Table II

Comparison of Calculated Aerial Production Data for Plant Species Collected in Maine During the Interval from 29 July to September 1974
(X=Mean, r_i=Instantaneous Rate for the Disappearance of Dead Material, Y=Production, X=Mortality)

Species	r_i mg/g/day	Y g/m^2/day	X g/m^2/day
	X	X	X
Carex palecea (mx)	19.5	3.1	5.0
Juncus gerardi, C (mx)	-2.5	-18.0	-6.6
Juncus gerardi, H (mx)	0.0	-2.9	-0.1
Plantago sp. (mx)	—	-0.01	0.1
Spartina alterniflora, C	9.5	3.0	6.9
Spartina alterniflora, H	16.5	11.2	13.2
Spartina patens	17.9	8.4	12.2
Spartina patens (mx)	—	2.2	1.9

C=Creek bank
H=High marsh
(mx)=represents a mixture of plant species in the sampling area

Table III

Plant	annual increment (g/m^2) G	D	M
Spatina alterniflora			
creek bank	2112	—	1301
creek head	—	—	202
high marsh	2017	—	—
Spatina patens	301	469	541
Spartina cynosuroides	3572	—	—
Sporobolus virginicus	582	—	—
Distichlis spicata	1078	3396	—
Phaqmites communis	—	3615	—
Juncus gerardi	—	4279	1626
Juncus roemerianus	3354	—	—
Salicornia virginica	439	1428	—
Borrichia frutescens	818	—	—

Annual Increment for the Underground Phytomass in Various Salt Marsh Plant Species from Maine (M), Delaware (D) and Georgia (G)

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Methylmercury and Selenium: Distribution, Effect and Interction in Teleost Fish.

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Mercury accumulates in the tissues of fish and marine animals following uptake through the gills or digestive tract. In most fish, more than 90% of the mercury in the tissues is found in the form of methyl-mercury. In the American eel, *Anguilla rostrata*, previously found that increasing mercury concentrat in the tissue up to 1.5 ppm correlated with decrea intracellular potassium concentrations in the m (*Pollution and Physiology of Marine Organisms*, Academic Press, 1974; *Fed. Proc. 33*: 2137, 1974). tunafish and marine mammals a major part of the merc is not found in the form of methylmercury, and merc and selenium are present in the livers of these animals 1:1 ratio on a molar basis (*Nature 245*: 385-386, 19 Questions asked in the present study were: 1) does accumulated methylmercury have an effect upon volume and ion regulation in the variou tissues? 2) d pretreatment with selenium have an effect upon merc retention in the fish? 3) does selenium affect distri of mercury in the tissues? 4) does selenium ca breakage of the methylmercury bond?

In the first part of the study methylmercur administered intramuscularly to the winter flo *Plseudopleuronectes americanus*, repeatedly o period of weeks. Mercury accumulated in the tis without any apparent deleterious effects upon the There was no effect on plasma osmolality in spite o concentrations in the gills up to 24 ppm. Intrace water content and ion concentrations were norma muscle and all other tissues in spite of merc concentrations ranging from 1 to 24 ppm. Intrace water content was not significantly different in co and experimental groups. Na-K-ATPase levels in tis tissues were not depressed, but were significantly hig in the bladder and kidneys of the methylmercury treat fish compared to the controls.

In the second part of the study *Fundulus heteroc* was used. Fish were either sham injected i.m. with saline or injected i.m. with selenium (2 l/g B.W. of 2 mM $Na_2 SeO_3$). Thirty minutes later they were inject with labeled methylmercury in an equivalent amount molar ratio). One group was injected with methylmercury, another with ^{203}Hg methylmercury difference in overall retention of mercury was fo between control and selenium pretreated fish significant difference in distribution of mercury was see between the two groups. The accumulation of merc was significantly decreased in the kidneys of the selen pretreated fish compared to those of the control gro (Table 1). In the livers a slight decrease was seen, muscles an increase was seen. The results showed n significant difference in accumulation of the ^{14}C labele methylmercury compared to the ^{203}Hg labelled co pounds in liver or kidney. Because the labelled mer group will be incorporated into other organic compound following its hydrolysis, one could conceivably fail to se a difference in accumulation of the two compound shortly after treatment. However, with time a significa difference in distribution could be expected. From th data presented in Table I it is clear that even after 3 days there is no difference in distribution of the tw compounds and it is concluded that selenium does no increase breakage of the bond in methylmercury.

