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**The Ability of Yolk-Sac Stage Dogfish Pups To Survive
Outside the Uterus**

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Incidental to an investigation of the functional relationship of mother to developing young in the Spiny Dogfish (*Squalus acanthias*), five to eight pups 17.5—19 cm long were removed from each of six uteri and placed in aquaria, finger bowls, and plastic tubes filled with flowing filtered sea water. All pups had large yolk-sacs, averaging 8cm in length and 2.7 cm in diameter. Pups which were permitted to swim freely in aquaria soon injured the delicate wall of the yolk-sac and died. Moreover it was found that when pups swim freely and the yolk-sac is pendant, yolk is transported up the lumen of the yolkstalk more slowly or not at all.

Pups confined in finger bowls or plastic tubes, were still vigorous and healthy at the end of 41 days, at which time the experiment was concluded. During this period there was a noticeable reduction in the size of the yolk-sac (in 2 pups it was but 1 cm long) and in a marked increase in the total length of the pup (from an average total length of 18.5 cm to 23 cm 41 days later). It would appear therefore that development proceeds normally outside the uterus if the pups are supplied with flowing sea water and are confined in containers small enough to restrict their locomotor activity and support their yolk-sacs.

Pups 18 cm in length, placed in a plastic tube sealed at each end, lived but 24-36 hours. This gives some clue to the oxygen needs of the developing pup and the extent of gaseous exchange which takes place within the maternal uterus. Whether this exchange is facilitated solely by the richly vascularized uterine mucosa or is supplemented by a periodic expulsion of the uterine fluid through the cloaca remains to be demonstrated.

The ease with which dogfish pups may be maintained outside the uterus in flowing sea water suggests their wider use as experimental animals.

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**Permeability of Uterine Mucosa of
Gravid *Squalus acanthias* to Phosphorus**

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Radioactive phosphorus (P32), in the form of PO_4 in weak HCl, was injected into the caudal vein of four gravid *Squalus acanthias* bearing

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"pups" 19-22 cm. in length. One mc of P32 suspended in 1 ml of elasmobranch saline was utilized in each injection. Samples of uterine fluid (1 ml) and maternal blood (1 ml) were taken at 2, 4, 8, 10, 11, 12, 24, 48, 53, 74 hours after injection, placed in aluminum planchets, and allowed to dry for 2 hours. Counts were made in a shielded counting chamber (Nuclear-Chicago model 3053) with a thin end-window Geiger tube (giving a background of 30 cpm.) connected to a Decade Scaler (Nuclear-Chicago model 181A) with an external dual Timer. Maternal blood and uterine fluid counts presented below represent the mean count per minute for a 30 minute counting period.

Maternal blood counts, declined sharply in the first 11 hours, and were as follows: at the end of 2 hours 8569 - 12416; at the end of 4 hours 4641 - 4833; at the end of 8 hours 2054 - 2350; at the end of 11 hours 1482 - 1774. After 11 hours the maternal blood count dropped more slowly and in one dogfish reached 920 at the end of 53 hours, in another 730 at the end of 74 hours. Counts on the uterine fluid rose significantly above background at the end of 4 hours, reached their maximum (1183 - 1293) at the end of 11 hours, and then declined slowly at a rate approximating that of the maternal blood. At no time was the uterine fluid count higher than that of the maternal blood. Pups removed from the uterus at the end of 11 and 53 hours showed no count above background in their blood, somatic muscles, liver, and yolk.

It is concluded that 1) phosphorus readily passes through the uterine mucosa into the uterine fluid of gravid *Squalus acanthias* 4-11 hours after it is injected into the maternal blood stream; 2) developing pups fail to utilize phosphorus present in the uterine fluid.

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Relation of Blood Oxygen Content and Renal Succinoxidase Activity to TmPAH

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In the aglomerular goosfish (*Lophius americanus*) blood oxygen content and the hematocrit of freshly caught animals were approximately 5 volumes % and 15% respectively. Under experimental conditions during the next 4-6 days these levels usually decreased, reaching values as low as 1.5 volumes % for blood oxygen content and 5% for the hematocrit. However, during this period no significant decreases were noted in TmPAH (0.5 μ M/kg/min) or in renal succinoxidase activity (10 μ l O_2 /100 mg DNA/min). Comparison of TmPAH and renal succinoxidase activity in the dog and goosfish reveals that in the former TmPAH (5 μ M/kg/min)