the presence or absence of specific receptors. In addition pressure receptors in the gastrointestinal wall were stimulated mechanically. Selected areas of the alimentary tract were denervated and alterations in function noted.

The phylogenetically primitive hagfish (Myxine glutinosa) was demonstrated to have no neural control of its intestinal tract and no intrinsic propulsive mechanism. Ingested material passes through the alimentary tract by hydraulic pressure from ingested water and cephalo-caudad contractions of the body wall.

The spiny dogfish, Squalus acanthias, has developed two neuronally controlled propulsive mechanisms. One is a fast acting vomiting mechanism which is confined to the proximal stomach and the other is a slow reacting peristaltic mechanism largely limited to the distal stomach and pylorus. The ganglion cell that controls the peristaltic capacity of the distal stomach is predominantly confined to the C.N.S. However, continued minimal reactivity to serotonin in the chronically denervated preparation suggest the beginnings of a myenteric plexus in the wall of the distal stomach only. The dogfish intestine has peristaltic activity but there is no evidence of neuronal control. This suggests that the primitive smooth muscle is capable of some organized motor activity prior to the establishment of nervous connections.

In the frog, Rana catesbiana, the intestine has evolved serotonin and acetylcholine receptors which continue to function in spite of external denervation. This suggests that the ganglion cell has migrated to the intestinal wall and can function independent of C.N.S. connections.

These results would suggest that the primitive vertebrate intestine functions predominantly through its qualities of elasticity and tone. As neural control evolves there is a coincidental appearance of sensory and motor nerve fibers with receptors for acetylcholine and serotonin but the ganglion cell still remains in the C.N.S. In the higher vertebrates the ganglion cell migrates to the intestinal wall endowing it with neural excitatory control largely independent of C.N.S. connections.

Epinephrine is excitatory in the dogfish distal stomach but plays no apparent role in motor function either excitatory or inhibitory in the frog.

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THE EFFECTS OF MERSALYL ON THE FORMATION OF THE TELEOST BLASTODISC

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In a previous study (Huver, 1962 Doctoral Dissertation, Yale University) time-lapse cinephotomicrographic films revealed contractile waves occurring in the cortex of the egg of Fundulus heteroclitus during blastodisc formation. The SH-binding agent mersalyl which has been frequently used to inhibit contractility (The Motility of Muscle and Cells, Harvard University Press, 1958) was applied to the Fundulus egg in order to test the hypothesis that contractile waves play an important role in the formation of the blastodisc.

The fish were segregated according to sex upon delivery by the M.D.I.B.L. collectors to prevent spawning. Eggs were available from time of arrival, June 18, until July 12, when experiments

were curtailed because of the high frequency of overripe eggs. Both eggs and sperm were obtained by the conventional stripping technique. In most experiments, pricking the micropyle with a fine glass needle (15μ) was the method used for inducing blastodisc formation.

Observational and analytical aids employed were a Sage model 500 cinephotomicrographic apparatus and a Fairchild television microscope system.

A total of 35 pricking experiments were performed involving 976 eggs. Experimental groups were allowed to remain in a filtered seawater solution of 10^{-3} M mersalyl for intervals which ranged from 30 minutes to three hours before pricking; the percentage of eggs which had formed a blastodisc at one hour after pricking decreased from 86% to 24% over the aforementioned time-range. In control groups which had remained in filtered seawater for similar periods before pricking, the percentage of blastodisc formation decreased from 96% to 75%.

Measurements of the mean height of blastodiscs formed one hour after pricking in experimental groups of 10 eggs each which had been in 10^{-3} M mersalyl solution for 1.0, 1.5, 2.0, and 3.0 hours were .144, .127, .115, and .096 mm, respectively; corresponding values for seawater control eggs were .204, .160, .137, and .106 mm, respectively. The smaller blastodiscs of mersalyl-treated eggs were a result of an inhibition of the migration of cortical cytoplasm to the animal pole, as well as a failure of the gelation process which normally gives the terminal form to the blastodisc.

Time-lapse films and television microscope observations confirmed that mersalyl inhibits contractility in the Fundulus egg cortex. The amplitude of cortical contractile waves was markedly reduced in mersalyl-treated eggs.

The inhibition of blastodisc formation by mersalyl suggests that SH-groups play important roles in key aspects of this process. Two major aspects of blastodisc formation with which sulfhydryl groups appear to be associated are the cortical contractions which provide the motive force for cytoplasmic streaming and the gelation into the definitive blastodisc. The results support the view that cortical contractility is a sine qua non for the formation of the teleost blastodisc.

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NEGATIVE EVIDENCE FOR EXCHANGE OF CHLORPHENOL RED AND COMPETITOR ANIONS ACROSS THE RENAL TUBULAR EPITHELIUM OF WINTER FLOUNDER (Pseudopleuronectes americanus)

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Kinter and Cline (Am. J. Physiol. 201:209-17, 1961) originally proposed that competitor enhancement of anion efflux from renal tissue in vitro might involve a carrier mediated exchange or counter-transport interposed at some point between the medium and the site of anion accumulation. I have now tested this hypothesis using a recording microspectrophotometer adapted for measurement of chlorphenol red flux into or out of the luminal fluid of single flounder tubules exposed to oxygenated saline medium with or without the dye (Kinter, Am. J. Physiol., in press). First, low medium concentrations of another anionic dye, bromcresol green, enhanced efflux of