There was no effect of calcitonin on the level of serum calcium. The control value of 15.3 ± 1.2 (mean ± S.E.) mg per cent was not different from the value at the end of each experimental period. Parameters of renal function measured in these studies are shown in Table 1. Injections of calcitonin did not alter GFR, urine volume (V) or the fractional excretion of calcium or urea, which average 0.58 ± 0.10 and 0.07 ± 0.01, respectively, during control periods. During the last two experimental periods the fractional excretion of sodium fell slightly, while the excretion of potassium was reduced in all 3 periods.

Since cortisol has been shown to enhance sodium outflux across the gill of intact eels, calcitonin was administered intraperitoneally (24-40 MRC units/kg) to 3 groups of eels. The Na^{22} outflux was 56 (freshwater adapted), 36 (transfer to seawater for 24 hours) and 515 μEq/100 gm . hr (seawater adapted). These fluxes were similar to values measured in normal eels.

These studies show that, in contrast to the mammal, calcitonin has no effect on tubular function in the elasmobranch and no influence on gill transport in a teleost, in which an effect on calcium metabolism is demonstrable. There is no evidence, therefore, that this hormone is important as an osmoregulator in these lower vertebrates.

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EFFECT OF THREE NEW ANTITUMOR AGENTS ON DEVELOPING EMBRYOS OF THE SAND DOLLAR, *Echinarachnius parma*

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Gallium nitrate, rifamycin SV, and camptothecin are three drugs of diverse structure which have recently been reported to have antitumor activity in experimental animals. As the mechanism of antitumor activity of these agents is unknown, we have studied the effects of these drugs on early embryologic development in the sand dollar, *Echinarachnius parma*.

Camptothecin was dissolved in millipore filtered sea water (MFSW) while rifamycin SV and gallium nitrate were dissolved in distilled water. Fertilized ova were added to MFSW containing drug concentrations ranging from 0.1 to 100 μg/ml three minutes after fertilization. Embryos were observed at 2, 5, 12, and 24 hours. Gallium nitrate had no effect on development in the time period studied; rifamycin SV had no effect on the first cell division at all concentrations. At 100 μg/ml rifamycin SV further cell division did not occur, whereas at all other concentrations development through the first 24 hours proceeded normally. Camptothecin inhibited the first cell division at concentrations greater than 0.1 μg/ml; at concentrations of 1 - 100 μg/ml the cells eventually divided and reached blastula but developed no further. In addition the number of minutes which cleavage was delayed appeared to be dose related.

The ability of the embryos to overcome an initial effect on cleavage and then to develop only to blastula resembled the effects seen in the sand dollar embryo with cytosine arabinoside (Exptl Cell

Res, 60, 45-53, 1970) and x irradiation (Rieck, unpublished data). To further evaluate this relationship, fertilized embryos were incubated in 3 μg/ml camptothecin at 3, 15, 30, 40, 50 minutes following fertilization. In those incubated in camptothecin between 3 - 40 minutes following fertilization cleavage occurred at 145 minutes while in the control and 50 minute sample cleavage occurred at 100 minutes. It thus appears that camptothecin is acting during the initial S period. To corroborate this hypothesis samples of treated embryos were preserved for later histological study.

Thus, camptothecin may be acting like cytosine arabinoside, necessitating repair before cleavage can occur; further studies are necessary to substantiate this hypothesis. Rifamycin SV and gallium nitrate have no significant effect on sand dollar embryos in the concentrations examined.

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FURTHER OBSERVATIONS ON THE RESPONSE OF THE DOGFISH GASTRIC MUCOSA TO CATION SUBSTITUTION

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Exposure of the isolated dogfish gastric mucosa to a high extracellular [K^+] partially inhibits the active transport of Cl^-, dissociating it from the active transport of H^+ (Hogben et al., Comp. Biochem. and Physiol. [in press]). Both active transport of Cl^- and H^+ continue when almost all extracellular Na^+ is replaced by choline. The following experiments extend these observations.

In the first of three series of experiments, one surface of the mucosa was exposed to a saline in which [Na^+] was reduced to 87 mEq/L by the substitution of 165 mEq/L of choline$^+$. The other surface was bathed by the customary saline resembling dogfish plasma; [Na^+] 252 and [K^+] 10 mEq/L. Every 15 minutes the transmural potential difference (PD) and conductance (G) were recorded and short-circuit current (Isc) calculated as the product. The liquid junction potential difference due to the asymmetrical cation composition of the bathing solutions was ignored since measurement through 3 M KCl bridges established that it was less than 0.5 mv. In a second series of experiments, the customary saline was replaced at both surfaces by one having 175 mEq/L K^+ and 87 mEq/L Na^+. Before further measurements were obtained the solutions were removed and replaced 5, 15 and 30 minutes later. The H^+ ion secretory rate was determined at hourly intervals. The last series was conducted in a similar manner with both surfaces bathed by a Na^+ free saline in which Na^+ had been replaced by 252 mEq/L of choline. In other respects the experimental methods were those described in the report cited above.

In a previous study, the effects of unilateral exposure of the dogfish gastric mucosa to an elevated [K^+] were ascribed to the increased [K^+] though there was a concomitant reduction of extracellular [Na^+]. The electrical variables, PD and G, are graphed in Figure 1 for before, during and after exposure of one surface to a low Na^+ saline. Reduction of extracellular Na^+ at either surface did not materially change PD, G or Isc. Thus insofar as choline$^+$ can be considered an indifferent ion, the earlier conclusion has been validated.

The consequences of exposing both surfaces simultaneously to a high extracellular [K^+] have been summarized in Table 1. After an interval of 30 minutes from the time solutions were changed,