct and a little larger; otherwise the dermis is likewise finely chagreened from small spinules; the anterior spiracles, the antennæ-like papillæ, the ventral prolegs and the tail are all similar. One of my specimens shows very distinctly the thread-like organs protruding from the anal opening. The length of the larva is 17 mm. The pupa is likewise similar to the *Eristalis*-pupa; it is pale, dirty whitish, 12 mm long; in my specimens the anterior larval spiracles are only slightly visible on the pupa. The larva evidently lives in a similar way as the *Eristalis*-larva.

Of the genus only one, widely distributed species is known, also occurring in Denmark.

1. *M. florea* L.

1758. Linn. Syst. Nat. X, 591 et 1767. XII, 2, 984, 29 et 1761. Fn. Suec. 1796 (*Musca*). — 1764. O. F. Müll. Fn. Fridrichsd. 713 (*Musca*). — 1775. Fabr. Syst. Entom. 764, 8 (*Syrphus*) et 1805. Syst. Antl. 233, 9 (*Eristalis*). — 1817. Fall. Dipt. Suec. Syrph. 30, 25 (*Syrphus*). — 1822. Meig. Syst. Besch. III, 399, 21 (*Eristalis*). — 1843. Zett. Dipt. Scand. II, 669, 15 et 1849. VIII, 3114, 15 et 1855. XII, 4652, 15 (*Syrphus*). — 1862. Schin. F. A. I, 338 (*Helophilus*). — 1901. Verr. Brit. Fl. VIII, 521, 1. — 1907. Kat. paläarkt. Dipt. III, 112. — *Helophilus nigrotarsatus* Schin. F. A. I, 339.

Male. Vertex black, frons dark greyish yellow pruinose, shining above the antennæ; epistoma yellow pruinose with a black, shining middle stripe, not reaching the antennæ, and with the lower side parts black. Vertex and frons black-haired or the latter more or less to quite yellow-haired; epistoma with yellow hairs; the epistoma somewhat hollowed below the antennæ, with a moderate central knob and retreating below it; it is not protruding and slightly descending. Occiput whitish grey pruinose, but it is very narrow or disappearing above; the hairs whitish below, yellow above and here there are some black hairs at the eye-margin. Eyes with somewhat short, pale hairs. Antennæ black, third joint longer than broad; arista long, bare. Thorax black, dull, with some more or less distinct, greyish yellow or grey, sometimes almost whitish markings, caused by pruinosity; the markings are a transverse band at the front margin, divided in the middle and here traces of two short, longitudinal stripes may be seen; then a transverse band following the transverse furrow, likewise divided in the middle, and finally a band in front of scutellum; sometimes the middle part between the two anterior bands is greyish so that the whole front half becomes grey with a black spot at each side; thorax is clothed with yellow hairs, especially bright at the side

margins, and they are long on the postalar calli; the black space between the posterior bands is more or less black-haired so that a black-haired cross-band is formed, broadest at the sides; also on the anterior black spots may be some black hairs. Scutellum brownish, paler at the margin; it is black-haired on the disc, but yellow-haired all round the margin. Pleura greyish pruinose with long, yellow hairs. Abdomen black, dull, with a shining transverse band anterior to the hind margin on third and fourth segments, and sometimes on the middle of second segment; the second segment has a pair of triangular, yellow or orange side spots, not reaching the hind margin and broadly separated in the middle; third segment has large, somewhat transversely rectangular basal corner spots close to the front margin and reaching backwards to the middle or a little beyond; fourth segment has a pair of greyish or yellowish, pruinose transverse spots at the basal corners, less broadly separated in the middle than the other spots, and generally there is a similar, transversely triangular spot at the hind margin; the hind margins of the segments are yellow, broadest in the middle, narrowing or disappearing towards the side margins. Abdomen is clothed with relatively long, yellow hairs, the hind margins of second and third segments black-haired, generally broadest on second segment. Venter blackish with pale incisures and side membrane, and with long, yellow hairs. Legs black, femora with the apex yellow, slightly on hind femora; front tibiæ with about the basal half, middle tibiæ with the basal two thirds and hind tibiæ with about the basal third yellow; tarsi either all black or the anterior, especially the middle tarsi more or less yellow at the base: sometimes the tibiæ much more yellow, the anterior with only the apex black and the hind tibiæ with the basal two thirds yellow. Legs haired as usual; the colour of the hairs very varying, sometimes nearly all yellow or only black on the black part of hind tibiæ, or they are black to a high degree, only yellow or partly so on the yellow parts of tibiæ; middle femora relatively long-haired on the anterior side, hind femora black-setulose below in the apical part. Wings more or less brownish tinged on the anterior basal half. Squamulæ pale brownish with a darker margin and a yellow fringe. Halteres yellow.

Female. Vertex moderately broad, the frons widening downwards; vertex black, frons yellow pruinose with a broad, black stripe from the vertex to the antennæ, widening downwards; the hairs black on vertex and down the middle stripe, but yellow on the sides; the black lower side parts of epistoma are generally yellowish towards the oral margin. The markings on thorax generally more distinct, the whole front half greyish white with two black side spots. Abdominal

markings mainly as in the male, the fifth segment marked as the fourth. Legs paler, the apex of femora more broadly yellow, anterior tibiæ with only apex black and middle tarsi generally yellow at the base.

Length 10—14 mm.

As seen this species varies somewhat, especially with regard to the markings on thorax and the colour of the legs, and also in size; the Danish specimens come nearest to the darker form described by Schiner as *nigrotarsatus*; in southern regions the species varies much more, the legs being yellow to a high degree and the markings on thorax exaggerated; the design on thorax then may show some resemblance to a "Death's head", which induced Rondani to give the generic name derived from *μῦθα ἄτροπος*.

M. florea is common in Denmark; Copenhagen, Ordrup Mose, Ermelund, Dyrehaven, Hareskov, Donse, Tyvekrog, Frersiev Hegn, Tisvilde, at Sorø, Slagelse and Thureby; on Lolland at Maribo and in Kældskov; on Funen at Veflinge and Middelfart; in Jutland at Horsens and on the little island Endelave, at Frijsenborg, Hald near Viborg and Rebbild near Skørping. My dates are $13/5$ — $26/8$. It occurs especially near water and frequents various Umbelliferæ. The larva was found in Bollemosen on $22/4$ in a tree-stub with water, it developed on $18/5$ (Schlick), and pupæ (or larvæ) were taken in Hareskov, likewise in a tree-stub with water, on $12/4$, and at a ditch on $4/5$, they developed on $11/5$ and $16/5$ (Kryger).

Geographical distribution:— All Europe, Syria, northern Africa and on the Canaries; towards the north to northern Sweden, and in Finland.

32. **Mallota** Meig.

Also this genus is nearly related to *Eristalis* and *Helophilus*. The species are large and somewhat *Eristalis*-like, with a black, unspotted abdomen, or with only slight spots. They are densely pilose, either all over the body or only on thorax. The eyes are bare, nearly touching in a point in the male, separated in the female. Antennæ inserted above the middle of the head; they are short, third joint higher than long; arista long, apparently bare. Frons somewhat prominent; epistoma hollowed below the antennæ, with a moderate but distinct central knob and below it retreating to the mouth edge and a little descending; it is pale pruinose with a black middle stripe, and thinly haired with long hairs. Thorax without markings. Abdomen (in the Danish species) somewhat long and a little conical; genitalia

large. Legs somewhat robust, hind femora strongly thickened, with a small swelling with dense hairs below near apex; hind tibiæ broad and compressed; tarsi somewhat broad and flat; the curious, long bristle above the trochanters present, sometimes represented by two, close-standing hairs. Claws and pulvilli large and strong; empodium small, bristle-shaped, hairy. Wings as in *Helophilus*, the subcostal cell narrowly open; the basal part of the radial vein with fine hairs. Stigma small, stigmatal cross-vein present. Thoracal squamula as in *Eristalis*, with long, branched hairs, alar squamula with short, flattened hairs. Plumula not long, with branched hairs.

The above description refers to the sole Danish species, *cimbiciformis*; this species belongs to the subgenus *Zetterstedtia*, created by Rondani for the species with bare eyes, which are approximated in the male, and with strongly thickened hind femora; a group of species has the eyes hairy, separated in the male, and the hind femora more slightly thickened; these species then come in *Mallota* s. str. The American species *posticata* Fabr. has hairy eyes but they are approximated in the male. Most species have a rather short, somewhat rounded abdomen in contrast to the longer abdomen in *cimbiciformis*.

The developmental stages are described by Becher (*M. eristaloides*) (Wien. ent. Zeitg. I, 1882, 253); he found the larvæ and pupæ in a hollow poplar at the end of May, the imagines came at the beginning of June. I have examined larvæ found in holes in a maple-tree and in a beech on $\frac{1}{7}$ and $\frac{28}{7}$. The larva is similar to an *Eristalis*-larva, but it is more flattened, not cylindrical but elliptical in a transverse section; the antenna-like papillæ and the anterior spiracles as in *Eristalis*; the body is very strongly and deeply corrugated; the dermis is so finely chagreened that it is practically smooth, but the usual regularly arranged larger spines are present and distinct, and they are divided into several branches; especially those at the sides are long; on the ventral side there are likewise seven pairs of proleg-like warts beset with small spines, one pair on prothorax and six on the first six abdominal segments; at the posterior end the body is much flattened and the spines at the sides are here prolonged to papillæ increasing in length backwards and divided into several hairs at the end; the tail-part is rather thin and long, and able to be much elongated; as in *Eristalis* it consists of a long, corrugated basal part, a longitudinally striated middle part and a chitinous end part; there are also here four small papillæ on each side of the first division, one at the base, one at the apex and two intermediate; besides there are branched hairs on the sides of the basal part of first division.

The length of the body is 20 mm or more¹. The pupa is also similar to an *Eristalis*-pupa, but, however, rather characteristic; it is thickest a little before the middle, behind it is attenuated and flattened and with the side margin marked as an edge; towards the anterior end it is a little attenuated and rather flattened, and thus this end has quite another shape than in the *Eristalis*-pupa; the four horns are present as in *Eristalis*, but on account of the shape of the anterior end the prothoracal spiracles of the pupa lie longer behind the larval spiracles than in *Eristalis*. The length of the pupa is 18—20 mm.

The species of *Mallota* are large, strong and robust, more or less Bee-like flies; they frequent Umbelliferæ and other flowers.

Of the genus 5 species are known from the palæarctic region, two belong to *Mallota* s. str. and three to *Zetterstedtia*; one species (of *Zetterstedtia*) is found in Denmark.

1. *M. cimbiciformis* Fall.

1817. Fall. Dipt. Suec. Syrph. 27, 18 (*Syrphus*). — 1822. Meig. Syst. Besch. III, 285, 3 (*Eristalis*). — 1843. Zett. Dipt. Scand. II, 663, 8 et 1855. XII, 4652, 8 (*Syrphus*). — 1901. Verr. Brit. Fl. VIII, 552, 1, fig. 379. — 1907. Kat. paläarkt. Dipt. III, 114. — *M. eristaloides* Loew, 1856. Neue Beitr. IV, 17 et 43, 35. — 1862. Schin. F. A. I, 343. — *Imatisma posticata* Macq. (nec Fabr.) 1842. Dipt. exot. II, 126, 1, Pl. XII, fig. 2. — *M. posticata* 1856. Loew, Neue Beitr. IV, 18. — 1862. Schin. F. A. I, 343.

Male. Vertex rather large, black, slightly brownish just in front; frons greyish pruinose behind, more yellowish at the sides anteriorly, with a large, bare, black space above the antennæ; epistoma greyish yellow pruinose with a bare, black middle stripe, not reaching the antennæ, the lower lateral parts broadly black and also the extreme mouth edge; the epistoma is considerably hollowed below the antennæ, with a moderate central knob, below which it is slightly retreating, the lower part a little prominent and a little descending. Vertex and frons black-haired, epistoma with long, sparse, pale hairs at the sides. Occiput brownish pruinose, whitish along the eye-margin on the lower half, black above; the hairs are whitish below, yellow above, but here with many black hairs, and the short hairs on the middle part black. Antennæ short, third joint higher than long with a tendency towards an angle above; the basal joints black or brownish, third joint brown;

¹ Becher says: "Fussstummeln fehlen", he must thus have overlooked the spined, proleg-like warts, though they are nearly as pronounced as in *Eristalis*; when he says about *Helophilus* that the chitinised apical part of the spiracular tube in the larva seems to be wanting is this not correct, the *Helophilus*-larva has the tube constructed quite as in the *Eristalis*-larva.

arista brown, long and bare. Thorax grey or greyish yellow pruinose, with indications of three paler stripes, but the colour is nearly hidden under the dense pile, as thorax is densely clothed with long, pale hairs. Scutellum yellowish with similar hairs as on thorax. Pleura with long, whitish yellow hairs. Abdomen somewhat long, black or

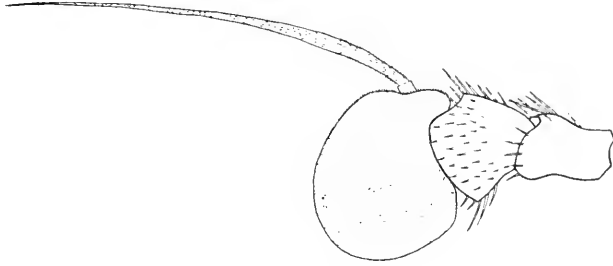


Fig. 160. Antenna of *M. cimbiciformis* ♂. from the inside. $\times 40$.

bluish black, shining, with more or less narrow and obscure, reddish hind margins to the segments; on second segment are a pair of more or less obscure, yellowish, triangular spots near the basal corners, and the basal corners of third and fourth segments may also be yellowish, this colour sometimes vaguely extended in on the segments; sometimes abdomen is quite unspotted. Abdomen is clothed with short hairs, which are sometimes all black, only at the base whitish, but sometimes also whitish on the front part of third and fourth segments, the whitish-haired space widening out towards the sides; at the side margin the hairs are long and all white, or black at the hind corners of the segments. Venter black with long, pale hairs. Legs black, the extreme apex of the femora and generally also the extreme base of hind femora reddish, and the basal part of the tibiæ may be more or less reddish or yellowish, especially on middle tibiæ, which may be yellow to near the apex; tarsi black or more or less brownish, especially the posterior pairs. Hind femora much thickened, hind tibiæ broad, curved and somewhat compressed; the tarsi rather flat and broad. Legs densely and longish-haired, hind trochanters with short, dense, black hairs below, the hairs otherwise very varying in colour from nearly all pale to nearly all black; hind femora with scattered, long hairs below and with dense, short, black hairs which form a dense clump, placed on a small swelling before the apex. Wings more or less brownish tinged and with a more or less distinct fascia down from the stigma. Stigma small. Squamulæ dirty yellowish with a pale yellow fringe. Halteres yellow.

Female. Vertex broad, black, frons a little more brownish, but black and shining on the part above the antennæ, a little yellowish at the eye-margins; the hairs black on vertex, paler on frons but black above the antennæ. Abdomen generally more white-haired than in the male.

Length 15—17 mm.

This species is rather like *Eristalis tenax* but cannot be confounded with it.

M. cimbiciformis is rare in Denmark; Ordrup Mose, Dyrehaven and on Moen. My sole date of capture is ²²/₆. Only few specimens have been taken, but it has been bred in great numbers by Mr. Schlick; the larvæ were taken in Dyrehaven on ¹/₇ and ²⁸/₇ in water in a hollow maple-tree and a hollow beech.

Geographical distribution:— All Europe, towards the north to middle Sweden; it is also recorded from North America.

33. **Merodon** Meig.

The genus is related to the other genera of the *Eristalinae* among others by the similar wing-venation. The species are of large or medium size and densely pilose. Eyes hairy, touching for a short distance in the male, separated in the female. Antennæ inserted in the middle of the head; they are somewhat short (or elongated in foreign species), the third joint a little elongated with an upper apical angle; arista not long, apparently bare. Epistoma with no central knob, a little arched just below the antennæ, hollowed in the middle and then produced to a prominent upper mouth edge, and almost not descending; it is black, slightly pruinose, hairy. Clypeus has the basal part somewhat long. Proboscis of some length; palpi short with numerous long hairs at the apex. Thorax rectangular. Scutellum black, without any distinct marginal fringe directed downwards. Abdomen shorter or longer, in the male consisting of four visible segments as in the related genera; genitalia somewhat large; the fourth ventral segment narrow, bent somewhat downwards and deeply incised in the hind margin, the fourth dorsal segment with the sides bent broadly down on the ventral side; (in some foreign species the fourth ventral segment is less incised). Legs strong and robust, hind femora considerably thickened and with a triangular tooth below near the tip in both sexes; hind tibiæ more or less dilated and compressed; tarsi broad and flat. The males of some species have processes on hind coxæ, or they have (such as our *equestris*) a spur at the apex of hind tibiæ. The curious long, bristly hair above the trochanters is present.

at all events on the anterior legs. Claws and pulvilli large and strong; empodium small, bristle-shaped. Wings with a venation about as in *Helophilus*, but the subcostal cell more widely open, the radial vein ending in the middle between the subcostal and cubital veins; anal vein not dipped downwards; the base of the radial vein with fine bristles. Vena spuria almost not produced beyond the medial cross-vein. Stigma consisting only of the stigmatical cross-vein. Thoracal squamula with long, branched hairs, alar squamula with shorter, flattened hairs. Plumula somewhat short, with simple, not branched hairs.

The developmental stages are rather well known because a species (*equestris*, perhaps also other species) is injurious to *Narcissus*. Already Réaumur (Mém. Ins. IV, 1738, 497, Pl. 34, fig. 1—12) mentions and figures a species, generally considered as *M. clavipes* but perhaps more probably *equestris*; he had got the larvæ in bulbs of *Narcissus* in November, and the imagines developed the next April. Van Roser (Württemb. Corr. Blätt. 11, 1834) and Serville et St. Fargeau (Encycl. Méthod. X, 1825, 525) mention the same. The larva and pupa of *M. equestris* (*narcissi*) are described and figured by Bouché (Naturg. Ins. I, 1834, 52, Tab. V, Fig. 7—13 et Stett. ent. Zeitg. VI, 1845, 150) from bulbs of *Narcissus niveus*. Besides other papers, often appearing in gardening and agricultural papers, there is an elaborate monograph by Ritzema Bos (Arch. du Mus. Teyler, 2, II, 1885) with some bibliography of the subject. Verrall records (Brit. Fl. VIII, 1901, 559) several samples of its breeding and its damages in England, and Stickel (Berl. Ent. Zeitschr. LIII, 1908, 202) mentions the larva in bulbs of *Amaryllis vittata* in autumn, they pupated in the earth and the pupa hibernated. — The larva is not of the rat-tailed type; according to the descriptions it is somewhat similar to a *Syrphus*-larva, the body is elongated elliptical, somewhat flattened, especially below, of greyish yellow colour; it is evenly attenuated towards the anterior end, more abruptly behind; it is transversely corrugated, densely beset with fine hairs, among which some stronger. There are distinct mouth hooks and the usual antennalike papillæ; on prothorax are the small anterior spiracular processes; above on the last segment is a short, black posterior spiracular process, and to each side of it is a pointed process or wart. The length is 16—23 mm. The pupa is darker, for the rest similar to a contracted larva; it has prothoracal spiracular tubes, directed forwards and diverging; the length is about 14 mm. As far as is known the female deposits the eggs on the ground at the food-plant; the larvæ live in and devour the bulbs of *Narcissus* and bulbs of other allied plants; there is only one, sometimes two larvæ in each bulb; the larva is full grown in autumn, and it seems to hibernate and pupate

and develop early the next spring; the pupa is generally found in the earth near the bulb.

The species of *Merodon* are beautiful, somewhat Bee-like flies; the genus is of southern occurrence, numerous species occurring in southern Europe and North Africa, but the species are far from being well known. They are recorded to occur on meadows and to frequent especially Umbelliferæ.

Of the genus nearly 65 species are known from the palæarctic region; one is found in Denmark.

1. *M. equestris* Fabr.

1794. Fabr. Ent. Syst. IV, 292, 51 (*Syrphus*) et 1805. Syst. Antl. 196, 2. — 1822. Meig. Syst. Besch. III, 352, 2, Tab. XXXI, Fig. 23 et 1838. VII, 141. — 1862. Schin. F. A. 1, 344. — 1901. Verr. Brit. Fl. VIII, 556, 1, figs. 380—381. — 1907. Kat. paläarkt. Dipt. III, 117. — 1913. Sack, Abhandl. Senckenb. Nat. Gesell. 31, 428, Tab. 24, Fig. 5. — *Syrphus flavicans* Fabr. 1794. l. c. IV, 292, 52 et 1805. l. c. 242, 40 (*Eristalis*). — 1822. Meig. l. c. III, 355, 8. — *Eristalis narcissi* Fabr. 1805. l. c. 239, 32. — 1822. Meig. l. c. III, 354, 6. — *Eristalis ferrugineus* Fabr. 1805. l. c. 240, 35. — 1822. Meig. l. c. III, 355, 7. — *M. nobilis* Meig. 1822. l. c. III, 353, 3 et 1838. VII, 141. — *M. transversalis* Meig. 1822. l. c. III, 354, 4. — *M. constans* Meig. (nec Rossi) 1822. l. c. III, 354, 5. — *M. validus* Meig. 1822. l. c. III, 365. 24. — 1862. Schin. F. A. 1, 347.

Male. Vertex long, brownish yellow pruinose, frons greyish pruinose, both with long, yellow hairs, more or less hiding the colour; epistoma black, shining, slightly greyish pruinose, with long, pale hairs; the epistoma has no central knob, it is arched just below the antennæ, hollowed in the middle and then produced to the rather prominent front mouth edge; it is almost not descending. Occiput greyish pruinose, the hairs yellow. Eyes with pale yellow hairs. Antennæ black, third joint a little elongate, straight or slightly concave above, with a more or less distinct upper angle; arista not longer than the antennæ, bare, brownish at the base. Thorax black, or more or less brown on the front part, shining; the ground colour nearly hidden by the long and dense pile, which is yellow on the paler front part, for the rest black. Scutellum black and black-haired. Pleura with long hairs which, as on the disc, are yellow in front, black behind. Abdomen somewhat conical, blackish, shining; it is long and densely pilose, the hairs black at the base, reddish on the apical part, or they are all pale, whitish at the base, yellow to reddish on the apical part. Venter black, with long, pale or mainly pale hairs; fourth segment bent somewhat downwards, incised in the middle of the hind margin; genitalia rather large. Legs strong and robust, black, at most reddish just on the anterior

knees; the anterior femora somewhat thickened, the hind femora considerably thickened with a triangular tooth below near apex on the anterior side; hind tibiæ broad in the apical two thirds, somewhat thickened after the middle, with a dilatation on the ventral side, compressed before apex and here especially incurved on the posterior side and the apex bent somewhat towards this side; on the posterior side the apex itself is prolonged into a strong, flattened and curved spur; all tarsi somewhat broad. The legs haired in the usual way, the hairs on femora rather long and dense; they are all or nearly all black, and likewise on tibiæ or more or less to quite pale on the anterior tibiæ; there are some longer hairs on the posterior side of middle tibiæ and on the dilatation below the hind tibiæ. Wings almost hyaline or somewhat tinged. Stigma consisting only of the cross-vein. Squamulæ and fringes smoky to black. Halteres brownish or black.

Female. Vertex and frons somewhat broad, widening evenly down to the antennæ; vertex and a middle stripe down to the antennæ black, the sides of the frons brownish pruinose; the hairs black on vertex, paler downwards but varying. The hairs on thorax all black, on abdomen black on the basal half, yellow or reddish on the apical half, or they are all yellow on thorax and yellowish grey on abdomen. Hind femora less thickened than in the male, but with the same triangular tooth; hind tibiæ almost simple and with no apical spur.

Length 11—13,5 mm.

The above description is made from our few Danish specimens; the males belong to the var. *equestris* (one specimen with the base of abdomen black-haired answers to *bulborum* Rond.), while the females are of the var. *validus*, except one specimen of the var. *narcissi*. In other regions the species varies very considerably, from nearly all black-haired to all pale-haired and with all intermediates; the varieties were not recognized as such and were consequently described as species; now it is clearly recognized that we have only one species

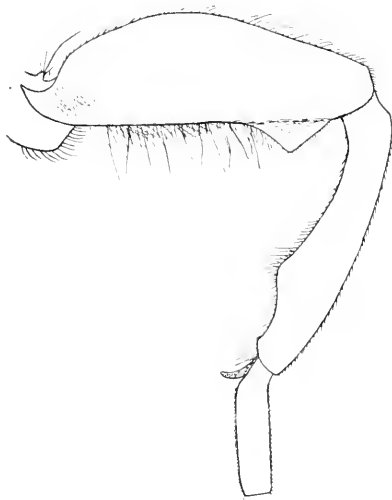


Fig. 161. Hind leg of *M. equestris* ♂.
from the anterior side. $\times 12$.

with an apical spur of the described shape on the hind tibiæ of the male, and upon the whole with the hind tibiæ of such a shape.

M. equestris is rare in Denmark; Copenhagen in gardens, Ordstrup Mose, Ørholm (the author), Fuglevad, Søllerød (Klöcker); on Funen at Odense, and in Jutland at Munkebjerg at Vejle Fjord (N. P. Jørgensen) and at Silkeborg (Esben Petersen). The dates are $^{28}/_4$ — $^{3}/_7$. Further I possess a specimen bred from a flower-pot by Mr. E. Suenson, the imago came on $^{10}/_4$. As the species besides in gardens also has been taken on other localities it now seems to live in Denmark, but it is of course introduced, and it has never appeared in any number nor done any damage. The species evidently spreads towards the north, thus Dr. Ammitzböll has kindly communicated to me that in 1915 the species was in May to July one of the most common Syrphids in the vicinity of Ystad in southern Scania, while there were earlier taken only three specimens in 1910.

Geographical distribution:— The species is distributed over all middle and southern Europe, and in North Africa; it was not known from Sweden before 1910 (Ringdahl, Entom. Tidskr. 32, 1911, 124), but it now seems common in southern Sweden (see above).

IV. Milesiinae.

34. **Tropidia** Meig.

Species of medium size and a somewhat narrow shape, with reddish markings on abdomen; they are slightly haired. Head semi-globular, not short, as broad as thorax and a little broader than high; it is slightly excavated behind. Eyes touching in the male, separated, but not broadly, in the female; they are bare; the facets in the male somewhat considerably enlarged on the upper front part. Antennæ inserted in the middle of the head; they are short, third joint nearly square; the basal joints have small hairs, the third and the arista microscopically hairy. Epistoma keel-shaped, without central knob, straight from the antennæ to the mouth edge and not descending; it is black and yellow but pale pruinose, with a black, bare middle stripe. Frons and epistoma without hairs. Jowls not descending; they are separated from epistoma by a furrow which stretches up to the middle of epistoma separating off narrow, short-haired eye-margins. Oral cone and proboscis of some length; clypeus of usual shape. Labrum long, of the usual construction, the median process the longest, cleft and with emergences at the apex; the upper lateral process delicate, the lower drawn a little out at the apex; hypopharynx a

little shorter than labrum; maxillæ likewise of usual shape, the lacinia a little shorter than hypopharynx, its microscopical spines especially distinct at the apex; the palpus a little shorter than the lacinia, with microscopical hairs and some bristles. Labium with the basal part and the oval labella of about equal length. Thorax rectangular; scutellum black with the apical margin yellow, and with a slight marginal fringe below. There are no bristles present, but the postalar calli have somewhat strong hairs, and at the margin of scutellum are long, almost bristly hairs. Abdomen of the breadth of thorax, elongated, somewhat narrowed behind; it is flat; in the male there are four not transformed segments, the first short, the other three of equal length; the fourth dorsal segment is about square or somewhat widened behind, but the apical corners are bent down as rounded triangular flaps; the fourth ventral segment is bent downwards and has a dense brush of hairs at the hind margin to each side of the middle; it is roundly incised in the front margin; the fifth ventral segment is present in its whole breadth, but quite short and quite hidden; the other segments lying as usual on the left side and turned to the right;¹ the ninth segment, the hypopygium, has elongated, triangularly spoon-shaped, hairy, outer lamellæ, and long terminal appendages, hidden under the fourth segment. In the female there are five normal abdominal segments, the fifth small, the rest hidden, the last ending with two lamellæ. Legs with the hind femora strongly thickened and curved, and in both sexes with a triangular tooth below at apex on the anterior side; hind tibiæ curved and somewhat compressed; the legs almost quite short-haired, only middle femora with long hairs behind; above on the trochanters a short bristle. Claws and pulvilli well developed; empodium not quite small, spine-shaped, hairy. Wings with the cubital vein curved a little down above the first posterior cell (in the non-Danish *fasciata* distinctly looped); medial cross-vein after the middle of the discal cell, rather sloping; anal vein dipped a little downwards in the middle; radial vein with very fine hairs on the basal part; no stigmatal cross-vein. Thoracal squamula with long, branched hairs, alar squamula with shorter, somewhat flattened hairs. Plumula quite short, with the hairs simple or slightly branched at the base.

The developmental stages were hitherto not known, but I have examined puparia from which *T. scita* was bred. The puparium is

¹ Verrall says (Brit. Fl. VIII, 128) that the genitalia are symmetrical, this is erroneous; they may look so seen from above, but they are principally constructed as in other Syrphids.

nearly cylindrical but a little flattened below; it shows here traces of seven pairs of spined prolegs; it is rounded in front, slightly attenuated behind: the dermis is densely covered with very short and fine spines: on the anterior part of the dorsal side are the prothoracal spiracles as two short, rounded, nearly egg-shaped, red tubes, with small, scattered tubercles; at the posterior end there are some small filaments at the sides, and at the end itself is a nearly 1 mm long, about cylindrical posterior spiracular process with indications of a longitudinal dividing line; its end is flat and bears the spiracles. The puparium is of a whitish yellow or dirty yellow colour and nearly 7 mm long. — The pupæ were sifted in spring from flood refuse in a fen; the imagines came on ¹⁴/₆.

Of the genus 4 species are known from the palæarctic region (one of them from China); one species occurs in Denmark.

1. *T. scita* Harris.

1776. Harr. Expos. engl. Ins. 107, Pl. XXXII, fig. 41 (*Musca*). — 1901. Verr. Brit. Fl. VIII, 568, 1, figs. 395—399. — 1907. Kat. paläarkt. Dipt. III, 121. — *Eristalis milesiiformis* Fall. 1817. Dipt. Suec. Syrph. 52, 5. — *T. milesiiformis* 1822. Meig. Syst. Besch. III, 347, 2, Tab. XXX, Fig. 14. — 1843. Zett. Dipt. Scand. II, 883, 1. — 1862. Schin. F. A. I, 349. — *T. dorsalis* Macq. 1827. Soc. Sc. Lille, 285, 1 et 1834. Suit. à Buff. I, 518, 2. — 1838. Meig. l. c. VII, 141, 3.

Male. Vertex long and narrow, black, frons and epistoma whitish yellow pruinose, the latter with a bare, black middle line; the ground colour of epistoma below the pruinosity is blackish below the antennæ, yellow on the middle, but black again from the lateral angles of the oral margin to the eye; the lower side parts are yellowish and bare. Vertex has slight, yellow hairs, at the anterior point black hairs; frons and epistoma without hairs; the epistoma is keel-shaped, straight from the antennæ to the not prominent mouth edge. Occiput greyish black, slightly pruinose, the hairs yellow, not dense, short, slightly longer above. Antennæ brownish or blackish, third joint nearly square. Thorax black or æneous black, shining, the humeri and a spot inwards to the wing-root silvery pruinose; it is clothed with short, yellow hairs, on the hinder half these hairs are a little longer but sparse, and there are here dense but exceedingly short, depressed, black hairs, the disc is therefore here more punctate and less shining; the postalar calli have short, black, bristly hairs. Scutellum black with the apical margin yellow, it has short, black hairs and at the margin long, yellow, almost bristly hairs. Pleura greyish white pruinose, with short, pale hairs. Abdomen mainly reddish or yellow, first segment except the

side margins, a narrow front margin of second segment not reaching the sides and fourth segment black, and along the dorsum a black middle line, generally interrupted on the hind part of second and third segments; sometimes the hind margins of second and third segments obscurely darkened so that the reddish colour forms two pairs of quadrate spots; the fourth segment is yellowish just at the basal corners, and it has the hind margin and a small central spot reddish, on its front half is a grey pruinose spot at each side and the black dorsal middle stripe is produced between them; abdomen is dullish, only the apical half of fourth segment shining; it is clothed with quite short, depressed hairs which partly follow the ground colour but are black somewhat beyond the sides of the middle stripe and also on the hind parts of the segments; on the grey spots on fourth segment they are pale; at the side the hairs are long only at the basal corners. Venter coloured mainly as dorsum but without black middle stripe; it has short, pale hairs. The genitalia are large, the fourth dorsal segment is about quadrate, but it has the apical corners bent down as rounded triangular lobes; the anterior half of the segment is somewhat depressed; the fourth ventral segment is bent downwards and has a dense brush of red hairs at the hind margin to each side of the middle; the outer lamellæ of the hypopygium are large, reddish. Legs black, shining, the anterior knees and the basal half of front tibiæ yellow, middle tibiæ yellow with a black ring just before the apex; anterior tarsi yellow with the fourth joint black; hind legs with only the extreme base of tibiæ pale; hind femora strongly thickened and curved, thickest towards the end, with a large, triangular tooth below the apex towards the anterior side, hind tibiæ somewhat compressed and curved and hind tarsi somewhat broad and flat; the legs mainly short-haired, only middle femora with long hairs behind; hind femora quite short-haired; the hairs are mainly pale on anterior femora, but front femora with a row of black, somewhat bristly hairs behind and a similar below, and middle femora with a few at apex; front tibiæ black-haired below and behind, middle tibiæ almost quite black-haired

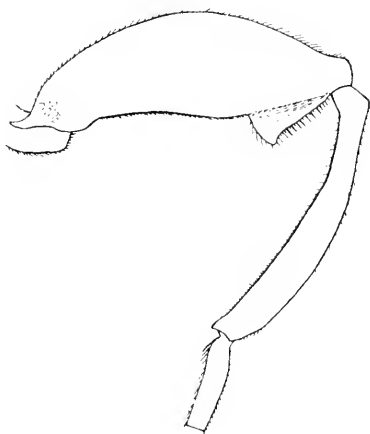


Fig. 162. Hind leg of *T. scita* ♂, from the anterior side. $\times 16$.

and hind legs black-haired, or the femora with a few yellowish hairs above; the hind femora very short-spinulose below, with a little longer bristles on the apical margin of the tooth; the hind tibiæ with a very short, erect ciliation below. Wings hyaline or nearly so; cubital vein

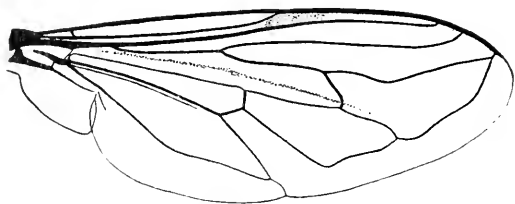


Fig. 163. Wing of *T. scita* ♂.

curved a little down over the first posterior cell. Stigma weak, elongate. Squamulæ whitish yellow with a pale yellow fringe. Halteres yellow.

Female. Vertex and frons rather narrow; vertex black above, the rest brownish pruinose, above the antennæ black, shining; the hairs yellowish, darker on the vertex. Abdomen coloured mainly as in the male but the red spots somewhat silvery pruinose on the front corners; fourth segment without red spot.

Length 7.5—10 mm.

T. scita is not rare in Denmark; Damhusmosen, Lersø, Ordrup Mose, Ermelund, Dyrehaven, Lyngby Mose, Fure Sø; on Lolland at Maribo and at Strandby west of Nysted; on Langeland at Lohals; on Funen at Middelfart and Ullerslev, and in Jutland at Horsens and at Gjerlev near Randers Fjord. My dates are $^{15}/_5$ — $^{18}/_7$. It occurs on meadows and in fens with rich vegetation; it has a curious behaviour as it flies very low near the ground among the herbage. The pupa was sifted from flood refuse in Ullerslev Mose on Funen, the imago came on $^{14}/_5$ (N. P. Jørgensen).

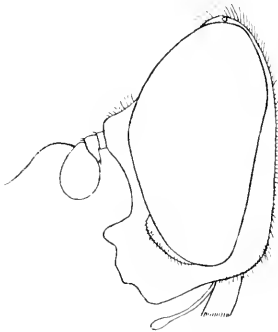
Geographical distribution:— Northern and middle Europe down into France; towards the north to middle Sweden.

35. **Myiolepta** Newm.

(*Myolepta*).

This genus seems to be related to *Tropidia* and is agreeing with it in several respects, though the place of the medial cross-vein might indicate another relationship; its place is therefore somewhat doubtful.

The species are of medium size, with pale markings on abdomen much as in *Tropidia* (or, in non-Danish species, without markings), and very slightly hairy. Head a little broader than high, narrowing downwards, slightly broader than thorax; behind it is flat below, excavated above. Eyes bare, touching in the male, separated in the female; the facets in the male somewhat enlarged on the upper front part. Frons somewhat prominent. Antennæ inserted in the middle of the head, short, third joint oval; arista long and thin, apparently bare. Epistoma strongly hollowed below the antennæ in the male, with a small but prominent central knob and below it a little hollowed or retreating, and the mouth edge a little produced, thus the



Head of *M. luteola*.
Fig. 164. Male.

