distilled water into the dorsal lymph sac, a simultaneous intramuscular injection of Pituitrin Surgical in doses of 0.1 to 0.5 international units per 10 g will cause retention of the injected water as well as of normal body water. Repeating this experiment in the winter, we were able to show that pituitary (posterior lobe) extract is still capable of causing a retention of some of the injected water although it has lost the power to cause a retention of normal body water. In experiments on some 300 frogs, the mean retention of injected water was 40% over a period of 3 hours. In over 90% of the frogs the injected water was retained by the neurohypophyseal extract. The percentage retention of injected water varied considerably but on the average was below that in the summer, at which time up to 100% retention was recorded in the first 3 hours.

These results demonstrate that pituitary (posterior lobe) extract has an effect on administered water different from that on normal body water because at a time when the extract was not capable of causing a retention of normal body water it was capable of causing a retention of administered water. The results of the present study of the Boyd-Whyte Reaction and those of Boyd, Mack and Smith[1] on the Brunn Reaction combine to demonstrate a truly remarkable seasonal variation in the water metabolism of frogs.

Conclusion. The depression of the Brunn Reaction in winter months reported by Boyd, Mack and Smith[1] was found accompanied by complete failure of pituitary (posterior lobe) extract to inhibit loss of normal body water in frogs. On the other hand, the loss of water injected into frogs was inhibited by pituitary (posterior lobe) extract in the winter though to an average extent less than in the summer.

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Modifications in Development of the Sand Dollar by NaCNS.

OLIN RULON. (Introduced by C. M. Child.)

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Experiments conducted at the Hopkins Marine Station, Pacific Grove, California, during the summer of 1938 on the unfertilized and fertilized eggs of *Dendraster excentricus* have given certain interesting modifications in the early developmental patterns of this form.

Unfertilized eggs treated for 12 hours with a solution of NaCNS (20 cc .54 M NaCNS plus 100 cc Ca-free sea water) showed a retardation in cleavage rate when returned to normal sea water and fertilized. The developing larvae ranged from forms showing considerable inhibition (increased mesenchyme, shortened anal arms, undifferentiated oral lobe) to larvae (approximately 35%) which consisted entirely of ectoderm and ectodermal structures. These ectodermized forms were modifications in the same direction as the 'animalized' forms produced in the sea urchin by Lindahl[1] and Hörstadius[2] with NaCNS treatment and experimental isolation of animal blastomeres. Neither mesenchyme, pigment nor gut was present. With higher concentrations or exposure periods the number of ectodermized forms was decreased and the number of inhibited forms increased. When NaCNS was used in normal sea water only inhibited larvae resulted. Ca-free sea water alone had little effect.

Fertilized eggs treated with NaCNS (20-30 cc .54 M NaCNS plus 100 cc normal sea water) for 12-24 hours appeared as thick-walled radially symmetrical blastulae usually containing a surplus of mesenchyme and showing a loss of cells from the vegetal region. When these forms were returned to normal sea water as many as 95% developed into exogastrulae with large evaginated entoderms, often filled with mesenchyme, and with ectoderm reduced to a small pigmented knob. Such forms were almost entirely entodermized and have been obtained by other workers (Herbst,[3] Child,[4] Hörstadius,[2] etc.) with various methods in this and other forms. If the treatment was less severe the ectoderm was usually quite large and underwent considerable differentiation. Fertilized eggs treated with Ca-free NaCNS solutions gave similar results if the period of exposure was short. If the treatment was longer than 8 hours the cells of the blastulae tended to separate. This was no doubt due to the calcium deficiency of the solution.

Contrary to Lindahl's view this work clearly indicates that the ectodermized forms produced by NaCNS treatment before fertilization result from recovery following a differential inhibition. The evidence lies in the following facts. *1. With optimum concentration and exposure period for ectodermization the maximum is only 35% and many larvae are not ectodermized at all but differentially inhibited, that is modified in the opposite direction. 2. With increase*

1 Lindahl, P. E., *Acta zool.*, 1936, **17**, 179.

2 Hörstadius, S., *Pubbl. Staz. zool. Napoli*, 1935, **14**, 251; *Biol. Rev.*, 1939, **14**, 132.

3 Herbst, C., *Mitt. zool. Sta. Neapel.*, 1893, **11**, 136.

4 Child, C. M., *Physiol. Zool.*, 1940, **13**, 4.

in concentration of agent or of exposure period percentages of ectodermized forms decrease, those of differentially inhibited forms increase. This is what would be expected from an inhibitory agent. The fact that cleavage and development are retarded further indicates the inhibitory action of NaCNS. Ectodermized forms result only when the treatment is sufficiently light to permit recovery of some individuals yet strong enough to affect the primary pattern. The exposure of unfertilized eggs to NaCNS in Ca-free sea water appears to result in a differential inhibition of the normal axiate pattern. With recovery on return to normal sea water and fertilization the basal levels of the egg seem to be freed to some extent from apical influence and develop in the same, or almost the same, direction as the originally higher levels. In other words the whole egg now develops as the animal portion with an increased scale of organization and a diminution or absence of entoderm and mesenchyme. When the early developmental stages (*i.e.*, first 12 hours after fertilization) are spent in solutions of NaCNS the resulting entodermization seems to follow from the depression of the more basal levels of prospective ectoderm to the physiological level of prospective entoderm. Such entodermized ectoderm may be considerably increased in size as a result of recovery on return to normal sea water. The increase in what appears to be mesenchyme results largely or wholly from dissociation and passage into the blastocoel of cells from the original entoderm. Child[4] has given a similar interpretation for entodermized larvae resulting from treatment with lithium.

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Variations in Arginase Activity in Livers of White Rats, Caused by Fasting.

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Baldwin[1] has indicated that the liver arginase of some animal species is dependent upon the nutritional condition. Takehara[2] determined arginase in the livers and the kidneys of 4 male dogs after fasts of 7 to 23 days. He concluded that "the value for arginase in liver and kidney is markedly increased by fasting." The writers

1 Baldwin, E., *Biol. Rev.*, 1936, **11**, 247.

2 Takehara, H. J., *Biochem.* (Japan), 1938, **28**, 309.