Effects of Don (6-Diazo-5-Oxo-L-Norleucine) and Azaserine on the Sand-Dollar Embryo

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DON and azaserine interrupt the development of the sand-dollar embryo at the mid-blastula and early gastrula stages. The minimum dose of DON producing consistent effects is 3 milligamma/10 cc of sea-water; azaserine is approximately 1/32 as active. Large doses of DON up to 1 mg./10 cc of sea-water have no appreciable effect on fertilization, cleavage or early development.

Various physiological purines and derivatives will protect against the action of DON and azaserine, even when added up to 12 hours after fertilization. The most active ones are guanine, hypoxanthine and inosine. The protective action of these substances appears to be non-competitive, and they are not effective against large doses of DON and azaserine.

In view of the fact that DON and azaserine, acting as glutamine antagonists, apparently interrupt the *de novo* synthesis of purines, it is suggested that embryonic development in the sand-dollar is blocked at the time when DNA production, initially supplied by endogenous purine precursors, becomes dependent on *de novo* purine synthesis.

This work is reported more fully in Proc. Soc. Exper. Biol. & Med. (in press)

Glomerular Filtration Rate and Renal Plasma Flow in the Fresh Water Brown Bullhead or Horned Pout, *Ameiurus Nebulosus*

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While considerable information is available concerning excretion in marine elasmobranchs and teleosts, little work has been done on renal function (other than osmotic regulation) in fresh water fishes. These studies were undertaken to compare urine flows, glomerula filtration rates and renal plasma flows in *Ameiurus* under standard laboratory conditions which were similar to those previously employed in measuring renal function in marine forms (Forster, 1953, J. Cell. Comp. Physiol. 42:487).

Urine flows and glomerular filtration rates are considerably higher

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than in marine teleosts, while renal plasma flows in fresh water and marine forms are similar. As is true in the frog, low urine/plasma concentration ratios of inulin indicate that relatively little water is reabsorbed by the tubules. Urine flows of 34 animals in good physiological condition were found to vary from 32 to 342 ml per Kg. body weight per day, with an average value of 154 ml/kg/day. This compares with other observations reported in the literature on fresh water fishes as follows: *Catostomus*, 7-26; *Ameiurus*, 51-79; *Pristis*, 250; *Salmo*, 60-160; *Pleuronectes*, 24; *Petromyzon*, 362; *Anguilla*, 25 (reviewed by Wilkgren, 1953, Acta Zoologica Fennica **71**:1). Glomerular filtration rates in the same 34 bullheads ranged from 83 to 582 ml. per Kg. per day with a mean value of 225. Maximal PAH clearances, which would estimate minimal renal plasma flows, were successfully obtained in 3 animals with values of 2630, 2733, and 46.36ml. per Kg. per day. Filtration fractions in these experiments were 0.13, 0.13 and 0.05 respectively. No comparable determinations of filtration rates and plasma flows on other fresh water fishes have been reported in the literature. Compared with mammals, the low glomerular filtration rates in *Ameiurus* relative to simultaneous renal plasma flows reflect, as in the frog, the non-availability of the renal portal circulation for glomerular perfusion (Forster, 1943, Amer. Jour. Physiol. **140**:221). Renal plasma flows in marine and fresh water teleosts and in the frog are roughly comparable. High urine flows and glomerular filtration rates in freshwater teleosts and the frog, relative to non-diuretic marine teleosts, is perhaps an adaptation to the osmotic gradient imposed by the hypotonic environment of the former.

Carbonic Anhydrase Inhibition in the Elasmobranch: Effect on Aqueous Humor and Cerebrospinal Fluid CO_2

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In 12 dogfish (*Sq. Acanthias*) concentration of total CO_2 in plasma was 7.4 mM/L ± S.E. of 0.07. Ratio (RAq) of CO_2 conc. in aqueous humor/plasma was 1.2 ± 0.1 Acetazolamide (100 mg. i.v. per fish) *lowered* RAq in all of 8 fish to 0.72 ± 0.05. Effect was observed at 30 minutes and lasted at least 6 hours. CO_2 plasma conc. were constant for 2 hours, then rose (Hodler et al. Am. J. Physiol. 183, p.155), but changes in RAq were independent of alterations in plasma CO_2. Carbonic anhydrase was found in ciliary process, iris and retina (but not lens); activity was abolished by acetazolamide *in vivo*. Results suggest that, as in mammals, this enzyme plays a role in CO_2 transfer into aqueous. Similar experiments were done on CSF/plasma for CO_2 which for 6 untreated fish was 1.15 ± .05. Acetazolamide produced no observable effect in 30 minutes, but at 2 hours there was a striking *rise* in RCSF to 1.72 ± 0.09, which persisted for at least 6 hours. Carbonic anhydrase was found in brain; its role may