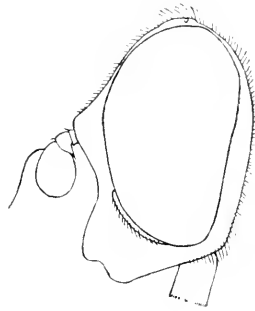


Fig. 165. Female.

lower part of epistoma somewhat prominent, slightly descending; in the female there is no central knob, the epistoma being hollowed from the antennæ to the produced mouth edge. (In *ruficornis* [non-Danish] the eyes are not touching in the male, and in both sexes the epistoma has no central knob). The epistoma is black but white pruinose except the central knob or lower part. Jowls small, a little descending; there are narrow, somewhat indistinct eye-margins with short hairs, they stretch half way up the epistoma. The frons slightly short-haired; epistoma bare. Oral cone and proboscis of medium length; mouth parts of usual construction, the maxillar palpus a little longer than the lacinia; labium with the basal part and the somewhat broad labella of about equal length. Thorax rectangular but somewhat narrowed in front. Scutellum black, marginate, with not long, bristly hairs at the margin; it has no marginal fringe below. Abdomen a little broader than in *Tropidia*, the fourth dorsal segment not bent down such as in this genus, and the fourth ventral segment simple.

Genitalia relatively large. The lamellæ at the end of the female abdomen somewhat long. Legs with the femora somewhat thickened, tibiæ a little curved, especially the hind tibiæ and these latter a little thickened about the middle and with the usual slight incurvation before the apex on the posterior side; the legs rather short-haired; the femora sulcate and spinose below the apical part; the curious small bristle above the trochanters present. Claws and pulvilli well developed; empodium short, bristle-shaped. Wings with the cubital vein imperceptibly curved down above the first posterior cell; medial cross-vein before the middle of the discal cell and slightly oblique; anal vein nearly straight; there are distinct, fine bristles on the basal part of the subcostal vein, continuing out on the radial vein to near the base of the cubital vein; no stigmatal cross-vein. Thoracal squamula with long, fine, branched hairs, alar squamula with short, slightly flattened hairs. Plumula somewhat short, with simple hairs.

The developmental stages are somewhat well known. Becher describes (Wien. ent. Zeitg. I. 1882, 250) larva and pupa of *M. obscura* and the pupa of *M. luteola*. The larva of *obscura* was found in a hollow poplar in the middle of March, it pupated on $^{20}/_3$ and the imago came on $^{10}/_4$; the pupa of *luteola* was found on the same place at the end of May and first in June, and the imago came at the middle of June. I have myself examined the pupa of *M. luteola*, found in the decaying wood in a hollow beech on $^{1}/_7$, the imagines came on $^{9}/_7$ and $^{10}/_7$. According to Brauer the larva of *M. luteola* has also been found in decaying wood of a maple-tree. The larva of *M. obscura* is, according to Becher, whitish, somewhat cylindrical but with the ventral side flattened; it is tapering behind and has here a thin, chitinised spiracular tube, telescopically pro- and retractile, and with hairs stellately arranged at the end; above the mouth are the two-jointed antenna-like papillæ sitting on a basal piece; there are no mouth hooks; on prothorax are short anterior spiracular tubes. The prothoracal segment is longitudinally wrinkled, the body otherwise with transverse corrugations; on the ventral side are six pairs of spined prolegs. At the sides of the posterior segments are some filaments with hairs at the end, the last pair the longest. The length in all (of a probably not quite full-grown larva) is 13 mm, the tapering part and the tube of which measure 4 mm. The pupa of *M. luteola* is quite agreeing with the above description of the larva; it is curious that Becher states for the pupa of both *obscura* and *luteola* that they are "von einem (weisslichen respective gelblichen) reifartigen Ueberzuge dicht bedeckt"; this is evidently caused only by the clay-like substance in which they live; Becher says that for this reason he

could not find "die an der Larve deutlichen Stigmenhörner"; I think this is a confounding with the prothoracal pupal spiracular tubes which he does not mention; these are, however, present and cannot escape observation when the pupa is cleaned for the adhering material; the tubes are cylindrical, brown, nearly 0,5 mm long, directed upwards and forwards and a little diverging; the pupa is 8—10 mm long in all, the tapering posterior part about 2 mm and the tube itself about 1 mm long.

According to the observations the larva seems to feed on the decaying wooden material, and they seem to hibernate.

Remarks: It was said above that the genus may be allied to *Tropidia*, but its place is doubtful on account of the medial cross-vein lying before the middle of the discal cell as in the *Syrphinae*; it will be seen that its larva shows some resemblance to the larva of *Tropidia* (to judge from the puparium), but it differs in an important point, as it has a telescopical posterior spiracular process; such a posterior process is otherwise only found in the *Eristalinae* (and *Serivomyia*), but is there much longer, and in *Chrysogaster* and *Neoascia*; in these latter genera it is short, and the imagines of *Chrysogaster*, *Neoascia* and *Myiolepta* show also rather great similarity; with regard to *Chrysogaster* the shape of the epistoma with a central knob in the male but without knob in the female is agreeing; on the other hand the shape of the frons in both sexes of this genus is very different from *Myiolepta*; Verrall says that if not belonging to the *Milesiinae* the place of *Myiolepta* would be near *Sphagina*, it resembles this genus in the slightly haired frons and bare epistoma, and this is perhaps its most natural place, but there are, however, several differences, and it must be noted that in *Calliprobola* among the *Milesiinae* the larva has also a tail; at present I shall therefore make no alteration.

Of the genus 5 palæarctic species are known; one occurs in Denmark.

1. *M. luteola* Gmel.

1788. Gmel. Syst. Nat. V, 2879, 379 (*Musca*). — 1838. Newm. Entom. Mag. V, 373. — 1862. Schin. F. A. I, 325. — 1901. Verr. Brit. Fl. VIII, 573, 1, figs. 400—402. — 1907. Kat. paläarkt. Dipt. III, 122. — *Thereva dubia* Fabr. 1805. Syst. Antl. 221, 14. — *Eristalis lateralis* Fall. 1817. Dipt. Suec. Syrph. 41, 4. — *Xylota lateralis* 1822. Meig. Syst. Besch. III, 224, 18. — 1843. Zett. Dipt. Scand. II, 880, 15.

Male. Vertex and frons black, shining, the latter white pruinose at the eye-margins; epistoma white or silvery pruinose, on the central

knob and down to the mouth edge black and shining, and likewise the lower lateral parts; vertex with slight, yellow hairs and frons with quite short and slight, likewise yellow hairs; epistoma nearly quite bare, only with a few, white hairs at the eye-margins; the epistoma is much hollowed below the antennæ with a central knob as much protruding as the antennal prominence, and below it a little retreating, the lower part of epistoma thus somewhat protruding but only slightly descending. Occiput black, greyish white pruinose on the lower part but only slightly above; the hairs white and longish below, yellow and quite short above. Antennæ reddish yellow, the basal joints darker to blackish, third joint short ovate; arista long, thin. Thorax black or æneous black, shining, the front margin somewhat indefinitely whitish pruinose; thorax is clothed with quite short hairs which are yellow or mixed black and yellow on the front half, black and more dense on the posterior half, and the disc therefore here more densely punctate as in *Tropidia*. Scutellum black, densely punctate, with quite short hairs which are black or more or less brownish yellow; at the margin are short, brownish yellow, bristly hairs; the scutellum is distinctly marginate. Pleura with longish, whitish hairs, a little yellow above. Abdomen black and yellow, marked in a somewhat similar way as in *Tropidia*; first segment greyish black except the yellow sides, second segment yellow with black middle line, generally a little widening forwards, broadest just before the front margin; the third segment may be nearly quite yellow with a black middle line, but it is generally more or less black on the hind part, and sometimes only the basal corners are more or less reddish; fourth segment æneous black; abdomen may thus be termed yellowish with the base, a larger or smaller apical part and a broader or narrower dorsal line black; it is dullish on the basal part, shining on fourth and on the greater part of third segment, and it is clothed with short hairs, which are pale on first segment, black on second and third but yellow and slightly longer on fourth segment; at the sides they are all yellow, and they are long at the basal corners; venter yellowish with just the base and the fourth segment blackish, often also the hind part of third segment dark; it has longish, pale or brownish hairs. Legs black, shining, all tarsi with the three first joints yellow, on the front tarsi generally somewhat darkened; all knees may sometimes be slightly and obscurely reddish; all femora somewhat thickened, front and hind femora the most; anterior tibiæ a little thickened towards the end; hind tibiæ a little curved, somewhat thick about the middle, and with a small elevation below just above the middle. The

legs short-haired, also on femora the hairs only slightly longer; the hairs on femora pale but more or less black above on the apical part, tibiæ black-haired only except the usual, depressed, reddish or brownish pubescence on the apical part below front tibiæ and on ventral and posterior side of hind tibiæ; the femora are sulcated below in the apical part and with two rows of short but somewhat strong, black

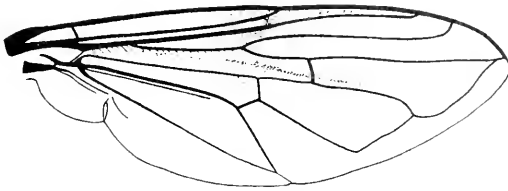


Fig. 166. Wing of *M. luteola* ♂.

spinules; hind femora also spinulose to the base. Wings yellow or brownish yellow, especially at the base and on the anterior part; stigma small and slight, below it an undefined dark or blackish cloud; medial cross-vein before the middle of the discal cell. Squamulæ whitish with yellow margin and fringes. Halteres whitish or pale yellow.

Female. Vertex and frons somewhat broad, widening downwards, black and shining; frons more or less distinctly trisulcate on the basal part, with a pair of small, whitish dust spots; the hairs short and pale. Epistoma without central knob, hollowed in the middle, with the mouth edge produced; it is black, shining, silvery pruinose only below the antennæ, along the eyes and on a stripe from the lower part of the eye to the lateral angle of the oral margin. Abdomen generally yellowish only on the sides of first and second segments. Front tarsi black.

Length 8—10 mm.

M. luteola is not rare in Denmark; Ermelund, Ordrup Mose, Bollemosen, Ørholm; on Langeland at Lohals, and in Jutland at Rebbild near Skørping. My dates are $17/6$ — $26/7$. It occurs in fens and in woods and thickets. The pupa has been taken in hollow trees in Dyrehaven (Schlick), and in a hollow beech at Ørholm on $1/7$, developing on $9/7$ and $10/7$ (the author); on the latter place the pupæ were found in the clay-like decaying wood together with larvæ and pupæ of *Xylomyia maculata*.

Geographical distribution: — Northern and middle Europe and down into Spain and Italy; towards the north to southern Sweden.

36. **Criorrhina** Meig.

Species of large or medium size and densely pilose, at all events on thorax; they are somewhat varying in shape, broad or narrower. Head very short, broader than high, about of the breadth of thorax or a little broader; it is flat or a little arched behind, only slightly excavated above. Eyes bare; in the male they are approximated above in a point but not touching, and the vertex is relatively long and narrow; they are separated in the female but not very broadly; in the male the facets are slightly enlarged above on the front part. The frons is slightly hairy or quite bare. Antennæ inserted above the middle of the head, the basal joints not quite short, the third large, higher than long; arista long, inserted near the base or at some distance from it; the basal antennal joints have small hairs, the third joint and the arista microscopically hairy. Epistoma hollowed below the antennæ and then produced to a not small but little prominent central knob, below which it is not retreating but almost straight to the mouth edge; the central knob and the lower part of epistoma is thus somewhat protruding, and it is considerably or much descending; the epistoma is black but pale pruinose on the whole front side, or sometimes with a bare, black middle stripe in the female; it is only slightly haired at the sides and on the eye-margins, sometimes also on the black lower side parts. The jowls are somewhat small and slightly descending, they are more or less separated from epistoma by a furrow which separates off narrow eye-margins, stretching more or less upwards, sometimes to above the middle. Proboscis and oral cone of some length; clypeus of usual shape, with the basal part somewhat long; the mouth parts otherwise mainly of the usual construction; labrum (*berberina*) strong and strongly semitubular, the median process the shortest, cleft and beset with emergences; the upper lateral processes thin, somewhat branched or beset with some emergences; the lower lateral processes of usual shape but the inner margin a little dentate with rounded teeth, and at the apex they are variously excised or dentate; the usual rows of small papillæ on the inside of the lateral margins of labrum are present; hypopharynx likewise strong and also semitubular, it is a little shorter than labrum, parallel-sided but attenuating in the outer part, the apex rounded; the salivary duct very distinct; the maxillæ considerably shorter than hypopharynx, of the usual, knife-like shape and with microscopical spines, especially distinct at the apex; the palpi long, double as long as the lacinia, somewhat club-shaped, with microscopical hairs and with numerous bristles; labium with the basal part firmly chitinised, slightly longer than the somewhat broad, triangularly oval labella.

Thorax quadratic or in the more elongated species rectangular. Scutellum concolorous with thorax, generally pruinose; it has no marginal fringe below (*berberina*, *oxyacanthae*) or a more or less distinct fringe is present (*floccosa*, *asilica*); no bristles present; metapleura with dense, short hairs, a little longer at the hind margin. Abdomen somewhat varying, in the shorter species it is short, broader than thorax and somewhat rounded; in the longer species it is narrower, somewhat elongate, a little narrowing behind; in the male there are four not transformed segments on both sides. Genitalia large, largest in the elongated species; there are somewhat long and forceps-like terminal appendages, and hairy outer lamellæ. In the female there are five normal abdominal segments, and at the end two small lamellæ. Legs simple or sometimes the hind femora thickened (in non-Danish species); the hind tibiæ a little curved and generally somewhat compressed, especially on the basal and apical parts, the middle part more thickened; the legs haired as usual, femora rather long-haired; above the trochanters the curious long, bristly hair present, or sometimes a pair, they are most distinct on anterior trochanters. Claws and pulvilli well developed; empodium short, bristle-shaped, hairy. Wings with the cubital vein not curved; medial cross-vein considerably behind the middle of the discal cell, very sloping; the base of the radial vein with fine bristles; no stigmatal cross-vein or only an indistinct one. Thoracal squamula with long, more or less richly branched hairs, alar squamula with shorter, flattened hairs. Plumula of medium length, with simple hairs.

The developmental stages are not well known; van Roser (Württemb. Corr. Bltt. 10, 1834, 268) found the larva of *C. oxyacanthae* in flood refuse at Neckar, but I have not seen this paper; Verrall suggests that the larva lives in sap of decaying trees. I have examined a pupa of *C. berberina* found under moss on a tree-stub at a fen on ²²/₄, it developed on ³/₅. The pupa is similar to that of *Tropidia*: it is nearly cylindrical but flattened on the ventral side; it is a little attenuated in front and more behind and it has here at the sides some short filaments; the anus lies at the beginning of the attenuated part, relatively long before the posterior end, at the posterior end is an about 1 mm long, reddish yellow, flattened cylindrical spiracular process; it has a longitudinal dividing line above and below, the end is flat and bears the spiracles; on the dorsum of the first abdominal segment are two short, about 0,5 mm long anterior spiracular tubes; they are brown, beset with tubercles and rather approximated. I could detect no traces of ventral prolegs. The colour is dirty yellowish and the length nearly 8 mm.

The species of *Criorrhina* are beautiful flies, more or less *Bombus*-like, especially the species which have both thorax and abdomen densely pilose: the other species may be almost Bee-like. The descending epistoma, which is hollowed below the antennæ but almost straight from the central knob downwards, gives them a characteristic profile. They occur in wooded districts, especially in spring, and often on flowers of *Crataegus* and on other shrub-flowers.

Of the genus 8 species occur in the palæarctic region, 4 have been found in Denmark.

Table of Species.

- | | |
|---|------------------------|
| 1. Scutellum and more or less of the thoracal disc in front of it black-haired | 1. <i>berberina</i> . |
| — Scutellum and the whole thorax yellow-haired | 2. |
| 2. Antennal arista inserted at some distance from the base of the third joint; abdomen somewhat narrow, with inconspicuous, yellowish grey pruinose bands; anterior tibiæ yellowish | 4. <i>asilica</i> . |
| — Antennal arista near the base of the third joint; abdomen roundish or oval, without distinct bands; tibiæ dark or blackish | 3. |
| 3. Abdomen densely yellow pilose | 2. <i>oxyacanthæ</i> . |
| — Abdomen with short hairs which are dark or brownish yellow, more or less black at the sides; at each basal corner a tuft of long, pale hairs | 3. <i>floccosa</i> . |

1. **C. berberina** Fabr.

1805. Fabr. Syst. Antl. 240, 33 (*Eristalis*). — 1822. Meig. Syst. Besch. III, 237, 11, Tab. XXIX, Fig. 9 (*Milesia*) et 1838. VII, 116. — 1843. Zett. Dipt. Scand. II, 674, 3 et 1849. VIII, 3114, 3. — 1862. Schin. F. A. 1, 350. — 1901. Verr. Brit. Fl. VIII, 580, 2. — 1907. Kat. paläarkt. Dipt. III, 123.

Male. Vertex and frons yellowish pruinose, the latter black down the middle; epistoma yellowish or greyish yellow pruinose, the lower lateral parts broadly black and shining; vertex with long hairs, black behind, yellow in front, sometimes almost all yellow; frons slightly haired with yellow or black hairs; epistoma haired only on the sides along the eyes and on the black lower part, the hairs long, pale above, blackish below, or all blackish; the epistoma is hollowed below the antennæ and then considerably produced to the central knob, but below it almost not retreating so that the knob is low; the lower part of epistoma with the knob thus produced, and it is very descending. Occiput yellow pruinose, the hairs brown or blackish below, yellow above, but here also a row of black hairs, and in the darker specimens the hairs all blackish. Antennæ reddish or brownish yellow,

third joint considerably higher than long; arista much longer than the antennæ, a little thickened in the basal part. Thorax yellow or brownish yellow pruinose, darkest behind, with traces of greyish stripes, two narrow in the middle and a broad, abbreviated on each side, but the colour of thorax is more or less hidden under the long and dense pile; this latter is yellow but black in front of scutellum, and the black-haired part may be smaller or larger until the hinder half is black-haired and the black hairs at the sides stretching quite forwards, and sometimes thorax is all black-haired. Scutellum dark brown with black pile, similar to that on thorax. Pleura black, shining, yellowish pruinose anteriorly, the hairs are long, black, or more or less yellow in front. Abdomen somewhat short and rounded, broader than thorax; it is black, shining, clothed with dense hairs, a little shorter than on thorax; the hairs are black on the basal part, but yellow or yellowish white on third and fourth segments, or on the third only on the hind part; often there is a row of black hairs at the hind margin of third segment. Venter black, shining, with long, black hairs, first

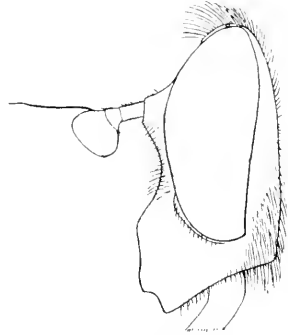


Fig. 167. Head of
C. berberina ♂.

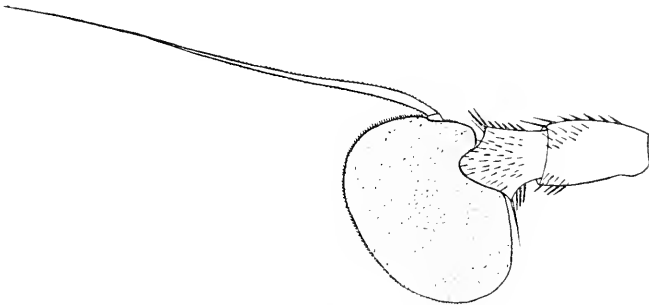


Fig. 168. Antenna of *C. berberina* ♂, from the inside. $\times 40$.

segment pruinose. Legs black, the extreme apex of femora reddish; anterior tibiæ obscurely reddish or brownish with an indefinite blackish ring before apex, hind tibiæ slightly brownish at apex; the tarsi lighter or darker brownish with the last joints blackish; hind tibiæ curved. The legs haired in the usual way, the hairs on femora somewhat long, especially on middle femora; posterior femora with dense, somewhat bristly hairs below; the hairs are all black. Wings yellow with

two faint and indefinite, dark clouds, one as a fascia across the base of the cubital vein and one about the apical part of the cubital cell and down the medial cross-vein. Squamulae brownish or blackish with a dark yellow fringe. Halteres brownish yellow.

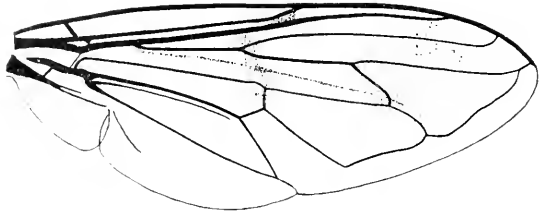


Fig. 169. Wing of *C. berberina* ♂.

Female. Quite similar to the male; vertex and frons moderately broad, widening downwards; they are yellow pruinose, with a black middle line from the ocelli to the antennæ and here widening to a spot; the hairs yellow but more or less black at the ocelli and above the antennæ. The two last, pale-haired abdominal segments often somewhat yellow pruinose, especially on a transverse middle band.

Length. The species may vary rather much in size, the length from 8—13 mm.

Remarks: This species is always described as having the thorax more or less pale-haired, at all events on the anterior part, but I possess several specimens with thorax all black-haired.

C. berberina is not rare in Denmark, though it can scarcely be termed common; Ordrup Mose, Bøllemosen, Fuglevad, Hillerød, Tyvekrog, Tisvilde, at Sorø and at Tjustrup Sø; on Falster; on Lolland in Kældskov and at Bremersvold; on Langeland at Lohals, and in Jutland at Horsens. My dates are $^{18}/_5$ — $^9/7$. It occurs in woods and thickets and in spring it is often seen on the flowers of *Crataegus oxyacantha*. The pupa was taken at Bøllemosen under moss on a tree-stub on $^{22}/_1$, it developed on $^3/5$ (Schlick).

Geographical distribution:— Europe down into Italy; its northern limit is in Denmark, and it occurs in England.

2. *C. oxyacanthæ* Meig.

1822. Meig. Syst. Besch. III, 237, 12 (*Milesia*). — 1862. Schin. F. A. I, 351. — 1901. Verr. Brit. Fl. VIII, 581, 3. — 1907. Kat. paläarkt. Dipt. III, 124. — *C. Brebissonii* Macq. 1827. Soc. Sc. Lille 328, 6 et 1834. Suit. à Buff. I, 498, 6. — 1838. Meig. l. c. VII, 171, 16.

Male. This species is quite similar to *berberina* except in the colour of the pile; the head is of the same shape but the hairs on vertex all yellow and on epistoma pale yellow, and the hairs on occiput whitish below, yellow above. Antennæ a little paler. Thorax and scutellum all clothed with long, dense pile, varying from dark yellow to pale yellow, and the hairs on pleura all yellow. Abdomen as in *berberina* but the hairs all yellow to pale yellow, generally darkest at the base. Legs coloured quite as in *berberina* but the hairs more or less pale behind at the base of the anterior femora and also partly on the anterior side of the middle femora. Wings, squamulæ and halteres as in *berberina*.

Female. Quite similar to the male, and differing in the same way from the female of *berberina*. Vertex and frons with the hairs all pale. Abdomen somewhat greyish pruinose and third and fourth segments generally with a more or less distinct, yellowish pruinose, transverse band.

Length 8—13 mm.

C. oxyacanthæ is like the preceding not properly common in Denmark, and it occurs in the same way: Ordrup Mose, Bagsvær, Frederiksdal, Ruderhegn, Søllerød, Tisvilde, Bognæs near Roskilde and at Sorø; on Falster, and in Jutland at Vejle, Horsens, Haarup near Horsens and Frijsenborg. My dates are $^{23}/_5$ — $^{17}/_7$.

Geographical distribution:— Europe down into Italy; its northern limit is in Denmark, and it occurs in England; it is also recorded from Japan.

Remarks: It has been suggested by Gerstäcker (Bericht. Gebiet. Entom. für 1861, 1863, 201) that *C. berberina* and *oxyacanthæ* are only colour variations of one species, and he speaks of intermediate forms; Portschinsky (Trudy Russk. Entom. X, 1877, 187) is of the same opinion; I have never seen such intermediate specimens, and I think it best at present to keep both species. Verrall notes that *berberina* occurs in Scandinavia but *oxyacanthæ* not, but this is an error evidently caused by Zetterstedt's recording *berberina*, but he records it only from Denmark, where both species occur, but Zetterstedt had not seen *oxyacanthæ*.

3. *C. floccosa* Meig.

1822. Meig. Syst. Besch. III, 238, 13 (*Milesia*). — 1862. Schin. F. A. I, 351. — 1901. Verr. Brit. Fl. VIII, 583, 4, fig. 403. — 1907. Kat. paläarkt. Dipt. III, 124. — *Syrphus regulus* Fall. 1826. Dipt. Suec. Suppl. 9. — *C. regula* 1843. Zett. Dipt. Scand. II, 672, 1.

Male. Vertex black, almost not pruinose; frons shining black with a distinct, longitudinal furrow, it is only narrowly pruinose just at the eye-margins; epistoma whitish pruinose with very broad, black and shining lower lateral parts. Vertex has long, yellow hairs, frons only a few pale hairs at the eye-margins; epistoma likewise with only few, white hairs at the sides and on the eye-margins, the black lower parts are bare; the epistoma is shaped as in the preceding species but it is much more descending. Occiput yellowish pruinose, the hairs long and white below, yellow above. Antennæ brownish, the basal joints blackish. Thorax brownish or yellowish grey, a little shining, densely clothed with long, erect, deeply yellow or tawny pile. Scutellum yellowish pruinose, with similar hairs as on thorax. Pleura with long, pale yellow hairs. Abdomen elongate, not broader than thorax but distinctly longer, somewhat flat; it is dull brownish black on the disc, shining bluish at the sides; the dull parts are shaped as broad triangles with the sides sloping outwards towards the hind corners; the first segment is grey pruinose at the sides; abdomen is clothed with short, decumbent hairs, which are dark yellow or brownish yellow on the middle or on most of the dull parts, but black on the shining side parts; the fourth segment is pale yellow-haired; at the basal corners of second segment is a conspicuous tuft of long, pale yellow hairs; the sides are black-haired except on the yellow-haired fourth segment. Venter black, grey pruinose, fourth segment shining; it is clothed with long, whitish hairs. Legs black, all tarsi paler or darker brownish or yellowish with the last or two last joints blackish; the hairs on femora somewhat long and dense, especially on the posterior femora; on the anterior femora the long hairs on the posterior side are white, but the short hairs on the anterior side darker, and blackish above, and the hairs on hind femora somewhat similarly coloured; the hairs on tibiæ are yellow, more or less mixed with black, on the hind tibiæ are a few longer hairs below in the middle; the anterior femora have a slight channel or flat space below the apical part, and on the middle femora there are here fine, bristly hairs; the hind femora have dense, somewhat bristly hairs below. Wings yellow tinged and yellow at the base, with the same middle and subapical clouds as in the preceding species, but more distinct. Squamulæ brownish with a yellow fringe. Halteres yellow.

Female. Vertex and frons moderately broad, widening downwards; vertex black and from it a middle line stretches down to a large, black, shining space above the antennæ, the sides yellow pruinose; the hairs yellow, the space above the antennæ bare. Abdomen broader than in the male, with a large, yellow pruinose spot at the

apex, including all the fifth and fourth segments and the middle of the hind margin of the third segment; it is all reddish-haired except on the bluish side parts of second and third segments; on the apical part it is generally paler-haired and the hairs are longer and much denser than in the male.

Length 12 to nearly 15 mm.

C. floccosa is, I think, a little more rare in Denmark than the two preceding species, and it has hitherto only been taken on Sealand; Ordrup Mose, Ermelund, Dyrehaven and Tyvekrog. My dates are $25/5$ — $13/6$. It occurs in woods and thickets, I have taken my specimens on flowers of *Crataegus oxyacantha*.

Geographical distribution:— Europe down into Italy; towards the north to southern Sweden, but rare.

4. *C. asilica* Fall.

1816. Fall. Dipt. Suec. Syrph. 22. 10 (*Syrphus*). — 1822. Meig. Syst. Besch. III, 238, 14 (*Milesia*). — 1843. Zett. Dipt. Scand. II, 672, 2 et 1855. XII, 4653, 2 et 1859. XIII, 5083, 2. — 1862. Schin. F. A. I, 351. — 1901. Verr. Brit. Fl. VIII, 585, 5, fig. 404. — 1907. Kat. paläarkt. Dipt. III, 123. — *Xylota rufipila* Meig. 1822. I. c. III, 215, 4.

Male. Vertex black, not pruinose, frons black, shining, with a longitudinal furrow, it is whitish pruinose at the sides; epistoma whitish or yellowish white pruinose, the lower side parts black; vertex

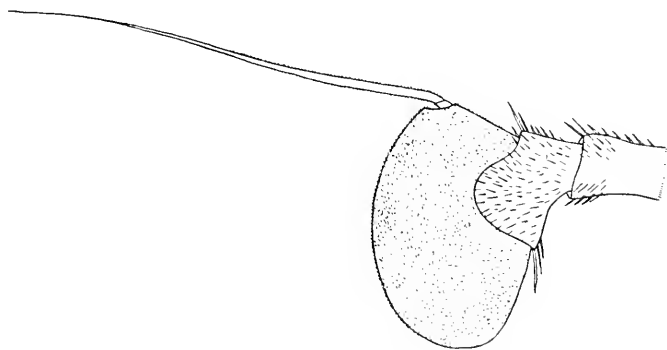


Fig. 170. Antenna of *C. asilica* ♂, from the inside. $\times 40$.

with long, yellow hairs, darker anteriorly, frons quite bare; epistoma with only a few white hairs at the sides and on the eye-margins; the epistoma shaped as in *floccosa*, but, however, less descending. Occiput greyish yellow pruinose, the hairs yellow, or paler beneath and here

long. Antennæ brown or pale brown, third joint almost twice as high as long; arista inserted just at the upper corner, at some distance from the base. Thorax blackish, shining, somewhat yellowish pruinose behind; it is clothed with long, somewhat dense, yellow pile. Scutellum yellowish pruinose, with similar hairs as on thorax. Pleura with long, pale yellow hairs. Abdomen elongate, scarcely as broad as thorax, a little narrowing backwards; it is black and shining; first segment grey except the extreme hind margin, second segment yellowish grey pruinose on the front half of the sides and with a similar, narrow, transverse band, lying before the middle and narrowly interrupted in the middle; third segment with a similar but still narrower band, a little more broadly interrupted in the middle, and fourth segment likewise but the band lying at the front margin and generally less distinct; abdomen is clothed with somewhat long but not dense, whitish or pale yellow hairs, most conspicuous at the hind margins of the segments; at the hind margin of the fourth segment the hairs are brown, and the genitalia have brownish black hairs; at the basal corners of second segment the hairs are long. Venter black, somewhat shining, the first segment grey pruinose; the hairs are long and pale, the fourth segment has shorter, darker to black hairs on the hind part. Legs with the femora black with yellow apex, tibiæ yellow, hind tibiæ more or less dark on the apical part; also the front tibiæ may be somewhat darkened on both sides, and sometimes middle tibiæ similarly; tarsi yellowish with the last two, or on front tarsi three joints darkened; legs with the hairs on femora rather long; all the hairs yellow, only below the apex of middle femora some black, bristly hairs, and the hind femora densely black-spinulose below. Wings a little yellowish with similar dark clouds as in the other species, the middle one rather distinct and the subapical stretching distinctly down the cross-vein. Squamulæ with their fringes and the halteres yellow.

Female. Vertex and frons moderately broad, widening downwards, all black, with only a pair of dust spots; the hairs short, black, sometimes paler, the space above the antennæ bare; epistoma with a very broad, black, shining middle stripe so that it is pruinose only along the eyes and from here down towards the lateral angles of the oral margin. Thorax more pruinose than in the male. Abdomen quite as in the male, the narrow band on fourth segment more distinct and less near the front margin.

Length about 12—13 mm.

C. asilica is rare in Denmark, I know only four specimens; Greisdal at Vejle (Schlick) and at Silkeborg (Axel Petersen). My dates are

$16/6$ — $12/7$. It is recorded to frequent the flowers of *Crataegus* in wooded districts.

Geographical distribution:— Northern and middle Europe down into Austria and Styria; towards the north to middle Sweden, and in Finland.

37. **Pocota** St. Farg. et Serv.

This genus is very nearly allied to and similar to *Criorrhina*. The head is relatively narrower and not so broad as thorax; in the male the eyes are touching for some distance, the vertex consequently less long. Frons bare. The epistoma is considerably hollowed and has no central knob but is very produced at the upper mouth edge, more than the frontal prominence, and it is only slightly descending; the profile is thus quite another than in *Criorrhina*. The epistoma is black, white pruinose leaving a broad middle line black, in the female nearly all black; it has only hairs just at the eye-margins. Scutellum is black and has no very distinct marginal fringe below. Legs simple with the hind femora not thickened. For the rest the species is similar to the shorter and broader species of *Criorrhina*.

The developmental stages are known, especially the pupa; it is already described by Schrank (Enumer. Ins. Austr. 1781, 459, 933), who found it "in carie arborum emortuarum", the imago came on $3/5$. Becher describes likewise the pupa (Wien. ent. Zeitg. I. 1882, 249), which he found in the middle of March in a hollow poplar; the imagines developed in the first eight days of April. Verrall mentions that two specimens in Bigot's collection were bred from pupæ found at the foot of a poplar-tree, and they developed on $27/3$; he has also a note of a specimen bred from a nest of *Bombus terrestris*, but naturally he is convinced that here may be some error. Kleine (Ent. Zeitschr. Stuttg. 21, 1907, 191) mentions the larva, found in decaying wood in a *Populus pyramidalis* in which were fungi; he thinks the larva feeds on the mycelium; the larvæ pupated in the decaying wood, the imagines came on $9/5$ — $23/5$ (I have seen only an abstract of this paper). I have myself examined a pupa, found as larva below the bark on a beech on $1/4$, it pupated but was dead as pupa on $10/5$. The pupa is oval, of pale brownish colour, slightly transversely wrinkled; the ventral side is flat and shows seven pairs of prolegs with groups of strong hooks, of these prolegs the first pair are distant from the others and lie near the mouth (thus quite as in *Eristalis*); the anterior dorsal end (the part which is detached by the opening) is somewhat flattened, at the hind margin of it are two short, wart-like, strongly chitinised anterior spiracular tubes. At the posterior end the pupa is abruptly

attenuated to a short, tail-shaped part, which along each side has a couple of short filaments; at the end it has a short, chitinised, brown posterior spiracular process (according to Becher, in my specimen it was not seen, either lost or quite retracted). The pupa has a length of about 15 mm, the tail-shaped part included. As will be seen my description is quite agreeing with the one given by Becher.

According to the above the larva lives evidently in decaying wood, especially in poplar-trees, and no doubt it hibernates.

The genus is, as seen, distinguished from *Criorrhina* by the touching eyes in the male and the characteristic shape of the epistoma. The species is rather rare and it is curious that it seems to have been bred more often than it has been caught, though none of our Danish specimens have been bred.

Of the genus only one species occurs in the palæarctic region, also occurring in Denmark.

1. *P. apiformis* Schrank.

1781. Schrank, Enum. Ins. Austr. 459, 933 et 1803. Fn. boica, III, 117, 2436 (*Musca*). — 1862. Schin. F. A. I, 352 (*Plocota*). — 1901. Verr. Brit. Fl. VIII, 587, 1. fig. 405. — 1907. Kat. paläarkt. Dipt. III, 125. — *Milesia apicata* Meig. 1822. Syst. Besch. III, 236, 10, Tab. XXIX, Fig. 4. — 1849. Zett. Dipt. Scand. VIII, 3114, 3—4 et 1855. XII, 4653, 3—4 (*Criorrhina*).

Male. Vertex black, frons black, shining, with a longitudinal furrow; it is whitish pruinose just at the eye-margins and at each side of the antennæ; epistoma whitish or silvery pruinose but with a broad, shining black middle stripe and the lower side parts black; the vertex has long, black hairs, frons bare and epistoma with only a row of somewhat long, black hairs at the eye-margins, not reaching up to the antennæ; the epistoma is strongly hollowed below the antennæ, there is no central knob but the front mouth edge is considerably produced, more than the frontal prominence, but the epistoma is slightly descending; the incurvature of the front mouth edge is large and the lateral angles distinctly drooping. Occiput

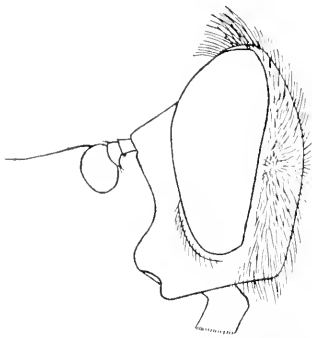


Fig. 171. Head of *P. apiformis* ♂.

blackish, the hairs black, long below and upwards to above the middle; on the hind side of the upper half the hairs are paler. Antennæ reddish or reddish brown, arista darker outwards. Thorax black, somewhat shining; it is clothed with long, dense pile which is red or

yellowish red on about the anterior third, black on the rest; often the red band is divided in the middle by a broader or narrower line with black hairs. Scutellum coloured and haired as thorax, the hairs black. Pleura with long, blackish or more brownish hairs, sometimes reddish in front. Abdomen ovate, black and shining; it is clothed with dense and relatively long pile, longest towards the apex; the hairs are black or brownish black on the two first segments, reddish on the third but darker to blackish in the middle, and long and whitish on the fourth segment; the genitalia have black hairs. Venter black, shining, more or less grey pruinose at the base; the hairs long, mainly reddish. Legs black, the extreme apex of femora reddish; tibiæ lighter or darker brown or reddish with a somewhat undefined black ring about the middle; tarsi yellowish to brownish, the last joint blackish and the next more or less blackish above; the legs haired as in *Criorrhina*, the hairs black or brown. Wings yellowish and yellowish brown at the base: they have the same two clouds as in the species of *Criorrhina*, the median fascia rather broad and dark, the subapical cloud continued distinctly down the medial cross-vein and along the last part of the discal vein. Squamulæ and fringes blackish. Halteres brownish black.

