

COMPARISON OF INVERTEBRATE THIOSULFATE:CYANIDE SULFURTRANSFERASES

H. G. Borei, University of Pennsylvania, Philadelphia, Pa.

The enzyme is contained in the mitochondrial fraction. Simple homogenization of the tissue brings 20-25% of the total enzyme content into the homogenization medium (Littorina, Polinices, Buccinum, Mytilus, Pecten, Asterias). The enzyme is perfectly stable in sea water for more than 15 days at + 4°C. if protected by 50 mM. thiosulfate, one of its substrates. Proteolytic breakdown of the mitochondrial fraction of the homogenate solubilizes the remainder of the enzyme. Autolysis of the tissue homogenate for 10 days at +4°C. has the same result.

Further analysis of the pH-optimum of the Littorina enzyme has shown a shift of the peak towards higher pH after purification. The Pecten maximus enzyme, with an optimum at pH 9.6, takes an intermediate position between the two formerly established groups, whose maxima are around pH 9.0 and around pH 10.0. Pecten magellanicus has an optimum at pH 9.2. On the other hand, enzymes from American and European Littorina litorea, Mytilus edulis, and Asterias species were compared and found species-constant in all respects. This points to a spectrum of species-characteristic isoenzymes, and suggests further analysis of the possible denaturation of the enzyme during the purification process.

The Michaelis constant for thiosulfate lies for the above animals between $1 - 6 \times 10^{-3}$. For cyanide similar values pertain, but the estimates are here complicated by the marked inhibitory effect by this ion. The temperature sensitivity shows great species variation: maximum activity for Littorina is at 26°C., for Mytilus at 48°C.; 50% heat inactivation is found at 36 and 58°C. respectively. The other tried animals show intermediate characteristics.

GILL PERMEABILITY IN Squalus acanthias¹J. W. Boylan, R. Johnson,² and D. Antkowiak, State University of New York at Buffalo, N. Y.

We measured the net movement of tritiated water and C-12 urea from fish to sea water using the in vivo gill perfusion system previously described. From these values the permeability coefficients were derived in terms of millimoles crossing membrane per unit of time, gill area and concentration gradient.

Average permeability to water during 15 periods in 7 dogfish was 7.66×10^{-6} cm/sec. Urea in 3 intervals each for 2 fish averaged 7.5×10^{-8} cm/sec. Comparable figures for toad bladder (Maffly, et al., J.C.I. 39:630) are 90 and 260 for water and urea, respectively.

With the exception of Phagiothecium denticulatum ($3.6 \text{ mMols/cm/sec} \times 10^{-8}$ for urea) no published data which we can discover describes a biological membrane of comparable impermeability to the dogfish gill.

*Supported by National Science Foundation Grant #G-13047.

†Student Fellow, Heart Association of Erie County.