

Observations on Mating Flights of the May-fly *Stenonema vicarium* (Ephemera).

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A small company of *Stenonema vicarium* imagoes was first observed mating after sundown on July 15, 1938. They appeared over the foot of a bridge about eight paces from the bank of Darby Creek, one mile north of Clifton Heights, Pennsylvania.

The males of *Stenonema* exhibited a characteristic flight which differed widely from that of most known genera of mayflies, but in their approach during mating they showed striking similarity to other genera. Of greater importance was the fact that these imagoes neither rose nor fell in rhythmic undulations, as in the case of *Baetis* described by Murphy 1922, but for the most part maintained a constant level during flight. These performances were observed at the same locality from four to six times weekly. They usually began after sunset and about twenty minutes before nightfall and continued until I could no longer see them, owing to the increasing darkness. Searches made every hour in the day between 7 o'clock a. m. and midnight revealed no mating flights except at the hours mentioned above.

The first indication of flight was the appearance of a single male slowly descending with out-stretched wings from the gray distance, to about the level of the eye of an observer, at which point a hovering movement began. Within from two to three minutes about three additional males were suddenly seen executing the same performance. This small group of individuals formed the nucleus about which additional males revolved. After the flight had been in progress for about ten minutes, the number usually reached about fifteen. The complete company seldom exceeded more than twenty-five members. As they slowly manoeuvred to and fro along a course about ten paces long by six wide and executed quick turns, their forward projecting forelegs, shining wings and outspread tails gave color and grace to their performance.

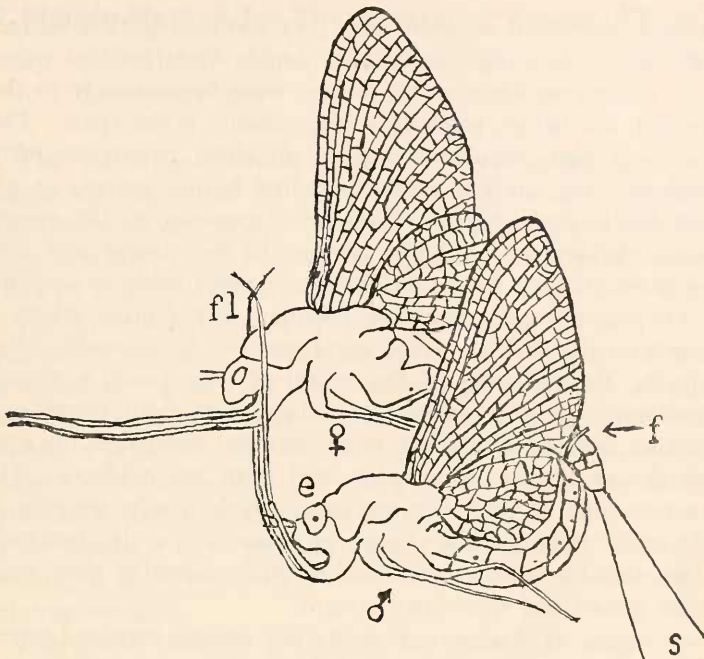


Fig. 1. A Mating Pair of *Stenonema vicarium*. *e* eye, *f* forceps, *fl* forelegs, *s* setae.

Females showed very little tendency to take part in the flights. The captures of two complete companies of imagoes and of the greater portion of a third yielded only one female, which was taken with the second group. It is probable that this female had just entered the swarm from beneath, because when a single female was seen passing below a company of males it was seldom disturbed; on the other hand, when it passed a few feet above or directly through the swarm, it was instantly attacked by them. The large eyes of the males are situated on the dorso-lateral regions of the head (fig. 1 *e*), a location which perhaps enables this sex to see females above them better than below. All attempts to mate were made by the male flying up beneath the female placing his forelegs over her prothorax and head. With upcurved abdomen he grasped the body of the female with his forceps near her

seventh abdominal segment (fig. 1 f) and mating thus became effective. The couple executed a double flight, seldom rising over eight feet while at times they were borne nearly to the ground, but before reaching it they usually broke apart. For the most part, copulation lasts from about twenty to forty seconds. On several occasions, after having mated, or attempted to mate, the male was seen returning to the swarm while the female continued onward to the stream and flew up it maintaining nearly the same level until ready to oviposit.

Oviposition takes place as follows: The female selects a ripple on the surface of the water and slowly descends. After dipping the abdomen in the water, at least twice, a resting position is assumed upon the surface, with head turned upstream, she flutters for a few seconds and discharges the eggs which are already partly protruded from her oviducts. The current aids in releasing the eggs, which slowly separate in the water and adhere to objects by means of the viscid strands. Two females which were watched while releasing their eggs, then turned and flew down stream.

A couple of imagoes captured while mating remained united for several seconds. Shortly after the abdomen of the female had been released she discharged two spherical masses of flame-colored eggs from her oviducts, which adhered firmly to the bottom of the nest.

These flights were observed, as stated above, from four to six times weekly from July 15, 1938 to October 13, 1938. The last of these flights (October 13) took place amid a down-pour of rain, after which the weather grew cooler and no such flights were seen at this location although daily observations continued until November 28, 1938.

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