Female. Vertex moderately broad, frons widening downwards, both black, shining; the hairs black, sometimes paler in front, the space above the antennæ bare. Epistoma black, only somewhat pruinose at each side of the antennæ and down the sides; for the rest the female similar to the male.

Length 12.5—14 mm.

This species is rather similar to *Bombus terrestris* and is perhaps the most *Bombus*-like fly of all Syrphids.

P. apiformis is rare in Denmark; Ordrup Mose (Stæger), Dyrehaven (Drewsen), Hillerød (Godskesen), and on Falster. My sole date is 6/7. Nearly all specimens are from earlier time, while it has only very rarely been taken in the later years. A larva was taken in Dyrehaven on 1/4 under the bark of a beech, it pupated, but on 10/5 the pupa was dead (Kryger). It is recorded to be especially a spring species like the species of *Criorrhina* and to frequent flowers of *Prunus* and *Crataegus*.

Geographical distribution: — Europe down into Italy; towards the north to southern Sweden.

38. **Cynorrhina** Willist.

Also this genus is allied to, and in most characters similar to *Criorrhina*, with which it was united as a somewhat aberrant species

until 1886. though it has also affinities to *Milesia*. Head short, as broad as thorax, behind it is excavated above; in the male the eyes touching for a short distance. Frons prominent, bare. Epistoma somewhat hollowed below the antennæ, with a slight central knob and slightly retreating below it, it is thus a little arched, not prominent, but somewhat descending; it is yellow with the lower lateral parts black, sometimes the middle stripe darkened, and it is bare with only slight hairs just at the eye-margins. Thorax a little rectangular; scutellum black without marginal fringe below. Abdomen elongated oval, broadest about the middle and here a little broader than thorax. Legs simple, hind femora not thickened; the legs short-haired, only anterior femora with a little longer hairs behind. Wings with the medial cross-vein sloping; no stigmatal cross-vein; basal part of the radial vein with very fine hairs.

The developmental stages are not known, but Verrall notes that the female has been observed depositing eggs on exsuding sap on beech and oak.

The genus is distinguished from *Criorrhina* and *Pocota* by the different epistoma and the slighter pubescence, from the former also by the touching eyes in the male, and from the latter by the descending epistoma with a central knob.¹ The Danish species is easily located by its colour.

Of the genus one species is found in the palæarctic region, also occurring in Denmark.

1. *C. fallax* L.

1758. Linn. Syst. Nat. X, 592 et 1767. XII, 2, 985, 35 et 1761. Fn. Suec. 1802 (*Musca*). — 1781. Fabr. Spec. Ins. II, 426, 26 (*Syrphus*) et 1805. Syst. Antl. 190, 10 (*Milesia*). — 1822. Meig. Syst. Besch. III, 235, 9. Tab. XXIX, Fig. 10 (*Milesia*). — 1843. Zett. Dipt. Scand. II, 860, 6 (*Milesia*). — 1862. Schin. F. A. I, 350 (*Criorrhina*). — 1901. Verr. Brit. Fl. VIII, 590, 1, fig. 406. — 1907. Kat. paläarkt. Dipt. III, 126. — *Syrphus semirufus* Fabr. 1794. Ent. Syst. IV, 301, 85 et 1805. Syst. Antl. 243, 51 (*Eristalis*). — 1817. Fall. Dipt. Suec. Syrph. 51, 3 (*Eristalis*).

Male. Vertex black, somewhat long, frons black, shining, with a longitudinal middle groove, very narrowly white pruinose at the eye-margins; epistoma yellow, slightly whitish pruinose at the sides, with a broad, bare middle stripe, which may sometimes be darkened to blackish, the lower side parts black. Vertex with black hairs, frons and epistoma bare, the latter only with slight, pale hairs just along

¹ Both Williston and Verrall say in the generic description "proboscis short", but the proboscis is not shorter than in *Criorrhina*.

the eye-margins; the epistoma is a little hollowed below the antennæ, with a very low central knob and below it slightly retreating, the lower part is thus not protruding but it is considerably descending. Occiput blackish, grey pruinose, the hairs whitish, but above also long, black hairs. Antennæ brown or reddish brown, arista darker towards the apex. Thorax black, shining, somewhat æneous on the front part, a little greyish pruinose on and inwards to the humeri; it is clothed with moderately long and not specially dense hairs which are pale yellow in front, black behind, but whitish in front of scutellum, the black hairs thus forming a cross-band. Scutellum black with white hairs. Pleura with pale yellow or whitish hairs, generally some black hairs below the wing-root. Abdomen widening from the base towards the middle and then narrowing towards the apex, about the middle wider than thorax; it is black and red, somewhat shining; the two first segments black, the rest red; the third segment varies somewhat in colour, it has generally a black middle spot near the front margin, then there may moreover be a spot at each side near the hind margin but these latter spots rather irregular; the spots may be enlarged and confluent so that the hind part and the middle of the segment are black, the red colour forming only two large basal corner spots and again each of these may have a black spot at the front margin; abdomen is clothed with short hairs; they are black on second segment except on two inwardly triangular patches at the basal corners where they are white, and they are long at the corners; the third and fourth segments have reddish hairs, but on the third are black hairs on the hind part and along the middle (the parts which are sometimes black); genitalia red. Venter reddish with the first and sometimes also second segment blackish; the hairs are sparse, pale and not long. Legs black, the apex of femora and the base and apex of tibiæ yellow, the base the most broadly; tarsi yellow with the two last joints black. Legs short-haired, the hairs only a little longer behind the anterior femora but hind femora quite short-haired; the hairs are black but more or less yellow on the anterior tibiæ, and whitish behind middle femora towards above; the posterior tarsi are distinctly black-spinulose below. Wings brownish grey tinged with a faint middle fascia and the medial cross-vein a little seamed. Squamulæ milky white with white fringes. Halteres pale yellow.

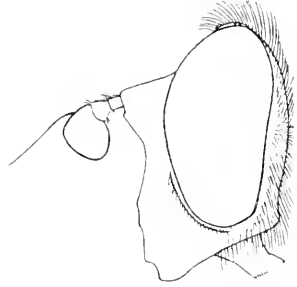


Fig. 172. Head of *C. fallax* ♂.

Female. Similar to the male; vertex and frons somewhat broad, widening downwards, black; the frons with large, grey side dust spots, almost or quite meeting in the middle; the hairs black; the space above the antennæ bare. Antennæ larger than in the male. Abdomen with the whole third segment, and generally the front margin of the fourth black; the black segments more white-haired than in the male, black-haired only in the middle. Tibiæ paler than in the male as base and tip are more broadly pale, especially on the anterior tibiæ.

Length 10—12.5 mm.

C. fallax is somewhat rare in Denmark; Geel Skov, Tisvilde, Sorø, and in Jutland at Serup on Thyholm. My dates are $^{26}/_5$ — $^8/_7$. It occurs in woods and my specimens are generally taken sitting on tree-stubs; it is also recorded to frequent flowers of *Prunus*, *Rubus* and *Berberis*.

Geographical distribution:— Europe down into Italy; towards the north to middle Sweden, and in Finland.

39. **Brachypalpus** Macq.

This genus is allied to *Criorrhina* and *Cynorrhina*, and also to the following genus, *Xylota*. The species are of somewhat large size and somewhat elongated shape; the colour is blackish æneous, sometimes with yellow markings at the base of abdomen, and the species are not specially densely pilose. Head somewhat short, about of the breadth of thorax; it is considerably broader than high, narrowed downwards and somewhat trapezoidal in circumference; behind it is a little arched below but a little excavated above. The eyes are bare, in the male touching for a short distance. Frons moderately prominent, with hairs only just at the eye-margins. Epistoma hollowed below the antennæ, without central knob but with the upper mouth edge produced about equally with the frontal prominence, the lower part of epistoma thus somewhat produced but not much descending; the epistoma is black and yellow, bare, with slight hairs only just at the eye-margins. Mouth parts (as far as I have examined) of usual construction, the proboscis somewhat short; palpi thread-like, not short.¹ Thorax rectangular, a little narrowed forwards; scutellum black, with a marginal fringe below. Abdomen elongated, not broader

¹ Macquart says in his diagnosis "palpes courts", in Schiner this has developed to "sehr kleinen Tastern" and Verrall says "palpi small"; this is, however, not correct, at all events not for the species described here, which has the palpi as long as in *Criorrhina*.

than thorax, a little narrowed behind. Genitalia relatively large. Legs with the hind femora considerably thickened and with short, strong spines below; hind tibiæ somewhat compressed and curved; hind trochanters in the male with a short, conical process on the inside. Wings with the medial cross-vein after the middle of the discal cell, somewhat oblique; the base of the radial vein with fine hairs; stig-matical cross-vein indistinct. Squamulæ as in the allied genera. Plumula with simple hairs.

The developmental stages are not described, but Brems notes (Isis 1846, 174) that he has found the larva of *B. valgus* in decaying wood in willows.

Of the genus 7 species are recorded from the palæarctic region, but, as remarked below, the species are not well characterised; one has been found in Denmark.

1. *B. laphriformis* Fall.

1816. Fall. Dipt. Suec. Syrph. 22, 11 (*Syrphus*). — 1862. Gerstäck. Troschel Arch. 1862, 28, II. 473. — 1907. Kat. paläarkt. Dipt. III, 127. — *Xylota valga* Zett. (nec Panz.) 1843. Dipt. Scand. II, 868, 1 et 1849. VIII, 3191, 1.

Male. Vertex brownish black, frons whitish pruinose, just above the antennæ bare and shining; epistoma black with only the lower front part yellow, or it is yellow also on the sides up to the eyes so that only a spot below the antennæ and the lower side parts are black, but the colours are obscured by white pruinosity; the lower front part and the lower side parts bare; to each side of the antennæ is a blackish streak across to the eye. The vertex has long, black hairs, frons bare only with yellow hairs along the eye-margins, and epistoma likewise with only a few pale hairs along the eye-margins; the epistoma is hollowed below the antennæ, without central knob but with the front mouth edge produced about equally with the frontal prominence; it is somewhat but not very descending. Occiput yellowish grey pruinose, the hairs whitish below and long to up above the middle, yellow above, and here also some black hairs. Antennæ brownish or reddish brown, arista brown, palest at the apex. Thorax blackish æneous, shining, somewhat pruinose at the front and side margins; it is clothed with long, somewhat dense, yellow or reddish yellow hairs, on the middle some black are intermingled. Scutellum unicolorous with thorax and with similar but longer hairs. Pleura yellowish pruinose, with long, yellow hairs. Abdomen elongate, about of the breadth of thorax, a little narrowed behind; it is black and shining; the first segment is yellow but often greyish pruinose on the disc, the second segment yellow at the side margin; the segments have

sometimes orange hind margins but they are often obscure or wanting; abdomen is clothed with moderately long hairs, which are yellow or whitish, they are black or blackish on the hinder half of fourth segment and more or less on the hind margin of the third; at the sides the hairs are rather long, longest at the basal corners. Genitalia with blackish hairs. Venter yellowish on the basal part, the third and fourth segments blackish; the hairs long and pale but darker on the fourth segment. Legs black and yellow, femora black with the basal part and the apex yellow but the extent of the colours somewhat varying, sometimes the femora are black only above and below, especially the hind femora are generally coloured in this way; tibiæ yellow on the basal part, more or less brownish towards the apex, middle tibiæ generally quite yellow; tarsi yellow with the two or three last joints blackish, front tarsi quite blackish and hind metatarsi often dark above; hind femora considerably thickened with the upper margin convex the lower straight but with an elevation before the apex; below there are about two rows of short, strong, black spines towards the anterior side, and similar, crowded spines towards the posterior side below the apical part, and here the femora are canaliculated between the rows; hind tibiæ somewhat compressed, and curved towards the apex, terminating on the inside with a very small and short spur; hind trochanters with a short, conical process on the inside; the hairs on femora long both behind and below, and also relatively long on the front side of middle femora; the hairs are all yellow, only below the hind tibiæ darker to blackish. Wings somewhat yellowish or brownish tinged, with a brown fascia on the middle and a faint subapical cloud, also seaming the medial cross-vein. Squamulæ and fringes pale yellow. Halteres yellow.

Female. Vertex and frons broad, widening downwards, yellowish pruinose, the vertex above and the space above the antennæ black; the hairs yellowish or brownish, darkest above, the space above the antennæ bare; epistoma yellow pruinose. Abdomen as in the male, the sides of second segment sometimes more broadly yellow; the hairs on the hind margin of the fourth and on all the fifth segment blackish, sometimes also some black hairs at the hind margin of third segment. Femora generally paler than in the male, the black colour less extended, especially on hind femora; the spines below the hind femora not reaching to the base and backwards forming only a single row.

Length 10,5—14 mm.

B. laphriformis is rare in Denmark; vicinity of Copenhagen, Ordrup Mose (Stæger), Dyrehaven (Drewsen), Geel Skov (the author), and on Lolland at Maribo and Christianssæde (Schlick). The dates

are only $\frac{5}{6}$ — $\frac{21}{6}$. It is recorded to frequent flowers of *Crataegus*, *Berberis* etc.; I have taken it sitting on a tree-stem and one of Mr. Schlick's specimens was taken sitting on the stub of an oak.

Geographical distribution:— The species is recorded to occur in Europe down into Italy, towards the north to middle Sweden, but little can be known with certainty by the present identification of the species of *Brachypalpus*.

Remarks: In determining this species as *laphriformis* Fall. I confess that I have partly taken the northern occurrence of the species into consideration, *laphriformis* being the only species occurring in northern Europe, and at the same time I find nothing to prevent the determination; it is true that Fallén says "abdomen ovatum", but otherwise his description is agreeing, and likewise Zetterstedt's description; the latter author says "sat crassa" but this is in comparison with the *Xylota*-species as he has the species in this genus; further I have seen specimens of Zetterstedt's *X. valga* from his collection and they are identical with my species, and this, I think, proves the correctness of my determination. It is at present impossible to determine the European species of *Brachypalpus* after the descriptions; for a sure distinction it would be necessary to know the various species. — The species are somewhat varying in colour and I should think that some of them are identical; thus I find it not improbable that *B. angustus* Egg. is identical with *laphriformis* as suggested by Gerstäcker (l. c.) and consequently also with *bimaculatus* Macq.; in fact I find Verrall's description of this species agreeing well with my *laphriformis*.

40. **Xylota** Meig.

Species of medium to rather large size and of a narrow, elongated shape, slightly haired; the colours may be quite black, but abdomen has often the middle part reddish, or there are pairs of yellow or glaucous spots; sometimes the end of abdomen is golden from dense hairs of this colour. Head somewhat semiglobular but rather low, considerably broader than high and broader than thorax; it is flat behind, a little excavated upwards. Eyes bare, touching in the male, separated in the female; in the male the facets are distinctly enlarged on the front part. Vertex more or less elongated. Frons somewhat prominent, nearly bare only with slight hairs at the eye-margins. Antennæ inserted in or a little below the middle; they are short, third joint short oval, sometimes not longer than high; the arista is relatively long; the basal joints of the antennæ have short hairs and the second has bristles at the apical margin above and below; third joint and

arista microscopically hairy, the latter bare on the apical half. Epistoma rather low, it is more or less but not much hollowed; there is no central knob and the front mouth edge is only slightly or a little more protruding, and epistoma is not descending; it is black but pale pruinose with only the lower side parts bare; sometimes it is only slightly pruinose; it is bare with only slight hairs at the eye-margins. Jowls small, not or almost not descending; there is a furrow separating off narrow eye-margins and stretching up above the middle. Proboscis and oral cone short; the mouth parts short but strong and somewhat characteristic. Clypeus with the basal part large, the side legs rather short. Labrum (*segnis*) short and strong, strongly semitubular, the median process somewhat broad, cleft, beset with emergences on the apical part; the upper lateral processes fine, not attenuated and pointed but truncate at the end; the lower lateral processes very broad and with the end broadly cut, not attenuated; the usual lateral rows of small papillæ on the inside present and the papillæ numerous; hypopharynx a little shorter than labrum, broad and semitubular, somewhat abruptly attenuated and with the apex pointed; the salivary duct distinct; maxillæ short, a little shorter than hypopharynx, rather broad and strong, as usual with very small, microscopical spines in rows; palpi quite small and short, shorter than the lacinia, with microscopical hairs, and with some bristles, especially at the apex. Labium short, the basal part shorter than the relatively large and broad labelia. Thorax rectangular; scutellum black or æneous, somewhat marginate, with a marginal fringe below. There are no thoracal or scutellar bristles, only the marginal hairs on scutellum may sometimes be strong and somewhat bristly, and above the wing-root are short but very strong, dense hairs. Metapleura with short, dense hairs. The metaepimera send a process upwards, below the halteres, these processes stand out at each side of the base of abdomen as in *Neoscia* but are less pointed. Abdomen is relatively long and narrow, parallel-sided and generally somewhat flattened; in the male there are four not transformed segments, the first somewhat short, the others of about equal length; sometimes (*femorata*) the fourth is unusually long, much longer than the others. Genitalia large, of usual shape. In the female the abdomen has five normal segments, the fifth small and pointed, the last terminating with two small lamellæ. Legs somewhat long, hind femora more or less thickened, especially in the male, and armed below with shorter or longer spines, either in the whole length or only on the apical part; the spines are generally also longest in the male; hind tibiæ more or less compressed and curved; in the male the hind trochanters have in many species a shorter or longer spine

or spur below near the apex. The legs haired as usual, the hairs on femora shorter or longer, sometimes rather short, especially on hind femora; the bristle above the trochanters more or less distinct, at all events on the anterior legs. Claws and pulvilli well developed; empodium small, spine-shaped, slightly hairy. Wings somewhat long; medial cross-vein more or less oblique, placed behind or almost on the middle of the discal cell; the basal part of the radial vein with fine, somewhat short bristles; no stigmatal cross-vein. Thoracal squamula with long, branched hairs, stopping rather long before the angulus, alar squamula with shorter, flat hairs. Plumula short with simple hairs.

The developmental stages are somewhat well known. Scholtz (Ent. Zeitschr. Breslau, 4, 1850, 31) found quite immature specimens of *X. lenta* numerous in a decaying Acer in the middle of May. Westwood mentions briefly (Introd. II, 1840, 559) the puparia of *X. pigra* and *florum*, the former probably from rotten wood. Perris describes and figures (Ann. Soc. Ent. de Fr. 4, X, 1870, 326, Pl. 4, fig. 112—124) the developmental stages of *X. pigra*; the larvæ lived together with larvæ of *Mycetobia pullipes* below the bark on Pinus among the detritus and excrements from *Tomicus sexdentatus (stenographus)* and *Acanthocinus aedilis*; the author says that the imago develops in spring from larvæ from the foregoing autumn, and in summer and autumn from larvæ which have developed in summer. Beling describes (Arch. f. Naturg. 41, 1875, 54) larva and pupa of *X. segnis*; the larvæ were found in a decaying, humid stub of a beech on $\frac{4}{9}$, the imagines developed next spring on $\frac{29}{14}$ and following days; on the same place the author found on $\frac{5}{5}$ still many larvæ and only a few pupæ; the imagines developed until $\frac{18}{6}$ and among them were two specimens of *X. lenta*, the larva of which thus had been together with the larva of *segnis*. Verrall figures (Brit. Fl. V, 1909, 39, fig. 69) larva and pupa of *X. sylvarum*, but no notes are given. I have myself examined larva and pupa of *X. segnis* and *nemorum*; the larvæ of *segnis* were taken in a decaying, humid stub of a beech on $\frac{6}{8}$; those of *nemorum* were taken in the same way on $\frac{5}{6}$, they pupated about $\frac{18}{6}$ and developed on $\frac{23}{6}$ and the following days, another larva was taken in water in a tree-stub on $\frac{17}{7}$, it developed on $\frac{25}{7}$, and a pupa was taken in a quite similar place on $\frac{23}{7}$, developing on $\frac{31}{7}$. — The larva of *X. segnis* is elongated, arched above, a little flattened below; it is a little attenuated at the head end, or, when not at all contracted, almost not thinner at the anterior end; towards the posterior end it is more attenuated; the dermis is finely chagreened from small spines or hairs, and the body is transversely corrugated; the prothoracal segment has

longitudinal folds; above on the corrugations are slightly larger, scarcely perceptible, divided spines, which are arranged regularly above and on the sides in the usual way; the prothoracal segment has numerous small spines at the anterior margin, and at the sides outwards to the anterior spiracles two groups of small spines. The head is small and retractile; above the mouth opening are the two-jointed antenna-like organs, each ending with two small papillæ; at the hind margin of the prothoracal segment lie the very small, brown anterior spiracles at each side; towards the end of the tapering posterior part are at each side three filaments one behind the other, the last placed at each side of the apex; they are clothed with relatively long hairs, and the hairs on the posterior part of the body are upon the whole longer than those on the anterior part; at the posterior end is a short, about 0.7—1 mm long, brown posterior spiracular process, bearing the spiracles on the flat end surrounded by stellately arranged fine threads. On the ventral side are six pairs of prolegs, armed with spines, on the six first abdominal segments, and below the prothoracal segment a pair of similar spined warts; the anus lies relatively long forwards at the beginning of the tapering part and somewhat before the side filaments; it is thus seen that the last segment is long and that it is this segment alone which bears the side filaments; these latter answer also in reality to the lateral spines found on the other segments; several of my specimens show the same bundle of threads protruding from the anus as was mentioned under the *Eristalis*-larva. The colour of the larva is yellow or whitish yellow, the length about 12 mm. The pupa is brownish, rather arched, almost not attenuated in front as the front end is declining downwards; it has the same posterior spiracular process as the larva, and likewise the side filaments but these latter are shorter; at the hinder border of the declining front part are two 1 mm long, brown anterior spiracular tubes; they are approximated at the base, directed upwards and a little backwards; they are beset with small tubercles, placed ring-like. The length of the pupa is about 9 mm. — The larva of *X. nemorum* is similar to the above description, but the larger, regularly arranged spines are here larger, rather conspicuous, and brown, and at each side of the prothoracal segment outwards to the anterior spiracles is a large, black, bifid spine, such as figured by Perris for *X. pigra*, but differing by the outer hook being the larger, while in *pigra* the inner is the larger; these spines are not found in the larva of *segnis*, which has here only groups of small spines. The length is about 9 mm. The pupa is likewise similar, the anterior spiracular tubes are a little shorter and thicker, and less approximated at the base, and at the lower

front margin of the pupa lie the two bifid spines, which remain, when the pieces for the opening have been detached; the length of the pupa is 7—8 mm. It will be seen that the larva of *memorum* is more similar to that of *pigra* as described and figured by Perris, than is the larva of *segnis*. With regard to the description and figures by Perris I shall draw attention to the fact that the way in which he describes and figures the segments of the larva is erroneous; the place of the anus shows that the last segment is long, and when we count twelve segments (the head taken as one segment) we also see that this is so; when the head, the three thoracal segments and the six proleg-bearing segments, in all ten, are counted, we have still a small eleventh segment and then the long twelfth segment with the anus at its front end. That Perris has made some error is also seen from the fact that while he says there are eleven segments without the head, he says later on that there are nine abdominal segments, which would give twelve segments without the head. — Perris mentions that the opening of the puparium is caused by a frontal bladder; this is, of course, erroneous.

The species of *Xylota* are beautiful and characteristic flies, and the larger species are rather strong. They occur in woods, generally on humid places or near water, and they are here seen running on large leaves in low herbage, f. inst. on leaves of Tussilago and Petasites; some species are especially seen on tree-stubs and stems or on piles of wood; they are shy but when disturbed they usually use their legs running rapidly away and often seeking the underside of the leaves, but they also fly well, though generally not for long distances.

Of the genus about 22 species are recorded from the palæarctic region, 8 have been found in Denmark.

Table of Species.

- | | |
|---|--------------------|
| 1. Abdomen red on the middle part | 2. |
| — Abdomen black, or with pairs of yellow or glaucous spots | 5. |
| 2. Legs partly yellow | 3. |
| — Legs all black | 4. <i>lenta</i> . |
| 3. Hind femora with equal and rather strong spines below in nearly the whole length; hind trochanters in the male with a large spine | 1. <i>segnis</i> . |
| — Hind femora very short-spinulose below, only with somewhat small spines towards the apex; hind trochanters in the male with a short spur or process | 4. |
| 4. Anterior tibiæ with blackish rings, hind tibiæ with the apical two thirds black | 2. <i>tarda</i> . |
| — Tibiæ yellow | 3. <i>ignava</i> . |

5. Abdomen quite black, or with golden hairs at apex 6.
 — Abdomen with yellow or glaucous spots 7.
6. Abdomen with no golden hairs at apex; all femora and anterior tibiæ red 5. *femorata*.
 — Abdomen with the apex covered with golden hairs; femora black 6. *sylvarum*.
7. Hind femora rather thick, hind tibiæ somewhat short, distinctly curved and with an erect ciliation below; fourth abdominal segment quite or mainly pale-haired, the hairs long at the hind margin; hind trochanters in the male simple 7. *nemorum*.
 — Hind femora almost not thickened, hind tibiæ longer and very slightly curved, without erect ciliation below; fourth abdominal segment mainly black-haired, the hairs all short; hind trochanters in the male with a small spur 8. *florum*.

1. *X. segnis* L.

1758. Linn. Syst. Nat. X, 595 et 1767. XII, 2, 988, 57 et 1761. Fn. Suec. 1823 (*Musca*). — 1775. Fabr. Syst. Entom. 772, 47 (*Syrphus*) et 1805. Syst. Antl. 191, 14 (*Milesia*). — 1816. Fall. Dipt. Suec. Syrph. 10, 5 (*Milesia*). — 1822. Meig. Syst. Besch. III, 220, 12. — 1843. Zett. Dipt. Scand. II, 874, 5. — 1862. Schin. F. A. I, 354. — 1901. Verr. Brit. Fl. VIII, 598, 1, figs. 408—409. — 1907. Kat. paläarkt. Dipt. III, 130.

Male. Vertex bluish black, shining; frons and epistoma paler or darker yellow to brownish pruinose, the lower side parts of epistoma black; vertex with yellow hairs, frons with pale hairs only just along the eye-margins, and also epistoma only with slight hairs on the eye-margins. Occiput greyish white pruinose below and upwards beyond the middle, æneous and shining above; the hairs white below, yellow above. Antennæ blackish, third joint dark brown; sometimes the antennæ paler; arista black, pale at the apex. Thorax from dark to rather bright æneous, shining, densely punctate, especially behind; it has a whitish pruinose spot inwards to the humeri; it is clothed with short, yellow hairs, among which are some longer hairs on the hind part; also on the sides and on the postalar calli are longer hairs; inwards to the wing-root are short, strong, black hairs. Scutellum æneous with short and longer, yellow hairs and along the margin some long, almost bristly hairs. Pleura slightly pruinose with longish, whitish, above yellow hairs; just below the wing-root some darker hairs. Abdomen linear, yellowish red on the middle; first segment æneous, second yellowish red with the extreme front margin black and almost always a shorter or longer, narrow, black pointed middle line from the front margin backwards; third segment reddish yellow with the hind margin, sometimes the hind part black, generally produced a little forwards in the middle; fourth segment bluish black,

sometimes slightly and indefinitely paler at the hind margin; abdomen is more or less dull along the middle of second and third segments and at the hind margin of the latter; it is clothed with short hairs, which are yellow but on fourth segment black except on and at the sides, they are also often black on the hind margin of third segment and sometimes in the middle at the hind margin of second; towards the sides they are longer and longest towards the base and at the basal corners. Genitalia with yellow or partly black hairs. Venter coloured mainly as dorsum, with short, pale hairs, longer at base and apex, and darker to blackish at the end of fourth segment. Legs black, the very apex of anterior femora yellow; anterior tibiæ yellow with a larger or smaller, black ring near the apex, sometimes they are almost quite yellow, anterior tarsi with the three first joints yellow; hind tibiæ with the basal third yellow, hind tarsi blackish or with the three basal joints more or less yellow, only metatarsus dark above; hind femora somewhat thickened, hind tibiæ somewhat compressed and somewhat strongly curved in the apical third; hind trochanters with a strong, spine-like process below, directed backwards; hind femora with two rows of short, strong spines below, the row towards the posterior side present only on the apical part; the legs short-haired, also the femora with only longish hairs; the hairs whitish to more or less dark yellow, just at the apex of front femora may be a few black hairs and the short hairs on the apical part of hind femora are black. Wings more or less brownish tinged, sometimes

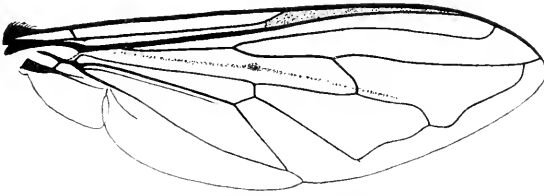


Fig. 173. Wing of *X. segnis* ♂.

almost hyaline. Stigma brown. Squamulæ pale yellow with darker margin and fringes. Halteres pale yellow.

Female. Vertex and frons rather narrow, slightly widening downwards, bluish and shining; frons with a pair of whitish dust spots nearly meeting in the middle; the hairs short, pale, the space above the antennæ bare. Hind trochanters without spine, hind femora less thickened than in the male, the spines less strong and those in the anterior row produced less towards the base.

Length 10—13 mm.

The larva and pupa are described above under the description of the genus.

X. segnis is common in Denmark all over the country. My dates are $10\frac{1}{5}$ — $19\frac{1}{9}$. It occurs in woods and fens, generally on somewhat humid places where it is seen running on the leaves of low herbage, especially on large leaves as those of *Petasites*. The larva was taken in a decaying, humid stub of a beech in Dyrehaven on $6/8$ (Schlick), and I have taken newly emerged specimens, still with the wings not unfolded, on tree-stubs in Egebæks Vang in the latter part of July.

Geographical distribution:— All Europe down into Italy, and on Madeira; towards the north to middle Sweden, and in Finland.

2. *X. tarda* Meig.

1822. Meig. Syst. Besch. III, 225, 19. — 1862. Schin. F. A. I, 357. — 1901. Verr. Brit. Fl. VIII, 600, 2, fig. 410. — Kat. paläarkt. Dipt. III, 131. — *X. bifasciata* Zett. (nec Meig.) 1843. Dipt. Scand. II, 872, 4 et 1849. VIII, 3191, 4. — *X. confinis* Zett. 1843. Dipt. Scand. II, 872, 5 et 1849. VIII, 3191, 5 et 1855. XII, 4674, 5. — 1862. Schin. F. A. I, 354.

Male. This species is rather similar to *segnis*. Frons with a bare space above the antennæ. Thorax more short-haired and with the long hairs behind less numerous and shorter; scutellum almost with only short hairs except the hairs at the margin. Abdomen as in *segnis*, second segment more broadly black at the base; the markings often darker or more obscure and sometimes the hind margin of second segment darkened. Legs coloured and haired as in *segnis*, the hairs on femora much shorter, on hind femora quite short; hind femora less thickened and hind tibiæ much less curved, and they are evenly curved, not abruptly in the apical third; hind trochanters with only a short spur; hind femora with only quite small but numerous spinules below, not arranged in rows, only on the apical part a little larger and in two rows.

Female. Similar to the male and differing from the female of *segnis* by the same characters as in the males; the reddish markings on abdomen more vague.

Length 9—10,5 mm.

This species is easily distinguished from *segnis* by the characters given above, especially the different armature below the hind femora, and in the male by the short spur on the hind trochanter. Schiner's character from the dark hind margin of the second abdominal segment is only sometimes present; Verrall's statement that the front

tibiæ are much darker than in *segnis* is contrary to Schiner's statement that the tibiæ are dark only on the apical part; none of the statements I have found confirmed, the tibiæ in my specimens being coloured mainly as in *segnis*.

X. tarda is rare in Denmark, I know only seven specimens; Dyrehaven (Stæger), in Jutland at Hald near Viborg (the author), and on Bornholm at Allinge and in Almindingen (H. J. Hansen). My dates are only $24/6$ — $24/7$.

Remarks: In Verrall's Catalogue of the Syrph. and in Kat. paläarkt. Dipt. *X. bifasciata* apud Zett. is considered to be a synonym to *nemorum* Fabr., but I have seen specimens from Zetterstedt's collection of his *bifasciata*, and they were *tarda*; this synonymy is already adopted by Wahlgren (Entom. Tidskr. XIII. 1909, 75), and Verrall has the same in Brit. Fl.

Geographical distribution:— Northern and middle Europe down into Austria and Hungary; towards the north to middle Sweden, and in Finland.

3. *X. ignava* Panz.

1798. Panz. Fn. Germ. LX, 4 (*Syrphus*). — 1822. Meig. Syst. Besch. III, 221, 13 — 1843. Zett. Dipt. Scand. II, 875, 9 et 1849. VIII, 3192, 9 et 1859. XIII, 6039, 9. — 1862. Schin. F. A. I, 355. — 1907. Kat. paläarkt. Dipt. III, 129.

Male. Also this species is similar to *segnis*, but is stouter and darker. Vertex broader, more triangular, bluish; frons and epistoma pale yellow pruinose, the latter also with the ground colour yellow; vertex with whitish hairs, frons and epistoma with only slight, pale hairs just along the eye-margins. Occiput greyish white pruinose, above bluish and only slightly pruinose; the hairs all white, only at the upper corners some few short, black, bristly hairs. Antennæ with the basal joints reddish brown or blackish, the third joint dark, blackish brown or black; arista blackish. Thorax æneous black, punctate, inwards to the humeri a somewhat large, whitish pruinose spot; the thorax is clothed with short, yellowish hairs, on the hind part intermingled with some longer, paler hairs; along the front margin, on the præalar and postalar calli and across in front of scutellum are white, somewhat longer hairs; above the wing-root and somewhat inwards are black hairs. Scutellum with short and longer, white hairs, along the margin are numerous long, but fine, not bristly hairs. Pleura slightly pruinose, with longish, white hairs. Abdomen coloured as in *segnis* but with the colour on the middle more red; it is dull on the disc, shining

at the base, the sides and on fourth segment; it is clothed with short hairs which mainly follow the ground colour, but there are inconspicuous black hairs forming triangular middle spaces on the red segments, rather extended on third segment; at the side margins the hairs are longer, white, increasing in length towards the base. Venter coloured as dorsum, with short, pale hairs, black on fourth segment; at the base they are longer. Legs with femora black or blackish, the apex of anterior femora yellow; tibiæ and tarsi yellow, the two last tarsal joints more or less darkened; hind tibiæ sometimes slightly darkened in the middle; the hind trochanters have a short, conical, pointed process below, it is directed downwards and is yellow; hind femora considerably thickened, more than in *segnis*, but they are armed about as in *tarda*, as they have numerous small spinules below not arranged in rows on the larger part, only at the apex forming two rows of a little larger spinules; hind tibiæ a little less curved than in *segnis*; the legs haired as in *segnis*, the hairs whitish, only at the apex of front femora a few black hairs, and the short hairs on the apical part of hind femora and partly below are black; the hairs on tibiæ are fine and dense and cause the tibiæ to shine white or silvery in certain lights. Wings yellowish or light brownish tinged, especially on the middle part. Stigma pale brown. Squamulæ whitish with yellow margin and fringes. Halteres pale yellow.

Female. Similar to the male; vertex and frons broad, broader than in *segnis*, widening downwards; they are bluish black, somewhat above the antennæ a greyish pruinose cross-band and the frons pruinose at the sides of the antennæ; the hairs whitish, the space above the antennæ bare. Hind trochanters simple, hind femora less thickened and the spinules below smaller, stretching less near to the base.

Length 12,5—13 mm.

This species is easily distinguished by the colour of its legs and the process of the hind trochanters of the male, besides by other characters.

X. ignava is very rare in Denmark, we have only two specimens, a male and a female; I am not quite certain with regard to its belonging to our fauna, one of our specimens in the Danish collection is labelled "Denmark?" and the other has no locality; on the other hand it is very probable that the species should occur in Denmark as it is found both north and south of us.

Geographical distribution:— Europe down into Italy; towards the north to southern Sweden, and in Finland, but not in England.

4. **X. lenta** Meig.

1822. Meig. Syst. Besch. III, 222, 15. — 1843. Zett. Dipt. Scand. II, 877, 11. — 1862. Schin. F. A. I, 355. — 1901. Verr. Brit. Fl. VIII, 601, 3, fig. 411. — 1907. Kat. paläarkt. Dipt. III, 129. — *Milesia pigra* Fall. p. p. (nec Fabr.) 1816. Dipt. Suec. Syrph. 11, 7.

