

the widespread occurrence of this enzyme in these fishes. The range of enzyme activity was 22-225  $\mu$ moles urea/g hr.

Liver slices from other aquatic vertebrates such as bullfrog (Rana catesbeiana) tadpoles, small adult but not large adult bullfrogs and Necturi (Necturus maculosus) also catalyzed the conversion of urate to urea.

1964 #9

#### ANION SUBSTITUTION: COUPLING OF H AND Cl ION ACTIVE TRANSPORT BY DOGFISH GASTRIC MUCOSA

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Bathed in vitro by Cl-saline, gastric mucosae of Squalus acanthius do not generate a potential difference because H and Cl ion active transport proceed together. Likewise anion (A-media) substitution for Cl by sulfate, isethionate or glucuronate did not produce a significant potential difference;  $.4 \pm .5$  mV. H ion secretion decreased with a time constant of .48/hr over 5 hr and was 1.3  $\mu$ Eq/g/hr at 2.75 hr. Fate of mucosal Cl was followed by exposing mucosae to Cl-36 in Cl-saline for 3 hr and eluting for 2.75 hr into either A-media or Cl-saline. Bathed by A-media, the luminal Cl flux had a time constant of .55/hr and was 2.2  $\mu$ Eq/g/hr at 2.75 hr. Correspondence of the magnitude and time course of H ion secretion and Cl luminal flux indicates that anion substitution does not uncouple H and Cl transport. The fraction of Cl-36 transferred across the luminal border at 2.75 hr was .26/hr into A-media and .35/hr into Cl-saline. The lesser fraction transferred from cell into mucosal A-media suggests that a locus of "exchange diffusion" is at the luminal border.

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#### GILL PERMEABILITY IN Squalus acanthias\*

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We measured the net movement of tritiated water and C-14 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  $7.66 \times 10^{-6}$  cm/sec. Urea in 3 intervals each for 2 fish averaged  $7.5 \times 10^{-8}$  cm/sec. Comparable figures for toad bladder (Maffly, et al., J. C. I. 39:630) are 90 and  $260 \times 10^{-8}$  cm/sec for water and urea respectively.

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

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