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DESCRIPTION OF THE NYMPH OF *CENTROPTILUM WALSHI* (EPHEMEROPTERA: BAETIDAE), WITH BIOLOGICAL NOTES[1]

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ABSTRACT

The nymph of *Centroptilum walshi* McDunnough is described. *C. walshi* appears to be bivoltine in Wisconsin, with emergences throughout June into early July and from late August to early November. Mature nymphs were smallest when stream temperatures were the warmest. The nymphs were closely associated with *Ranunculus* sp., and numbers increased when the *Ranunculus* beds became more dense.

Information on life histories and ecology of species of *Centroptilum* is limited because nymphs of many species are either unknown or have not been associated with their respective imagoes. This paper describes the nymph, life history, and habitat of *Centroptilum walshi* McDunnough (1929).

The investigation was conducted on Carter Creek, Adams County, Wisconsin, (T. 19N, R. 7E, S. 26) at Highway G. This small spring-fed stream flows through interspersed deciduous forest and meadows. The streambed is mostly silt with scattered beds of *Ranunculus* sp. and the stream banks at this site are lined with shrubs and grasses, some of which are partially submerged in the stream. At the sampling site the stream is approximately 5.4 m wide and 40 cm deep with little seasonal change. During the sampling period current velocites ranged from .09 to .15 m/sec and water temperatures ranged from 4°C to 21°C.

Carter Creek was sampled twice monthly from April through December, 1975, monthly in February and March, 1976, and twice a month in April and May, 1976. Samples were taken by holding a D-frame aquatic net (1 mm mesh) against the bottom of the stream and disturbing the substrate upstream by kicking with one's foot. Samples were collected for one minute, sorted for baetids in the field, and preserved in 70% ethanol. In the laboratory nymphs were examined under a dissecting microscope, separated to species, and counted. Growth was determined by measuring head capsule width to the nearest .05 mm at its widest point using a binocular microscope with an ocular micrometer. Emergence periods were indicated by the presence of nymphs with black wing-pads. Sexes were separated when nymphs had head capsules .50 mm wide or wider.

Adult male *walshi* have been previously reported from Iowa, Illinois, Kansas and Manitoba (Daggy, 1941). Adults were reared in the laboratory from nymphs collected from Carter Creek and identified using the keys of Traver (Needham et al., 1935), Daggy (1941) and Burks (1953). Adult male *walshi* can be separated from other Wisconsin species by their brilliant lemon yellow eyes (live), white abdomen with a yellowish tinge and black spiracular lines, and by the shape of their genitalia (McDunnough, 1929). Male imagoes change color rapidly after death making identification difficult.

C. walshi appears to be bivoltine in Wisconsin. It winters as eggs, which hatch in early May. In 1975, emergence occurred from 6 June through 3 July and from 21 August through 3 November. No mature nymphs were collected on 16 July and 6 August, and this apparent gap in emergence was considered the end of the first generation and the beginning of the second. Nymphs disappeared from Carter Creek between 17 November

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and 4 December, 1975, probably succumbing to low stream termperatures that typically occur in central Wisconsin in late November.

Growth varied seasonally, presumably with changes in stream temperature regimes. Maximum head capsule widths of mature nymphs were .90 mm for males and .75-.80 mm for females and occurred in early June, and from September to November when stream temperatures were cooler. From late June through August, when the stream was warm, head capsule widths of last instar nymphs averaged .10 mm less.

Numbers of nymphs appeared to vary with the condition of beds of *Ranunculus* sp., which they used as their principal substrate. As the condition of *Ranunculus* beds improved throughout the summer of 1975 and into the following spring, greater numbers of nymphs were collected. Only 19 *walshi* nymphs were collected on 23 May, 1975, while on 29 May, 1976, 379 nymphs were collected. A series of 896 nymphs and 8 reared adults are housed in the University of Wisconisn collection. Although there are probably only four or five species of *Centroptilum* in Wisconsin, the nymphs are not known well enough to provide a workable key.

DESCRIPTION OF NYMPHS OF *CENTROPTILUM WALSHI*

(Fig. 1)

(Mature male nymphs in 70% ethanol, females similar except as noted).

Length: 5.0-5.5 mm, Tail filaments: 2.0 mm

Head: Tan, narrowly darker along inner and posterior margins of eyes and along arms of epicranial suture above antennae; a pair of very small, dark-brown spots on front just below fork in epicranial suture; clypeus narrowly infuscate across base; dark brown spots laterally at base of labrum.

Pronotum: Bordered with brown; pale mesally and brown laterally with two pale areas within brown lateral areas: a pair of narrowly-separated, small, dark spots near posterior margin of mesal pale area.

Mesonotum: Marked irregularly with tan and brown; a prominant dark brown spot at base of each wing pad; a pair of small dark spots mesally near posterior margin and often with darkened areas just anterior to these spots.

Metanotum: Light brown with a pair of small, narrowly separated dark spots mesally near posterior margin.