Male. Again this species is somewhat similar to *segnis*, but it is larger, much broader and stronger and of darker colour. Vertex black, elongated, eye-suture somewhat short; frons and epistoma whitish pruinose, the frons rather prominent and also the mouth edge prominent; vertex with pale hairs intermingled with some black ones; frons quite without hairs, and epistoma with only slight, pale hairs at the sides of the antennæ and just along the eye-margins. Occiput whitish pruinose on the lower half, black and shining above; the hairs white, above almost all black. Antennæ with the basal joints black, the third joint somewhat large, dark brown to blackish; arista blackish, brownish at the base. Thorax black, shining, finely punctate, inwards to the humeri a whitish pruinose spot; thorax is clothed with short, whitish yellow and partly black hairs, and on the whole disc with longer, erect, partly pale, partly black hairs; above the wing-root some black hairs and on the postalar calli some longer, yellow hairs. Scutellum with longer and shorter, pale hairs, the long hairs at the margin not bristly. Pleura with somewhat long, not dense, white hairs. Abdomen coloured about as in *segnis*; first segment black, second and third red; the second with only the extreme front margin black not reaching the sides, and with a black triangle in the middle; the third segment quite red without black hind margin; fourth segment black; abdomen all shining: it is clothed with not quite short hairs, which follow the ground colour but are pale on first segment; they are somewhat long on fourth segment, on the other segments they are short along the middle, increasing in length towards the sides and especially long towards the basal corners. Genitalia with longish, black hairs. Venter coloured as dorsum, with long, pale, on fourth segment black hairs, on this latter segment they are shorter except at the end. Legs all black; hind trochanters simple, hind femora rather thickened, thickest near the apex and somewhat abruptly attenuated at the end; they have for the greater part only bristles below and it is only on the apical third that there are stronger, short spines, not distinctly arranged in rows; hind tibiæ somewhat compressed and evenly curved, they are canaliculate behind in the basal half; legs somewhat long-haired, also the tibiæ with relatively long pubescence; anterior femora whitish-haired, hind femora with white

hairs on the anterior side, on the posterior side the hairs mainly black and long, the short hairs on the apical part black; the hairs on anterior tibiæ pale except below middle tibiæ and to a slight degree below front tibiæ, where they are black; hind tibiæ black-haired, below they have a sharp edge on the basal third, the rest bears a somewhat short, erect ciliation. Wings more or less, sometimes somewhat strongly brownish tinged, generally the most on the apical part; medial cross-vein less oblique than in the other species and placed near the middle of the discal cell. Stigma brown. Squamulæ whitish with yellow margin and fringes. Halteres pale yellow.

Female. Vertex and frons somewhat narrow, widening downwards, black and shining; frons with two greyish white dust spots; the hairs short and pale, the space above the antennæ bare. Epistoma much more thinly pruinose than in the male. Thorax more short-haired and more black-haired, as the hairs on the front part and along the middle are mainly black and likewise inwards to the wing-root; the long hairs on the postalar calli partly black; scutellum with more or fewer black hairs, and the long marginal hairs black and stronger than in the male. Abdomen with the basal part of fourth segment red. Hind femora quite as in the male.

Length 11—13.5 mm.

This species is easily known already by its quite black legs.

X. lenta is not rare in Denmark, but, however, much less common than *segnis*; Ordrup Mose, Ermelund, Dyrehaven, Geel Skov, Hillerød, Tisvilde, Nordskoven at Jægerspris; on Møen; on Falster; on Lolland in Dødemose west of Nysted, and on Langeland at Lohals; in Jutland at Horsens and at Funder near Silkeborg. My dates are $26/5$ — $10/7$. It occurs on similar localities as *segnis*.

Geographical distribution: — Europe down into Italy; towards the north to middle Sweden.

Remarks: Under *X. pigra* Zetterstedt says (Dipt. Scand. II, 878) "In Dania, D. Stæger"; according to this expression Zetterstedt had evidently not seen Danish specimens; in Stæger's collection is a single female, labelled *pigra*, but it is only a (somewhat immature) specimen of *lenta*; *X. pigra* is thus hitherto not found in Denmark.

5. *X. femorata* L.

1758. Linn. Syst. Nat. X, 595 et 1767. XII, 2, 988, 58 et 1761. Fn. Suec. 1824 (*Musca*). — 1816. Fall. Dipt. Suec. Syrph. 11, 8 (*Milesia*). — 1843. Zett. Dipt. Scand. II, 876, 10. — 1862. Schin. F. A. I, 355. — 1907. Kat. paläarkt. Dipt. III, 128. — *Syrphus volvulus* Fabr. 1794. Ent. Syst. IV, 295, 62 et 1805. Syst. Antl. 192, 15 (*Milesia*). — *X. volvulus* 1822. Meig. Syst. Besch. III, 223, 16, Tab. XXVIII, Fig. 29.

Male. Vertex black, long but not narrow, eye-suture somewhat short; frons somewhat prominent, black and shining; epistoma black, shining, only a little pruinose at the sides of the antennæ and below from the upper mouth edge towards the eyes; it has the mouth edge rather prominent; vertex black-haired, frons with only some single hairs at the eye-margins and epistoma with only a row of white hairs at each eye-margin. Occiput bluish black, shining, a little pruinose along the eye-margins below; the hairs not long, brownish below, yellowish above and here some black hairs. Antennæ reddish, first joint black, third joint short, not longer than high; arista not long, brownish yellow, pale towards the apex. Thorax blackish or dark æneous, not very shining, with indications of two or four darker stripes; inwards to the humeri it has a small, whitish pruinose spot; it is clothed with short, mainly yellow hairs and has on the whole disc longer, mainly black hairs, longest behind; above the wing-root are short, black hairs. Scutellum has short and long, pale hairs, the hairs along the margin not bristly. Pleura black, shining, with not dense, blackish, behind and downwards pale hairs. Abdomen long, the fourth segment unusually long and swollen in the basal part; the abdomen is black or bluish black, shining, but dull along the middle and on the hind parts of second and third segments so that the shining parts form here two large basal corner spots; it is clothed with short hairs which are white but black on the dull parts and on fourth segment, on this latter are only some white hairs at the end of the swollen front part; the hairs are longer towards the sides and long at the basal corners; they are all white at the side margin except just at the hind corners of the segments and on the last part of the fourth segment. The genitalia are more or less, often quite retracted into the long fourth segment. Venter black, shining, with long, white hairs, black at the apex. Legs red or yellowish red, coxæ, trochanters, the apex of hind femora and the hind tibiæ and tarsi black; hind trochanters simple, hind femora somewhat strongly thickened, especially towards the apex, which is somewhat abruptly attenuated; below there are yellow hairs, becoming black and more bristly outwards, and only below the apical part are somewhat short, black spines, not arranged in rows; hind tibiæ somewhat compressed, evenly curved; the legs not long-haired, the hairs long only behind the front and especially the middle femora; the hairs are yellow, behind the apex of middle femora there may be a few black hairs and they are partly black on the posterior side of hind femora and black on the black apex and on the hind tibiæ; these latter with a short, erect ciliation below in the whole length. Wings somewhat brownish tinged; medial cross-vein

not very oblique but placed after the middle of the discal cell. Stigma brown. Squamulæ dirty whitish or smoky, with dark margin and fringes. Halteres with yellow peduncle and blackish knob.

Female. Similar to the male; vertex and frons somewhat broad, widening downwards; they are black and shining, the frons with two small, greyish side dust spots; the hairs black, the space above the antennæ bare. Thorax and scutellum more short-haired than in the male. Abdomen with the fourth segment long but shorter than in the male. Hind femora a little less thickened than in the male but otherwise similar.

Length 12 to fully 14 mm.

X. femorata is rather rare in Denmark; Tyvekrog (the author), Tisvilde (J. C. Nielsen, the author), and a few specimens from earlier times without particular locality. My dates are $\frac{3}{6}$ — $\frac{11}{7}$. It seems to occur in more extended woods and has been taken sitting on tree-stubs; it is also else recorded from such localities, often sitting on felled trees.

Geographical distribution: — Northern and middle Europe down into France; towards the north to northern Sweden, in Finland, and in Siberia and down towards China.

6. *X. sylvarum* L.

1758. Linn. Syst. Nat. X, 592 et 1767. XII, 2, 985, 37 et 1761. Fn. Suec. 1804 (*Musca*). — 1775. Fabr. Syst. Entom. 767, 20 (*Syrphus*) et 1805. Syst. Antl. 191, 13 (*Milesia*). — 1816. Fall. Dipt. Suec. Syrph. 10, 4 (*Milesia*). — 1822. Meig. Syst. Besch. III, 223, 17. — 1843. Zeit. Dipt. Scand. II, 870, 2. — 1862. Schin. F. A. I, 356. — 1901. Verr. Brit. Fl. VIII, 602, 4, fig. 412. — 1907. Kat. paläarkt. Dipt. III, 131.

Male. Vertex black or bluish black, somewhat elongated, frons and epistoma yellow pruinose, the former black and shining just above the antennæ; vertex with yellow hairs, frons and epistoma bare with only slight, pale hairs down just along the eye-margins. Occiput whitish grey pruinose on the lower part, bluish black and shining above; the hairs are whitish below, yellow above. Antennæ blackish, third joint generally brown or blackish brown; arista long, black. Thorax æneous, shining, punctate, inwards to the humeri a greyish pruinose spot; it is clothed with short, yellow hairs and with a little longer, erect, likewise yellow hairs; these latter are long on the hinder part; behind on the middle of the disc both the short and long hairs are more or less black; on the præalar and postalar calli are longer, yellow hairs, on the latter black anteriorly, and above the wing-root are somewhat strong, black hairs. Scutellum with short, decumbent,

and long, pale hairs, the long marginal hairs stronger, nearly bristly. Pleura with somewhat short and dense, yellow hairs, reddish yellow just above. Abdomen black, dull, the first segment bluish, shining, the second with a shining side margin, widening somewhat triangularly inwards on the front part; the third segment with similar shining spaces and the fourth quite shining, but on these segments it is seen only with difficulty on account of the densely covering hairs; abdomen is clothed with short and longer, mainly yellow hairs, on the second segment they are short and depressed on the dull part, longer and erect on the shining parts, they are generally black on a triangular space at the hind margin; at the sides they are longest and specially long and paler at the basal corners; the third segment has the dull part clothed with short, adpressed, black hairs, the shining parts have longer, decumbent, golden hairs, which thus form a transverse, sometimes interrupted band near the front margin, widening towards the sides and stretching along the side margins; the fourth segment is quite covered with long but depressed, golden hairs, leaving only just the front margin bare; the hairs are arranged regularly as with a comb in such a way that on the middle part they are directed towards the median line, on the side parts directed outwards. Genitalia shining, black-haired. Venter black, shining, with paler incisures; it has short, yellow hairs, at the base they are long and whitish, and they are also long at the hind margins of the segments and partly at the sides. Legs with femora black, the extreme apex of anterior femora yellow and all tibiæ and the three first joints of the tarsi likewise yellow; the tibiæ have about the apical half or a little more darkened except along the dorsal side, which remains yellow, but the darkening is only indistinctly seen on account of the dense hairs; the hind trochanters have two short, wart-like processes below near the apex; the hind femora are slightly thickened, with short, black spines below on the apical half, forming two rows, the anterior row is continued towards the base as small spinules, not arranged in rows; hind tibiæ slightly and evenly curved; the legs have the hairs of medium length, longest behind, anterior femora and above hind femora; the hairs are white and yellow and there are some black hairs behind the apex of the anterior, especially the front femora, and the short hairs on the apical part of the hind femora are black; the hairs on tibiæ are dense, depressed and almost golden, below the anterior tibiæ there may be some black hairs; hind tibiæ without erect ciliation below. Wings slightly or a little more brownish tinged, especially on the anterior part; medial cross-vein very oblique. Stigma brown. Squamulæ pale yellowish with darker margin and fringes. Halteres pale yellow.

Female. Similar; vertex and frons rather narrow, widening downwards, bluish; frons with two greyish dust spots; the hairs short, yellow, the space above the antennæ bare. Abdomen as in the male, the small fifth segment black, shining and black-haired. Hind trochanters with indications of the processes present in the male.

Length 11 to fully 15 mm.

X. sylvarum is somewhat common in Denmark; Ordrup Mose, Ermelund, Dyrehaven, Bøllemosen, Ørholm, Hillerød, Egebæks Vang, Nyrup Hegn, Tisvilde, Faxe Ladeplads, Jægerspris; on Falster; on Lolland at Maribo and in Kældskov; on Langeland at Lohals; on Funen at Veflinge, Odense and at Lundeborg on the eastern coast; in Jutland at Horsens, Rye near Silkeborg and Sæby. My dates are $\frac{3}{16}$ — $\frac{25}{8}$. It occurs on similar localities as *seguis* and is often seen on plants with large leaves as Petasites.

Geographical distribution:— Europe down into Italy; towards the north to middle Sweden, and in Finland.

7. *X. nemorum* Fabr.

1805. Syst. Antl. 192, 17 (*Milesia*). — 1862. Schin. F. A. I, 356. — 1901. Verr. Brit. Fl. VIII, 604, 5, fig. 413. — 1907. Kat. paläarkt. Dipt. III, 129. — *X. bifasciata* Meig. 1822. Syst. Besch. III, 219, 10. — *X. florum* Zett. (nec Meig.) 1843. Dipt. Scand. II, 879, 13. — *Milesia ignava* 1816. Fall. (nec Panz.) Dipt. Suec. Syrph. 11, 16.

Male. Vertex black or æneous black, not specially long; frons and epistoma grey pruinose, the former shining at the extreme front margin; vertex with yellow, anteriorly with black hairs, frons a little pale-haired and epistoma with distinct, whitish hairs at the eye-margins. Occiput greyish pruinose, less above; the hairs yellow, above a few black hairs. Antennæ blackish or blackish brown; arista of medium length, black. Thorax greenish æneous, shining, often with indications of two darker middle stripes; it is greyish pruinose on and inwards to the humeri; it is finely punctate and clothed with short, erect, yellow or whitish and black hairs; the hairs are black especially across the middle, and behind are longer, black hairs among the short; above the wing-root are short, black hairs. Scutellum with short, yellow and long, partly black hairs; the long marginal hairs yellow, not bristly. Pleura with shortish, yellow hairs, just above some black hairs. Abdomen somewhat short, dull black, with yellow spots; the first segment æneous and shining and the fourth shining; second segment has two transversely quadrate, yellow spots a little before the middle, and third segment a similar pair nearer the front margin; the spots are somewhat shining; they are either isolated from the sides or reaching

the margin; abdomen is clothed with short hairs, which on second and third segments mainly follow the ground colour, they are depressed on the black parts but erect on the spots; the fourth segment has mainly yellow hairs but some black in the middle on the front part; they are long and reddish yellow at the hind margin; towards the sides of abdomen the hairs are longer and at the side margin all yellow, and long at the basal corners. Genitalia yellow-haired. Venter yellowish, blackish on first and fourth segments; it is clothed with longish, pale hairs, shorter on fourth segment but long and dense at its hind margin. Legs black, the anterior knees, the extreme base of hind tibiæ and the two basal joints of the anterior tarsi yellow or reddish yellow; the third joint of the anterior tarsi often brown, and likewise second joint of hind tarsi; hind trochanters simple, hind femora considerably thickened, thickest about or a little beyond the middle; below they have numerous, very short, black spinules, only at the apex some longer spines in two rows; hind tibiæ rather short, somewhat compressed and distinctly curved; the legs are somewhat short-haired, the hairs mainly yellow, behind the apex of anterior femora some black hairs and the short hairs on the apical part of hind femora are black; also below middle tibiæ are black hairs, and the hind tibiæ have a short, erect, very dense, black ciliation below. Wings a little brownish tinged; medial cross-vein not very oblique,

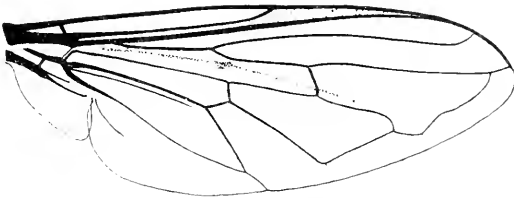


Fig. 174. Wing of *X. nemorum* ♂.

near the middle of the discal cell. Stigma yellowish brown. Squamulæ whitish with yellow margin and fringes. Halteres yellow.

Female. Vertex and frons somewhat broad, widening downwards; they are æneous black, somewhat shining; frons with two grey dust spots, almost or quite united in the middle; the hairs are black above, yellow below, a small space above the antennæ bare. Abdomen relatively broad, with the spots generally smaller and more or less obscurely yellowish or quite glaucous; it is black-haired with the spots and all the fourth segment conspicuously pale-haired, on the latter the hairs long at the hind margin as in the male. Hind femora a little

less thickened than in the male, with no spinules below on the basal part; front tarsi generally darker than in the male.

Length 7—8,5 mm.

The larva and pupa were described above under the description of the genus.

The types to this species, a male and a female, are present in the collection of Tönder Lund and Sehestedt, and I have examined them.

X. nemorum is somewhat rare in Denmark, and has hitherto been taken only on Sealand; Ordrup Mose, Dyrehaven, Lyngby Mose, Hareskov. My dates are $^{25}/_5$ — $^{30}/_8$. It occurs in woods, generally at water. The larvæ were taken in a decaying stub of a beech in Hareskov on $^{5}/_6$, they pupated about $^{18}/_6$ and developed on $^{23}/_6$ and the following days (C. Larsen); further a larva was taken in water in a hollow tree-stub in Dyrehaven on $^{17}/_7$, it developed on $^{25}/_7$, and a pupa was taken on the same place on $^{25}/_7$, developing on $^{31}/_7$ (Schlick).

Geographical distribution: — Northern and middle Europe, probably down into Italy; towards the north to northern Sweden, and in Finland; it is also recorded from North America but with some doubt.

8. *X. florum* Fabr.

1805. Fabr. Syst. Antl. 250, 7 (*Scaeva*). — 1822. Meig. Syst. Besch. III, 217, 8. — 1862. Schin. F. A. I, 356. — 1901. Verr. Brit. Fl. VIII, 606, 6, fig. 414. — 1907. Kat. paläarkt. Dipt. III, 128. — *X. nemorum* Meig. (nec Fabr.). 1822. l. c. III, 219, 11. — 1843. Zett. Dipt. Scand. II, 871, 3 et 1849. VIII, 3191, 3.

Male. Vertex bluish black, not specially long nor narrow; frons and epistoma greyish white pruinose, the former with a somewhat large, black space above the antennæ; vertex with yellow hairs, frons and epistoma with only slight, white hairs along the eye-margins. Occiput greyish pruinose below, bluish black above; the hairs white, a little yellowish above. Antennæ blackish, third joint brown; arista long, blackish brown. Thorax æneous, on and inwards to the humeri a whitish or silvery pruinose spot; thorax is clothed with short, adpressed, yellow hairs and has only very few a little longer, likewise yellow hairs behind; on the præalar and postalar calli are a little longer hairs and above the wing-root stronger, black hairs. Scutellum with short and some longer, pale hairs, the marginal hairs a little stronger. Pleura with longer, whitish, above yellow hairs. Abdomen considerably longer than in *nemorum*, dull black, with first and fourth segments shining, æneous or bluish; the spots similar to those in *nemorum* but a little smaller and less quadrate; abdomen is also haired

as in *nemorum* but the fourth segment is quite black-haired except at the basal corners, and the hairs are all short, not long at the hind margin; the pale hairs on the second pair of spots are decumbent, not erect as in *nemorum*. Genitalia yellow-haired. Venter yellowish, black at the base and on the apical part; it has short, pale hairs, long only at the base and partly on fourth segment and here darker. Legs black, about the basal third of the tibiæ, or on hind tibiæ somewhat less, and the two first joints of anterior tarsi yellow and also the third joint somewhat pale; hind trochanters with a short spur or process below near the apex; hind femora almost not thickened, below they are covered with quite short black spinules or bristles and there are two rows of small spines, the row on the anterior side stretching towards the base, the other present only on the apical third; hind tibiæ relatively longer than in *nemorum*, very slightly curved; the legs are rather short-haired, the hairs are whitish or yellow, behind the apex of anterior femora are some black hairs; the short hairs on a large apical part of hind femora are black and towards below the black hairs stretch inwards almost to the base; also at the apex of middle femora and to a slight degree on front femora are short, black hairs; the hairs on tibiæ are yellow, below hind tibiæ darker to blackish, but there is no erect ciliation. Wings a little brownish tinged, especially towards the anterior margin; medial cross-vein rather oblique, placed after the middle of the discal cell. Stigma brown. Squamulæ whitish with yellow margin and fringes. Halteres yellow.

Female. Vertex and frons somewhat narrow, widening downwards, black or bluish black; frons with large, grey dust spots nearly meeting in the middle; the hairs are short, yellow, the space above the antennæ bare. Abdomen with the spots smaller and more triangular than in the male, and generally quite or nearly quite glaucous; the fourth segment has similar, glaucous, more or less distinct spots; abdomen is all black-haired with only the spots distinctly white-haired. Hind femora as in the male but without spinules below the basal part.

Length 10—11 mm.

This species is somewhat similar to *nemorum* but it is conspicuously larger, and it is easily known by the much thinner hind femora, the shorter and less curved hind tibiæ with no erect ciliation below, and in the male by the short spur on the hind trochanters and besides there are more characters as the colour and length of the pubescence on fourth abdominal segment and still other characters. It is very similar to *X. abiens* Wiedem., which will perhaps be found in Denmark, but that species is smaller, with shorter hind legs and thicker

hind femora; its hind tibiæ have as in *florum* no erect ciliation below and its hind trochanters have a short spur.

X. florum is a rare species in Denmark and until 1915 we had only six specimens, four from earlier time without particular locality, one taken in Dyrehaven at Mølleaaen in 1914 (the author) and one taken at Tisvilde in 1913 (J. C. Nielsen); in 1915 I found it in some number in Egebæks Vang; it occurred along a brook in the wood on places where there were many tree-stubs and rather rich vegetation, and it was here flying together with *segnis*, but *florum* was present in greater numbers; it was often seen sitting on the stubs, and no doubt it had its breeding places here; I took also a specimen in Nyrup Hegn in the vicinity. The dates are $^{26}/_5$ — $^{21}/_7$.

Geographical distribution:— Europe down into Italy; towards the north to northern Sweden, and in Finland.

Remarks: The synonymy of *X. nemorum* and *florum* has been somewhat confused; the synonymy I have followed here is also found in Verrall's Brit. Fl., but in the appended Catalogue of the Syrphidae he has in contrast to it another synonymy, which latter is adopted in the Kat. paläarkt. Dipt., but it is not correct; Verrall takes here, as said above (515), *bifasciata* apud Zett. as a synonym to *nemorum* Fabr., while it was stated above that it belongs to *tarda* Meig., further he has *nemorum* apud Zett. as synonym to *florum* Fabr. and *florum* apud Zett. as synonym to *nigripes* Zett. Through the kindness of Dr. S. Bengtsson in Lund I have had opportunity to study specimens of *nemorum* and *florum* from Zetterstedt's collection, and they proved that *nemorum* apud Zett. is *florum* Fabr. (as generally adopted), and *florum* apud Zett. is *nemorum* Fabr.; I have therefore not followed the Kat. paläarkt. Dipt. The synonymy I have thus adopted is for the rest already found in Wahlgren (Entom. Tidskr. XIII, 1909, 75, 76). It is just possible that *nigripes* Zett. is only a variety of *nemorum* (as Schiner thinks), and if so *nemorum* Fabr. includes both *nigripes* Zett. and *florum* Zett.

41. **Syritta** St. Farg. et Serv.

Rather small, elongate and narrow species of black colour with yellow spots on abdomen; they are very short-haired. The genus is somewhat allied to *Xylota*. Head relatively long, semiglobular, as broad as high and a little broader than thorax; it is somewhat excavated behind. Eyes large, bare, touching in the male for a moderate distance, separated in the female; in the male the facets are somewhat strongly enlarged but only on a small space about the suture.

Vertex much elongated; frons very small, not prominent, without hairs. Antennæ inserted in the middle of the head, the second joint without bristles; arista short, bare. Epistoma keel-shaped, very slightly hollowed from the antennæ to the mouth edge, which latter is the more produced part; the epistoma is not descending, it is white pruinose, the lower side parts bare, yellow; it has only slight hairs at the sides below. Jowls very narrow, not descending. Oral cone and proboscis rather long. Clypeus with the basal part small. Mouth parts otherwise of usual construction, but they are much longer than in *Xylota* and for the rest also else differing from the mouth parts in this genus. Labrum long, semitubular, the median process cleft, with emergences, the upper lateral process thin and pointed, the lower lateral process broad, with a broad end and as usual with the lower corner rounded, the upper drawn a little out; hypopharynx long, slightly shorter than labrum, parallel-sided, attenuated at the end but the apex itself rounded; maxillæ likewise long but shorter than hypopharynx, of usual shape and structure, rounded at the end; the palpus a little shorter than the lacinia, thread-like, microscopically haired, with some short bristles and one long at the apex; labium with the basal part longer than the not large, oval labella. Thorax rectangular, the anterior side margin yellowish pruinose. Scutellum black, without marginal fringe below. No thoracal or scutellar bristles, only a few very short, bristly hairs at the apex of scutellum. Metapleura with short, dense hairs, a little longer towards the hind margin. Abdomen narrow and elongate with parallel sides, rather flat; in the male there are four not transformed segments, the first not quite small, the others about equal in length; the first segment has the hind corners rounded off and the second is produced much forwards at the basal corners; the first ventral segments are somewhat narrow so that there is a broad side membrane; the fourth ventral segment is shorter than the dorsal, roundly incised at the hind margin. Genitalia large, the outer lamellæ elongated triangular, the terminal appendages styliform, a little curved. In the female there are five visible abdominal segments but the fifth is very small, pointed, often almost hidden; the rest are hidden, the last terminates with two small lamellæ; the fourth ventral segment is about as long as the dorsal. Legs with the hind femora very strongly thickened, with small spines below and serrated on the apical part; the hind tibiæ distinctly curved, hind metatarsi a little thickened; the legs are very short-haired, there are longer hairs only behind the middle femora, and below the hind femora there are a few long bristles. Claws and pulvilli moderately developed; empodium spine-shaped, hairy. Wings with the cubital vein curved a little down above

the first posterior cell; medial cross-vein not oblique, placed on the middle of the discal cell; upper marginal cross-vein undulated; the basal part of the radial vein with fine bristles, almost only to detect under the microscope. No stigmatal cross-vein. Squamulæ not large, thoracal squamula with long, branched hairs, alar squamula with somewhat shorter, only slightly flattened hairs. Plumula quite short with rather short, simple hairs.

The developmental stages of *S. pipiens* are mentioned by De Geer (Mém. Ins. VI, 1776, 121), who found the larvæ in horse-dung; they pupated in the beginning of May and developed at the middle of the same month. Scholtz (Ent. Zeitschr. Breslau, 1—3, 10) found the larvæ in cow-dung. Beling (Arch. f. Naturg. 48, 1, 1882, 233) describes the larva and pupa. The larvæ were found numerous together in dense clumps under rotten straw and other vegetable matter at the end of March; they developed on $13/5$ and the following days. Terry (Proc. Hawaiian Ent. Soc. II, 1910, 96) records the life history of *S. oceanica* Macq., but I have not seen this paper. I have myself examined pupæ found in a fen in heaps of vegetable matter in August. According to Beling the larva is 10 mm long, about cylindrical, a little attenuated towards both ends; it is dirty yellowish, the dermis is tough, short-spinulose; the segments with about four corrugations each; on the ventral side are seven pairs of small prolegs with spines; the prothoracal segment has at the front margin numerous short, brown, recurved spines in transverse rows; above the mouth opening are as usual the two-jointed antenna-like organs; at the posterior end of the body are on each side three filaments, the posterior of which are the largest; at the end itself is a brown, somewhat flattened posterior spiracular process, it has a longitudinal dividing line above and below and bears the spiracles on the flat end. The pupa is arched, rounded in front, slightly attenuated behind; near the anterior end are two short, cylindrical, yellow anterior spiracular tubes, they are a little distant, directed upwards and diverging, and they have the somewhat thickened apical half beset with small tubercles, partly arranged in rings; at the posterior end is the larval posterior spiracular process, directed a little upwards. The length is about 6 mm.

The species of *Syritta* are characteristic flies by their strongly thickened hind femora; our Danish species, which is very widely distributed and common, is an excellent hoverer and is seen everywhere hovering around flowers and bushes; Zetterstedt tells (II, 881) that the male hangs in the air before the female sitting on a leaf, and soon after the copulation takes place.

Of the genus 6 species are recorded from the palæarctic region,

but only two of them are European, and except the common *pipiens* they are all southern species; only *pipiens* occurs in Denmark.

1. *S. pipiens* L.

1758. Linn. Syst. Nat. X, 594 et 1767. XII, 2, 988, 56 et 1761. Fn. Suec. 1882 (*Musca*). — 1764. O. F. Müll. Fn. Friedrichsd. 725 (*Musca*). — 1775. Fabr. Syst. Entom. 772, 46 (*Syrphus*) et 1805. Syst. Antl. 194, 27 (*Milesia*). — 1816. Fall. Dipt. Suec. Syrph. 12, 9 (*Milesia*). — 1822. Meig. Syst. Besch. III, 213, 1 (*Xylota*) et 1838. VII, 114, 1, Tab. LXVII, Fig. 21—29. — 1843. Zett. Dipt. Scand. II, 881, 1 et 1855. XII, 4675. 1. — 1862. Schin. F. A. I, 358. — 1901. Verr. Brit. Fl. VIII, 612, 1, figs. 416—417. — 1907. Kat. paläarkt. Dipt. III, 132.

Male. Vertex very elongated triangular, black behind, yellow pruinose on the front half; frons pale yellow and epistoma white pruinose, the extreme mouth edge bare and likewise the lower side parts which are yellow, blackish anteriorly; vertex with short, yellow hairs; frons bare, epistoma with a few white hairs on the sides below. Occiput whitish grey pruinose, æneous above but with a small pruinose spot at each side of the vertex; the hairs very short, white below, yellowish and a little longer above; on the middle they are exceedingly short. Antennæ yellowish red; arista short, not longer than the antennæ, brown. Thorax black or æneous black, very slightly shining; humeri and the side margins to the transverse furrow broadly yellow pruinose; in the middle of the front margin two grey pruinose spots as beginning of lines; postalar calli reddish, in front of them a yellowish pruinose streak, the inner ends of which form two pale spots at the hind margin in front of scutellum, one on each side. Thorax is clothed with quite short and adpressed, yellow hairs. Scutellum coloured and haired as thorax. Pleura pale yellow to whitish grey pruinose, with very short, pale hairs. Abdomen dull black, the middle of the extreme hind margin of the third segment and the whole fourth segment shining; first segment grey at the basal corners, second segment with a pair of large, yellow side spots at the front margin, they occupy two thirds of the length at the side margin but are sloping inwards at both ends so that their inner margin is much shorter than the side margin and often rounded; on the third segment are a pair of similar spots, but they are shorter, more quadrate and close to the front margin, they are sometimes connected in the middle at the front margin; the fourth segment has as a pair of transverse, greyish yellow pruinose spots at the basal corners; the spots go all in full width over the side margin; the yellow spots are more or less shining, in certain lights they are somewhat whitish pruinose; the hind margin of fourth segment is

narrowly orange, and generally also the hind margin of third segment in the middle. Abdomen is clothed with exceedingly short hairs which mainly follow the ground colour, but are somewhat pale at the sides and apex of fourth segment; they are not longer at the sides, but the basal corners have a tuft of long, white hairs. Genitalia yellow-haired, the outer lamellæ with the apical part yellow. Venter yellowish with the base and the fourth segment blackish: it is almost bare with only few longish hairs at base and on fourth segment. Legs black and yellow; anterior femora yellow with a larger or smaller black spot on the posterior or upper side, generally stretching from near the base to near the apex; sometimes a similar but smaller spot below, and sometimes the spot is rather faint; anterior tibiæ with the apical half or two thirds brown or blackish, sometimes only above; anterior tarsi yellow; hind femora black with the base and a dorsally interrupted middle fascia yellow; hind tibiæ black with the base and a ring in the middle yellow, and hind tarsi black; the hind femora are exceedingly thickened and somewhat compressed, below they have a row of quite short spines on about the basal two thirds; the apical third bends abruptly up to the apex, it has towards the anterior side an edge with a row of dense, short spines and towards the posterior side a row of few, about four, longer spines; the hind tibiæ are curved, with a sharp edge below, interrupted in the middle; hind metatarsi a little thickened; the legs quite short-haired, only middle femora with long hairs behind and hind femora with a row of few long, white, bristly hairs below on the basal part; the hairs are pale; hind tibiæ almost quite bare only with a row of fine, distant, erect hairs below. Wings clear; stigma slightly yellowish to pale brown; cubital vein

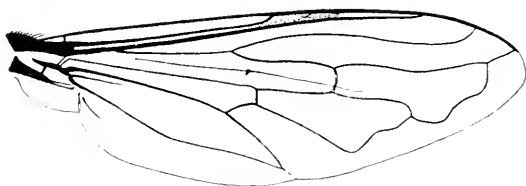


Fig. 175. Wing of *S. pipiens* ♂.

curved a little downwards above the middle of the first posterior cell; middle cross-vein not oblique, on the middle of the discal cell; upper marginal cross-vein undulated. Squamulæ with their fringes, and the halteres whitish.

Female. Vertex somewhat narrow, widening down the frons; the vertical space black, the rest greyish or yellow to brownish pruinose

with a blackish cross-band above the middle and generally a very narrow, black middle line, slightly widening above the antennæ; the hairs pale. Antennæ larger than in the male; third joint generally more brown. Abdomen with the spots smaller, less defined and more whitish pruinose, the spots on third segment more transverse as only their front part is pale, the hind part black and shining. Anterior legs generally paler.

Length 7.5—9 mm.

S. pipiens is very common in Denmark all over the country; it occurs on nearly all localities, also in gardens, and it frequents many various flowers; the male is a fine and indefatigable hoverer, one of the best of all Syrphids. My dates are $7/5$ — $15/10$; I have taken it in copula on $22/8$. The pupa was taken in Dambusmosen in heaps of leaves and other vegetable matters in August (Schlick).

Geographical distribution:— Very widely distributed and common; all Europe, in parts of Asia and down to South Africa and on the Canaries and Madeira; towards the north to northern Sweden and in Finland; it is also common in North America.

42. **Eumerus** Meig.

Species of somewhat small or medium size; the colours are black or æneous, abdomen in many species more or less reddish, and it has three pairs of more or less distinct, whitish pruinose, shallow lunules or oblique bands. Head not short or somewhat long, semi-globular, sometimes rather flattened above; it is broader than high and broader than thorax, a little excavated behind. Eyes somewhat large, in the male either only approximated in a point or touching for a shorter or longer to rather long distance, in the female separated; they are apparently bare or more or less to densely hairy; in the male the facets on the front part, towards the suture, are more or less, from slightly to rather strongly enlarged. Vertex long; the occiput puffed out above; frons not prominent, somewhat small to very small, haired. Antennæ inserted in or a little below the middle, in the male of *ornatus* considerably below; they are smaller or larger, third joint sometimes rather large, a little elongated or nearly square as it is generally more or less truncate in front; it is larger in the female than in the male; sometimes the second joint elongated (*longicornis*, non-Danish); arista is inserted near the base or at some distance from it, more or less near the upper front corner, it has generally the basal joints distinctly visible; the basal antennal joints have small hairs, and bristles at the apex, longest below, third

joint and arista microscopically hairy. Epistoma straight, not hollowed, without central knob and not descending; it is blackish or æneous, but more or less, generally densely pale pruinose and it has longish, somewhat dense hairs. Jowls small and not descending, with a small pit in front, but there is no furrow stretching upwards. Oral cone and proboscis somewhat short; clypeus horse-shoe-shaped with the basal part small. Labrum (*sabulorum*) short, strong and high at the base, strongly semitubular; the median process broad, cleft, irregularly serrated or dentate at the margin; the upper lateral processes shorter, conical, with small teeth on the margin; the lower lateral processes considerably longer than the others, broad and broadened at the apex, which is almost circularly rounded, turned a little upwards; the usual lateral rows of small papillæ present on the inside of labrum; hypopharynx as long as labrum, with nearly parallel sides, rounded at the apex; maxillæ somewhat shorter, relatively short and broad, nearly straight, not or slightly knife-shaped, and rounded at the apex; they have the usual microscopical spines in rows and the spines are rather distinct, directed inwards and specially distinct at the inner margin and the apex; palpi quite short, half as long as lacinia, a little swollen, with microscopical hairs and with some bristles. Labium with the basal part rather short, distinctly shorter than the oval labella. Thorax a little rectangular or almost quadrate; scutellum black or æneous, marginate and with the margin serrulated or crenelated; it has no marginal fringe below. No thoracal or scutellar bristles. Metapleura with dense, somewhat short hairs. Abdomen somewhat narrow and elongated, as broad as or a little narrower than thorax, with parallel sides; in the male there are four not transformed segments of which the fourth is the longest; the fourth ventral segment is much shorter than the dorsal, incised in the hind margin in various ways, either with a broad, not deep incision or with a narrower but deeper incision, and further the incision may have teeth at the margin. Genitalia relatively large; the fourth dorsal segment is bent down over the genitalia at the sides and apical corners; in the female there are five normal segments, the fifth quite small, the rest are hidden, the last terminates with two small lamellæ. Legs generally somewhat robust, hind femora more or less thickened and armed below with spines, especially on the apical part; the hind tibiæ more or less thickened and hind metatarsi likewise more or less thickened, sometimes strongly (in non-Danish species). The legs have shorter or longer hairs but they are generally somewhat short; sometimes (in non-Danish species) the hind legs and tarsi specially haired. Claws and pulvilli of medium size; empodium small, spine-shaped, hairy. Wings with the cubital

vein curved a little down over the first posterior cell, or nearly straight; sometimes (in non-Danish species) more deeply dipped; medial cross-vein more or less oblique, placed at or behind the middle of the discal cell; the upper marginal cross-vein curiously angulated, the lower marginal cross-vein bent about rectangularly upwards; the basal part of the radial vein with very fine bristles. No stigmatal cross-vein. Vena spuria stretching only to the cross-vein or slightly beyond. Thoracal squamula with long, branched hairs, branched especially below near the base; alar squamula with shorter, simple, not flattened hairs. Plumula quite short, with short, simple hairs.

