ECOLOGICAL AND PHYSIOLOGICAL CONSIDERATIONS OF DEPOSIT-FEEDING IN A FRESHWATER BIVALVE, CORBICULA FLUMINEA

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A three pronged approach was used during the summer and fall of 1986 to study the physiological ecology of the introduced Asian bivalve, Corbicula fluminea, especially with respect to deposit-feeding and its relationship to downstream transport. Studies were conducted using caged clams which were maintained in Fairfield Lake during the summer of 1986, using clams starved in freshwater aquaria over that same time period, and using clams in an artificial laboratory stream during the fall of 1986.

Specimens used in the caged clam and starvation experiments were collected from a population in the Clear Fork of the Trinity River during May of 1986. All specimens collected were of the light morphotype and a subsample of approximately one thousand animals was collected. Oxygen consumption and ammonia excretion rates were determined for a subsample prior to their use in the two experiments.

Clams used in the field study were individually numbered and their shell lengths (SL) measured before being placed into cages. Their SL was remeasured every two weeks over a 159 day period and the oxygen consumption and ammonia production rates determined for a subsample approximately every three weeks. During the field study, the clams maintained an average shell growth rate of approximately 0.025 mm/day. The O:N ratio was also assessed to determine the nutritional condition of the clams during the study period. The O:N ratio fell below 100:1 during most of the 159 day study period.

Oxygen uptake rates and ammonia excretion rates were periodically determined for a subsample of a second group of clams from the original collection which was subjected to prolonged starvation in the laboratory during the course of the field study. The O:N ratios were consistently above 100:1 throughout the study. Since low O:N ratios may be an indicator of starvation in some bivalve species, these anomalously high O:N ratios in starving clams may indicate that this species converts ammonia into some less toxic form of nitrogenous waste product. Starved clams also displayed a steady increase in weight specific oxygen consumption rate as tissue mass decreased during the study, suggesting that the amount of stored nutrients in cells may seriously affect estimations of weight specific oxygen consumption rates in invertebrate species due to natural variations in the proportion of non-respiratory biomass.

A sample of C. fluminea were subjected to a range of current speeds in an artificial laboratory stream to determine what water flow rates would induce downstream transport. Downstream transport was directly related to shell length with the smallest sized clams being transported at the lowest current speeds.