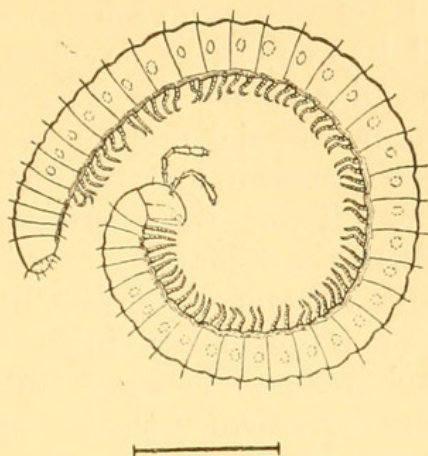


Length about 13 mm. Ocelli absent. Body creamy white (*i. e.* without general pigment), but marked on either side with a row of yellow to reddish-brown spots which are



lacking on the five front body-segments. The body is sparsely furnished with relatively long hairs.

Types in the Brade-Birks collection.

In the field the most noticeable difference between *T. guttulatus* and the new species is the paleness of the latter. In *T. guttulatus* the dark spots which run down either side of the body are very conspicuous, whereas the corresponding rows of yellow to reddish-brown spots seen in *P. pallidus* are hardly visible to the naked eye.

S.E. Agricultural College,
Wye, Kent,
21st July, 1920.

XII.—*Scent-organs (?) in Female Midges of the Palpomyia Group.* By F. W. EDWARDS.

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DURING the first half of June of this year, while staying near Dartmouth, I noticed on several successive evenings a swarm of flies which I at first took to be the males of a rather large *Chironomus*, such as *C. dorsalis*, Mg. On netting

specimens, however, I was astonished to find, first that the insects were only about half as large as they appeared to be when on the wing, and secondly that the swarm consisted exclusively of *females* of *Palpomyia brachialis*, Hal. The fact that only females were present seemed sufficiently remarkable, for, as is well known, these dancing swarms of Chironomidae and other Diptera nearly always consist of males only, and are often an essential preliminary to copulation, the females flying into the swarm one by one, pairing, and the pairs dropping out. There was, however, something still more remarkable about these insects.

By accident I squeezed one of the flies between my fingers, and noticed that some curious reddish tubes were being everted from the end of the abdomen. Subsequent examination of other specimens confirmed the presence of these tubes, and by careful observation of the insects on the wing it was ascertained that the tubes were always fully everted during flight, the position in which they were held being made out with some accuracy. When the specimens were taken in the net the tubes were withdrawn into the body with amazing rapidity, so that by the time the flies could be examined there was rarely a trace of the tubes visible externally. This, then, was the explanation of the apparent discrepancy in size between the flying and the captured insects.



Palpomyia brachialis, Hal. Flying attitude.

The accompanying diagram shows the arrangement of the fully extended tubes while the insect is in flight. The tubes arise from openings in the membrane at the bases of some of the abdominal segments. There is a pair at the bases of each of segments 5-7, each tube being nearly as long as three

abdominal segments, while between segments 7 and 8 there is another pair which is as long as the whole abdomen, each tube being forked near its base, so that there are apparently four long tubes on this segment. The reddish-orange colour of the tubes is in striking contrast to the shining black body of the insect (*P. brachialis* is a species much resembling the common *P. flavipes*, Mg., but with a yellow base to the abdomen, and smoky wings yellow at the base).

Examples preserved in spirit were submitted to Dr. H. Eltringham for his opinion as to the nature of the tubes. Although these were unfortunately not fit for thorough microscopic examination, Dr. Eltringham was able to ascertain that the tubes were of a glandular nature and provided with delicate retractor muscles at different parts of their length; he expressed the opinion that they were most probably scent-producing glands. It is probable that they are connected with pairing, and serve to attract the males—though I did not observe any males fly into the swarm, and searched in vain for them by sweeping in the vicinity.

After making the above described discovery I examined every species of this group of flies which I came across, and found that the tubes were by no means confined to *P. brachialis*; on the contrary, it seems likely that they will be found, when searched for, in all species of *Palpomyia* and *Bezzia* and allied genera. Already the evidence available shows that they exist in seven species, with interesting specific modifications. *Palpomyia flavipes*, Mg., and *P. præusta*, Lw., show a pair of simple (not forked) tubes between segments 7 and 8, which, like those of *P. brachialis*, are as long as the whole abdomen; these species also have three, or perhaps four, pairs of very short blunt-ended tubes, each hardly longer than one abdominal segment, between tergites 4-7 or 3-7. In *P. flavipes* the tubes have a similar reddish-orange colour to those of *P. brachialis*, but in *P. præusta* they are for the most part pale in colour.

Another (undetermined) species of *Palpomyia* also shows tubes, the precise form of which was not properly made out.

A slightly different arrangement is seen in *P. distincta*, Hal., in which species the four pairs of tubes are all of about equal length (about as long as three segments) and quite colourless.

In the genus *Bezzia* I have so far had an opportunity of examining two species. *B. annulipes*, Mg. (? *solstitialis*, Winn.), has three pairs of colourless tubes, the pair between

the seventh and eighth tergites being nearly as long as the abdomen, the other two pairs (between the fifth and sixth and sixth and seventh tergites) a little over half as long. In *B. ornata*, Mg., there is apparently only one pair of tubes, between the seventh and eighth tergites; these are colourless and not much shorter than the abdomen.

The presence of the tubes was ascertained or confirmed in all the above cases by pressing the thorax and base of the abdomen of the flies between finger and thumb. A similar test applied to various species of the genera *Forcipomyia*, *Dasyhelea*, *Kempia*, *Culicoides*, and *Stilobezzia* failed to produce any eversion, so that it is likely that the tubes occur only in the bare-winged group. Up to the present I have found them in females only; they are absent in the male of *B. annulipes*, the only species in which I have so far been able to search for them in the male sex.

Apart from *P. brachialis*, the only species in which I have observed the females swarming is *P. flavipes*, Mg. This was at Snailbeach, Salop, in July last, where a few females were observed swarming with male mayflies of the genus *Baëtis*, on which the *Palpomyia* were preying (see Ent. Month. Mag., Sept. 1920). Although the suggestion may seem fanciful, it is perhaps within the bounds of possibility that in this case the tubes were of advantage on account of their slight resemblance to the tails of the mayflies, thus rendering them more easy of capture. The possibility of this is somewhat increased by the fact that in this species I have also observed the males swarming in the normal manner. Whether the more elaborate tubes of *P. brachialis* have been developed through the addition of some sexual function, or whether (more probably, perhaps) the function is connected with sex in all cases, can only be determined by careful observation of the habits of allied species.

So far as I am aware, eversible tubes have not hitherto been found in any Chironomid, nor in the female of any insect. They are, of course, well-known in the males of some Lepidoptera and Trichoptera, and M. Tonnoir has recently described them in certain species of moth-flies of the genus *Pericoma*. In none of these cases are the tubes situated at the end of the abdomen as they are in *Palpomyia* and *Bezzia*.



Edwards, F W. 1920. "Scent organs (?) in female midges of the Palpomyia group." *The Annals and magazine of natural history; zoology, botany, and geology* 6, 365–368.

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