The metamorphosis of *E. strigatus* is known; the larva (*aeneus*) is mentioned by Curtis (Gard. Chronicle II, 1842). Léon Dufour bred the same species (*aeneus*) from an onion, which became rotten (Soc. Sc. Lille, 1845, 197, Pl. I. fig. 1—4). Bouché (Stett. ent. Zeitg. VIII, 1847, 145) describes larvæ and pupæ of it (*aeneus*); the larvæ live in the bulbs of *Allium Cepa* in July, and they may sometimes do great damage, destroying the whole crop; they pupate in the bulbs or in the earth, sometimes also under bark of decaying trees in the vicinity; the pupal stage lasts three to four weeks; the author says that sometimes the pupa hibernates; he adds that the larva of what he calls var. *strigatus* is somewhat differing and lives above the ground in the flower stalks, at the base of which it pupates. Scholtz mentions (Ent. Zeitschr. Breslau, 1—3, 1847—49, 18) that according to Boie the larva (*aenus*) lives in bulbs of *Narcissus*. Herold notes (Zeitschr. f. wiss. Insektenbiol. XI, 1915, 345) that he found the larva (*lunulatus*) in potatoes, which were greatly injured by the attack; in each potato were several larvæ; they were found on $17/7$ and they pupated soon after, partly in the potatoes, partly in the earth, and developed in the beginning of the next month.

According to Bouché the larva is dirty greyish yellow, spinulose, wrinkled, and flat below; the anterior spiracles are brown; at the posterior end is at each side a conical, wrinkled wart or filament and below them a brown posterior spiracular process, which bears the spiracles on the truncated end and is wrinkled in its basal part; the length is fully 6 mm (Herold gives 8—11 mm). The pupa is similar to the contracted larva but is darker; no anterior spiracular tubes are mentioned.

The affinities of the genus are not clear; the place of the medial cross-vein and the thickened hind femora seem to indicate relationship to *Xylota* and *Syritta*; on the other hand it also shows many characters pointing towards the *Pipiza*-group, especially towards *Paragus*, thus the shape of vertex and epistoma, the shape of abdomen with

the peculiar, somewhat impressed lunules, and the pale, abbreviated lines on thorax; again some points, as the sometimes distinctly looped cubital vein and also the habits of the larva might seem to approximate it to *Merodon*. The question is at present not to be settled, I should, however, be inclined to think that it is most nearly allied to *Xylota*, also on account of the construction of the mouth parts.

The species of *Eumerus* are interesting and characteristic flies: they occur in and at the outskirts of woods on various flowers, many species especially on dry and sandy localities. Verrall says that the species seem to [him to have some connection with small aculeate Hymenoptera.

The genus is mainly of southern occurrence; about 41 species occur in the palæartic region; 4 have been found in Denmark.

Table of Species.

- | | |
|---|------------------------|
| 1. Abdomen more or less reddish..... | 1. <i>sabulonum</i> . |
| — Abdomen not reddish..... | 2. |
| 2. Eyes distinctly hairy, in the male touching for a long space; wing-stigma blackish | 3. <i>ornatus</i> . |
| — Eyes less hairy, in the male touching for a short space; wing-stigma pale brown | 3. |
| 3. Antennæ black; abdomen with pale, somewhat long hairs at apex; fourth abdominal segment in the male without pale hind margin | 2. <i>strigatus</i> . |
| — Antennæ red; abdomen with the hairs at apex black and short; fourth abdominal segment in the male with a pale hind margin | 4. <i>ruficornis</i> . |

1. *E. sabulonum* Fall.

1817. Fall. Dipt. Suec. Syrph. 61, 7 (*Pipiza*). — 1843. Zett. Dipt. Scand. II, 863, 2 et 1855. XII, 4673. 2. — 1848. Loew, Stett. ent. Zeitg. IX, 144, 4 et 1855. Verhandl. zool. bot. Gesell. Wien, V, 693. — 1862. Schin. F. A. I, 288. — 1901. Verr. Brit. Fl. VIII, 616, 1, figs. 418—420. — 1907. Kat. paläarkt. Dipt. III, 136. — *E. rubriventris* Macq. 1827. Soc. Sc. Lille, 267, 2 et 1834. Suit. à Buff. I, 528, 10. — 1838. Meig. Syst. Besch. VII, 112, 18. — *E. Selene* Meig. 1822. l. c. III, 210, 12. — ? *Syrphus tricolor* Fabr. 1798. Ent. Syst. Suppl. 563, 85—86 et 1805. Syst. Antl. 244, 52 (*Eristalis*). — ? *E. strigatus* Meig. (nec Fall.) 1822. l. c. III, 207, 7.

Male. Vertex large, æneous black, eyes approximated or nearly touching in a point, apparently bare: frons and epistoma black, shining; vertex with yellow hairs, frons and epistoma with longish, whitish hairs. Occiput æneous, much puffed out above; it is grey pruinose along the eye-margin below to above the middle, the pruinose margin often ending above in a reddish streak; the hairs short, white, almost

wanting in the middle. Antennæ blackish brown or black, third joint small, truncated at the end, somewhat square; arista inserted somewhat near the base, thickened in the basal part. Thorax æneous or dark brassy, densely punctate, a little shining; it has two faint, abbreviated, greyish lines and in the middle a very narrow line; the two interstices between the lines are darker; thorax is clothed with quite short, yellow hairs. Scutellum concolorous with thorax and with the margin densely serrated; it has still shorter hairs. Pleura æneous, sometimes golden or coppery, with short, pale hairs. Abdomen conspicuously reddish, either quite or almost quite red, but darkest towards the apex, or with the apex more or less darkened to black; the black colour may include the fourth segment and the hind margin and sides of the third; first segment black, sometimes with the hind margin red, and second segment may be blackish at the front margin in the middle; abdomen is densely punctate, very slightly shining except just at the apex; it has three pairs of whitish pruinose, oblique transverse lines or very shallow lunules; these lunules run from near the apical corners

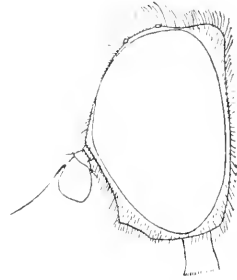


Fig. 176. Head of *E. sabulorum* ♂.

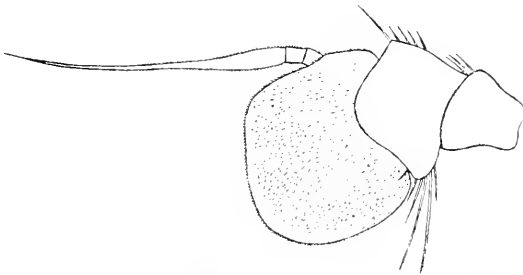


Fig. 177. Antenna of *E. sabulorum* ♂, from the inside. $\times 70$.

inwards and forwards to above the middle; the pair on second segment do not reach the sides but are here produced somewhat forwards. Abdomen is clothed with quite short hairs, which are for the greatest part black, but pale on the lunules and also at the sides except at the front corners of third and fourth segments; the hairs are short also at the sides, only at the basal corners somewhat long. Genitalia black, shining, yellow-haired. Venter coloured as dorsum and with short, pale hairs. Legs black, the anterior knees, a shorter or longer basal part of all tibiæ and the three first joints of anterior

tarsi reddish or yellowish, but second and third tarsal joints with the extreme base black; also hind tarsi with the basal joints, especially second and third somewhat pale; the hind femora are thickened and have below on the apical half two rows of short but strong spines; hind tibiæ slightly curved, somewhat dilated in the apical half, hind metatarsi a little thickened; the legs short-haired, only behind middle femora a little longer hairs; the hairs pale; the four first joints of the anterior tarsi have a small apical bristle on each side. Wings somewhat brownish tinged; stigma only slightly darker; cubital vein

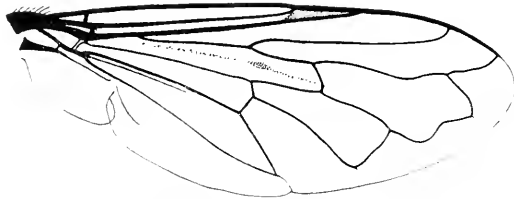


Fig. 178. Wing of *E. sabulorum* ♂.

curved a little down over the first posterior cell; medial cross-vein placed on the middle of the discal cell. Squamulæ and fringes whitish. Halteres yellow.

Female. Similar to the male; vertex and frons broad, nearly parallel-sided, black; the hairs whitish, dark about the ocelli. The antennæ considerably larger than in the male.

Length. This species varies somewhat in size, the length from 5 to fully 8 mm.

E. sabulorum is common in Denmark on suitable localities; Charlottenlund, Ørholm, Brede, Vedbæk, Tisvilde, Frederiksværk, Rørvig, Nykøbing; on Lolland; on Funen at Faaborg; in Jutland in Nørholm Skov at Varde, at Horsens, Søndervig, Frijsenborg, Silkeborg and Laven near Silkeborg and at Skagen; on Bornholm at Rønne. My dates are $\frac{5}{6}$ — $\frac{15}{8}$. It occurs exclusively on sandy localities and therefore often near the shore.

Geographical distribution: — Europe down into Spain and Italy; towards the north to middle Sweden.

Remarks: I have in the description specially mentioned the small bristles at the ends of the four first joints of the anterior tarsi because of what Verrall says about this character; the said author is somewhat inclined to think that the true *sabulorum* should have no bristles and that the form with the bristles might be a distinct species (*litoralis* Curt.); this is because Loew ascribed *sabulorum* no bristles as character

against his *tarsalis* with relatively large bristles, and because Verrall had a specimen in which he could detect no bristles. How this may be I think our species is the true *sabulonum*. Verrall says that on the front tarsi the bristles are present only on the posterior side, but I find the small bristles present on both sides.

2. *E. strigatus* Fall.

1817. Fall. Dipt. Suec. Syrph. 61, 8 (*Pipiza*). — 1843. Zett. Dipt. Scand. II, 864, 3 et 1855. XII, 4674, 3. — 1901. Verr. Brit. Fl. VIII, 621, 3, fig. 424. — 1907. Kat. paläarkt. Dipt. III, 137. — *E. aeneus* Macq. 1827. Soc. Sc. Lille, 269, 8 et 1834. Suit. à Buff. I. 528, 11. — 1838. Meig. Syst. Besch. VII, 112, 19. — *E. grandicornis* Meig. 1822. I. c. III, 208, 8. — 1843. Zett. I. c. II, 866, 6. — *E. funeralis* Meig. 1822. I. c. III, 208, 9. — 1843. Zett. I. c. II, 867, 7. — *E. flavifrons* Meig. 1822. I. c. III, 209, 10. — *E. lunulatus* Meig. 1822. I. c. III, 209, 11. — 1848. Loew, Stett. ent. Zeitg. IX, 121, 9. — 1862. Schin. F. A. I, 362. — *E. Selene* Loew (nec Meig.) 1840. Programm Posen, 28, 5 et Isis 1840. 561, 5.

Male. Vertex long and rather broad, æneous; eyes actually touching for a short distance, with slight, scattered, white hairs behind and below; frons and epistoma grey pruinose, on the latter the æneous ground colour may be slightly visible; vertex with yellow hairs, more or less blackish across at the ocelli, sometimes only a few black; frons with short epistoma with longer, dense, white hairs. Occiput whitish pruinose below along the eye-margins to above the middle, æneous above and rather puffed out; the hairs whitish, above yellowish, very short on the middle. Antennæ rather large, third joint longer than

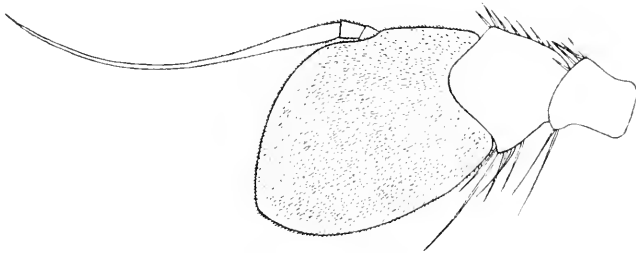


Fig. 179. Antenna of *E. strigatus* ♂, from the inside. $\times 70$.

broad, with the lower apical corner pointed; they are black but greyish pruinose; arista somewhat long, inserted at some distance from the base; the bristles below the apex of both basal antennal joints long. Thorax æneous or brassy, punctate, somewhat shining; there are two narrow, grey lines, abbreviated behind the middle; thorax is clothed

with short but somewhat erect, yellow hairs, longer than in *sabulonum*. Scutellum with the margin finely serrated, it is coloured and haired as thorax, at the margin the hairs a little longer. Pleura æneous with somewhat longish, white hairs. Abdomen æneous, coarsely punctate, not very shining except at the sides and apex; it has three pairs of lunules or oblique bands as in *sabulonum*; the lunules are a little greyish or almost bluish white and the spaces which they cover are a little impressed; abdomen is clothed with short hairs, which are black except at the base, on the lunules, at the sides and on the apical part of fourth segment, where they are pale; they are longer at the sides and on the apical half of fourth segment; at the basal corners of abdomen they are longest. Genitalia yellow-haired. Venter a little æneous, with longish, pale hairs. Legs blackish æneous, the knees and the basal part of the tibiæ reddish or yellowish; the three basal joints of the middle tarsi often more or less yellowish and on the hind tarsi they may be pale towards the ends; hind femora considerably thickened, with two rows of short, strong spines below on the apical part, the posterior row continued to or beyond the middle, the anterior row present only on the apical third or fourth; hind tibiæ conspicuously dilated from near the base to the apex, and hind metatarsi thickened, especially at the base: the legs more long-haired than in *sabulonum* and rather densely haired; the hairs somewhat long on all femora, on hind femora both above and below, longest below and here also some bristly hairs present; the tibiæ somewhat fringed above; the hairs are whitish; at the apex of hind tibiæ on the posterior side are some long, yellow, bristly hairs. Wings a little greyish or brownish tinged; cubital vein curved a little down over the first posterior cell; middle cross-vein very oblique, placed after the middle of the discal cell. Stigma pale brown. Squamulæ and fringes whitish. Halteres yellow.

Female. Similar: vertex and frons broad, widening downwards; they are æneous, the frons more or less broadly grey pruinose along the eye-margins, and sometimes also thinly on the middle; the hairs pale but black across the ocelli and just above the antennæ. Third antennal joint broader, almost as high as long.

Length 6.5—8.5 mm.

E. strigatus is not rare in Denmark though it can scarcely be termed common: Copenhagen in gardens, Charlottenlund, Ordrup Mose, Tisvilde, Lynæs, at Sorø; on Lolland at Maribo and in Kældskov and Dødemose west of Nysted and here rather common; on Langeland at Lohals; on Funen at Langensø; in Jutland in Hø Skov at Aarhus and at Thisted. My dates are $16/5$ — $30/8$. It occurs in fens and in

and at the outskirts of woods on various flowers, especially I have taken it on Compositæ.

Geographical distribution: — Europa down into Spain and Italy; towards the north to middle Sweden, and in Finland.

3. *E. ornatus* Meig.

1822. Meig. Syst. Besch. III, 205, 4. — 1843. Zett. Dipt. Scand. II, 865, 4. — 1855. Loew, Verh. zool. bot. Gesell. Wien, V, 694. — 1862. Schin. F. A. I, 362. — 1901. Verr. Brit. Fl. VIII, 620, 2, fig. 423. — 1907. Kat. paläarkt. Dipt. III, 135.

Male. Head rather long and of a characteristic shape, as it is flattened above; the vertex is long, almost as long as the head but very narrow: eyes touching for a long distance and the frons very small; on account of the long vertex and eye-suture the frons is pushed downwards and the antennæ inserted considerably below the middle, and the epistoma is directed backwards towards the lower side of the head. Vertex black, shining, the ocelli lying quite anteriorly; it is yellow-haired but anteriorly, at the ocelli black-haired; frons and epistoma white pruinose, the former with slight, the latter with longish, dense, white hairs. The eyes distinctly brownish-hairy, the facets on the front side rather much enlarged. Occiput grey pruinose below along the eye-margin, above æneous black, puffed out; the hairs whitish below, yellow above, very short on the middle. Antennæ of medium size, third joint almost square, angulated below; they are black, third joint blackish brown; arista somewhat long, inserted at some distance from the base, near the upper apical corner; the bristles below the apex of both the basal antennal joints long. Thorax dark æneous, finely punctate, shining; it has two narrow, grey lines, abbreviated behind the middle; it is clothed with longish hairs, which are mainly black, but yellowish in front and behind. Scutellum æneous, marginate and with the margin serrulated; it has longish, yellow hairs. Pleura with yellow, above black hairs. Abdomen black or bluish black, somewhat coarsely punctate and moderately shining, at the sides æneous, coppery or purplish and more shining; it has three pairs of distinct, whitish or bluish white pruinose lunules or oblique bands, which are somewhat impressed; abdomen is clothed with short, black hairs, whitish only on the lunules; at the sides they are slightly longer and yellow and they

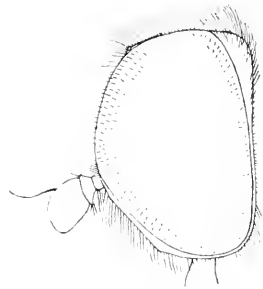


Fig. 180. Head of
E. ornatus ♂

are long at the basal corners. Genitalia black-haired, they are of a somewhat curious shape, the ninth segment below with its side parts swollen and brownish. Venter æneous with not long, pale hairs, at the hind margin of fourth segment long, dark hairs. Legs relatively not strong, black, the knees and base of tibiæ more or less yellowish, sometimes very obscurely; the three basal joints of the middle tarsi may be more or less pale, and the hind tarsi may have the apex of the same joints more or less brown; sometimes also the front tarsi a little pale; hind femora only moderately thickened, with two rows of not quite short spines below the apical third; hind tibiæ somewhat strongly and rather abruptly thickened in about the apical two thirds, hind metatarsi slightly thickened: the legs haired about as in *strigatus*; the hairs yellow but the short hairs at the apex of hind femora and at the apical part on the anterior side of anterior femora black, and also about the middle of hind tibiæ are black hairs; at the apex on the posterior side of hind tibiæ are some long, bristly hairs as in *strigatus*. Wings almost hyaline or more or less brownish tinged; stigma blackish; cubital vein very slightly curved, almost straight; medial cross-vein placed behind the middle of the discal cell. Squamulæ whitish with a darker yellow margin and fringe. Halteres yellow.

Female. Similar; vertex and frons somewhat narrow, much narrower than in *strigatus*, almost parallel-sided; they are æneous, shining, the frons grey pruinose at the eye-margins and with more or less vague side dust spots; the hairs are yellow but blackish at the ocelli and just above the antennæ. Epistoma less densely pruinose than in the male. Antennæ with the third joint larger.

Length 7,5—8,5 mm.

This species is easily distinguished from the somewhat similar *strigatus* by the shape and size of the head and frons, the place of the antennæ, the hairiness of the eyes and the short-haired and black-haired end of abdomen; besides it is narrower and much darker.

E. ornatus is somewhat rare in Denmark and more rare than *strigatus*; Faxø Ladeplads (the author); on Lolland at Maribo (Schlick); on Langeland at Lohals (the author), and in Jutland at Horsens (O. G. Jensen). My dates are $\frac{11}{6}$ to the beginning of August. It occurs in woods on bushes and in low herbage on more or less sunny places.

Geographical distribution: — Europe down into Italy; towards the north to southern Sweden.

4. *E. ruficornis* Meig.

1822. Meig. Syst. Besch. III. 206. 5. — 1848. Loew, Stett. ent. Zeitg. IX, 127, 13 et 1855. Verh. zool. bot. Gesell. Wien, V. 688, 694. —

1843. Zett. Dipt. Scand. II, 865, 5 et 1859. XIII, 6036, 5. — 1862. Schin. F. A. I, 362. — 1907. Kat. paläarkt. Dipt. III, 136.

Male. Very similar to *strigatus*; head of similar shape but the vertex narrower, bluish black, yellow-haired. Eyes touching for a short distance, slightly whitish-hairy, but however, more hairy than in *strigatus*. Antennæ of about the same size, third joint scarcely as large; the basal joints blackish, the third red or brownish red; the antennæ greyish white pruinose; the arista inserted at a little distance from the base. Thorax black or dark æneous, the usual two grey lines faint or very faint; it is clothed with short, erect, yellow hairs. Scutellum more bluish than in *strigatus*, with yellow hairs, finely serrated at the margin. Abdomen as in *strigatus* but the fourth segment with a somewhat broad, yellowish hind margin, broadened in the middle; it is also haired in the same way but the hairs on the apical part of fourth segment black and not long, but a little erect. Genitalia larger, black-haired; the fourth ventral segment with a more narrow incision in the hind margin and the margins of the incision cleft into teeth, the apical corners with dense, black hairs. Legs mainly as in *strigatus* and haired in the same way; tarsi blackish; hind femora slightly less thickened but armed below as in *strigatus*. Wings brownish; stigma brown or pale brown; cubital vein and medial cross-vein as in *strigatus*.

Female. Likewise similar to the female of *strigatus* but distinguished by the red antennæ and the black-haired apex of abdomen; the fourth abdominal segment without yellow hind margin. Antennæ with the third joint very large, roundish.

Length 6,5—7,5 mm.

E. ruficornis is very rare in Denmark, we have only four specimens from earlier time, taken at Sorø, no doubt by Jacobsen; no date is given.

Geographical distribution: — Europe down into Spain and Italy; towards the north to middle Sweden.

43. **Ferdinanda** Rond.

(*Chrysochlamys* Walk.)

Species of medium size and of more or less bright æneous colours, with pruinose stripes on thorax. Head somewhat semiglobular, broader than high and broader than thorax, slightly excavated behind. Eyes touching in the male, separated in the female, hairy; in the male the facets are slightly enlarged on the front part towards the suture.

Frons somewhat prominent, hairy. Antennæ inserted above the middle of the head; they are not small, third joint nearly roundish; the basal joints have small hairs, the second small bristles at the apex above and below, the third and the arista microscopically hairy. Epistoma hollowed below the antennæ, with a moderate central knob and below it retreating; it is somewhat protruding and slightly descending; epistoma is yellow, nearly bare, with hairs only below on the sides. Jowls small, almost not descending; in front they are somewhat separated from epistoma by a furrow which stretches upwards towards the antennæ and thus separates off distinct eye-margins, almost as in *Chilosia*; the eye-margins are hairy. Oral cone and proboscis of moderate length; clypeus with the basal part not long. Labrum (*cuprea*) of usual shape, semitubular; the processes of equal length, the median not broad, cleft to the base, each part pointed and with some emergences at the apex; the upper lateral processes as broad as each part of the median, curved slightly inwards, knife-shaped and pointed; the lower lateral processes broad, of quite the usual shape; the lateral rows of small papillæ on the inside present as usual and the papillæ scattered over the whole lower lateral process; hypopharynx a little shorter than labrum, parallel-sided but with the apical part attenuated, the apex itself is rounded; the maxillæ somewhat short, considerably shorter than hypopharynx, rather curved, knife-shaped and pointed; they have the microscopical spines arranged in rows rather distinct; palpi long, much longer than the laciniae, a little clubbed, with microscopical hairs and with bristles in the whole length. Labium with the basal part a little shorter than the somewhat large, nearly oval labella. Thorax rectangular; scutellum yellow, translucent, with a short marginal fringe below; thorax has long and strong bristles which are one or two posthumeral, two notopleural, about four supraalar and four postalar bristles, and further a transverse row in front of scutellum; scutellum has eight to ten strong marginal bristles. Mesopleura have three bristles above; metapleura with dense, short, towards the hind margin longer hairs. Abdomen of a shape as in *Chilosia*; in the male there are four not transformed segments, the three last of about equal length. Genitalia not large. In the female abdomen has five visible segments, the following hidden, the last ending with two short lamellæ. Legs simple and haired in the usual way, but with some few bristles at the apex of middle femora and on tibiæ; anterior trochanters with a solitary bristle above. Claws and pulvilli well developed; empodium spine-shaped, hairy. Wings with the cubital vein curved very slightly downwards above the first posterior cell; medial cross-vein somewhat oblique, placed at the middle of the discal

cell; marginal cross-veins normal; base of the radial vein with distinct bristles. No stigmal cross-vein. The thoracal squamula has long, richly branched hairs, the hairs have a long stem with branches at the sides and are divided into branches above; the alar squamula has shorter, a little flattened hairs. Plumula rather long, with somewhat long, simple or slightly branched hairs.

The developmental stages of *F. cuprea* are known. Fallén mentions the pupa (*ruficornis*) as found at the foot of a wounded tree (Dipt. Suec. Syrph. 1817, 50). Zetterstedt (Dipt. Scand. II, 1843, 780) mentions the larva (*ruficornis*) found in wounds on oak-trees and the pupa found in the ground at the roots in the middle of July. Brauer records that the larvæ may be found in exsuding sap on stems of *Aesculus*, *Acer*, *Populus* etc., but he gives no further information. The pupa (*nigrifrons*) is mentioned by Vimmer (Casopsis Soc. ent. Bohem. VIII, 1911) but I have not seen this paper. I have myself examined larvæ and pupæ of *F. cuprea* and *ruficornis*; the larvæ were taken in sap in a *Populus alba* attacked by *Cossus*, on $11/8$; on the same place pupæ were found in the earth next spring on $23/3$, they developed on $11/4$ and in the following time. The imagines were *cuprea* but also a couple of specimens of *ruficornis* were bred; the larvæ of the two species thus had lived together. Pupæ of *cuprea* were further taken in a decaying tree in April, they developed on $1/5$.

The larva of *F. cuprea* (and as I could find no difference between my larvæ taken on the above mentioned occasion, I think the larva of *ruficornis* is quite similar) is elongate, almost cylindrical, only very slightly flattened below; it is slightly attenuated just in front and still less behind; the dermis is chagreened from dense, fine, recurved spines; the body is transversely corrugated but not deeply, each abdominal segment shows about three corrugations; above and at the sides are some small warts with a little larger spine, divided at the apex; these small warts are regularly placed on the corrugations in the same way as in other Syrphid larvæ, only the six warts above are on all segments placed on the same corrugation, the two lateral, however, more posteriorly than the two median. On the ventral side there are seven pairs of slight prolegs with small spines on the first seven abdominal segments; also on metathorax a pair are traceable; above the mouth opening the antennæ-like organs are present, each ending with two small papillæ; at the hind margin of the prothoracal segment lies at each side a very small anterior spiracular tube, brown at the apex. The mentioned small warts above and at the sides increase in size backwards, on the last segment they form six conical filaments, three at each side, surrounding the segment; in the middle of the posterior

surface of the segment, between the filaments, is a short, brown posterior spiracular process; it is constricted in the middle, somewhat elliptical in transverse section and with a longitudinal dividing line above and below; it bears the spiracles on the truncated end. The colour of the larva is dirty yellowish; the length of the full-grown larva is 16 mm. The pupa is brownish, flattened below, much arched above; the front part is attenuated and the dorsal side here declining downwards to the anterior point; about at the hinder border of the declining part are two short, blackish spiracular tubes, pointing upwards and diverging; they are beset with small tubercles; the pupa is a little attenuated towards the posterior end and has here the six filaments and the posterior spiracular process as in the larva, but the filaments are shorter. The pupa is much shorter than the larva, the length is 7.5—9 mm. — According to the above the larva evidently hibernates.

Also of this genus the affinities are obscure; it is placed here on account of the medial cross-vein being not situated before the middle of the discal cell, but the bristles on thorax and the distinct eye-margins, as well as the simple legs would otherwise place it near *Chilosia*; I am inclined to think that it is in reality nearly related to this genus, also on account of the construction of its mouth parts, which are rather conform with those of *Chilosia*; the species were originally placed in that genus until Rondani in 1844 created the genus *Ferdinandea* for them, but placing this genus next to *Chilosia*.

The species of *Ferdinandea* are rather beautiful flies with their striped thorax and brightly æneous or brassy abdomen; they occur in wooded districts and frequent various flowers but are often seen at ulcerated tree-stems with exsuding sap.

Of the genus 3 species are known from the palæarctic region; 2 occur in Denmark.

Table of Species.

1. Arista blackish; the dull bands on abdomen just on the hind margins of the segments 1. *cuprea*.
 — Arista reddish; the dull bands on abdomen before the hind margins of the segments 2. *ruficornis*.

1. *F. cuprea* Scop.

1763. Scop. Entom. Carn. 355, 962 (*Conops*). — 1857. Lœw, Verh. zool. bot. Gesell. Wien, VII, 619, 2 (*Chrysochlamys*). — 1862. Schin. F. A. I, 363 (*Chrysochlamys*). — 1901. Verr. Brit. Fl. VIII, 624, 1, figs. 425—426 (*Chrysochlamys*). — 1907. Kat. paläarkt. Dipt. III, 138. — *Chrysochlamys nigrifrons* Egg. 1860. Verh. zool. bot. Gesell. Wien, X, 664. — 1862. Schin.

F. A. I, 364. — *Syrphus ruficornis* Rossi (nec Fabr.) 1790. Faun. Etr. II, 290, 1466, Tab. X, Fig. 9. — 1817. Fall. Dipt. Succ. Syrph. 50, 2 (*Eristalis*). — 1822. Meig. Syst. Besch. III, 278, 1 (*Syrphus*). — 1843. Zett. Dipt. Scand. II, 779, 3 (*Eristalis*).

Male. Vertex black, a little greyish pruinose; frons yellow to brownish yellow, or more or less black except the anterior margin; it is greyish white pruinose along the eye-margins; epistoma dark yellow, somewhat pruinose at the eye-margins, the mouth edge and jowls more brownish; vertex and frons black-haired, on the latter the anterior margin bare; epistoma nearly bare, with only some black, erect hairs below at the sides, but at the lateral mouth edges and on the jowls are yellow hairs; the eye-margins with yellow hairs. Occiput grey pruinose from the brownish yellow jowls upwards; the hairs whitish below, yellowish above and here a row of long, black hairs overhanging the eyes. Eyes yellowish-haired. Antennæ reddish or brownish red, third joint more or less blackish on the apical part; arista black. Thorax dark æneous, shining, humeri and postalar calli somewhat yellowish; on the disc are four grey or bluish grey pruinose stripes, the median stripes diverging behind and the median and lateral stripes on each side connected in front and behind; the lateral stripes produced a little inwards at the transverse furrow; on and at the humeri are pruinose spots. Thorax is clothed with short, decumbent, yellow and long, erect, black hairs. Scutellum yellowish translucent, likewise with short, yellow and long, black hairs; thorax has long, black bristles along the sides, on the postalar calli and in front of the scutellum, and this latter has numerous long, black marginal bristles. Pleura grey or yellowish pruinose, with long, yellow hairs, above on mesopleura are four long, black bristles. Abdomen bright æneous or brassy and brightly shining; a narrow front margin on second segment and the hind margins of second and third segments dull black; the black hind margins are produced more or less triangularly forwards in the middle and the second segment has a more or less distinct, narrow, black dorsal line; abdomen is densely clothed with somewhat short, erect, yellow or tawny hairs; they are longer at the side margins and longest at the basal corners. Venter æneous, a little pruinose, with somewhat long, yellow hairs. Legs yellow, coxæ and trochanters black; the three last joints on the anterior tarsi and the two last on hind tarsi blackish; for the rest the legs are either quite yellow or the anterior femora are more or less black on the basal part, until the basal half or more; sometimes also the hind femora and the anterior tibiæ may have more or less distinct, dark rings, sometimes rather large; the legs are haired in the usual way, the

hairs on femora somewhat long: the hairs vary according to the colour of the legs from almost all yellow to nearly all black; the front tibiæ have some small bristles about the middle on the posterior side; the middle femora have about three bristles behind the apex and the hind femora have black, bristly hairs below the apical part; the posterior tibiæ have a couple of bristles below the middle on the posterior side, the middle tibiæ also generally some scattered, shorter bristles above and on the anterior side; the bristles may vary a little in number and like the hairs they may vary from yellow to black. Wings yellowish tinged on the base and the anterior part, on the apical part slightly

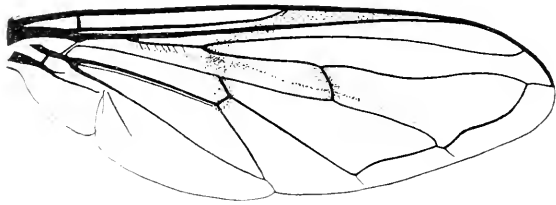


Fig. 181. Wing of *E. cuprea* ♂.

blackish: from the base of the cubital vein downwards is a blackish fascia and the medial cross-vein is blackish seamed. Stigma yellow. Squamulæ whitish, the fringes yellow. Halteres with a yellow peduncle and a brownish knob.

Female. Similar to the male; vertex and frons broad, rather widening downwards, as in the male quite black or brownish yellow; the frons is more or less pruinose across the middle; the hairs black. The legs vary in colour as in the male.

Length. This species varies not little in size, the length from 8 to 12 mm.; the female is the larger.

As seen the species varies somewhat with regard to the colour of the frons and the legs; the darker forms were described by Egger as *nigrifrons*. With us the darker form seems to be the most common, but the females are only more rarely dark.

E. cuprea is not rare in Denmark, though hardly common; Charlottenlund, Ordrup Mose, Ermelund, Dyrehaven, Frederiksdal, Brede, Holte, Geel Skov, Tisvilde, Faxe Ladeplads, Jægerspris, Boserup near Roskilde and Tjustrup Sø; on Falster; on Lolland in Kældskov; on Langeland at Lohals; on Funen, and in Jutland in Nørholm Skov at Varde, at Horsens and Silkeborg. My dates are $^{21}/_5$ — $^9/_9$. It occurs in wooded districts, sometimes on flowers, but generally on stems of

trees on which there is exsuding sap. Zetterstedt remarks: "in *Dania certis annis freq., D. Stæger*", and in Stæger's collection are also rather many specimens so that he must on some occasion have met with it in some numbers, while it is otherwise generally only seen singly. The larva was taken in sap in a *Populus alba*, attacked by *Cossus*, in Holte on $\frac{11}{8}$, and pupæ were found on the same place in the earth at the foot of the tree next spring on $\frac{23}{3}$, they developed on $\frac{11}{4}$ and further on (Kryger); the larva lived here together with the larva of the following species, which also was bred; the pupa was taken in an ulcerated tree in Frederiksdal in April, developing on $\frac{1}{5}$ (Schlick).

Geographical distribution: — Europe down into Italy; towards the north to northern Sweden, and in Finland.

2. *F. ruficornis* Fabr.

1775. Fabr. Syst. Entom. 769, 35 (*Syrphus*) et 1805. Syst. Antl. 243, 50 (*Eristalis*). — 1857. Loew, Verh. zool. bot. Gesell. Wien, VII, 620, 1 (*Chrysochlamys*). — 1862. Schin. F. A. I, 363 (*Chrysochlamys*). — 1901. Verr. Brit. Fl. VIII, 626, 2 (*Chrysochlamys*). — 1907. Kat. paläarkt. Dipt. III, 139.

Male. This species is very similar to *cuprea*; frons black or brownish; epistoma a little less descending, with the hairs below at the sides all yellow. Third antennal joint less blackish on the apical part; arista yellow or reddish, darker towards the apex. Thorax with the grey lines narrower and with fewer black hairs, especially in front and behind. Scutellum with only few black hairs. Abdomen more bluish; the dull black marginal bands lying before the hind margins so that the hind margins themselves are shining; the hairs on the dull bands partly or mostly black, especially on third segment. Legs with the basal half or more of femora blackish brown, and with a dark ring on anterior or front tibiæ; all the hairs and bristles pale, and the bristles on the tibiæ small or almost wanting.

Female. Similar, but the legs generally all yellow, except the last tarsal joints.

Length 8—10 mm.

This species is, as seen, very similar to *cuprea* but distinguished with certainty by the given characters, of which especially the red arista and the dull abdominal bands placed before the hind margins are conspicuous.

F. ruficornis is very rare in Denmark, we have in all seven specimens; the five are from earlier time, without particular locality, the sixth is a bred specimen from Holte (Kryger) and the seventh is taken in Jutland at Silkeborg (Esben Petersen). As remarked under the foregoing species the larva was taken together with the larva of that

species in a poplar, attacked by *Cossus*, in Holte on $11/8$, and pupæ were taken the next spring on the same place on $23/3$ at the foot of the tree (Kryger). The larvæ of the two species thus lived here together, but only a couple of specimens of *ruficornis* were bred (and only one was secured) so that evidently the larva of *cuprea* was by far the most numerous; the specimens of *ruficornis* developed on $15/4$.

Geographical distribution: — Europe down into Italy (if Rondani's species is correctly determined); Zetterstedt does not mention it from Sweden, but Loew mentions (l. c. 619) that he had got a specimen from Zetterstedt so that the species goes towards the north to Sweden.

Remarks: The synonymy of the two species is mainly due to Loew; it is perhaps doubtful whether *ruficornis* Fabr. is this species or *cuprea*; in the collection of Tönder Lund and Sehestedt there is a specimen labelled *ruficornis*, and it is *cuprea*; Fabricius says "Habitat in Daniæ floribus", but as he does not quote the said collection, the specimen is certainly not the type, but this latter is no doubt in Kiel. — Stæger did not know the species but a few specimens were in his collection under *cuprea*; Rondani remarks (Dipt. Ital. Prodr. II, 1857, 147) that he had got the species from Denmark from Stæger; it is most probable that it has been *cuprea*, and Rondani's description seems to me to answer best to the dark variety of *cuprea*.

44. **Spilomyia** Meig.

