

ABSORPTION OF DISSOLVED NUTRIENTS BY OYSTERS

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The large epithelial surface areas of the gill and mantle of oysters are suitable for direct nutrient absorption. During normal filter feeding activity these surface areas are exposed to a large water volume. Consequently oysters obtain calcium, phosphorus (Bevelander 1952) and trace elements (Kopfler and Mayer 1973) by direct absorption from seawater. Direct absorption of dissolved organic nutrients has been demonstrated (Schulte et al. 1973) but the capacity for direct absorption of nutritionally important quantities of dissolved organic nutrients has not been examined.

Tritium-labelled D-glucose, L-methionine, L-lysine.HCl, myo-inositol and choline chloride were used as tracers and non-labelled nutrients were added to obtain the required concentrations. Uptake by oysters (*Saccostrea commercialis*) was investigated at their normal feeding densities (Nell and Wisely 1983) as well as over exponentially increasing densities. The tissue distributions of D-glucose and L-methionine after a 4 h immersion in water were also determined.

All nutrients were absorbed but only L-methionine, L-lysine.HCl and choline chloride were absorbed in quantities sufficient to be nutritionally significant. At low concentrations (< 0.7 mg/L), active absorption of all nutrients was observed but, in the case of high D-glucose (≥ 70 mg/L) and myo-inositol (≥ 0.7 mg/L) concentrations, uptakes resembled passive diffusion. Nutrient accumulation in oyster tissues was dependent on the nutrient concentrations in water. Various tissues concentrated dissolved D-glucose and L-methionine but the highest concentrations were found in the gill. Large uptakes of choline chloride and the essential (Harrison 1976) amino acids L-methionine and L-lysine.HCl indicate that they are suitable supplements for oyster diets. In contrast only small amounts of dissolved D-glucose were accumulated in oyster meats, indicating that this is not a suitable source of carbohydrate. However, when oysters have been starved for several months to deplete their glycogen reserves, dissolved glucose may increase their longevity. Dissolved myo-inositol also appears unsuitable since only small quantities (0.1 $\mu\text{g}/\text{oyster}$) were accumulated at normal dietary concentrations.

The importance of comprehensive vitamin premixes in oyster diets (Trider and Castell 1980; Nell and Wisely 1983) is demonstrated by the rapid absorption of choline chloride. There are probably other vitamins that could be absorbed in this way. Further experiments are required to determine if the demonstrated uptake of dissolved amino acids and vitamins actually improve oyster growth and survival.

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