Abdominal Terga: Terga 1, 4, 8 and 10 mostly pale; 5 and 9 pale anteriorly and dark posteriorly; 3 dark anteriorly and pale posteriorly; 2, 6 and 7 predominantly dark with a pair of pale oblique lines and dots anteromedially; each tergum with a large dark brown spot at middle of lateral margin; tergum 1 with a pair of dark spots anteriorly and a mesal posterior dark spot; paired tiny dark mesal dots on segments 1-8, difficult to see on dark segments; in females pigmentation tends to be more unicolorous with fairly diffuse, paired light areas mesally on terga 2-5 and 8-10.

Tail Filaments: Cerci and median filament of equal length, each pale with a broad brown band just past middle and another at tip.

Gills: Rounded with pinnately branched tracheae; branching of tracheae limited, rarely with more than four or five short branches; base of gills reddish in recently collected nymphs.

Legs: A large brown spot on coxa; femur with large brown spots on outer face near base and just past middle, and with distal projection brown at apex; similar markings on inner face less distinct; tibia and tarsus with a brown band in basal half; tarsus usually with a narrower apical band also and occasionally somewhat darkened between bands; tarsal claws long (0.25 mm), gently curved, and extremely slender in distal two-thirds; claws without denticles, but with a double row of fine, short setae ventrally in basal half.

Ventor: Thoracic sterna pale mesally, dark brown laterally; abdominal sterna 1-5 progressively darker, with 6 and 7 brown; sterna 8-10 pale with lateral dark blotches; dark blotches laterally on sterna 2-5 and a dark posterior border mesally on sterna 3-5;

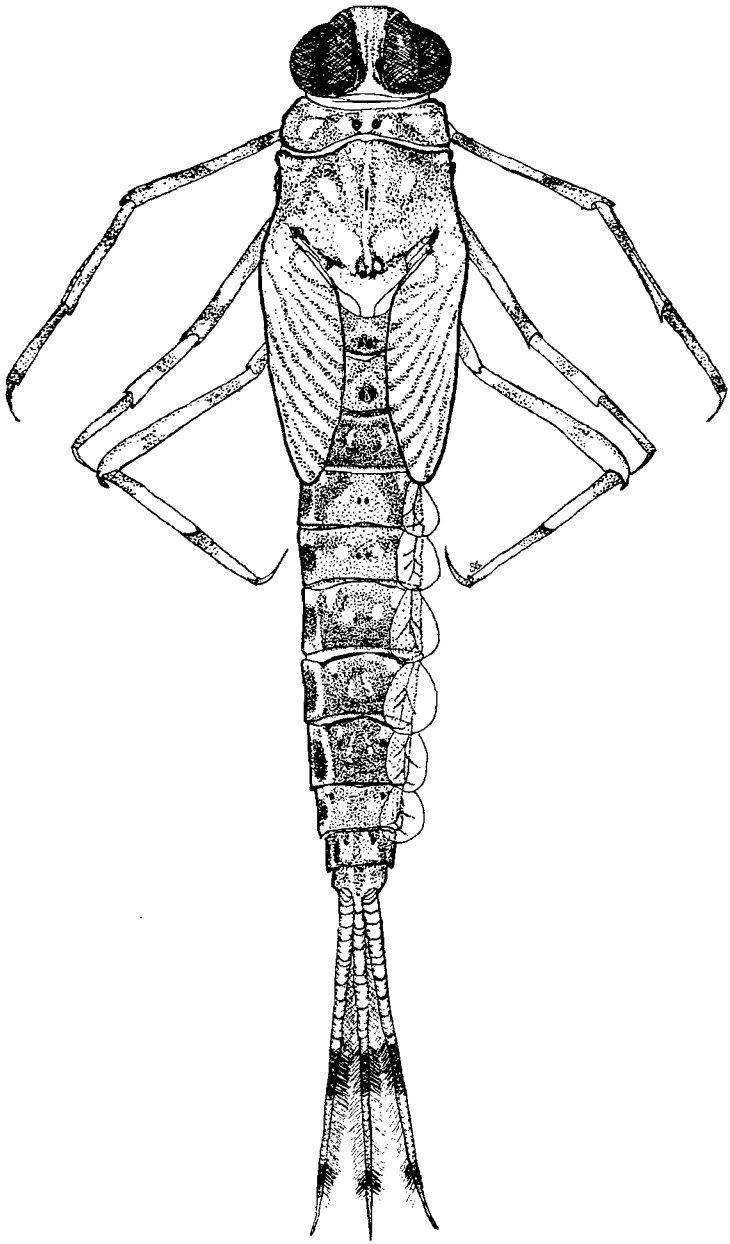

Fig. 1. Male nymph of *C. walshi* with gills removed from left side to show color pattern. Drawing by Sarah Gerould.

sternum 6 with a pair of large sub-mesal pale areas; sternum 7 pale mesally; all sterna pale along lateral margin, except at extreme edge where dark spot on terga can be seen.

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