Large, wasp-like flies with yellow spots on thorax and very conspicuous yellow bands on abdomen. Head semiglobular, broader than high and broader than thorax; it is a little excavated behind, especially above. Eyes touching in the male for a not long distance, separated in the female; they are bare, with somewhat irregular dark, longitudinal bands and spots; in the male the facets are enlarged on the front part, towards the suture. Vertex elongated; frons a little prominent, without hairs. Antennæ inserted above the middle of the head; they are a little elongated as the two basal joints are somewhat long, each as long as or a little longer than the third joint, which is roundish; arista inserted near the base, as long as the antennæ; the basal antennal joints have small hairs and short bristles at the apex above and below, third joint and arista microscopically hairy. Epistoma very slightly hollowed, almost straight from the antennæ to the mouth edge, slightly more hollowed in the female; it is almost not descending; it is yellow with a more or less distinct, black middle stripe, and it has erect hairs except along the middle, the lower side parts are bare. Jowls small, not or almost not

descending; they have a small groove or furrow in front at the eye-margin. Oral cone and proboscis of medium length; clypeus with the basal part large, only triangularly incised in the anterior end but without long side legs. Labrum strong, semitubular, the apical processes somewhat short, the median cleft to the base, each part attenuated towards the apex and here cleft into some spines or emergences; the upper lateral processes curved a little inwards, with some spines at the margin and especially at the apex; the lower lateral processes broad, a little incised in the truncated end and with the inner or upper corner drawn a little out; the processes are of about equal length, the upper lateral the longest; the lateral rows of small papillæ on the inside present as usual; hypopharynx about of the length of labrum, parallel-sided, a little attenuated in the anterior part with the apex rounded; maxillæ shorter than hypopharynx, as usual curved and knife-shaped, rounded at the end and with microscopical spines in rows; the palpi double as long as lacinia, a little clubbed, with microscopical hairs and with bristles in the whole length. Labium with the basal part a little shorter than the somewhat large, broadly oval labella. Thorax rectangular; scutellum black with the margin yellow and without marginal fringe below. There are no thoracal or scutellar bristles. Metapleura with dense, short hairs. Abdomen somewhat elongated, slightly narrowed behind; it is rather arched above; in the male there are four not transformed segments. Genitalia somewhat large. In the female there are five visible abdominal segments, the rest hidden, the last terminating with two small lamellæ. Legs somewhat long; hind femora with a triangular process below near the apex in both sexes; tarsi a little flattened, fourth joint strongly incised in the apical margin. The legs short-haired, only middle femora with somewhat long hairs behind; all trochanters with a solitary bristle above. Claws and pulvilli well developed. Empodium spine-shaped, hairy. Wings with the subcostal vein distinct from the costa quite to the apex; subcostal cell open; cubital vein curved slightly down in the first posterior cell; medial cross-vein very oblique, placed near the apex of the discal cell; discal cell with the lower apical corner rounded; anal vein after the closing of the anal cell stretching long forwards, almost upwards before terminating in the margin below the apical corner of the discal cell. An indistinct stig-matical cross-vein present. Basal part of the radial vein with fine bristles. Squamulæ not broad, thoracal squamula with moderately long, short-stemmed, richly branched hairs; alar squamula with shorter, flattened hairs. Plumula not long, with simple hairs.

The developmental stages are not known, but no doubt the larva

is similar to that of the next genus and lives in the same way in decaying wood.

The species of *Spilomyia* are beautiful, wasp-like flies; they occur in woods and seek various flowers, especially Umbelliferæ.

Of the genus 5 species occur in the palæarctic region; one is found in Denmark.

1. *S. saltuum* Fabr.

1794. Fabr. Ent. Syst. IV, 287, 32 (*Syrphus*) et 1805. Syst. Antl. 189, 9 (*Milesia*). — 1830. Meig. Syst. Besch. VI, 349. — 1843. Zett. Dipt. Scand. II, 856, 2 et 1849. VIII, 3188, 2. — 1862. Schin. F. A. I, 365. — 1907. Kat. palæarkt. Dipt. III, 143. — *Syrphus diophthalmus* Rossi (nec L.) 1790. Faun. Etr. II, 294, 1477, Tab. X, Fig. 2. — 1822. Meig. l. c. III, 229, 3 (*Milesia*) et 1830. VI, 349 (*Spilomyia*).

Male. Vertex elongated, black, a little greyish pruinose, the anterior half yellow; frons and epistoma yellow, white pruinose at the sides and narrowly down along the eyes and also on the lower part; frons with a blackish triangle above the antennæ, epistoma with a more or less distinct, black or brownish middle stripe and just the anterior mouth edge black; the middle stripe does not reach to the antennæ. Vertex black-haired, the yellow anterior part bare; frons without hairs; epistoma with erect, pale hairs, except along the middle and on the lower part; just below the antennæ at each side the hairs are dark. Jowls reddish yellow, a little pruinose. Occiput whitish

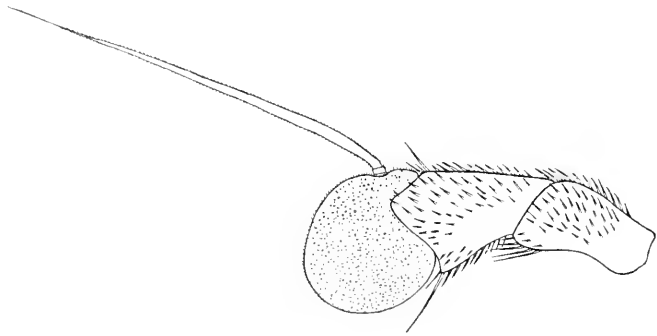


Fig. 182. Antenna of *S. saltuum* ♂, from the inside. $\times 40$.

grey pruinose along the eyes, the hairs whitish below, yellowish above and here also with numerous not long, black hairs, sometimes the hairs almost all black. Eyes with dark, longitudinal stripes and spots, the part at the vertex and suture and all the front and hind margins dark, further a longitudinal stripe down the hinder part, more or less

dissolved into spots below, and some more or less confluent spots down between this stripe and the front margin. Antennæ yellowish red, third joint generally somewhat darkened above; arista yellow. Thorax black, dull, the humeri and postalar calli and a small, sometimes indistinct spot on the præalar calli yellow, further a yellow spot on each side inwards to the humeri, a lateral stripe on the hind part beginning at the transverse furrow and here curved a little inwards, and stretching back to the postalar callus, and finally an angle-shaped or somewhat angularly bow-shaped spot in front of scutellum; there are moreover two faint, grey pruinose, distant middle stripes in front, reaching to the transverse furrow, the inner part of which latter is likewise greyish pruinose. Scutellum black with the margin yellow. Thorax has somewhat short, erect, black hairs, but pale on the yellow spots and just at the front and hind margins; above the wing-root the hairs are very dense; scutellum with longer, all whitish hairs. Pleura with a yellow spot above the front coxæ, an elongated spot down the mesopleura, a spot above on sternopleura, one on pteropleura and finally the metapleura yellow; the small protuberance in front of the squamulæ is yellow; the hairs on pleura pale. Abdomen dull black with six yellow bands, as second, third and fourth segments have each a band at the front third and the hind margin yellow; the bands on the hind margins are broader than those on the disc, the apical band the broadest and triangularly incised in the middle; the bands on the disc are generally narrowly interrupted in the middle and they are widened at the sides so that the side margin is yellow. Abdomen is clothed with short hairs, which are mainly yellow but with rather many black intermingled on the black parts, especially towards the middle, and on the hind margins of the segments; on the last segment the black hairs are predominant on the hinder half, and sometimes also on the hind margins of second and third segments; at the side margin the hairs are yellow and a little longer and longest at the basal corners; the first segment has longish, whitish hairs. Genitalia yellow with yellow and black hairs. Venter black, shining, with the hind margins of the segments and the side membrane yellow, and with longish, pale hairs, short on the

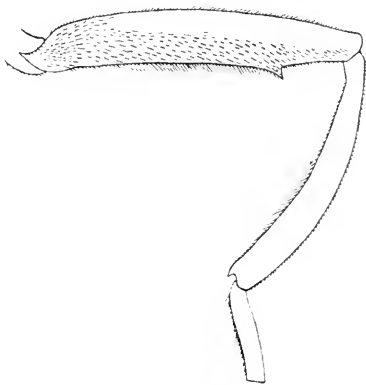


Fig. 183. *S. saltuum* ♂, hind leg.
× 8.

fourth segment. Legs yellow or reddish yellow, front tibiæ except the basal part and front tarsi black, anterior femora generally brownish below; the hind femora have a triangular process below near the apex towards the anterior side; the legs short-haired, only the middle femora with longer hairs behind and the front femora with slightly longer hairs behind; hind femora quite short-haired; the hairs black and yellow, those behind and below the front femora and the short hairs above and below middle femora black, and on middle femora also the long hairs black towards the apex; hind femora black-haired except generally on the posterior side and along the middle of the anterior side, the hairs below somewhat bristly; front tibiæ with the hairs on the black part somewhat dark, posterior tibiæ yellow-haired but the hind tibiæ with a short fringe below, which is longest and black on the middle part, and sometimes there are also some black hairs above. Wings yellow at the base and anterior margin; stigma

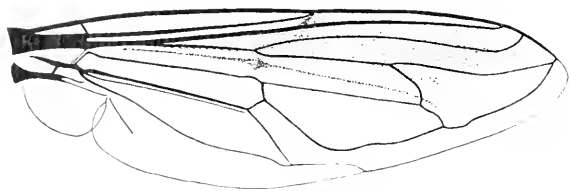


Fig. 184. Wing of *S. saltuum* ♂.

quite small, below it a small browning and from here to the apex the anterior part is brown down to the cubital vein, but the browning often slight. Squamulæ whitish, the thoracal squamula with the margin and fringe of the same colour, but alar squamula with a brownish margin and fringe. Halteres orange or yellow.

Female. Vertex moderately broad, frons somewhat rapidly widening downwards; the vertex black, frons yellow with a black middle stripe from vertex to antennæ: the hairs black. Abdomen has in all eight bands, as the fifth segment is marked like the others, but the black colour forming only a narrow, transverse band; often only the yellow hind part of the segment visible.

Length 12—16 mm.

S. saltuum is rare in Denmark and all our specimens are from earlier time, while it has not been taken in recent times; the specimens are from the vicinity of Copenhagen and from Dyrehaven (Drewsen); the sole date is ¹⁶/_s. It is recorded to frequent especially Umbelliferae.

Geographical distribution:— Northern and middle Europe down into Spain and Italy; towards the north to middle Sweden. It is also recorded from Japan.

45. **Temnostoma** St. Farg. et Serv.

This genus is nearly allied to *Spilomyia* (and to the other allied, non-Danish genera *Milesia* and *Calliprobola*) and the species are like those of *Spilomyia* large wasp-like flies with yellow spots on thorax and very conspicuous yellow bands on abdomen, but there is in this respect the interesting difference that while the markings in *Spilomyia* are due to the chitine itself being yellow, they are here caused by a yellow pruinosity. Head slightly shorter than in *Spilomyia*; eye-suture a little shorter, eyes unicolorous. Antennæ inserted in the middle of the head; they are shorter than in *Spilomyia* as the basal joints are short, each shorter than the roundish third joint. Epistoma slightly hollowed below the antennæ, with a very small central knob and below it slightly retreating; it is slightly protruding and a little descending; it is black but yellow pruinose on the sides and hairy only on the lower half including the lower side parts. Oral cone, proboscis and mouth parts as in *Spilomyia*. Scutellum black. Legs simple, hind femora without any process below. Wings with the subcostal vein near to costa in the apical part and the subcostal cell more widely open than in *Spilomyia*; cubital vein slightly curved; medial cross-vein less oblique and less near to the apex of the discal cell; discal cell with the lower apical corner angular and with a short veinlet; anal vein ending normally; basal part of the radial with fine bristles. No stigmatal cross-vein. Squamulæ and plumula as in *Spilomyia*.

The developmental stages of *T. vespiforme* are mentioned by Meigen (Syst. Besch. III, 233), who notes that Baumhauer brought to him in spring some thick, almost oval, reddish grey larvæ, found in decaying wood; they soon pupated and the imago escaped in May. One of our specimens is bred but no remarks are given about it. — The puparium of the allied *Calliprobola speciosa* is described and figured by Mik (Wien. ent. Zeitg. III, 1884, 199, Taf. III, Fig. 2—2 c); the author found the full-grown larvæ at the end of March in a decaying stub of a beech, they pupated the next day; the pupa is described as arched above, flat below, slightly attenuated in front but more behind, and it is interesting that it has here a somewhat long (6 mm) tail-shaped prolongation with the spiracular process at the end; to judge from Mik's figure the spiracular tube is telescopically retractile; the longer

part of the tail is evidently the prolonged last segment, and it has also as usual filaments on each side, one pair at the base and one at the apex (probably a third pair of filaments in the middle are overlooked): near the anterior end are two short, recurved anterior spiracular tubes: they have the small tubercles placed in half-rings on the posterior side: the small warts mentioned by the author, placed at the anterior end are evidently the larval spiracles. On the ventral side are six pairs of prolegs with hooks, and besides one pair on the sides of the mouth opening; the flat, band-shaped bristles at the anus, mentioned by the author, are, I think, the same organ or bundle of threads which is known in several Syrphid larvæ protruding from the anus.

Of the genus 3 species are known from the palæarctic region, all occurring in the northern and middle Europe; one has been found in Denmark.

1. *T. vespiforme* L.

1758. Linn. Syst. Nat. X, 593 et 1767. XII, 2, 986, 44 et 1761. Fn. Suec. 1811 (*Musca*). — 1775. Fabr. Syst. Entom. 769, 93 (*Syrphus*) et 1805. Syst. Antl. 188, 4 (*Milesia*). — 1816. Fall. Dipt. Suec. Syrph. 9, 3 (*Milesia*). — 1822. Meig. Syst. Besch. III, 232, 5 (*Milesia*). — 1843. Zett. Dipt. Scand. II, 857, 3 (*Milesia*). — 1862. Schin. F. A. I, 366 (*Spilomyia*). — 1907. Kat. paläarkt. Dipt. III, 144.

Male. Vertex long, black, the anterior part yellow or white pruinose; frons and epistoma yellow or whitish yellow pruinose, the frons with a narrow, black middle line ending with a black triangle above the antennæ, epistoma with a middle stripe and the lower side parts black; vertex with black hairs, the yellow anterior part bare; frons without hairs; epistoma with pale, erect hairs on the lower half, dark on the black lower side parts. Occiput yellow pruinose along the eye-margin, this colour disappearing above, but occiput again greyish pruinose on each side of the vertex; the hairs longish, yellowish, above they are all or nearly all black and somewhat long. Antennæ yellow, third joint roundish; arista longer than the antennæ. Thorax black, dull or very slightly shining; on the middle there are two faint, grey stripes, diverging a little behind and united in front; they are abbreviated behind the middle; the humeri, the præalar calli and inwards on the transverse furrow, the postalar calli and a spot forwards from them and a triangular spot in front of scutellum are yellow pruinose, the inner part of the spot on the transverse furrow paler, whitish yellow; thorax is clothed with somewhat long, black hairs, longest behind; they are yellow on the yellow spots and anteriorly on the grey middle

lines; above the wing-root are some long, a little stronger hairs. Scutellum bluish black, shining, dull on the basal part, with long, yellow hairs. Pleura with an elongated, yellow pruinose spot down along the mesopleura, and with long, yellow hairs. Abdomen dull black with six yellow pruinose bands on second, third and fourth segments; the bands lie near the front margin and at the hind margin of each segment; the bands are, except the second, rather broad, considerably broader than the interjacent black bands; the first band is placed at some distance from the front margin, it is slightly attenuated towards the middle and exceedingly narrowly interrupted in the middle; the second band is somewhat narrow and attenuated and quite thin in the middle and leaves here the black hind margin free; the third band is quite near the front margin, it is generally produced triangularly backwards in the middle or connected with the fourth band by a narrow, yellow middle line; the fifth band is still nearer the front margin and is always connected by a yellow middle line with the yellow apical band; the two bands on each segment are connected at the sides; the bands are all caused by pruinosity. Abdomen is clothed with short, all yellow hairs; it looks as they are a little darker on the black bands, and I think there are some black hairs intermingled but they are not easy to detect. Genitalia yellowish red with yellow hairs. Venter with first and second segments black, the latter with traces of a yellow front and hind margin; third and fourth segments black with all the margins broadly yellow; the hairs on venter long and pale. Legs yellow and black, front legs black except the knees, the yellow colour stretching more or less inwards below the femora; posterior legs yellow, the femora more or less black on the basal half or more, the hind femora only below and behind; the last tarsal joint also generally more or less darkened or with a dark spot;

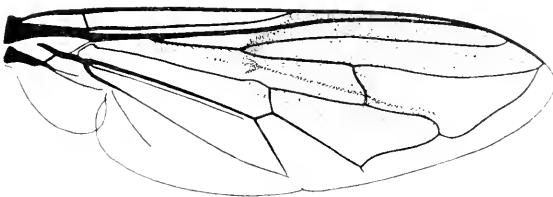


Fig. 185. Wing of *T. respiforme* ♂.

the legs somewhat short-haired but on the femora the hairs longer, especially behind the anterior femora; the hairs are yellow but all black on front tibiae and tarsi, and likewise the short hairs at the

apex of the front femora. Wings yellowish tinged; stigma yellow; about the base of the cubital vein a slight darkening and from it to the apex the wing a little darkened on the anterior part and along vena spuria and the discal vein. Squamulae yellowish white, with the margin and fringes dark yellow. Halteres yellow.

Female. Vertex of medium breadth, the frons widening downwards; vertex black, frons yellow pruinose at the sides with a black middle stripe; the hairs black above, yellow downwards, the space above the antennae bare. The fifth abdominal segment marked as the fourth so that abdomen has eight yellow bands.

Length 13,5—17 mm.

T. vespiforme is rare in Denmark; Ordrup Mose (the author), Dyrehaven (Drewsen), at Røde Bro and in Bøllemosen (the author), in Hareskov (Henriksen) and at Fiskebæk (the author). My dates are $^{27}/_6$ — $^{6}/_8$. It occurs on humid places in woods and frequents especially Umbelliferae; I have also taken it flying at tree-stubs, probably the breeding places, and once I took in Bøllemosen several specimens which came flying and sat down on dead tree-branches lying on humid ground; when they were sitting on the branches they were not easily disturbed and could be taken with a glass-tube; they were all males. One of the specimens from Drewsen has, according to the label, been bred, but there are no further notes.

Geographical distribution:— Northern and middle Europe down into France; towards the north to northern Sweden, and in Finland.

46. **Arctophila** Schin.

Large *Bombus*-like, densely pilose species, with the pile all pale or dark and pale variegated. Head somewhat short, broader than high, as broad as or a little narrower than thorax; it is flat or a little arched behind, but a little excavated upwards. Eyes touching in the male for a short distance, well separated in the female; they are bare; in the male the facets above very slightly enlarged. Vertex broad, triangular; frons slightly prominent, with longish hairs. Antennae inserted about in the middle of the head; they are small, third joint roundish or almost square; the basal joints have small hairs, the second bristles at the apex above and below, the third is microscopically hairy; the arista somewhat short, plumose with long hairs. Epistoma very long; it is slightly hollowed below the antennae, with a small and low central knob lying rather low, below the lower margin of the eye; below the knob the epistoma is slightly retreating; it is slightly protruding but strongly descending and pointed at the apex;

the epistoma is brown or yellow, with the lower lateral parts black; it is almost bare as there are hairs only on the sides at the eye-margins, and in one species some hairs on the lower lateral parts. Jowls small and narrow, separated from epistoma by a deep furrow which separates off narrow eye-margins; these eye-margins bear short hairs. Oral cone and proboscis rather long; clypeus long and with a long basal part. The mouth parts characteristic by their long and slender shape. Labrum (*bombiformis*) long, strongly semitubular, the apical processes of equal length; the median process cleft to the base, each part conically pointed, cleft into spine-like emergences at the apex; the upper lateral processes thin and delicate, curved a little inwards and befid at the apex; the lower lateral processes with the lower apical corner rounded, the upper or inner corner drawn a little out and somewhat pointed; the usual lateral rows of small papillæ on the inside present; hypopharynx as long as labrum, slender, with parallel sides, it is attenuated at the end and somewhat pointed; the maxillæ are long and slender, almost as long as hypopharynx; they are knife-shaped and a little curved towards the apex, and they are somewhat pointed; they have the usual microscopical spines in rows; the palpi are as long as or slightly longer than the lacinia, thread-like, with microscopical hairs and with numerous bristles in the whole length. Labium long and slender, with the basal part a little longer than the narrow and elongated labella. Thorax nearly quadrate; scutellum black, with no distinct marginal fringe below. Metapleura with dense, not quite short hairs. Abdomen somewhat ovate; in the male there are four not transformed segments. Genitalia of medium size or somewhat large, the hypopygium short but somewhat broad, the incision with the outer lamellæ rather shallow; the claws or clasping terminal appendages rather strong, unsymmetrical, the appendage on the right side long and claw-shaped, the other shorter and of another shape; the penis or penis-sheat very thick. In the female the abdomen has five visible segments, the rest hidden, the last terminating with two lamellæ. Legs somewhat long; hind femora more or less thickened and curved in the male, slightly or not in the female; the hind tibiæ may also be somewhat thick and curved in the male, and in this sex they are prolonged into a short, spur-like process at the apex below. The legs are more or less long and densely haired; the trochanters have a couple of long, bristly hairs above. Claws and pulvilli well developed; empodium spine-shaped, hairy. Wings with the cubital vein curved a little down over the first posterior cell or only very slightly so (or, in American species, more strongly dipped), medial cross-vein just before or a little behind the middle of

the discal cell: the basal part of the radial vein with distinct, fine bristles. No stigmatal cross-vein or an indistinct one. Thoracal squamula with long, richly branched hairs; the hairs have long stems which bear many small branches; alar squamula with short, slightly flattened hairs, longer in *bombiformis* than in *mussitans*. Plumula not short, with simple hairs or these branched only just at the base.

As far as I am aware the developmental stages are not known.

The species of *Arctophila*, which genus Schiner separated from *Sericomyia* in 1860, are large, beautiful *Bombus*-like flies. They occur in and at woods and also on fields, and they frequent various flowers.

Of the genus 3 palæartic species are known, 2 occur in Denmark.

Table of Species.

1. The dense pile black and yellow or pale 1. *bombiformis*.
— The dense pile all yellow 2. *mussitans*.

1. *A. bombiformis* Fall.

1810. Fall. Specim. Entom. 25 et 1816. Dipt. Suec. Syrph. 16, 1 (*Syrphus*). — 1822. Meig. Syst. Besch. III, 343, 1 Tab. XXX, Fig. 8 (*Sericomyia*). — 1843. Zett. Dipt. Scand. II, 644, 1 (*Sericomyia*). — 1862. Schin. F. A. I, 331. — 1907. Kat. palæarkt. Dipt. III, 140.

Male. Vertex black, somewhat yellowish pruinose; frons brownish yellow pruinose, with an impressed middle stripe; epistoma strongly descending, the descending part nearly as long as the height of the eye; there is a small central knob; epistoma is brown, whitish or yellowish white pruinose, the pruinosity leaving the middle stripe bare, but the stripe not reaching to the antennæ; the lower lateral parts from the eye downwards bare and black; vertex with black or brown, posteriorly with some yellow hairs; frons with long yellow and some black hairs; epistoma with erect, pale hairs but only on the sides near the eye-margins, for the rest bare; the hairs are short below and here present only as a row along the eye. Occiput greyish yellow pruinose; the hairs brownish black below, yellow above and here also some black hairs; at the upper

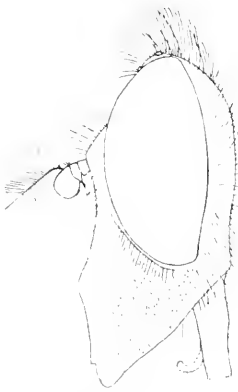


Fig. 186. Head of
A. bombiformis ♂.

corners of the eyes the black hairs are quite short and bristly. Antennæ red, third joint more or less darkened; arista reddish brown, long plumose, the rays blackish. Thorax dull black, greyish pruinose

on the front part; on the black part two slightly less dull, abbreviated middle stripes are seen, and at each side an elongate, shining spot, but the ground colour is mostly hidden under the long, dense pile with which thorax is clothed; the hairs are yellow on a little less than the front half, black on the rest. Scutellum with still longer hairs, which are yellow but black on the base. Pleura with long hairs, which are mainly black but with a yellow tuft in front of the wing-root. Abdomen black, dull, somewhat greyish pruinose at the base; the fourth segment is shining; sometimes there are a pair of indefinite and obscure reddish spots on third segment, and the sides and hind margin of the fourth segment may be reddish; the hairs are whitish on the basal part, black on the front part of, or on most of the third segment, and whitish or yellow to reddish on the rest of the segment and on the fourth segment; the black-haired part thus varies in extent and is sometimes rather narrow; the hairs are longest on the apical part and at the sides and long at the basal corners. Genitalia reddish, pale-haired. Venter black, shining, with long, sparse, pale hairs, fourth segment with short hairs. Legs black, the extreme apex of femora and the basal and apical part of tibiæ more or less reddish; tarsi reddish or brownish, the last joint darkened; sometimes the tibiæ quite brownish or only darker in the middle; hind femora much thickened and curved, hind tibiæ short, rather thick and considerably curved, on the inside at the apex prolonged as a blunt spur; legs densely and somewhat long-haired, the hairs black on femora, the short hairs just at the apex yellow, and the hairs on tibiæ yellow or dark yellow. Wings a little tinged, especially towards the apex;

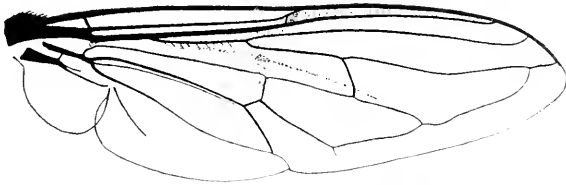


Fig. 187. Wing of *A. bombiformis* ♂.

stigma small, brown, with an indefinite stigmatal cross-vein, below it a brown fascia; cubital vein curved a little down; medial cross-vein placed after the middle of the discal cell. Squamulæ and fringes blackish brown. Halteres with the peduncle brown, the knob brownish black.

Female. Vertex and frons broad, widening downwards, brownish pruinose, just above the antennæ a shining lunule; the hairs yellow

with black intermingled, especially on the vertex and above the antennæ. Hind femora not thickened nor curved, and hind tibïæ likewise thinner, slightly curved and with no spur-like prolongation at the apex.

Length 15—17 mm.

This species is rather like a *Bombus terrestris*.

A. bombiformis is not rare in Denmark but it has hitherto been taken only in Jutland, except an old pair in Westermann's collection, labelled Sealand; in Jutland it has been taken in Vejle Nørreskov, at Horsens, Frijsenborg, Marselisborg and Rye near Silkeborg. The dates are ¹¹/₇—¹⁸/₈. It occurs in wooded districts on flowers, I have generally seen it on Compositæ, especially Carduus.

Geographical distribution: — Europe down into Italy; towards the north to southern Sweden.

2. *A. mussitans* Fabr.

1777. Fabr. Gen. Ins. 306, 2—3 et 1805. Syst. Antl. 225, 6 (*Syrphus*). — 1816. Fall. Dipt. Succ. Syrph. 18, 4 (*Syrphus*). — 1822. Meig. Syst. Besch. III, 345, 4 (*Sericomyia*). — 1843. Zett. Dipt. Scand. II, 645, 2 (*Sericomyia*). — 1862. Schin. F. A. I, 332. — 1901. Verr. Brit. Fl. VIII, 632, 1, figs. 431—432. — 1907. Kat. paläarkt. Dipt. III, 140. — *Volucella superbiens* O. F. Müll. 1776. Zool. Dan. Prodr. 2093.

Male. Vertex blackish, yellowish pruinose; frons yellow pruinose; epistoma a little less descending than in *bombiformis* and with a still smaller central knob; it is yellow, the lower side parts from the eye to the apex black; it is pruinose above at the eyes from the frons half way down; vertex and frons with long, yellow hairs; epistoma with pale hairs only on the sides at the eye-margins, and also with some hairs below on the lower side parts; the hairs at the sides are long above, short and only present just along the eyes below. Occiput yellowish pruinose, the hairs all yellow. Antennæ yellowish red, the bristles on second joint black; arista brownish, with long rays. Thorax and scutellum æneous, shining, clothed with a long and dense, all yellow or tawny pile. Pleura with long, whitish or pale yellow hairs. Abdomen blackish or dark æneous, somewhat yellowish pruinose, slightly shining; it is clothed with long, all pale yellow hairs, which are more erect than in *bombiformis* and not longer at the apex. Genitalia shining, with long, pale hairs. Venter black, shining, with pale incisions and with long, pale, on the fourth segment partly black hairs. Legs all black, sometimes the anterior tibïæ and base of tarsi a little brownish; hind femora only slightly thickened and curved; hind tibïæ

likewise slightly curved and with the spur-like prolongation very short; legs with the femora less densely and long-haired than in *bombiformis*, the hairs nearly all black or more or less yellow below and behind the anterior femora, especially towards the base, and just at the base of the hind femora; on the front tibiæ the usual, adpressed pubescence on the anterior and ventral side is brown. Wings somewhat tinged, from the base to the stigma they are yellow on the anterior part;



Fig. 188. Wing of *A. mussitans* ♂.

below the stigma is a somewhat broad, brown fascia; no stigmatical cross-vein; cubital vein very slightly curved; medial cross-vein placed a little before the middle of the discal cell. Squamulæ blackish with a brown fringe. Halteres with the peduncle yellow, the knob blackish.

Female. Vertex and frons broad, widening downwards, brownish yellow pruinose, the hairs yellow. Legs with the hind femora straight and thinner than in the male, and all femora more pale-haired.

Length 13—16 mm.

This species is rather similar to *Criorrhina oxyacanthæ*.

In the collection of Tönder Lund and Sehestedt are two specimens of this species, a male and a female, which I have examined; as Fabricius refers to the said collection the specimens are, no doubt, the types.

A. mussitans is somewhat common in Denmark; vicinity of Copenhagen, Ermelund, Hillerød, Vemmetofte, at Slagelse; in Jutland in Greisdal at Vejle, at Horsens, Frijsenborg, Rye near Silkeborg and Rebbild near Skørping; on Bornholm at Blykobbe Aa and at Hammeren. My dates are $24/7$ — $4/10$, it is thus a somewhat late occurring species. It occurs in and at woods and also on fields, and it frequents various flowers.

Geographical distribution:— Northern and middle Europe down into France and also recorded from northern Italy; towards the north to southern Sweden.

47. **Sericomyia** Meig.

Rather large flies of dark colour with conspicuous yellow bands on abdomen, not very hairy. The genus is not similar to *Arctophila* in outer appearance, but it is nearly allied to it. Frons slightly more protruding. Antennæ as in *Arctophila* but inserted a little above the middle. Epistoma slightly hollowed between the antennæ and the central knob, which latter is slightly larger than in *Arctophila* and placed a little higher upwards; below the knob the epistoma is considerably retreating; it is much less descending than in *Arctophila* and not pointed below (fig. 190); the colour is yellow with a black middle line and black lower side parts. There is a furrow at the lower inner eye-margin as in *Arctophila*. Proboscis and oral cone long; clypeus with a long basal part, and the mouth parts otherwise as in *Arcto-*

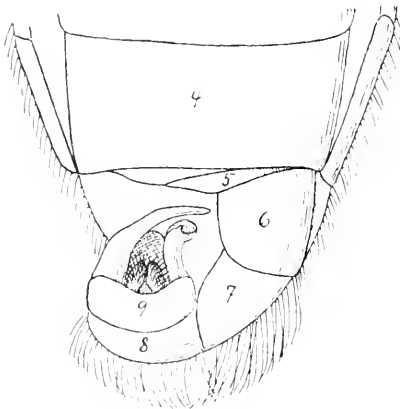


Fig. 189. *S. borealis*, male genitalia from below, showing the large, unsymmetrical claws; 4—8 fourth to eighth ventral segments, 9 ninth segment or hypopygium.

phila and likewise somewhat long and slender; the maxillar lacinia relatively a little shorter, the palpus distinctly longer than the lacinia; the labella a little less narrow. Scutellum black or reddish, with a short marginal fringe below. Genitalia as in *Arctophila*, the claws of the hypopygium likewise unsymmetrical. Legs with the hind femora less thickened. Wings with the medial cross-vein placed just behind the middle of the discal cell.

The developmental stages have not been described, but Watkins has mentioned that *S. borealis* has been bred (Naturalists' Journ. 1896), and Bloomfield, who mentions the

same case (Ent. Month. Mag. XXXIII, 1897, 222), communicates that the larva was found in May in a shallow pool in a peat bog with decomposing sods; it is a rat-tailed larva with a rather long tail, and it is of a dull grey colour. — It is somewhat curious that the genus has a larva of this type.

The species of *Sericomyia* are beautiful flies with their brightly banded abdomen. The genus is easily distinguished from *Arctophila* by the shorter and slighter hairiness and the less descending epistoma. The species occur in woods, especially in rather open districts, on moors and in fens, and they frequent various flowers; in middle

Europe they occur in the mountains. They are rather shy and fly very quickly and at long distances.

Of the genus 4 or 5 species occur in the palæarctic region (two or three in northern Europe, the other two in Russia and Siberia); two occur in Denmark.

Table of Species.

1. Abdominal bands dark yellow, widened at the sides, apex of abdomen yellow; scutellum blackish; larger species 1. *borealis*.
 — Abdominal bands whitish or pale yellow (in fresh specimens), not widened at the sides, apex of abdomen black; scutellum reddish; smaller species 2. *lappona*.

1. *S. borealis* Fall.

1816. Fall. Dipt. Suec. Syrph. 20, 7 (*Syrphus*). — 1822. Meig. Syst. Besch. III, 343, 2, Tab. XXXI, Fig. 9. — 1843. Zett. Dipt. Scand. II, 646, 3. — 1862. Schin. F. A. I, 331. — 1901. Verr. Brit. Fl. VIII, 635, 1, figs. 433—434. — 1907. Kat. paläarkt. Dipt. III, 140.

Male. Vertex black, very slightly pruinose; frons greyish pruinose, black and shining just above the antennæ, with an impressed middle line; epistoma yellow with a middle stripe and the lower side parts black, it is yellow pruinose at the sides above and downwards in front of the black parts; vertex black-haired, posteriorly with yellow hairs; frons yellow-haired, and epistoma with erect, yellow hairs on the sides above and downwards on the eye-margins. Occiput yellowish pruinose, above more greyish; the hairs yellowish and above some few black hairs. Antennæ reddish brown to blackish brown, the third joint generally darkest; arista brown, long plumose, with the rays blackish. Thorax black, a little æneous in front, slightly shining; there are two approximated, faint greyish or brownish middle stripes, a little diverging behind and abbreviated at the middle; at the humeri and inwards is a white or silvery pruinose spot; thorax is clothed with somewhat short hairs, which are yellow or whitish on the front part and in front of scutellum, but blackish across between the wing-roots; the hairs are shortest on the middle; on the præalar and postalar calli are longer, tuft-like, more deeply yellow hairs. Scutellum black or slightly brownish black, with black hairs on the disc, yellow on the base and round the

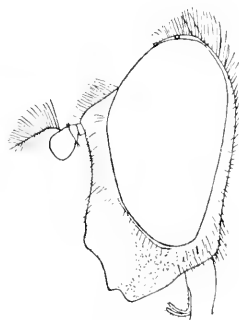


Fig. 190. Head of *S. borealis* ♂.

margin; they are long and a little stronger at the margin. Pleura with yellow hairs in front and below, black behind. Abdomen dull black with three dark yellow bands, narrowly interrupted in the middle; the first band is about on the middle of the segment, the second and third near the front margins, the third nearest; the third band is often only indistinctly or not at all interrupted in the middle; the hind margin of the fourth segment is broadly orange, most broadly in the middle, and the second and third segments have narrow, orange, often indistinct hind margins; the abdominal bands are evenly widened towards the sides as their hind margin slopes backwards from the middle to the sides; the bands are generally separated from the sides, but the side margins may be yellowish on the last segments and then here confluent with the bands. Abdomen is clothed with short hairs which mainly follow the ground colour but are quite or almost quite yellow on the whole fourth segment and long at the hind margin of this segment; at the side margin the hairs are yellow and a little longer than on the disc, and they are long at the basal corners. Genitalia reddish with long, yellow hairs. Venter reddish, with larger or smaller, black, transverse spots on the segments, first segment black; the hairs are long and yellow. Legs red with about the basal half or more of the femora and the last, or sometimes the two last tarsal joints black; on the front femora the black colour often continued forwards below and on hind femora sometimes present only on the anterior side; hind femora slightly thickened and somewhat curved, hind tibiæ slightly curved; the legs have moderately long hairs, the femora, especially the hind femora, have long, bristly hairs below; the hairs vary in colour, on the femora from extensively yellow, only behind front femora black, to all black; the hairs on tibiæ yellow, often more or fewer black on the front side of middle tibiæ, and on the hind tibiæ are some black hairs above and also often on the front tibiæ. Wings more or less brownish or yellowish tinged, especially towards the anterior margin; stigma dark yellow. Squamulæ yellow with darker margin and fringes. Halteres with the peduncle yellow, the knob blackish brown.

Female. Vertex and frons broad, widening downwards, black with a brownish pruinose cross-band a little above the antennæ; the hairs black. Abdomen with the second and third bands generally not interrupted, the fifth segment yellow with a more or less visible blackish base; it has, like the hind margin of fourth segment, long, yellow hairs. Hind femora not thickened.

Length 13—17 mm.

