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A NOTE ON THE FOOD OF *CALLIBAETIS* (EPHEMEROPTERA:BAETIDAE)

C. E. Cushing¹ and R. T. Rader²

ABSTRACT.— *Callibaetis* nymphs in Rattlesnake Springs, Hanford Reservation, Washington, feed almost exclusively on fine particulate organic matter (FPOM) collected from the stream bottom.

The functional group concept proposed by Cummins (1973) has become increasingly used in characterizing invertebrate fauna in streams. Inherent in categorizing aquatic organisms by various functional groups, or trophic relationships (collectors, grazers, shredders, etc.), is knowing the food eaten and how it is obtained. Merritt and Cummins (1978) have summarized a large body of information on trophic relationships of North American aquatic insects; however, the trophic relationships for the genus *Callibaetis* is unclear. This note provides information on the food habits and trophic relationships for this mayfly in Rattlesnake Springs, Washington, and supplements the Edmunds et al. (1976) note on food of this genus.

Rattlesnake Springs is a small permanent spring-stream on the U.S. Department of Energy's Hanford Reservation in south-central Washington. The region is in the northern extension of the Great Basin. Base flow is about 0.011 m³/s, and the stream flows about 3 km before disappearing into the desert floor. Further physical, chemical, and biological data can be found in Cushing et al. (1980) and Cushing and Wolf (in press).

METHODS

Callibaetis nymphs were collected with hand nets during a sampling program to characterize the invertebrate fauna of Rattlesnake Springs. Samples were preserved in 70 percent ETOH until examination. Gut contents were analyzed by suspension, filtration, and microscopic examination essentially as described by Cummins (1973), Gray and

Ward (1979), and Short and Ward (1981). The majority of the particles were spherical; hence, volumetric calculations were based on the particle size diameters.

RESULTS AND DISCUSSION

Data for 31 nymphs from eight sites are presented in Table 1. The number of organic detrital particles per nymph gut ranged from 3270 to 17,600, and varied in size from 111 μm to 230 μm . These particles comprised from 95 to 100 percent of the material present, by number; diatoms comprised 1 to 5 percent, and insect parts, probably ingested by chance, less than 1 percent. The calculated volume of the particles per nymph ranged from 7.6 to 22.3 mm³.

Stations 1 through 17 are in the open desert, and 27, 29, and 31 are in a steep-sided canyon. The unusually high number of particles in the guts of nymphs from Sta. 31 may be related to its location. It is located at the origin of Rattlesnake Springs in a seepage pool with heavy growths of filamentous green algae.

These data indicate that *Callibaetis* is primarily a collector-gatherer (sensu Cummins 1973) feeding mainly on fine particulate organic matter (FPOM) from the stream bottom. These results are in contrast to Edmunds et al. (1976), who state that *Callibaetis* nymphs are herbivorous, feeding on diatoms and other algae. A rich diatom and algal flora is present in Rattlesnake Springs (Lippert and Cushing 1973); yet these forms make up less than 5 percent of the food ingested in Rattlesnake Springs. The findings are, however,

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consistent with data on other Baetidae (Cummins 1973, Merritt and Cummins 1978).

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TABLE 1. Detrital (FPOM) particles in *Callibaetis* guts taken during July 1980.

Date	Station	n	\bar{x} No. particles (range)	\bar{x} diameter, μm (range)	Part. volume, mm^3
7 July	1	4	5300 (3440-7070)	140 (110-200)	7.6 ¹
8 July	9	4	6600 (5700-7190)	170 (120-210)	17.0
8 July	11	4	3940 (3270-4330)	210 (170-230)	16.5
9 July	17	4	7300 (4900-9090)	150 (130-190)	12.9
10 July	23	3	5300 (4900-5600)	190 (160-210)	19.0
10 July	27	4	7400 (5070-9660)	140 (120-170)	10.6
14 July	29	4	8900 (5750-11,600)	150 (120-200)	15.7
14 July	31	4	15,500 (10,500-17,600)	140 (110-170)	22.3

¹Volume calculated using mean numbers for particle size and numbers. Because FPOM constitutes 95 to 100 percent of the gut contents observed, similar data for diatoms and insect parts were not calculated.