In conclusion: 1) accumulation of methylmercury i tissues of the flounder has no effect on osmo-, volume or ion regulation in the tissues; 2(pretreatment wi

Table I

Hg in Kidney of Fundulus Calculated from ^{209}Hg and from ^{14}C Following Injection of Labelled Methylmercury

	p.p.m.				Ratio kidney/gill			
	Hg only		Hg + Se		Hg only		Hg + Se	
	^{203}Hg	^{14}C	^{203}Hg	^{14}C	^{203}Hg	^{14}C	^{203}Hg	^{14}C
5 hrs	0.63 ±0.07	0.47 ±0.08	0.20 ±0.08	0.39 ±0.18	1.78 ±0.20	1.42 ±0.09	0.86 ±0.23	0.87 ±0.16
25 hrs	0.91 ±0.22	0.87 ±0.21	0.67 ±0.22	0.58 ±0.28	1.59 ±0.12	1.60 ±0.15	0.80 ±0.15	0.75 ±0.11
73 hrs	1.28 ±0.22	1.62 ±0.45	0.67 ±0.24	0.73 ±0.10	1.80 ±0.22	1.76 ±0.55	0.91 ±0.11	0.99 ±0.08

Mean ± S.D.

The fish in the columns labelled Hg + Se were pretreated with Na_2SeO_3 ½ hour before the injection of methylmercury.

lenium does not change methylmercury retention in *undulus heteroclitus*; 3) pretreatment does change stribution in the tissues; and 4) pretreatment does not crease breakage of the chemical bond in methyl-rcury.

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timulation of Rectal Gland Secretion by Cyclic AMP.

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The isolated rectal gland of *Squalus acanthias*, when erfused *in vitro*, secretes a fluid high in sodium and nloride. The rate of secretion is lower than that ommonly observed in live dogfish, however, and eclines with time. Because it seemed possible that rectal and secretion is regulated by circulating humoral factors resent in the intact fish, we tested the hypothesis that, e some other secretory organs, active transport in the ctal gland is stimulated by cyclic adenosine mono-nosphate.

Dogfish of either sex weighing 2 to 5 kg were taken hook and line from Frenchman's Bay and used for all periments. They were ketp in marine live-cars and crificed within 3 days of capture. Rectal glands taken om freshly killed animals were placed in a plexiglass and minum chamber cooled with running sea water mperature 16 ± 1°C). The artery and duct were nnulated with PE 90 polyethylene catheters. The rectal and was perfused by gravity at a flow between 4 and 9 l/min with a medium at pH 7.6 containing (mM/L) a:280; K:6; Mg:3; Ca:2,5; Cl:290; Phosphate:1; $SO_4$0.5; CO:8; Urea:350; Glucose:5. The perfusion medium was ssed with a mixture of 99% O_2 and 1% CO_2. Duct fluid as collected at timed intervals (usually 10 min) for up to hours. Potential differences were measured using KCl ar bridges and a Hewlett Packard 410-C electronic voltmeter equipped with two calomel electrodes. All pharmacological agents used were previously dissolved in perfusion medium and added to the perfusion reservoir. Na and K were measured with an IL 343 flame photometer and Cl by amperometric titration. Cyclic AMP was assayed by a protein binding assay at two dilutions of rectal gland fluid stored at -20°C.

The addition of a single dose of 1 mM theophylline to the perfusion medium was followed by a significant change in the magnitude of the PD (from 6.8 ± 2.1 to 19.7 ± 7.6 mV, p 0.05, duct negative), a rapid gland fluid from 202 to 2982 l/hr/gWW (p 0.001) and a resultant rise in the rate of excretion of Cl from 104 to 1525, Na from 105 to 1604 and K from 6.2 to 46.1 Eq/hr/gWW. The concentration of Na and Cl exceeded 500 meq/L in duct fluid and, if below that level during control studies, rose appreciably after theophylline stimulation. The concentration of cyclic AMP in rectal gland fluid ($5x10^{-9}$ - $5x10^{-8}$M) did not change, though the total amount excreted increased owing to the large increment in the rate of fluid secretion. After secretion is stimulated by 0.25 mM theophylline, a slow and continuous decline in function supervenes which can be reversed by the subsequent addition of dibutyryl cyclic AMP (0.1 mM). The response to theophylline was dose dependent and increased in magnitude without a plateau as the concentration of this drug was increased in the perfusion medium from 0.01 mM to 5 mM. The rate of fluid secretion was increased 23 times by the highest dose (5 mM) of theophylline tested. Dibutyryl cyclic AMP (0.05 mM) produced the same effects as theophylline when added alone, although in the absence of ptheophylline the effects were less marked and of shorter duration. Perfusion of the rectal gland in the presence of 0.25 mM theophylline and 0.05 mM dibutyryl cyclic AMP resulted in stable stimulation of the rectal gland for up to 140 minutes.

Since cyclic AMP is the common intracellular effector of a number of different hormones, a search for the most likely candidates was conducted in an effort to determine their possible role in the regulation of the activity of the rectal gland. Vasopressin (Pitressin ^{R}), and