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ASSOCIATION OF A CHIRONOMID (DIPTERA) LARVA WITH *EPHEMERA DANICA* L. (EPHEMEROPTERA)

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Commensal and parasitic Chironomids on may-fly nymphs are well known and have been studied by various workers. Sulc and Zavrel (1924) described the close associations of *Camptocladius* (*Epoicocladius*) *ephemerae* Kief. with *Ephemera vulgata* L. in Rumania, the larvae of which live with the nymphs in their burrows and browse over their backs for small pieces of detritus and algae wafted in by the current of water set up by the motion of their host's gills. Wesenberg-Lund (1943) quotes Tonnoir as stating that many observers have seen Chironomid larvae on the gills of *E. vulgata*. Edwards (1929) records that 'the same midge has since been found living with the same may-fly in Yorkshire' and that 'the adult midge has also been met with in Cheshire . . . in a locality where may-flies (*Ephemera danica*) were abundant.' Edwards' material was sent by Percival who, with Whitehead, had studied the ecology of *E. danica*. This suggests that in fact this Chironomid is associated with both these species of *Ephemera* and is of very common occurrence, although Coe (1950), placing it in the genus *Hydrobaenus* (*Smittia*), does not add any localities in Britain to those given by Edwards. In the absence of any other records it was thought worth while to give some very brief notes on the finding of this species on nymphs of *E. danica* in the river Test in Hampshire.

While investigating the life history of *E. danica*, samples of nymphs were collected from the river bottom at intervals during the summer and it was noticed that many of them had Chironomid larvae clinging to them. These larvae agreed well with Kieffer's description (in Sulc and Zavrel) of *Epoicocladius ephemerae*, although no dissection of the mouthparts was carried out. Of 120 nymphs examined alive in the first week of April nearly 60% carried at least one Chironomid, 20% two larvae and 8% three or more. Although exact counts were not done on live nymphs in subsequent samples, larvae were common in all material collected up to late August. Larvae in various stages of development were seen throughout the period March to August and it seems likely that some of them stay with the nymphs all through the winter. The larvae attach themselves by their pseudopods to the hairs on the nymph, occasionally shifting from one part of the nymph to another. They were most commonly seen on the hairs underneath the gill tufts and on the tuft of hairs between the mid and hind coxae. They were not washed off by strong currents of water and showed little tendency to leave their host in the unnatural surroundings of a watch glass. Pupation occurs on the underside of the nymph. A slender cocoon is formed from particles of silt and attached to the thoracic sternites between the mid and hind legs, apparently always in exactly the same position. No pupae were seen early in the summer, but in late June one out of 90 nymphs carried these cocoons and in August 9 out of 110 (8%).

Two interesting points can be noted. Firstly, this association is a relatively loose one. That is to say although the Chironomid larva is bound by its choice of habitat to one or two species of *Ephemera*, yet it is free to change from one individual of the host species to another at any time in its larval life. That this migration does in fact occur is shown by the observation that *mature* may-fly nymphs, in other words those that have almost completed the aquatic phase of their existence, are just as often found carrying attendant larvae as are immature ones. If such nymphs are kept in a jar for a few days until the subimagines emerge, the Chironomid larvae are seen to abandon the empty nymphal shucks and to seek a new host. In the river they must be exposed to considerable risks by this untimely and involuntary journey to the surface. The attendant mortality is partially offset

by a second provision whereby pupation is delayed until the season of emergence of the host (May and early June on the river Test) is over and the helpless pupae are thereby prevented from arriving prematurely at the water surface and from being swept away downstream and destroyed. This 'staggered' attainment of maturity is in contrast to the very close association of certain *Simulium* larvae with may-fly nymphs in Africa, recently described by Van Someren and McMahon (1950), where pupation of the *Simulium* occurs after the last nymphal moult of the host and emergence of the two adults is more or less synchronised.

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