45° C. for that from clam liver, the 50% inhibition point for Cu^{2+}ions was reached at $c = 3x10^{-6}$ in the mammalian enzyme, at $c = 5.6x10^{-5}$ in the clam enzyme. The pH optima coincide, but the response to phosphate ions differs markedly. The sensitivity to cyanide and the protective effect of thiosulfate much less pronounced in the clam rhodanese as compared with the mammalian rhodanese.

The Normal Development Of The Sand Dollar Egg

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The time sequence of the early cleavage stages, from fertilization to 32-cell stage, of the egg of the sand dollar, *Echinarachnius parma*, was followed microphotographically and the results statistically analyzed. Parallel series were run for different temperatures. The further development up to pluteus stage was mapped microscopically and the time sequence established. The gained fundamental information will be used in further studies of the embryology of this echinoderm material.

Maternal-Embryo Relationships in the Spiny Dogfish, Squalus acanthias.

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While the dogfish embryo shows no "placentation", and the existence of a gaseous exchange between mother and embryo is obvious, other possible chemical relationships are still obscure. No difference in total iron was found between early (capsule and late (pup) embryos. No evidence of a fetal pup hemoglobin was found in oxygen saturated absorption curves. The uterine fluid changes from one similar to blood in the capsule stages (urea, Cl, Ca, Mg, pH) to a slightly modified form of sea water for the pup stages (no urea, Mg, Cl). This later fluid has a pH under 6, detectable Fiske-SubbaRow phosphate, and a positive Nessler reaction not due to urea or volatile ammonia. This sea water probably enters through the utero-cloacal pore which becomes very flaccid in the pup stages. The pups urinate into the uterus (direct observation). Experiments indicate that, based on maternal urine and bile content, the uterus is permeable in the uterine-maternal direction to phenol red, atabrine, and sodium fluorescein. The uterus is impermeable to these substances in the maternal blood-uterine direction. The embryo is impermeable to those substances except after oral ingestion. The uterus and embryo are permeable to maternally injected antipyrine, and the uterus is permeable to maternally injected I^{131}. Move-

ment of water from mother through the uterus is very low. The evidence indicates that embryonic wastes can be eliminated by the mother, but except for gas, there is no important chemical contribution to the embryo by the mother.

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The Distribution of Exogenous Inulin within Maternal and Fetal Body Fluids of the Dogfish, Squalus acanthias

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In the elasmobranch, *Squalus acanthias*, embryonic development is internal. This contrasts with the oviparous method of most lower vertebrates. The ovoviviparity occurs without placental specializations for obtaining nutrients from the mother. Preliminary observations were made in this study to determine whether the freely filterable and nonmetabolizable polysaccharide, inulin, could pass from the maternal blood stream to maternal uterine fluid and to fetal body fluids. Inulin is widely used in mammals for measuring extracellular fluid volume because it diffuses freely through capillary endothelium and is distributed uniformly throughout interstitial fluids. Despite its extensive vascularity, the dogfish uterus was found to be an effective barrier to the passage of inulin. Maternal plasma concentrations were maintained between 26 and 38 mg. per cent by repeated intramuscular injections over a ten day period. No significant quantities of inulin were detected in maternal uterine fluid or in pooled samples of fetal plasma, peritoneal or peridural fluids at the end of the injection period. Within the mother, inulin came approximately to equilibrium with plasma in peridural fluid, but did not enter pericardial or peritoneal fluids in significant amounts.

While the maternal uterus may serve in gaseous exchange, and in excretion by absorbing and carrying away those fetal wastes formed as the embryo develops at the expense of food materials within its yolk sac, it does not appear able to function as a nutritive organ in providing such freely filterable plasma constituents as inulin.

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