D-glucose transport will be reached since as $\bar{c}$ increased, Ki decreases. Thus, our work indicates that both the aqueous and vitreous humors, the D-glucose transport mechanism is saturable. Although time limited the number of experiments (we would have liked more points at the higher glucose concentration), our data suggest that the vitreous barrier is more easily saturable as indicated by a 53% drop in the vitreous humor rate constant from resting to 50 mM. D-glucose concentration, apposed to only a 28% drop in the aqueous humor rate constant for the same range of plasma D-glucose concentrations.

In conclusion, our work to date indicates that in the dogfish D-glucose is transported into the aqueous and vitreous humors by a mechanism of downhill facilitated diffusion which is stereospecific and saturable. These results are not inconsistent with a stereospecific membrane bound carrier molecule model and perhaps similar to that postulated to exist at the level of the blood-brain barrier. These investigations were supported by NIH Research Grant EY 1340 and Training Grant EY 07009.

INHIBITION OF CHLORIDE SECRETION BY PROLACTIN IN THE ISOLATED OPERCULAR EPITHELIUM OF *Fundulus heteroclitus*

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Fresh water adaptation in teleost fishes depends on the endocrine control of osmoregulation (Hirano and Mayer-Gostan, VIII Int. Symp. Comp. Endocrinol., Amsterdam, 1978). Prolactin appears to be the main hormone involved, since hypophysectomized *Fundulus heteroclitus* perish (Burden, Biol. Bull. 110:8-28, 1956), prolactin keeps them alive after hypophysectomy (Pickford and Philips, Science 130: 454, 1959; Pickford, Robertson and Sawyer, Gen. Comp. Endocrinol. 5:160, 1965) and it stops the excessive loss of salts through the gills (Mayer, Bull. Inf. Sci. Techn. CEA 146:45, 1970). Prolactin effects take many hours to become operative, and consists in a reduction of membrane permeability. The actions of prolactin are permissive and require the presence of other hormones.

Prolactin effects were tested on the chloride secretory process of the isolated opercular epithelium of *Fundulus heteroclitus* (Karnaky et al. Science 195:203, 1977). Electrical properties and chloride fluxes were compared in operculi obtained from 3 groups of *Fundulus heteroclitus*: (1) adapted to seawater, (2) adapted to seawater receiving prolactin, and (3) fresh water adapted fishes. Ovine prolactin NIH P.S. 9 was dissolved in Ringer's and injected for 2 to 3 days (5 µg/gr body weight), controls were injected with 2.5 µl/gr body weight of Ringer's. Blood samples were collected in some fishes for Na and Cl plasma determinations. Dissection, electrical and flux determinations followed published methods for the opercular epithelium (Degnan et al. J. Physiol. 271:155, 1977). In preparations in which there was no resting potential after treatment, electrical resistance was determined by a small imposed potential difference.

Prolactin induced known changes in plasma electrolytes. Blood Na and Cl were respectively 152.6 ± 7.4 and 156.6 ± 17.9 in controls while in the experimental fishes Na was 172.4 ± 14.3 and Cl 174.2 ± 9.85.

The changes in fluxes of chloride and electrical parameters are shown in Table 1. Prolactin induced a very significant decrease ($P < 0.01$) in the transepithelial potential associated with an increase in electrical resistance of the membrane ($P < 0.02$) after the prolactin treatment. The difference between seawater adapted fish and fresh water adapted was highly significant ($P < 0.001$) for both the transepithelial P.D. and resistance of the membrane.

The changes observed in the transepithelial potential difference are the result of a large decrease in chloride secretion (Table 1). The control chloride fluxes are comparable to those reported before for this preparation, but under treatment with prolactin the net chloride flux is abolished at

TABLE 1

Electrical properties and chloride fluxes of opercular epithelia of *Fundulus heteroclitus* during treatment with prolactin

	Cl efflux $\mu Eq.h^{-1}.cm^{-2}$	Cl influx $\mu Eq.h^{-1}.cm^{-2}$	Pd mV	R $\Omega.cm^2$
Seawater control	6.4 ± 0.98* (n = 5)	1.1 ± 0.21 (n = 6)	10.7 ± 1.57 (n = 11)	87 ± 10 (n = 11)
Seawater + prolactin	1.2 ± 0.30 (n = 5)	1.7 ± 0.31 (n = 6)	2.0 ± 0.30 (n = 11)	135 ± 14 (n = 5)
Fresh water adapted	0.95 ± 0.28 (n = 6)	-	0.9 ± 0.3 (n = 5)	296 ± 81 (n = 4)

*Mean ± S.E.M. between brackets: Number of experiments.

the expense of the unidirectional flux in the direction serosa to mucosa. The value of this flux under prolactin treatment is comparable to the one obtained in fresh water adapted fish.

Changes in resistance of the operculum produced by prolactin could be related to the tightness of the junctions between the different cells constituting the epithelium (P. Claude, J. Memb. Biol. 39: 2-9, 1978). Leaky junctions have been observed by Sardet (personal communication) and Bentley, Sardet and Mayer Gostan (personal communication) in neighboring sister cells of the "chloride cells" that have many interdigitating arms on their apical surface. Prolactin could then act on these junctions. Prolactin appears to be the main hormone responsible for the crucial decrease in ion movements which accompany the freshwater adaptation. This work was supported by NIH Research Grants EY 01340 and GM 25002.

SUGAR TRANSPORT ACROSS THE INTESTINE OF WINTER FLOUNDER

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Previous studies have shown that no net absorption of D-glucose takes place in the intestine of winter flounder (*Pseudopleuronectes americanus*), although L- and D-tyrosine and L-tryptophan are actively absorbed by this tissue (Rout, W.R., Lin, D.S.T. and Huang, K.C., Proc. Soc. Exptl. Biol. Med. 118:935, 1965). The absence of a nearly ubiquitous transport process from the intestine of the winter flounder aroused our curiosity, and led us to study this phenomenon further. Renal clearance studies of D-galactose in winter flounder show that this sugar is poorly absorbed from the renal tubules, whilst the high clearance ratio of 2-deoxy-D-galactose, indicates that this sugar is actively secreted into the tubule lumen (Pritchard, J.B., Booz, G. and Kleinzeller, A., Amer. J. Physiol. 234(5):F424, 1978). Since there is usually close similarity between the sugar transport processes in the kidney and intestine, it was considered worthwhile to investigate the transport of 2-deoxy-D-galactose and of galactose by the intestine of winter flounder in order to characterize the secretory process and the absent absorptive process.

Winter flounders weighing 250-350 g were obtained by trawling off Mt. Desert Island during July and August and were held in flowing aerated seawater. After the intestine was removed from a freshly killed fish, the serosa and external muscle layers were removed by a simple stripping procedure. The