S. borealis is rather common in Denmark; Ordrup Mose, Bølle-

mosen, Lyngby Mose, Geel Skov, Hillerød, Nyrup Hegn, Tisvilde; in Jutland in Nørholm Skov at Varde, in Greisdal and Højenbæk Dal at Vejle, at Horsens, Frijsenborg, Funder and Sminge near Silkeborg, Støvring near Randers, Hald near Viborg, Rebbild near Skørping, Frederikshavn and Jerup near Frederikshavn, and on Bornholm at Hammeren. My dates are $\frac{3}{6}$ — $\frac{29}{8}$. It occurs in woods and fens on various flowers often on Umbelliferæ.

Geographical distribution:— Northern and middle Europe down into France; towards the north to northern Sweden, and in Finland.

2. *S. lappona* L.

1758. Linn. Syst. Nat. X, 591 et 1767. XII, 2, 983, 27 et 1761. Fn. Suec. 1794 (*Musca*). — 1822. Meig. Syst. Besch. III, 344, 3. — 1843. Zett. Dipt. Scand. II, 646, 4. — 1862. Schin. F. A. I, 331. — 1901. Verr. Brit. Fl. VIII, 637, 2, figs. 435—436. — 1907. Kat. paläarkt. Dipt. III, 141. — *Syrphus lapponum* 1781. Fabr. Spec. Ins. II, 422, 4 et 1805. Syst. Antl. 226, 7. — 1816. Fall. Dipt. Suec. Syrph. 20, 8.

Male. This species is somewhat similar to *borealis*, but it is much smaller and less strong. Vertex black, frons whitish pruinose only at the sides, for the rest black and shining, with a deep middle furrow; epistoma with the black middle stripe broader than in *borealis* and the central knob a little larger; vertex black-haired, frons with yellow hairs at the sides, black on the middle; epistoma haired as in *borealis*. Occiput grey pruinose, with the black hairs above more numerous. Antennæ reddish brown or dark brown. Thorax as in *borealis*, the tuft-like hairs on præalar and postalar calli darker and less conspicuous. Scutellum reddish, likewise with black hairs on the disc, yellow round the margin. Abdomen black or bluish black, less dull, the hind margins of the segments shining, the fourth segment shining on the hinder half; the bands are narrower than in *borealis*, bony white or pale yellow, sometimes darker (in drying the bands generally turn dark yellow as in *borealis*), and they are not or very slightly widening towards the sides; there are no pale hind margins to the segments, and the bands are separated from the side margins. Abdomen haired as in *borealis*, the hairs likewise following the ground colour but all or almost all pale on fourth segment, except at the front margin, and sometimes also along the hind margin of third segment; at the sides they are yellow; the long hairs at the basal corners are brownish red. Genitalia black, shining, with long, yellow hairs. Venter black, shining, with pale incisures and long, pale hairs. Legs red, front femora black on the basal half or more, the black colour prolonged forwards behind; middle femora black on the basal part, sometimes only behind: the

two last joints of all tarsi black or blackish; hind femora less thickened than in *borealis*; the legs haired in the same way but the hairs generally more black on anterior femora. Wings yellow along the anterior

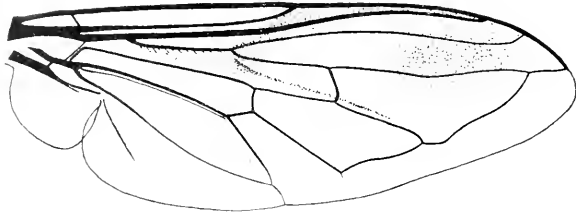


Fig. 191. Wing of *S. lappona* ♂.

part with a faint blackish clouding before the apex. Squamulæ and fringes brownish. Halteres with yellow peduncle and a brownish black knob.

Female. Similar; vertex and frons broad, widening downwards, black with greyish dust spots, meeting in the middle; the hairs dark above, yellow below. Abdomen with the fifth segment black, yellow-haired, and the segments with yellow hairs at the hind margins.

Length 10,5 to nearly 13 mm.

S. lappona is much more rare in Denmark than *borealis*; Dyrehaven, Lyngby Mose, and in Jutland at Frijsenborg and at Funder near Silkeborg. My dates are ²⁵/₅ to the beginning of July. It occurs on the same localities as *borealis*, perhaps more preferring moors, and it occurs sometimes in company with *borealis*.

Geographical distribution:— Europe down into Italy; towards the north to northern Sweden, in Finland and on the Faroe Islands and Iceland; it occurs also (if correct) in Canada (but not, as Verrall says in Greenland, as *Volucella lappona* by Otto Fabricius is some species of *Syrphus*).

V. Chrysotoxinae.

48. **Chrysotoxum** Meig.

Species of large or moderate size, of dark colours with yellow markings on the sides of the thoracal disc and on pleura, and with characteristic, yellow, interrupted bow-shaped bands on abdomen; the species are not very hairy. Head not short, somewhat semiglobular, a little broader than high and broader than thorax; it is somewhat excavated behind. Eyes touching in the male, well separated in the

female: they are more or less hairy, much less in the female than in the male; in the male the facets above are very slightly enlarged. Vertex of moderate length. Frons somewhat prominent, with longish hairs. Antennæ inserted well above the middle of the head; they are elongate and porrected, the basal joints somewhat long, the third elongate, linear, with the arista inserted near the base; the arista is about as long as the third joint; the basal antennal joints have hairs or small bristles, especially above and below, third joint and arista microscopically hairy. Epistoma a little hollowed between the antennæ and the somewhat low central knob, below the knob it is somewhat retreating; it is only a little protruding and not very descending, the lower margin goes straight backwards to the jowls; the colour is yellow with a black middle stripe and with a black band from the lower part of the eye down to the lateral oral margin; the epistoma has erect hairs except on the middle stripe. Jowls somewhat broad, a little descending; they are somewhat separated from epistoma by a furrow at the lower eye-corner. Proboscis and oral cone of medium length. Clypeus with the basal part somewhat large, triangularly incised in the anterior end. Labrum (*cautum*) is strong, strongly semitubular and somewhat high at the base; the apical processes are of equal length, the median cleft to the base, with spines or emergences at the margin and at the apex; the upper lateral processes are not very delicate, they are broad at the base, tapering and pointed, somewhat irregularly serrated at the margin and divided into some emergences at the apex: the lower lateral processes are broad, of usual shape, with the lower or outer corner rounded, the upper or inner corner angular; the usual lateral rows of papillæ on the inside of labrum are present and they are scattered on the whole lower process: hypopharynx is as long as labrum, not very slender; it is parallel-sided, semitubular, attenuated in the outer part, with the apex rounded; the salivary duct is very distinct; the maxillæ are short, not half so long as hypoprarnyx; they are knife-shaped, somewhat broad, and rounded at the end; they have the usual microscopical spines, and these spines are relatively long and strong on the outer side: the palpi are short, thread-like, a little longer than the lacinia, with microscopical hairs and with long bristles in the whole length. Labium with the basal part somewhat short, shorter than the broad, oval labella. Thorax rectangular; scutellum with yellow margin, the disc more or less black or blackish; there is no distinct fringe below the margin. No thoracal or scutellar bristles present. Metapleura with dense, short hairs. Abdomen rather arched, elongated oval, sometimes more linear, broadest in the female; it is distinctly marginate:

in the male there are five not transformed segments on the dorsal side, except the first of nearly equal length; on the ventral side there are only four not transformed segments, the fifth is not quite symmetrical, as it is not chitinised quite to the margin on the right side, but has here a broad side membrane, and the apex of the genitalia stretches in below the segment; the other small, transformed segments are distinctly seen below on the left side, and the genitalia are, as usual, turned over to the right; the genitalia are larger or smaller, the hypopygium in some species small, with small, symmetrical claws, in other species (f. inst. *cautum*) it is large, with very large, curiously shaped, unsymmetrical claws or clasping appendages. In the female the abdomen has five distinctly visible segments, the fifth not small; a small sixth segment is generally also seen, especially below; the rest are hidden, the last terminates with two short lamellæ. The legs are simple, hind femora not thickened, the hind tibiæ have the usual incurvation on the posterior side before the apex rather pronounced; the legs are haired in the usual way and not strongly; above the trochanters a solitary long hair or a couple of hairs. Claws and pulvilli well developed. Empodium short, spine-shaped, hairy. Wings with the cubital vein curved more or less downwards; medial cross-vein not very oblique, placed before the middle of the discal cell; the basal part of the radial vein with very fine bristles. No stigmatal cross-vein. Thoracal squamula with long, richly branched hairs, which have long stems; besides there are on the marginal part of the surface long, simple hairs; alar squamula with short, flattened hairs. Plumula short, but with relatively long, branched hairs.

With regard to the developmental stages v. Roser found the larva of *C. festivum* (*arcuatum*) in a hollow tree; he also (according to Schiner) mentions the larva of *bicinctum* (Württemb. Corr. Blt. 1834, 267). Beling (Arch. f. Naturg. XLVIII, 1, 1882, 231) describes the larva and pupa of *C. bicinctum*; the larva was found in a compost-heap on $\frac{3}{4}$ and developed on $\frac{20}{6}$. Vimmer (Casopis, Soc. ent. Bohem. VIII, 1911) mentions the pupa of *C. elegans*, but I have not seen this paper. I have myself examined the puparium of *C. festivum*, to which there were, however, no notes about the way in which it was found.

According to Beling the larva of *C. bicinctum* is flat below, arched above; the segments are divided into corrugations; on the dorsal side are pointed filaments or spines in transverse rows, those along the sides the largest (these filaments are, no doubt, arranged in the usual way); the posterior end is obliquely declining and has a brown, chitinised posterior spiracular process; the colour of the larva is yellowish white; the length 8 mm. The pupa is of the same length;

it is flat below, much arched above, of a dirty brownish colour, otherwise it resembles the contracted larva. The pupa of *C. festivum* answers rather well to Beling's description; the mentioned filaments are still seen as low warts, arranged as usual; those on the sides at the posterior end are the largest; there are no anterior spiracular tubes; the pupa has the posterior end curved strongly downwards; the length is 10 mm.

The species of *Chrysotoxum* are very beautiful flies, characterised by the yellow bows on abdomen; they occur in woods and fens and on meadows, sometimes at the borders of water, and they are seen on many various flowers.

Of the genus 20 species are known from the palæarctic region; 5 occur in Denmark.

Table of Species.

- | | |
|--|-----------------------|
| 1. Third joint of antennæ nearly as long as, or longer than the two basal joints together; wings without any blotch | 2. |
| — Third joint of antennæ distinctly shorter than the two basal joints together; wings with a larger or smaller blotch at the anterior margin after the middle | 3. |
| 2. Eyes with short, whitish hairs; second antennal joint longer than first; venter with three pairs of yellow spots at the front margins of the segments; male genitalia very large; rather large species | 1. <i>cautum</i> . |
| — Eyes with longer, denser, dark hairs; second antennal joint as long as first; venter with only two pairs of small, yellow spots on third and fourth segments, lying in the middle; male genitalia small; smaller species | 2. <i>arcuatum</i> . |
| 3. Abdomen with four yellow bows | 4. |
| — Abdomen with only two yellow bows | 5. <i>bicinctum</i> . |
| 4. All femora quite yellow | 3. <i>festivum</i> . |
| — Anterior femora black at the base | 4. <i>vernale</i> . |

1. *C. cautum* Harr.

1777. Harr. Expos. engl. Ins. 60, Pl. XV, fig. 15 (*Musca*). — 1901. Verr. Brit. Fl. VIII, 643, 1, figs. 441—442. — 1907. Kat. paläarkt. Dipt. III, 146. — *C. scutellatum* Macq. 1827. Soc. Sc. Lille, 349, 4 et 1834. Suit. à Buff. I, 490, 4. — 1838. Meig. Syst. Besch. VII, 107, 10. — *C. sylvarum* Meig. 1822. l. c. III, 171, 6. — 1856. Loew, Verh. zool. bot. Gesell. Wien, VI, 609, 2. — 1862. Schin. F. A. I, 253.

Male. Vertex black, frons black, shining, greyish white pruinose at the sides, with a middle longitudinal impression in front; epistoma yellow with a black middle stripe and a black band from the lower anterior corner of the eye down to the mouth; vertex and frons black-haired, epistoma with erect, yellow hairs except on the middle

stripe and the black part below. Jowls pale reddish yellow. Occiput whitish grey pruinose, the hairs somewhat long, whitish below, yellow above, and here with a row of black hairs overhanging the eyes. Eyes with short, whitish hairs. Antennæ black, third joint not so

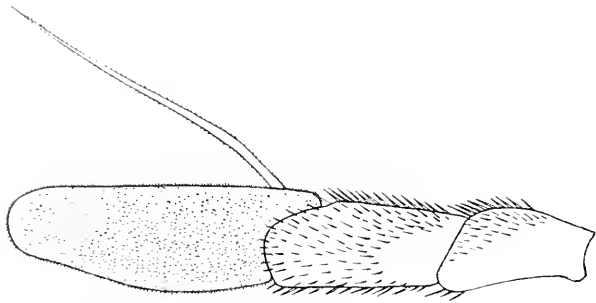


Fig. 192. Antenna of *C. cautum* ♂, from the inside. $\times 40$.

long as the two basal joints together, of which latter the first (on the inside) is a little more than half as long as the second; arista about of the length of the third joint, yellow in the basal half, black on the apex. Thorax black, shining, with two abbreviated, greyish middle stripes, diverging behind and merging into a faint greyish space in front of scutellum; at the sides there is a yellow spot from the humeri to the transverse furrow and one on the postalar callus, prolonged somewhat forwards; thorax is clothed with somewhat long, brownish yellow hairs, darker across the middle; they are longest behind; above the wing-root are dense black hairs. Scutellum brownish or blackish above with a yellow margin; seen from the side it is more yellow; it has long, black hairs, yellow on the base. Pleura with a yellow or reddish spot down on mesopleura, a more or less faint spot above on sternopleura and the metapleura yellow; they have long, yellow hairs, somewhat tuft-like above. Abdomen black, dullish, slightly shining at the hind margins of the segments; the fifth segment has the hind part bent somewhat upwards on account of the large genitalia; abdomen has four somewhat bow-shaped, yellow bands, interrupted in the middle, and the hind margins of the segments are yellow; the middle interruptions of the bands decrease in breadth backwards; the bands are widened at the sides, they do not reach the side margin but so do the yellow hind margins, and the bands are connected with the hind margins at the posterior corners; the hind margins increase in breadth backwards, on the second segment the margin is narrow, often present only at the sides, and on the fifth

segment it is so broad that only a narrow, black transverse stripe is left, and the yellow hind margin is sometimes produced triangularly forwards into the interruption of the band; sometimes the black band almost disappears, the segment then being nearly quite yellow. Abdomen is clothed with somewhat short hairs, which to a great degree follow the ground colour but generally are black on the yellow hind margins, but sometimes yellow on all hind margins; the yellow hairs are longer and more erect than the black; the hairs at the side margin are somewhat long, longest at the basal corners; they are yellow, though black just inwards on the black parts. Genitalia red, very large, with large, unsymmetrical appendages. Venter black, shining, with transverse, yellow side spots on second, third and fourth segments towards the front margins and with yellow hind margins to the segments; the side spots are in shape just reversed to the dorsal bands, as they have a concave margin in front and a convex behind; the hairs on venter long, yellow. Legs yellow, the femora more reddish, with the basal part or basal half black; the anterior tibiæ and the basal part of the hind tibiæ of a beautiful pale or canary yellow colour; the legs are haired in the usual way; the short hairs on the anterior side of middle and hind femora more or less black, for the rest the hairs yellow or some black hairs behind the apical part of the anterior femora. Wings a little tinged, more strongly and brownish

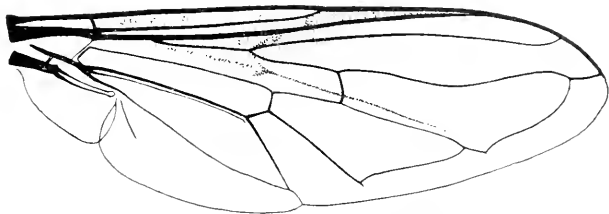


Fig. 193. Wing of *C. cautum* ♂.

yellow towards the anterior margin; cubital vein with a slight curve. Squamulæ whitish yellow with a yellow margin and fringe. Halteres yellow.

Female. Vertex and frons broad, very widening downwards, black, the frons with two large, grey dust spots; the hairs black. Legs paler than in the male, the anterior femora black only at the base, hind femora quite yellow or black only at the extreme base.

Length 12—14 mm.

C. cautum is common in Denmark; Amager, Ermelund, Hareskov, Geel Skov, Sollerød, Hillerød, Tyvekrog, Tisvilde, at Sorø; on Lolland

at Maribo, Strandby, Bremersvold and in Kældskov; on Langeland at Lohals; on Funen at Assens; in Jutland at Horsens and Frijsenborg. My dates are $12/5$ — $17/7$. It occurs in and at woods and on fields, frequenting various flowers.

Geographical distribution:— Europe down into Italy, and on Madeira; it is not known from Scandinavia but it occurs in England, and is recorded from Siberia.

2. *C. arcuatum* L.

1758. Linn. Syst. Nat. X, 592 et 1767. XII, 2, 985, 39 et 1761. Fn. Suec. 1806 (*Musca*). — 1841. Loew, Stett. ent. Zeitg. II, 159, 3 et 1856. Verh. zool. bot. Gesell. Wien, VI, 609, 4. — 1862. Schin. F. A. I, 253. — 1901. Verr. Brit. Fl. VIII, 645, 2, figs. 443—444. — 1907. Kat. paläarkt. Dipt. III, 145. — *C. fasciolatum* Meig. (nec De G.) 1822. Syst. Besch. III, 170, 4. — 1843. Zett. Dipt. Scand. II, 634, 2 et 1849. VIII, 3108, 2 et 1852. XI, 4300, 2 et 1859. XIII, 5074, 2. — *C. hortense* Meig. 1822. l. c. III, 173, 8.

Male. This species is very similar to *cautum*; the eyes are more densely and longer haired, and the hairs are brown; epistoma with a broader black middle stripe and with some black hairs above at the sides of the antennæ; occiput all black-haired above. Antennæ with

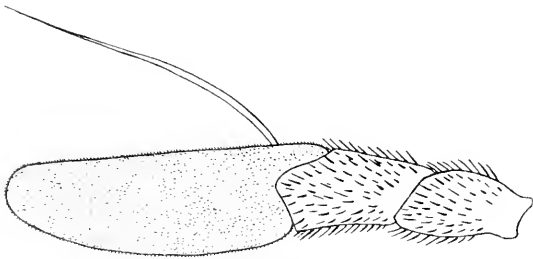


Fig. 194. Antenna of *C. arcuatum* ♂, from the inside. $\times 40$.

the third joint a little longer than the two basal joints together, the second (on the inside) almost not longer than the first. Thorax with the greyish stripes abbreviated behind the middle, but there is no greyish space in front of scutellum; the yellow spots on the sides reaching near to each other; thorax and scutellum darker haired than in *cautum*, the hairs nearly all blackish. Pleura black-haired above and behind. Abdomen more short ovate, more arched and more pointed than in *cautum*, with the fifth segment much smaller and curved evenly downwards; abdomen is marked in the same way but the yellow bows are more narrow, more curved and almost not

widened towards the sides, and abdomen is thus more black; it is also more shining, especially towards the apex; it is haired mainly as in *cautum* but the hairs just at the basal corners are black. Genitalia small, with the appendages very much smaller. Venter black, shining, with pale hind margins to the segments; third and fourth segments with narrow, transverse, yellow side spots placed on the middle of the segments; the hairs are long, partly yellow, partly black. Legs mainly as in *cautum* but thinner; the hairs on femora nearly all black. Wings with the brownish yellow tinge more distinctly along the anterior margin.

Female. Vertex broader than in *cautum*, frons widening downwards, black, with two large, yellowish dust spots; the hairs black. Antennæ longer than in the male with the third joint relatively longer. Abdominal bows broader but likewise not widened towards the sides; the hairs at the basal corners not black. Legs with the femora less black on the basal part, hind femora nearly all yellow.

Though similar to *cautum* the species will easily be known; in the male the small genitalia at once distinguish it, and in both sexes it is distinguished by the antennæ, the yellow spots on venter, besides by other characters.

C. arcuatum is rather rare in Denmark, I know only seven specimens, three males and four females; Tisvilde (Klöcker, the author) and in Jutland at Silkeborg (Jensen-Haarup). The dates are only $8/7$ — $26/7$. It was for the first time taken in 1907.

Geographical distribution:— Northern and middle Europe down into Austria, Styria and Hungary; it is also recorded from Italy (var. *nigropilosum*); towards the north to northern Sweden, and in Finland.

3. *C. festivum* L.

1758. Linn. Syst. Nat. X, 593 et 1767. XII, 2, 986, 45 et 1761. Fn. Suec. 1812 (*Musca*). — 1856. Loew, Verh. zool. bot. Gesell. Wien, VI, 612, 9. — 1862. Schin. F. A. I, 255. — 1901. Verr. Brit. Fl. VIII, 650, 5, fig. 440. — 1907. Kat. paläarkt. Dipt. III, 148. — *Musca arcuata* De Geer (nec L.) 1776. Mém. Ins. VI, 125, 15. — 1775. Fabr. Syst. Entom. 767, 22 (*Syrphus*) et 1805. Syst. Antl. 184, 3 (*Mulio*). — 1816. Fall. Dipt. Suec. Syrph. 5, 2 (*Mulio*). — 1822. Meig. Syst. Besch. III, 162, 2, Tab. XVII, Fig. 7. — 1841. Loew, Stett. ent. Zeitg. II, 138, 159. — 1843. Zett. Dipt. Scand. II, 636, 4 et 1855. XII, 4644, 4 et 1859. XIII, 5074, 4. — *Musca bipunctata* O. F. Müll. 1776. Zool. Dan. Prodr. 2041.

Male. Vertex black, more or less greyish behind; frons black, yellow or greyish pruinose behind at the eye-margins; epistoma yellow with a broad middle stripe and a band downwards from the lower

part of the eye black; sometimes the whole lower side part black; vertex with black, behind with yellow hairs, frons with black or brown hairs; epistoma with pale hairs. Jowls varying from orange to black. Occiput whitish grey pruinose, the hairs whitish below, yellow above, somewhat long. Eyes with short, whitish hairs. Antennæ black, third

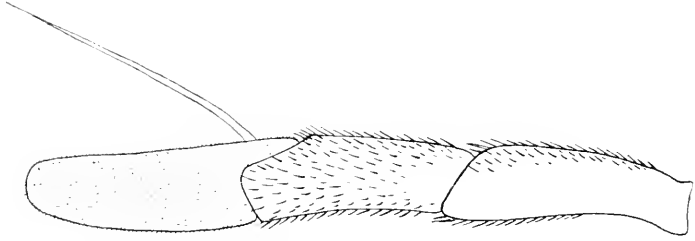


Fig. 195. Antenna of *C. festivum* ♂, from the inside. $\times 40$.

joint much shorter than the two basal joints together, and all three joints of nearly equal length¹; arista about of the length of the third joint, brownish yellow on the basal part. Thorax black, shining, with two grey stripes, abbreviated behind the middle and a little diverging; it has the usual yellow longitudinal side spots from humeri to the transverse furrow, and on the postalar calli and produced forwards; they are not widely interrupted; thorax is clothed with somewhat long, brownish hairs. Scutellum yellow with a smaller or larger black spot on the disc; it has brown hairs with more or fewer black on the middle. Pleura with the usual three yellow spots somewhat large and distinct; the hairs are yellow. Abdomen black, dull, somewhat shining at the hind margins of the segments, along the middle line and at the apex; it has four pairs of bright yellow, equal and rather arched bows, not reaching the side margin; the third, fourth and fifth segments have pale hind margins, the margin is narrow on the third segment and often not reaching the sides or present only in the middle; the margin on fifth segment is the broadest; abdomen is clothed with very short hairs which quite follow the ground colour; just along or beneath the side margin they are a little longer, brownish yellow, and they are long and all yellow on and about the basal corners. Genitalia small, black and black-haired. Venter black, shining,

¹ Generally the second joint is given as a little shorter than the first; my measurements show, however, that when dissociated these joints are equal in length, but in situ the second is a little shorter as its base is overlapped by the first joint.

the first segment for the greater part reddish; the third and fourth segments have each a pair of transverse, yellow spots close to the front margin; the hairs on venter are long and pale on the basal half, short and black behind. Legs yellow with coxæ and trochanters black, femora more reddish yellow; tibiæ quite, or except the apex, pale or canary yellow; the legs somewhat short-haired and not densely haired; the hairs all yellow. Wings rather brownish yellow tinged, strongly

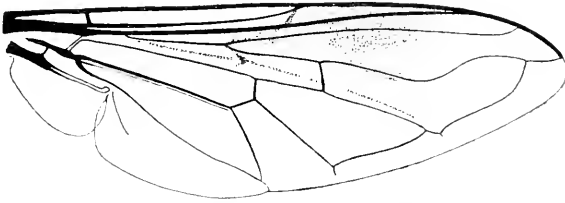


Fig. 196. Wing of *C. festivum* ♂.

towards the anterior margin; before the end of the subcostal vein is a brown, roundish spot at the anterior margin; it is sometimes somewhat faint; the cubital vein has a rather deep curve. Squamulæ and fringes yellow or orange. Halteres yellow.

Female. Similar; vertex and frons broad, widening downwards, black; frons with two large, yellowish dust spots; the hairs very short, black. Eyes very short-hairy, nearly bare. Thorax and scutellum exceedingly short-haired, the hairs behind on thorax black. Abdomen with the pale hind margins to the segments narrower than in the male and generally present only on fourth and fifth segments.

Length 11—14,5 mm.

C. festivum is common in Denmark; Fuglsang Sø, Lyngby Mose, Fiskebæk, Geel Skov, Hillerød, Tisvilde, Melby, Rørvig, Nordskoven at Jægerspris; on Lolland at Maribo, in Kældskov and Vester Ulslev Mose; on Funen at Odense; in Jutland in Nørholm Skov at Varde, at Horsens, Frijsenborg, Funder near Silkeborg, Hald near Viborg, Søndervig, Blaavandshuk, Restrup at Aalborg, Sæby, Frederikshavn and on Læsø. My dates are ¹⁷/₆—⁸/₉. It occurs in woods, fens and on meadows, sometimes at the borders of water, and it is seen on many various flowers. Two of the specimens in our collection are bred, but there are no notes about the circumstances under which the larvæ or pupæ were found.

Geographical distribution:— Europe down into Italy, and in North Africa; towards the north to middle Sweden, in Finland and Siberia.

4. *C. vernale* Loew.

1841. Loew, Stett. ent. Zeitg. II, 159, 4 et 1856. Verh. zool. bot. Gesell. Wien, VI, 612, 10. — 1843. Zett. Dipt. Scand. II, 637, 6 et 1859. XIII, 5075, 6. — 1862. Schin. F. A. I, 225. — 1901. Verr. Brit. Fl. VIII, 652, 6, fig. 447. — 1907. Kat. paläarkt. Dipt. III, 151.

This species is very similar to *festivum*, but the antennæ are a little shorter, the second joint shorter than the first, and the third joint not much shorter than the two basal joints together. The grey lines on thorax are narrower; the spots on pleura smaller and the one above on sternopleura often wanting. The anterior femora with about the basal fourth black. The cubital vein is curved a little less downwards.

Length about 11,5 mm.

In spite of the great similarity to *festivum* the species seems, however, to be quite distinct and valid.

C. vernale is very rare in Denmark, we have only three specimens, a male and two females; two of the specimens are taken at Tisvilde on ²⁶/₅ 1913 and ⁶/₆ 1915 (J. C. Nielsen) and one on Bornholm in July 1892 (Løvendal).

Geographical distribution: — Europe down into Spain and Italy; towards the north to middle Sweden, and in Finland.

5. *C. bicinctum* L.

1758. Linn. Syst. Nat. X, 592 et 1767. XII, 2, 985, 38 et 1761. Fn. Suec. 1805 (*Musca*). — 1775. Fabr. Syst. Entom. 767, 21 (*Syrphus*) et 1805. Syst. Antl. 183, 2 (*Mulio*). — 1776. O. F. Müll. Zool. Dan. Prodr. 2019. (*Musca*). — 1816. Fall. Dipt. Suec. Syrph. 6, 3 (*Mulio*). — 1822. Meig. Syst. Besch. III, 168, 1. — 1843. Zett. Dipt. Scand. II, 638, 7. — 1841. Loew, Stett. ent. Zeitg. II, 159, 1 et 1856. Verh. zool. bot. Gesell. Wien, VI, 613, 14. — 1862. Schin. F. A. I, 255. — 1901. Verr. Brit. Fl. VIII, 653, 7, fig. 448. — 1907. Kat. paläarkt. Dipt. III, 146.

Male. Vertex black, grey on the hinder half; frons black, very slightly pruinose just along the eye-margins; epistoma yellow or whitish yellow with a broad middle stripe and the lower side parts black; vertex with blackish brown, posteriorly with yellow hairs; frons with yellow hairs, anteriorly generally black; epistoma with whitish or yellowish hairs. Jowls brownish orange. Occiput whitish, almost silvery pruinose along the eye-margins, the hairs white below, yellow above, and here also some black hairs. Eyes with moderately long and dense, pale brownish hairs. Antennæ black, with the third joint much shorter than, almost only half as long as the two basal joints together, the

second shorter than the first; arista as long as third joint, brownish at the base. Thorax æneous, shining, with two somewhat narrow, greyish stripes, abbreviated behind the middle; the yellow, longitudinal side spots present as usual, moderately interrupted; thorax is clothed with somewhat long, yellowish brown hairs, longest behind; above the wing-root are dense, black hairs. Scutellum æneous black with a narrow yellow margin, and with similar hairs as on thorax, among which some few black. Pleura with only the spot on mesopleura present; the hairs long, yellow. Abdomen black, rather shining, a little dull only on second segment before the hind margin; it has two yellow bows, one on second and one on fourth segment; the first bow is broad, a little raised, just interrupted in the middle, and it reaches the side margins with just the hinder corners; the second bow is not interrupted and it does not reach the margins; on the third segment are generally a pair of very narrow, shorter or longer lines as traces of a bow; the fifth segment has a small, interrupted bow or this bow is reduced to two small spots; the segments have narrow, pale hind margins, sometimes widening at the hind corners, on second segment the margin present only in the middle and generally also at the sides; abdomen is clothed with short hairs, which as usual mainly follow the ground colour, and there are yellow hairs about the traces of the bow on third segment; the hairs at or beneath the side margin are yellow, a little longer, and long at the basal corners. Genitalia small, black and partly black-haired. Venter black, shining, with a broad, yellow band at the base of the third segment; the hairs are long, yellow on the basal half, black at apex. Legs yellow, anterior femora with the basal part or half black, hind femora black to near the apex; hind tarsi more or less darkened above, especially metatarsus; the tibiæ more or less canary yellow; the legs are somewhat thinly haired, but the hairs below the posterior femora long; all the hairs are yellow or there are some black behind the apical part of the anterior femora and below the apex of hind femora. Wings yellowish on the basal half between costa and the discal vein, and after this yellow part with a large, brown spot stretching about to the end of the subcostal vein and down into the cubital cell, on the inner part to the cubital vein; the cubital vein somewhat deeply curved. Squamulæ somewhat blackish with brownish yellow fringes. Halteres yellow.

Female. Similar; vertex and frons broad, widening downwards, black; the frons with large, greyish yellow dust spots; the hairs very short, pale. Eyes very short-haired. Thorax and scutellum with exceedingly short hairs, black behind on thorax. Abdomen generally

without traces of the bow on third segment, and generally with a pale hind margin only on fourth segment.

Length 10—11,5 mm.

C. bicinctum is not rare in Denmark, though less common than *festivum*; Ordrup Mose, Fure Sø, Donse, Geel Skov, Hillerød, Nyrup Hegn, Nordskoven at Jægerspris; on Lolland at Maribo, in Kældskov and Vester Ulslev Mose and at Strandby; on Langeland at Lohals; on Funen at Odense, Veflinge, Middelfart and Strib; in Jutland in Nørholm Skov at Varde, at Horsens and at Rebbild near Skørping; on Bornholm at Rønne and in Almindingen. My dates are $^{25/5}$ — $^{7/8}$. It occurs in woods and fens and on meadows, especially on humid places and near water, where it is seen in low herbage and on flowers.

Geographical distribution: — Europe down into Spain and Italy; towards the north to middle Sweden, and in Finland; it is recorded from North America by Schiner and Loew but Aldrich does not record it in his Catalogue.

VI. Microdontinae.

49. **Microdon** Meig.

Species of medium size and of a somewhat broad and clumsy shape; the colour is dark æneous with more or less distinct abdominal bands of pale hairs. (This description refers only to the European species; foreign species may be large, and sometimes of quite another shape, wasp-like with a petiolate abdomen, and they may be of various, sometimes brilliant colours). Head semiglobular, a little broader than high, about of the breadth of thorax; it is a little excavated behind. Eyes separated in both sexes, the most broadly in the female; in the male the frons is narrowing downwards to somewhat above the antennæ and then widening down to the epistoma, the inner eye-margin thus angular; in the female the borders are almost parallel or slightly diverging downwards, not or almost not angular. The eyes are bare; the facets not, or practically not, enlarged above. Frons not prominent, hairy, but with a bare space above the antennæ. The antennæ are inserted above the middle of the head, very near to each other, and there is no lunula visible above them; they are elongated and porrected, with linear joints; the basal joint is about as long as the two other joints together, the second joint the shortest, the third linear with the arista near the base; the arista is short; the basal antennal joints have small hairs, the third joint and arista micro-

scopically hairy. Epistoma evenly arched, without central knob or protruding mouth edge, parallel with the eye-margin and thus curving evenly inwards below; it is not descending; the colour of epistoma is æneous, and it has longish, dense hairs. Jowls of moderate size, not descending; they have a pit in front at the lower eye-margin. The oral aperture is small and round. Proboscis short, and the palpi very short, but I have otherwise not examined the mouth parts. Thorax is quadrate; scutellum has two larger or smaller, pointed processes or spines at the apical margin; it is æneous or brownish red, without any marginal fringe below. Metapleura with short, dense hairs. No thoracal or scutellar bristles present. Abdomen broad near the base, broader than thorax, somewhat narrowed behind; first segment small and rather narrow; in the male there are four not transformed segments, the fourth very long, nearly as long as the three basal together, but on the ventral side it is much shorter. Genitalia somewhat large, of usual construction. In the female abdomen has five visible segments, the two last somewhat long; the fourth dorsal segment has the hind margin roundly incised in the whole breadth; the following segments after the fifth are hidden, the last has at the end two small lamellæ. Legs somewhat short and strong, tarsi broad and flattened, hind metatarsi somewhat swollen; the femora have a curious offset near the base on the anterior side, this part is all covered with short hairs and represents the usual scabrous patch. The femora are rather short-haired, the tibiæ densely haired with not short hairs; a solitary bristle above the trochanters present. Claws and pulvilli well developed; empodium relatively large, styliform but compressed, hairy. Wings rather short; the radial vein curved upwards from the base of the cubital vein; the cubital vein with a curious veinlet stretching down in the middle of the first posterior cell, half way or more through it; medial cross-vein placed near the base of the discal cell; the upper marginal cross-vein recurrent, the lower about perpendicular; there is no stigma but a distinct stigmatal cross-vein; the basal part of the radial vein with short, almost not visible bristles. Squamulæ not large, the thoracal squamula with moderately long, branched hairs, alar squamula with simple hairs, nearly even as long as those on the thoracal squamula. Plumula short, with simple hairs.

The metamorphosis is rather well known; the larvæ are somewhat similar to small slugs, and they have given rise to a whole literature. When first detected the larva was described as a new genus (*Parmula*) of land Mollusca by v. Heyden (Isis 1823, 1247) and in 1824 likewise as a new genus of land Mollusca (*Scutelligera*) by v. Spix (Abhandl. d. bayr. Akad. d. Wissensch. IX), and in the following

time they were treated as such. In 1839 Schlotthauber (Isis 1840, 922) mentions for the first time the larva as belonging to *Microdon* and clears up the earlier mistakes. Zetterstedt mentions in 1843 (Dipt. Scand. II, 640, 641) the pupa of *M. devius* (*apiformis*), found under the bark of a tree, and another attached to a stalk of grass. In 1845 Elditt describes (as *M. mutabilis*) the pupa of a species which seems to be *Eggeri* (Stett. ent. Zeitg. VI, 1845, 384, Tab. I, Fig. 6—14). In 1848 Wissmann describes (Stett. ent. Zeitg. IX, 1848, 79) the larva of *M. mutabilis* (as *apiformis* M.). Laboulbène mentions briefly an undetermined *Microdon* larva (Ann. Soc. Ent. de Fr. 6, II, 1882, Bull. XCVI et CVI). In 1883 Pujade describes (Ann. Soc. Ent. de Fr. 6, III, 1883, 23, Pl. I, fig. 1—16 et Bull. XCIX) the metamorphosis of *M. Eggeri* (as *mutabilis*). Besides other papers, among which are especially an interesting one by Wheeler (Journ. New York Ent. Soc. XVI, 1908, 202) treating North American species, and one by Donisthorpe about *M. mutabilis* (Ent. Record 18, 1909), there appeared in 1912 an elaborate monograph over the developmental stages of *Microdon* by Maria Andries (Zeitschr. f. wiss. Zool. 103, 300, Tab. III—V), in which the stages of *M. mutabilis*, of a new species, *rhenanus* and of *Eggeri* with a new var. *major* are described and figured; the work contains a somewhat complete bibliography. The author declares all the earlier descriptions which she knew, except the one by Wissmann, to belong to *Eggeri*, or perhaps also to the otherwise unknown *M. devius* and *latifrons*; as remarked above Zetterstedt has, however, briefly described the pupa of *devius*, which seems more similar to *mutabilis* than to *Eggeri*.

