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Relationship between the body size and the clearance rate of *Glauconome chinensis*

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Introduction

It is well known that the clearance rate is influenced by the size of animals (Winter, 1973; Bayne et al., 1976; Werner and Hollibaugh, 1993; Yukihira et al., 1998). Most studies on feeding of bivalves have dealt with large or commercially important species. Studies with small but ecologically important species were relatively rare. *Glauconome chinensis* Gray (Bivalvia: Glauconomidae) is a small bivalve inhabiting upper tidal flats of silty sediments. Recently, we have found in a tidal flat near Kunsan *G. chinensis* predominating with a great density more than 8,000 ind./m^2. In spite of their small size, the ecological importance of *G. chinensis* in tidal flat community cannot be disregarded. To better understand the role of *G. chinensis* as a primary consumer in community food web, it is necessary to determine clearance rate as a function of their body size.

Materials and Methods

Glauconome chinensis were collected at a tidal flat near Kunsan. Bivalves were divided into 12 size classes with 1 mm interval. Clearance rate was measured by indirect method with *Isochrysis galbana* as a prey. Algal cell concentrations before and after the feeding experiment were determined with a fluorometer. Clearance rate was calculated using the equation of Frost (1972). The relationship between body size and clearance rate was determined by fitting curves to a power function (Bayne et al., 1976).

Results and Discussion

Clearance rate of *Glauconome chinensis* ranged from 1.3 to 28.2 ml/hr/ind. Body size affected significantly on clearance rate ($P<0.001$). When shell length increased from 4 to 9 mm, clearance rate rapidly increased ($P<0.001$). As shell length increased further, clearance rate increased gradually, but showed no significant differences ($P=0.087$). The exponents of fitting equations for shell length and flesh dry weight were 2.254 and 0.712, respectively. The exponent for flesh dry weight of *G. chinensis* is in good accordance with that obtained by Winter (1973) and higher than that obtained by Yukihira et al. (1998). Weight-specific clearance rate decreased with increasing flesh dry weight, ranging from 1.0 to 3.1 liter/hr/g. Body size also affected significantly on weight-specific clearance rate ($P<0.001$). There were no significant differences of weight-specific clearance rate when shell length was in the range from 4 to 12 mm ($P=0.262$) and from 9 to 16 mm ($P=0.158$). We could divide size classes of *G. chinensis* into 3 groups. In the range of 4~9 mm, all the rates greatly changed by body size and were statistically significant. In the range of 9~12 mm, clearance rate not standardized to flesh dry weight showed statistical significance, but that standardized did not. In the range of 12~16 mm, all the rates showed no significant differences. These indicate that increase in metabolic rates with body size is fastest for 4~9 mm, intermediate for 9~12 mm and slowest or nearly zero for over 12 mm. Therefore, physiological experiments with individuals of *G. chinensis* larger than 12 mm will give the most stable results.

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