Effect of Carinamide on Sulfate and Thiosulfate Secretion in the Aglomerular Kidney of Lophius americanus

Fredrik Berglund, Robert B. Howe, and Roy P. Forster
Boston University, Union College, and Dartmouth College

Competition between sulfate and thiosulfate ions in renal tubules was demonstrated earlier by Berglund and Forster in the dog and in the aglomerular *Lophius* (Fed. Proc. **16**:10, 1957). In *Lophius*, thiosulfate depresses tubular secretion of sulfate. In dogs, thiosulfate depresses the tubular reabsorption of sulfate, and sulfate also depresses the reabsorption of thiosulfate. In neither species does probenecid exert any effect on either sulfate or thiosulfate transport. Carinamide, closely related to probenecid, does, however, block the tubular secretion of thiosulfate or sulfate. As both ions are secreted in *Lophius*, the effect of carinamide was tested in this species. In a dose of 4 mg/kg, carinamide exerted a 60 and 70% depression of sulfate excretion respectively in two *Lophii*, and a 29% depression of thiosulfate excretion in one *Lophius*. There was no effect on the excretion of magnesium and calcium. These results should be compared with earlier experiments in this laboratory, in which probenecid in a dose of 3 mg/kg produced a 75% depression PAH secretion, but had no effect on the excretion of sulfate or magnesium ions. Neither do cinchoninic acid derivatives, which markedly depress the tubular secretion of PSP (phenolsulfonphthalein) in the dog, have any effect on the thiosulfate clearance in that species. Among agents which depress the tubular secretion of PSP, PAH and many other organic acids, carinamide so far is unique in its ability to depress tubular secretion of sulfate or/and thiosulfate ions in widely different vertebrate species. This feature demonstrates further the close relationship between sulfate and thiosulfate with respect to renal tubular transport.

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The Effect of Ca Reduction On Skeletal Development In Echinarachnius Parma Embryos

G. Bevelander
College of Dentistry, New York University

Observations were made on the development of the embryos of E. parma in which the Ca content of the sea water in which these organisms develop was reduced without however modifying the osmolarity of this medium.

It was shown that when the Ca content was reduced to one tenth the normal value, the embryos developed in a relatively normal manner for the first 24-36 hours except for the appearance of a skeletal system. When

the Ca content was increased to .3 normal Ca content, development was relatively normal and skeletal elements were also fabricated. In an intermediate range, .2 Ca, skeletal formation occurs in some instances but usually is delayed in appearance or suppressed entirely. When embryos were reared in sea water containing compounds such as protamine sulphate, Hyamine, a quaternary ammonium salt, or toluidine blue, all containing strong positively charged molecules, the embryos developed but were devoid of skeletons. These observations indicate (1) that a higher concentration of Ca is necessary for skeletal development than for metabolic processes permitting embryonic development. (2) The effect of strong positively charged molecules in contact with the surface of the embryo through which ions are transfered inhibits or suppresses Ca transfer and as a consequence skeletal development. The additional observation that ions reaching the internal regions of the embryos in which the skeleton develops must pass through an ectodermal layer containing a sulphated polysaccharide suggests that this substance may be associated with cation transfer.

Rhodanese in Marine Invertebrates

Hans G. Borei
University of Pennsylvania

The enzyme rhodanese, which has a general occurrence in vertebrates, and supposedly functions as an intracellular transsulfurase, has been analyzed for occurrence and activity in marine invertebrates. It was assayed by virtue of its capacity to catalyze the transfer of sulfur from thiosulfate onto cyanide forming thiocyanate. For this purpose an assay technique was worked out, which was suitable for tissue homogenates of marine material yielding enzyme activities in the 0.25 μmol SCN- range.

The survey of the marine invertebrates showed the occurrence of rhodanese in practically all animal groups. Mostly the relative activities were low, with the exception of the Mollusca phylum, in which activities comparable with those of the vetebrates were found. An analysis of the organ-distribution of rhodanese in different mollusks revealed a preference for such organs which have an excretory function or otherwise partake in degrading or synthesizing exo- or endogenous material, e.g. digestive gland, kidney, gills and pericardium.

The digestive gland of the scallop, *Pecten*, is a particularly rich source for the enzyme. The enzyme from this material was partially purified, and its properties compared with a horse liver rhodanese of comparable purity. The general properties were found similar, but sufficient dissimilarities exist to warrant the conclusion that the enzymes from the two sources, though members of a common enzyme family, are distinct. The thermal denaturation point is 56° C. for the mammalian rhodanese,