According to the descriptions the larva is short oval in circumference, flat below, very arched above; along the margin all round is a fringe of short filaments; at the anterior end the margin is a little incised for the head, and there are here the usual, antenna-like organs, the last joint of which bears two relatively long, styliform papillæ. Above at the posterior end is a short posterior spiracular process, a little divided at the end and here bearing the spiracles. No segmentation is visible (but Andries gives, however, after studying the youngest stage, the number as twelve). The larva of *Eggeri* (to which, as said, according to Andries all the earlier descriptions, except the one by Wissmann, probably belong) is curiously reticulated above, as it has a network of raised polygonal meshes, beset with special hairs; from the head-end to the posterior spiracles run two longitudinal lines without reticulation; the larva is brown, of a length of 8—10 mm; the larva of *mutabilis* (and *rhenanus*) is only somewhat reticulated along the margin, but is for the rest rather smooth; it is of whitish

colour, the length is 11 mm. The pupa is similar to the larva, but has two short anterior spiracular tubes; the pupa of *Eggeri* is 7—10 mm long, with somewhat long anterior spiracular tubes; the pupa of *mutabilis* is 10 mm long, the anterior spiracular tubes are short.

The larvæ live in the nests of ants; they have been recorded from *Formica rufa* L., *F. fusca* L. and var. *fusco-rufibarbis* F., *F. sanguinea* Latr., *F. exsecta* Nyl., *Lasius brunneus* Latr., *L. niger* L., *L. flavus* F., *L. fuliginosus* Latr., *Camponotus herculeanus* L. and *C. ligniperda* Latr.; there seems, however, according to Andries, to be some reason to believe that the larva generally found with the various ants (also *F. fusca*) belongs to *M. Eggeri* (or to species with a similar larva), while the larva of *M. mutabilis* is probably found only with *F. fusca* and v. *fusco-rufibarbis*. Andries found always the larva of *M. Eggeri* in stems and stubs of trees inhabited by ants, generally in stubs of spruces and firs, more rarely in stubs of beeches and oaks; the larva of *M. mutabilis* (and *rhenanus*) she always found with *F. fusca* and *fusco-rufibarbis*, and nearly always under stones, only in a single case in a stub inhabited by *F. fusca*. Foreign species of *Microdon* have likewise been found in nests of various ants (see Wheeler l. c. and Knab and Malloch [Trans. Roy. Soc. of South Australia XXXVI, 1912, 233], in which latter paper two Australian species are described together with their puparia, found with ants); Wasmann mentions (Krit. Verz. d. Myrm. und Termitophil. Anthropol. Berlin 1894, 175) *Microdon*-larvæ from nests of Termites, but says that it is not certain, whether the larvæ did not belong to ants living in the vicinity of the nests of the Termites. — The pupa is found on the same places as the larva. The larva hibernates, the pupation takes place between the middle of April and the end of May. The puparium is opened in a special way, differing from other Syrphids, as three pieces are detached, while in other Syrphids only two. The pupal stage lasts, according to Andries, as an average 18 days (in all from 15—23 days). The eggs are deposited in slits in the bark; Andries found them at the end of May and in the beginning of June, and she gives interesting remarks about the egg-deposition, which she observed as the females, she held in captivity, deposited. The egg of *M. Eggeri* is white, oval, 0,7 mm long, 0,3 mm broad; the shell is beautifully ornamented. On an average there were twelve days between the deposition and the escape of the young larva. The reason why the *Microdon* larvæ live in the nests of ants, and what they feed on are questions not yet solved; Wheeler (l. c.) suggests that they take the minute pellets of food, which, after their moisture has been extracted, are rejected from the hypopharyngeal pockets of the worker ants.

The species of *Microdon* are rather curious, somewhat robust flies, with some resemblance to the hive-bee. They are recorded to occur on humid meadows, flying in the grass with the abdomen pendulous, and they produce a humming noise.

Of the genus 6 species are recorded from the palæarctic region, but of these only 4 are found in Europe; 3 have been found in Denmark. In 1912 Andries has, in the work cited above, founded a fifth European species, *rhenanus*; this species is, however, seen to be very near to *mutabilis*, both as imago and in the developmental stages so that I am inclined to doubt its distinctness; its biology is also seen to be the same as for *mutabilis*, the larva occurring only with *F. fusca*; the length is by Andries for *rhenanus* given to 9 mm, for *mutabilis* to 12 mm, but the length of the latter is otherwise generally given to 9—12 mm, and I have found it to be 8—10,5 mm so that this character is of no value. Also it is no good method to introduce a new species with only a few words, especially in a genus, the species of which are not quite well known.

Table of Species.

- | | |
|--|-----------------------|
| 1. Scutellum brownish red | 1. <i>mutabilis</i> . |
| — Scutellum æneous | 2. |
| 2. Thorax with a patch of black hairs on the disc between the wing-roots; scutellum with the spines not specially small, the margin between them concave | 2. <i>devius</i> . |
| — Thorax all yellow-haired; scutellum with very small spines, the margin between them straight | 3. <i>Eggeri</i> . |

1. ***M. mutabilis* L.**

1758. Linn. Syst. Nat. X, 592 et 1767. XII, 2, 985, 40 et 1761. Fn. Suec. 1807 (*Musca*). — 1775. Fabr. Syst. Entom. 767, 24 (*Syrphus*) et 1805. Syst. Antl. 184, 4 (*Mulio*). — 1816. Fall. Dipt. Suec. Syrph. 4, 1. — 1822. Meig. Syst. Besch. III, 164, 2. — 1843. Zett. Dipt. Scand. II, 642, 2. — 1862. Schin. F. A. I, 250. — 1899. Mik, Wien. ent. Zeitg. XVIII, 141. — 1901. Verr. Brit. Fl. VIII, 660, 1, figs. 451—453. — 1907. Kat. paläarkt. Dipt. III, 155. — *Aphritis apiarius* Latr. 1804. Dict. Hist. nat. Déterv. XXIV, 193, 564. — 1805. Fabr. Syst. Antl. 185, 9 (*Mulio*). — *Musca apiformis* De Geer, 1776. Mém. Ins. VI, 128, 18, Tab. VII, fig. 18—20. — 1822. Meig. l. c. III, 163, 1 et 1830. VI, 349 (*Microdon*). — 1856. Loew Verh. zool. bot. Gesell. Wien, VI, 600 (*Microdon*).

Male. Vertex and frons æneous green, shining, punctate; frons at its narrowest point with an impressed and impunctate transverse line; vertex and frons with yellow hairs, which are erect above the impression but below it are declining forwards; above the antennæ is a triangular, bare space; epistoma æneous green, densely covered

with longish, somewhat decumbent, yellow or yellowish white hairs. Occiput æneous green, the hairs whitish below, yellowish above. Antennæ black, third joint often more or less brownish; the third joint

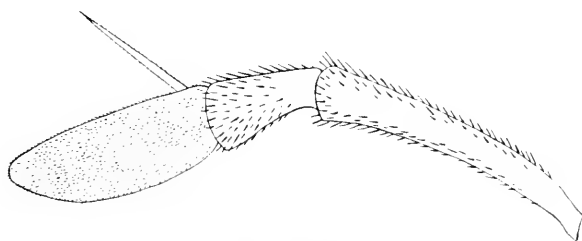


Fig. 197. Antenna of *M. mutabilis* ♂, from the inside. $\times 40$.

about twice as long as the second; arista much shorter than the third joint, brownish. Thorax æneous green, shining, with traces of some stripes; it is clothed with yellow or reddish yellow hairs. Scutellum brownish red, sometimes a little æneous at the base; it is densely clothed with hairs like those on thorax but of a more reddish colour. Pleura green with long, yellowish white hairs; the bare, wedge-shaped space above the front coxæ quite polished. Abdomen black or greenish or bluish black, densely punctate, dull, a little shining at base and apex and here also the most bluish or greenish; it is clothed with short, decumbent hairs, which are very short and black on a little more than the front half of third segment and on the front part of fourth segment, but longer and golden or silvery on the hind margins of second and third segments and on the hinder three fourths of the fourth segment; abdomen is thus black with two bands and the whole hind part golden or silvery from hairs; the middle band is generally narrowly interrupted by black hairs, and these also form a triangle stretching in on the hind part of fourth segment; at the sides the hairs are all golden or silvery, and at the basal corners there are longer erect, yellow or whitish hairs. Genitalia red or brownish red, with short, pale hairs. Venter blackish, shining, with longish, pale hairs, shorter and dark on the middle of the fourth segment. Legs with the femora black or æneous black with the apex reddish yellow; tibiæ and tarsi yellow, the tibiæ with a more or less distinct narrow, oblique dark band below the middle; the tarsi broad and flat, especially the hind tarsi and hind metatarsi somewhat swollen; the hairs on femora rather short, on tibiæ and tarsi dense and relatively long; they are all yellow. Wings a little brownish tinged, the marginal cross-veins may be slightly dark seamed. Squamulæ and fringes pale yellow. Halteres yellow.

Female. Similar; vertex and frons much broader and with the borders almost not angular, nearly parallel. Abdomen with three golden or silvery bands besides the apex.

Length 8—10,5 mm.

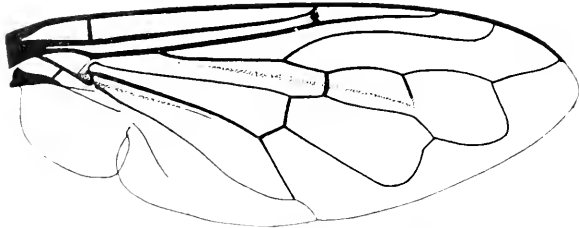


Fig. 198. Wing of *M. mutabilis* ♂.

M. mutabilis is rare in Denmark; Ordrup (Stæger), Dyrehaven (Drewsen, H. J. Hansen), at Sorø (Schlick); on Lolland at Nysted (L. Jørgensen), and in Jutland at Horsens (O. G. Jensen). The dates are $^{22}/_5$ — $^{18}/_6$.

Geographical distribution:— Europe down into Italy; towards the north to southern Sweden, and in Finland; it is also recorded from Siberia.

2. *M. devius* L.

1761. Linn. Fn. Suec. 1808 et 1767. Syst. Nat. XII, 2, 985, 41 (*Musca*). — 1775. Fabr. Syst. Entom. 767, 25 (*Syrphus*) et 1805. Syst. Antl. 185, 5 (*Mulio*). — 1856. Loew, Verh. zool. bot. Gesell. Wien, VI, 600. — 1862. Schin. F. A. I, 251. — 1899. Mik, Wien. ent. Zeitg. XVIII, 139. — 1901. Verr. Brit. Fl. VIII, 662, 2, fig. 454. — 1907. Kat. paläarkt. Dipt. III, 154. — *M. micans* Meig. 1822. Syst. Besch. III, 165, 3. — *M. anthinus* Meig. 1822. l. c. III, 165, 4 Tab. XXVI, Fig. 34. — *M. apiformis* Curt. (nec De G.) 1824. Brit. Entom. 70. — 1843. Zett. Dipt. Scand. II, 641, 1.

Male. This species is very similar to the preceding one; the hairs on vertex, frons and epistoma pale yellow to whitish, about the ocelli more or fewer black hairs. Antennæ with the third joint a little longer, more than twice as long as the second; arista longer, about as long as third joint. Thorax rather green, the hairs pale yellow, on the middle between the wing-roots is a patch of black hairs. Scutellum æneous green with pale yellow hairs, less dense than in *mutabilis*; just the spines on scutellum may be reddish. Pleura with the bare, wedge-shaped space above the front coxæ quite polished as in *mutabilis*. Abdomen greenish black, haired as in *mutabilis* but the pale hairs always silvery or pale brassy, and distinctly shorter than

in *mutabilis*; on the venter also the fourth segment has long, pale hairs. Genitalia black. Legs as in *mutabilis* and likewise wings, squamulæ and halteres.

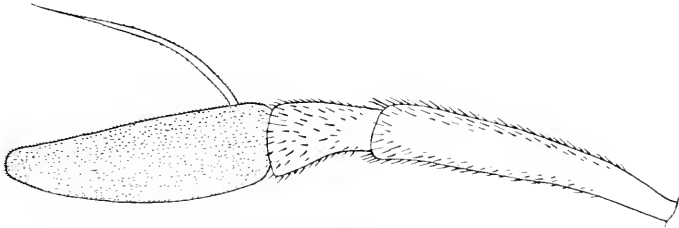


Fig. 199. Antenna of *M. devius* ♂, from the inside. $\times 40$.

Female. Similar, and differing from the female of *mutabilis* by the same characters as in the male; vertex and frons with many black hairs to almost quite black-haired.

Length 10—11 mm.

M. devius is rare in Denmark; Dyrehaven (Drewsen), at Sorø (Schlick); on Lolland at Bremersvold (Løvendal) and in Merrits Skov (L. Jørgensen). The dates are $^{28}/_5$ — $^{26}/_6$.

Geographical distribution: — Europe down into Italy; towards the north to northern Sweden, and in Finland.

3. *M. Eggeri* Mik.

1897. Mik, Wien. ent. Zeitg. XVI, 66 et 1899. XVIII, 138. — 1900. Strobl, Wiss. Mittheil. Bosn. Herzeg. VII, 585. — 1903. Villen. Bull. Soc. Entom. de Fr. 193. — 1907. Kat. paläarkt. Dipt. III, 154. — *M. brevicornis* Egg. (nec Loew) 1862. Verh. zool. bot. Gesell. Wien, XII, 783. — *M. latifrons* 1893. Strobl (nec Loew) Mittheil. Ver. Steierm. XXIX, 198. — *M. mutabilis* 1883. Poujade (nec L.) Ann. de la Soc. Ent. de Fr. 6, III, 23, Pl. 1, fig. 1—16.

Male. Again this species is rather similar to the two preceding; frons broader, the line between the two upper corners of the eye scarcely as long as the breadth of the frons on its narrowest point (while in the two other species it is longer); vertex and frons yellow-haired. Antennæ with the third joint about twice as long as the second; arista short, shorter than the third joint. Scutellum æneous, the spines small, especially thin, not broad at the base, the margin of scutellum between them not concave; thorax all yellow-haired, scutellum with paler hairs. The wedge-shaped space on pleura above the front coxæ not quite polished, but somewhat striated on its anterior part. Abdomen as in the other species, the pale hairs some-

what long, whitish or silvery to golden. Genitalia black. Legs as in the other species but the tarsi generally brownish to blackish, and generally also the apical half of tibiae darkened. Wings more strongly brown, all cross-veins more or less dark seamed.

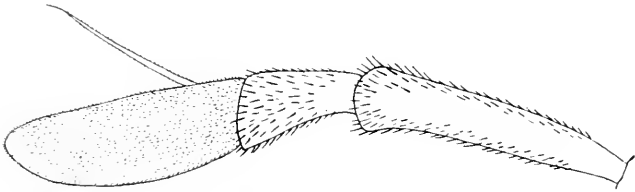


Fig. 200. Antenna of *M. Eggeri* ♂, from the inside. $\times 40$.

Female. Quite similar; vertex and frons, as in the male, broader than in the other species, the borders not at all angular; the hairs all yellow.

Length 8—9 mm.

I have determined this species as *Eggeri* because of the relative length of second and third antennal joints, which prevents it from being *latifrons* Loew; I am inclined to think that *M. latifrons* apud Verrall is likewise *Eggeri*.

M. Eggeri is very rare in Denmark, and it seems to be rarer than the two other species; at Sorø (Schlick); on Lolland at Maribo (Schlick) and in Kældskov (L. Jørgensen); the dates are only $\frac{3}{6}$ — $\frac{16}{6}$.

Geographical distribution:— Northern and middle Europe down into France; at present it has its northern limit in Denmark.

Remarks: The three species of *Microdon* now described are certain and distinct; Verrall seems to doubt the distinctness of the European species of *Microdon*, but concerning the three species recorded here I feel quite certain with regard to their validity.

VII. Ceriinae.

50. **Cerioides** Rond.

(*Ceria* Fabr.)

Somewhat large, narrow and elongate species, very similar to a *Conops*; they are of black colour with yellow spots on thorax and pleura, and with narrow, yellow bands on abdomen, and they are nearly bare. Head considerably broader than high and broader than thorax, it is considerably excavated behind, but the margin is puffed

out, especially above and below. The eyes touching in the male, separated in the female; they are bare; in the male the facets are distinctly enlarged above towards the suture. Frons somewhat protruding, and the protruding part may be prolonged to a long, styli-form process, bearing the antennæ (f. inst. in the Danish species); the frons has exceedingly short hairs, the prominent style is bare. Antennæ inserted well above the middle of the head, quite near to each other, and there is no visible lunula above them; they are elongate and porrected, first joint long, styli-form, the second and third form together a spindle-shaped body, bearing at the apex a short, conical, pointed style; the two basal antennal joints have small hairs, the third and the style are microscopically hairy. Epistoma is about straight downwards, quite below with a small central knob just above the mouth edge; it is slightly protruding below but considerably descending; it is yellow with the middle stripe and lower lateral parts black, and it is bare. The jowls are broad and very descending, at the lower eye-margin they have a curious impression, and from here a slight furrow stretches a little upwards just along the eye-margin. Clypeus is deeply incised in front. Proboscis of medium length; palpi thread-like, slightly clubbed; I have otherwise not examined the mouth parts. Thorax rectangular; scutellum black and yellow (or, in foreign species, quite yellow), with no marginal fringe below. Metapleura with very short, dense hairs. There are no thoracal or scutellar bristles. Abdomen somewhat narrow and elongated, rather arched and cylindrical, though flat below; sometimes it is narrower at the base and clubbed; the first segment is not quite short; in the male there are four not transformed segments, the fourth segment is the longest on the dorsal side, but downwards its hind margin curves evenly forwards so that at the side margin it is much shorter than above; the fourth ventral segment is just as long as the side margins of the dorsal, it is slightly and roundly incised in the hind margin. The genitalia are large, especially the eighth segment forms a very large knob at the end of abdomen; in the female the abdomen has five visible segments, the fifth the smallest, the rest are hidden, the last has two lamellæ. Legs somewhat long: hind femora somewhat dilated and curved in the male, but not or almost not in the female; they are armed with short spinules below; the legs are short-haired. Claws and pulvilli well developed; empodium thin, spine- or bristle-shaped, hairy. Wings with the radial vein curved upwards from the base of the cubital vein; the cubital vein curved more or less down in the first posterior cell (in the Danish species rather much), the curve is angular below and from the angle a veinlet goes perpendicularly downwards; the medial

cross-vein is placed well after the middle of the discal cell, it is almost not oblique; the basal part of the radial vein with few, fine bristles; there is an indistinct stigmatal cross-vein. Squamulae very narrow, thoracal squamula with somewhat short, branched hairs, alar squamula with quite short, curiously flattened hairs. Plumula wanting.

The larva of *C. conopsoides* was observed by v. Roser (Württemb. Corr. Bltt. 1834, 267). Léon Dufour describes and figures the larva and pupa (Ann. de la Soc. Ent. de Fr. 2, V, 1847, 19, Pl. I, (1), fig. 1—6). The author found the larva in exsuding sap on an ulcerated stem of an elm in March and the following year at the beginning of June: it pupated in the first days of August and after a week the imago appeared. Schiner mentions (Verh. zool. bot. Gesell. Wien, VII, 1857, 446) that he bred the species from decaying poplars (I think Schiner speaks of *conopsoides*, but it cannot be seen, as an asterisk has been omitted). In Faun. Austr. Schiner says that the metamorphosis of several species is known, but he quotes only Dufour, and I am not aware that the metamorphosis of any other species than *conopsoides* is known. The pupa is mentioned by Vimmer (Casopsis, Soc. ent. Bohem. VIII, 1911) but this paper I have not seen.

According to Dufour the larva is elongated oval, flat below, arched above; the dermis is chagreened from small spines; the prothoracal segment is covered with spines and warts; at the anterior end are as usual the antenna-like organs, each ending with two cylindrical papillae; near to the hind margin of the prothoracal segment is at each side a not small anterior spiracular tubercle. At each side the segments have three warts, one towards the dorsal side with five or six hairs and two warts towards the ventral side, each with three spines; on the thoracal segments are only two warts; at the posterior end the warts become longer filaments with more hairs or threads. The posterior end has a rather long, cylindrical posterior spiracular process, more than one third of the body in length; it has five or six stellately arranged (branched?) threads at the apex. The length of the larva is 10—12 mm. The pupa is grey and black variegated; it is similar to the larva but narrower and more arched; the warts and filaments at the sides are present only as small spines, longer at the sides of the posterior part; also on the dorsal side of the segments some spinules are visible (not mentioned for the larva but certainly present in the usual arrangement). There are no anterior spiracular tubes. The pupa is of the same length as the larva.

The species of *Cerioides* are very characteristic and beautiful flies, highly resembling species of *Conops*; they are recorded to occur especially at ulcerated trees with flowing sap.

Of the genus 7 species occur in the palæarctic region, all belonging to the southern parts; only one, *conopsoides* goes towards the north and is found in Denmark.

1. *C. conopsoides* L.

1758. Linn. Syst. Nat. X, 590 et 1767. XII, 2, 982, 21 et 1761. Fn. Suec. 1790 (*Musca*). — ? 1764. O. F. Müll. Faun. Fridrichsd. 709 (*Musca*). — 1822. Meig. Syst. Besch. III, 160, 2, Tab. XXVI, Fig. 21—25 (*Ceria*). — 1843. Zett. Dipt. Scand. II, 631, 1 et 1849. VIII, 3107, 1 (*Ceria*). — 1853. Loew, Neue Beitr. I, 6, 1 (*Ceria*). — 1862. Schin. F. A. I, 369 (*Ceria*). — 1901. Verr. Brit. Fl. VIII, 665, figs. 456—457 (*Ceria*). — *C. conopsoides* 1907. Kat. palæarkt. Dipt. III, 156. — *Ceria clavicornis* Fabr. 1794. Ent. Syst. IV, 277, 1 et 1798. Suppl. 557, 1 et 1805. Syst. Antl. 173, 1. — 1804. Meig. Klass. eur. zweifl. Ins. I, 282, 1, Tab. XIV, Fig. 10—12 ♀. — 1816. Fall. Dipt. Suec. Syrph. 6, 1.

Male. Vertex black but the occiput behind it yellow, the extreme anterior apex a little greyish pruinose; frons prolonged into a long style, directed a little upwards and bearing the antennæ; the frons is yellow, black at the base of the style and the black colour stretching as a line across to the eye, the middle line backwards to the upper angle of the frons likewise black; the style is blackish on the middle, reddish at base and apex and below; epistoma yellow, with a broad middle stripe and all the lower lateral parts black; vertex and frons with

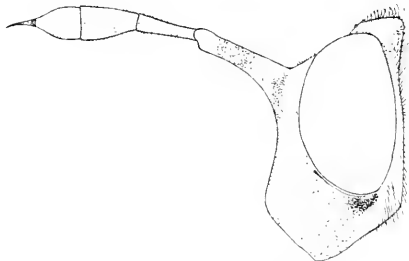


Fig. 201. Head of *C. conopsoides* ♂.

very short, quite inconspicuous pale hairs, epistoma bare. Occiput black, silvery pruinose just along the eye-margins; above and below it is rather puffed out, and it is yellow above on the middle part except just in the middle, where a black line from the vertex stretches backwards; the hairs are fine, inconspicuous and pale. Antennæ black, first joint long, styliform, second and third joints shorter, forming together an elongated oval body, bearing at the apex a short, conical style; the third joint is velvet brown, the style yellowish. Thorax black, densely punctate, dull; the humeri are more or less yellow and the postalar calli reddish; scutellum is black with a yellow band across just at the base; thorax and scutellum are clothed with exceedingly short hairs, which are mostly pale. Pleura with a perpendicular, yellow spot down the hind part of mesopleura and a roundish spot below it on sternopleura; the hairs are very short, though slightly longer

than on the disc, pale. Abdomen black, coarsely punctate, dullish; the first segment is yellow at the front margin, stretching backwards at the sides; at each side the front margin is somewhat raised into a swollen part, which is yellow; the second, third and fourth segments have yellow, likewise somewhat raised hind margins; abdomen has thus the base yellow and three yellow bands; it is clothed with short hairs, which are partly black, partly yellow, but they are so exceedingly short that they are almost not to be detected; they are longer only at the basal corners and here yellow. Genitalia black with a little longer, pale hairs. Venter black, shining, with pale hind margins to the segments, and with long, whitish hairs. Legs with the femora black with base and apex yellow, on the hind femora the yellow basal part large, and on the anterior femora the black colour stretches nearer to the apex behind than in front; tibiæ yellow with the apical half blackish, but generally the apex again more or less pale; anterior tarsi brownish with yellow base, or only brownish towards the end, hind tarsi quite brownish; hind femora thickened and curved, with two rows of black spinules below, and there are traces of the same armature below the apex of middle femora; hind tibiæ somewhat curved; the legs are quite short-haired, only middle femora with somewhat longer hairs behind; the hairs are mainly or all yellow. Wings with the anterior

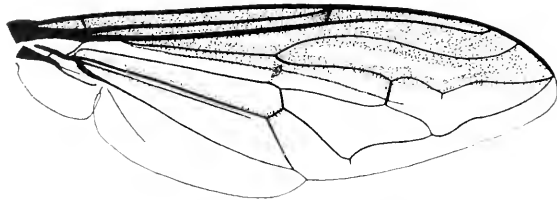


Fig. 202. Wing of *C. conopsoides* ♂.

half brown, down to vena spuria and on the outer part to the cubital vein; the stem of the postcal vein and the base of its upper branch brown seamed. Squamulæ and fringes whitish. Halteres yellow.

Female. Similar; vertex and frons black, above the antennæ a yellow cross-band, interrupted in the middle. Epistomal stripe broader. Hind femora slightly thickened and not curved.

Length 11,5—12,5 mm.

This species is very similar to a *Conops*.

Remarks: The above description is made from our two Danish specimens; it will be seen that they differ somewhat from Schiner's description, as they have the humeri only slightly yellow and no yellow

spot on the præalar calli; this is in accordance with Zetterstedt's description; I have seen specimens from Italy which are quite conform with Schiner's description, and they have also much paler legs; the northern specimens thus seem to be darker. Loew (l. c.) mentions these variations.

C. conopsoides is very rare in Denmark, we have only two specimens from earlier time without any particular locality, but I have no sufficient reason to doubt that they have been taken in Denmark; also the species is recorded by O. F. Müller, but it is to be remarked that I think it very probable that his species has been some *Conops*.

Geographical distribution:— Europe down into Italy and Algeria; towards the north to middle Sweden, and in Finland.

Addenda et Corrigenda.

Part. III.

- Page 55 Line 15 for "uniserial" read "biserial"
— 56 — 2 for "front femora" read "middle femora"

Part. IV.

- Page 61 Line 25 for "Belling" read "Beling"
— 62 — 17 for "*Hygrocleuthus*" read "*Hygrocleuthus*"
— 384 — 25 and 26 for "third joint shorter, longer than broad" read "third joint shorter, not longer than broad"

Part. V.

- Page 37 Line 2 for "*manicatus* both as *manicatus* and" read "*peltatus* both as *peltatus* and"
— 37 — 27 Dele "together"
— 80 — 31 for "an" read "and"
— 102 and 106 *Orthoneura geniculata* and *brevicornis*; these two species I met with in great numbers in Lyngby Mose from ²⁵/₅—³¹/₆ 1916; they were taken numerously on the leaves of bushes and low herbage, and especially they were sitting on a paling: of *geniculata* several pairs in copula were taken; with regard to the course of the marginal cross-veins of this latter species I find that the male has the upper cross-vein generally perpendicular and straight, but not rarely a little curved and recurrent; the lower cross-vein is straight or sometimes curved a little inwards in the middle; in the female the upper cross-vein is generally more or less recurrent and curved, but sometimes straight and perpendicular, and the lower cross-vein as a rule curved inwards, but also sometimes straight. The marginal cross-veins are thus a little varying and in reality equal in both sexes, but in the male the upper is more commonly straight and perpendicular and the lower more commonly straight than in the female.
— 104 *Orthoneura intermedia*; of this species I took a male in Lyngby Mose on ³⁰/₅ 1916.
— 155 Line 20 for "1875." read "1857."
— 157 *Chilosia frontalis*; I took a female in Ermelund on ⁵/₅ 1916.

- Page 193 Line 21 for "Mr. Schick" read "Mr. Schlick".
- 199 — 4 and 5 for "to Sweden" read "to northern Sweden"
- 284 — 23 and 24 for "(S. Jørgensen)" read "(L. Jørgensen)"
- 300 — 25 for "row a black hairs" read "row of black hairs"
- 305 — under the figure for "*S. corallae*" read "*S. corollae*"
- 326 — *Syrphus euchromus*; of this species I took a male in Lyngby Mose on ²⁵/₅ 1916.
- 356 — 37 for "1859. XII," read "1859. XIII."
- 382 — 21 for "i Jutland" read "in Jutland"
- 435 — 12 for "dowards" read "towards"
- 447 — 17 for "1875" read "1857"
- 460 — *Helophilus consimilis*; of this species I took a male in Lyngby Mose on ³/₆ 16. With regard to the question about the sexual armature of the hind femora I can state the following; the hind femora have on the posterior side at the base a small elevation, about as in *versicolor*, but it bears a small clump of short, but dense, black bristles. In the text I suggested that the male genitalia would give a good character, and this also proved correct; the characters from the exterior male genitalia of the three species of the *frutetorum*-group are the following: in *frutetorum* the outer lamellæ are very small, somewhat triangular, yellow or reddish; the terminal appendages are long, narrow and curved, varying in colour from yellow to blackish, and shining; in *versicolor* the outer lamellæ are of a similar shape, a little larger; the terminal appendages are much shorter and broader and less curved, and they are densely chagreened; they likewise vary in colour, but when pale their upper or inner margin remains dark; in *consimilis* the outer lamellæ are distinctly larger; the terminal appendages are short and broad with a broad apex, they are almost not curved, less chagreened than in *versicolor*, and shining; the outer lamellæ and terminal appendages are of nearly equal length; in my specimen both pairs are dark.
- 465 — 22 for "a each side." read "at each side."
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Synonyms are given in italics. References to Genera and Species which are not Danish have the page in italics.

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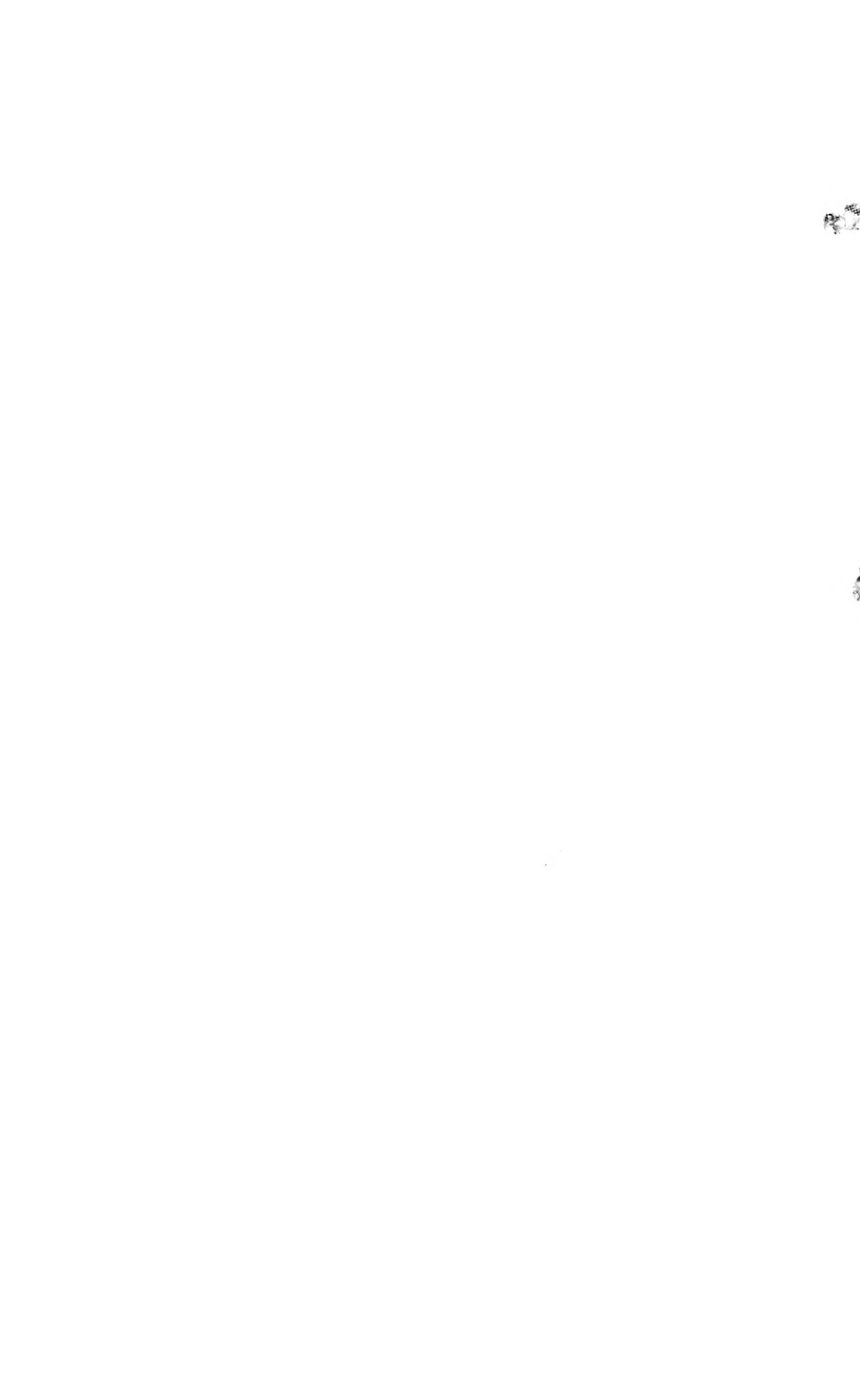
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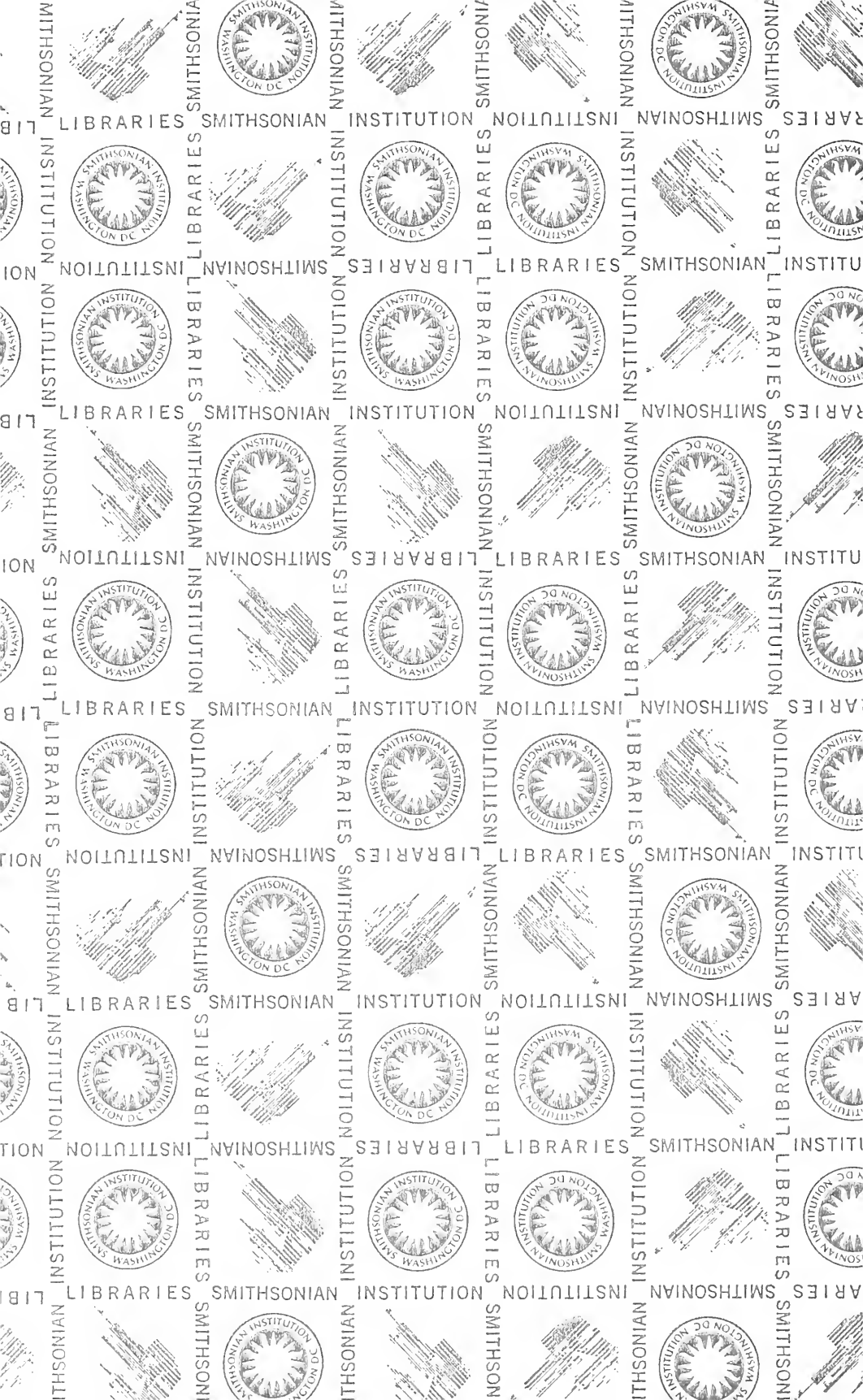
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