cm H_2O during the entire course of an experiment. Graphs of ΔP versus steady state flow rate were made from the data obtained with each fish.

The bulk absorption capacity of the system is expressed in ml/min per cm H_2O pressure. Since the animals tested showed a linear relationship between ΔP and CSF absorption over the pressure range used in this study, the absorption capacity (or the inverse of the resistance) could be found from the slope of a line drawn by regression analysis through the various data points.

The values (ml/min/cm H_2O) plus the S.D. were: Fish 1 = .0049 $\pm$ .0002; Fish 2 = .0046 $\pm$ .0008; Fish 3 = .0044 $\pm$ .0009; Fish 4 = .0042 $\pm$ .0009: Average = .0042 $\pm$ .0009.

The resistance to bulk absorption of CSF in the dogfish is approximately the same as that reported for the rabbit (Brain 93: 665-678, 1970). This similarity in CSF absorption exists despite marked differences in anatomy between these two species. In mammalian systems CSF flows from the ventricular system into the subarachnoid space and is primarily reabsorbed into the venous blood of the cerebral sinuses through the arachnoid granulations. *S. acanthias* lacks both a subarachnoid space and arachnoid granulations, thus the bulk absorption of CSF in this species must take place via other channels. Postmortem observations of the dye distribution in the animals used in the present study suggest that the cranial nerves and possibly the central canal of the spinal cord serve as pathways for outflow and reabsorption of CSF from the ventricular system of the dogfish.

1972 #43

THE RATE OF CEREBROSPINAL FLUID PRODUCTION IN *Squalus acanthias*

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The rate of cerebrospinal fluid (CSF) production has been measured previously in *S. acanthias* by the steady state dilution of inulin perfused through the brain ventricular system (Comp. Biochem. Physiol. 12: 171-177, 1964). However recent work with mammals suggests that the rates calculated on the basis of the dilution of inulin are spuriously high and that larger, less diffusible markers, e.g., high molecular weight dextran, should be used for CSF production studies (Exp. Neurol. 29: 546-553, 1970). In addition it has been reported that CSF formation is markedly effected by temperature (Exp. Neurol. 27: 101-114, 1970) and blood-CSF osmotic gradients (Physiol. Rev. 51: 273-311, 1971). In the present study a reexamination of the rate of CSF production in *S. acanthias* was made using large molecular weight markers, osmotically balanced perfusion fluids, and tightly controlled temperature conditions.

Dogfish, weighing from two to three kg, were anesthetized with pentobarbital (20 mg/kg), loosely strapped into a trough-like holder, and completely submerged in a box filled with seawater. The gills were perfused by forcing seawater through the spiracles. The temperature of the water in the gill perfusate and the box was maintained at 13-15°C. The inflow and outflow lines, 22 gauge needles attached to polyethylene tubing, were percutaneously placed in one lateral (olfactory) and the cerebellar ventricles respectively. Proper placement of both needles was ascertained by testing

a fluid aspirate for protein and by post-perfusion dissection. If the needles were not properly placed or the effluent perfusate was bloody, the experiment was discarded. The plasma osmolality of each fish was measured and an artificial CSF solution (perfusion fluid) of equal osmolality (± 5 mOsm) was prepared. One of the following marker molecules was added to the perfusion fluid: blue dextran (molecular weight = 2×10^6), ^{131}I-serum albumin or ^{3}H-inulin. Perfusion fluid was delivered to the ventricular system by a constant speed infusion pump. The concentration of marker material in the inflow and outflow perfusate was measured by spectrophotometry (blue dextran) or isotope counting. In this experimental situation the rate of CSF production is determined by the amount of dilution of the perfusion fluid which occurs by CSF secretion between the inflow and outflow sites. A standard equation, derived by Heisey *et al.* (Am. J. Physiol. 203: 775-781, 1962), is employed to calculate the production rate.

The CSF formation results (average ± S.D. plus number of animals) obtained with the three markers used are: blue dextran = 1.4 ± 0.7 μl/min., N = 3; ^{131}I-RISA = 1.5 ± 0.7 μl/min., N = 4; ^{3}H-inulin = 2.2 μl/min., N = 1. All three markers combined = 1.6 ± 0.6 μl/min, N = 8.

The rate of CSF secretion reported in this study is approximately one-half that reported by Oppelt *et al.* for the dogfish (Comp. Biochem. Physiol. 12: 171-177, 1964). There are several possible explanations for the discrepancy. In seven out of the eight experiments presented here larger, less diffusible markers were employed, thus smaller but more accurate rates would be expected from these data. Oppelt *et al.* used curare to immobilize their animals whereas pentobarbital was used in the present study. In connection with this reports suggesting that CSF production is partially reduced by anesthetic agents (J. Physiol. 199: 397-425, 1968) have appeared in the last several years. Although not explicitly mentioned by Oppelt *et al.*, the experimental conditions-temperature, perfusate osmolality, total body immersion - probably were different in these investigations. Finally the dogfish used in Oppelt *et al.* study were larger (4-5 kg) than those used in the current work (2-3 kg). At present the relative contribution of each of these factors to the divergence in the two estimates of CSF production is uncertain and a precise evaluation of the rate of CSF secretion of *S. acanthias* cannot be made.

1972 #44

THE EFFECT OF PURIFIED CHOLERA ENTEROTOXIN AND STAPHYLOCOCCAL ENTEROTOXIN B ON INTESTINAL TRANSPORT IN FLOUNDER

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Recent investigation with an *in vitro* rabbit ileum preparation has indicated that cholera enterotoxin (CT) increases the rate of Cl^- ion secretion from blood to luminal side and that this increase is associated with increases in transmucosal electric potential difference (PD) and short circuit current (Isc) (Field et al. J. Clin. Invest. 51:796-804, 1972). Staphylococcal enterotoxin B (SEB) has been studied in the *in vivo* rat intestine and is thought to stimulate Cl^- transport from serosa (S) to mucosa (M) by nonelectrogenic mechanisms (Sullivan et al. Am. J. Physiol. 220:1793-1797, 1971). The role