



Creating the Nation's first BioPark

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Letter from the Desk of David Challinor
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As mammals we all start feeding by drinking milk. Female milk production, along with self-regulating body temperature and hair, are three important characteristics differentiating the 4,000 mammal species from other vertebrates such as birds, reptiles and fish. The wide range in mammal size, ecology and behavior accounts for the extraordinary variety in milk production, nutrient content and mode of delivery to offspring.

Among the monotremes (egg-laying mammals), for example, the platypus female exudes milk through skin pores on her stomach, and the nursing young must suck the milk from their mother's skin and fur. In sharp contrast to this nursing system is that of the great whales, which not only evert their nipples for easy access, but contract certain muscles to pump rich milk into their nursing young.

The care of suckling mammals is a very important component of zoo husbandry; this letter, therefore, reports on the research of two Zoo scientists, Drs. Daryl Boness and Olav Oftedal, on pinniped (=finfooted, such as seals and walruses) lactation. These two scientists studied Hooded seals on the pack ice off the Labrador coast. The Canadian government gave the effort great support, taking them there in an icebreaker and using an onboard helicopter for the last part of the journey. The scientists sampled the milk of lactating females and discovered not only that it is about the richest milk (60% fat) yet analyzed, but that the mothers nurse their pups for only 3 or 4 days. Acquiring this data was not easy because the female is very aggressive in defending her young and is often accompanied by a large male, waiting to breed her as soon as she finishes nursing.

Previous knowledge about this species came from anecdotal reports from sealers who harvested the juveniles for their fur, which was known as a "blue coat." We do know that this Arctic species occasionally strays as far south as Maine. The male measures 9 to 10 feet long and weighs about 900 lbs; the female is slightly smaller. The name "Hooded" comes from the male's ability to inflate a nasal membrane to produce an air-filled, bladder-like crest about twice the size of a football.



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The scientists watched as the female gave birth on the ice to a 50 lb. pup, and learned that when weaned 3 or 4 days later, the pup had doubled its weight. They calculated that the newborn gained one pound for every 1.6 lbs. of milk consumed. Converted to layman's standards, the kilocalorie equivalent of this feeding binge is 42 quarts of chocolate ice cream a day!

Boness and Oftedal observed that the 4-day-old weaned pups lived for a month on the ice off the fat they had accumulated while nursing. At the end of that time, storms started breaking up the pack ice, and the hungry pups took to the water to feed on the rich store of invertebrates living near the ocean surface. At this stage the pups were lost to science, and we can only assume that they gradually learn to dive deeper and deeper for fish until they join the adults on the feeding grounds far to the north. They will not return to breed until they are about five years old.

Another remarkable adaptation of the Hooded seal to its short nursing time on the pack ice is the pup's curious moulting sequence. The scientists found that the fetus moults its "natal" coat in utero, so that it is born with a juvenile water-shedding coat (once valuable to furriers) over its blubber layer as protection against the cold. The hair, moulted in utero, is concentrated into compact balls in the amniotic fluid and is conveniently discharged at birth onto the ice.

Boness and Oftedal also studied the Harbor seal on Sable Island, an isolated narrow sandy spit about 200 miles east of Halifax. This species has developed a strategy for pup survival similar to the Hooded seal. The Harbor seal, however, is a more abundant species living off the coasts of Maine, northern Europe and the north Pacific south to California. The pups, born on tidal flats, have a relatively thick (3/4 inch) layer of blubber and a second coat (they evidently moult the natal coat later in their fetal development than Hooded seals). This is about the only other seal species that can withstand the cold water of an incoming tide right after birth.

Lacking a uterine moult, other species of seal pups such as the Harp must stay dry in their natal fur until they moult, 2 to 3 weeks after birth. The soft white birth coat of the Harp seal made it very vulnerable to seal hunters. Until recently, thousands of them were harvested for their fur on the pack ice in the St. Lawrence estuary and off the Newfoundland coast.

Although Hooded, Harbor and Harp seals still number in the hundreds of thousands, populations such as that of the European Harbor seal have experienced recent heavy mortality from what is reported to be a form of viral distemper. Seals must also



Letter From The Desk Of...

February 1, 1991

Page 3

compete with commercial fishermen for some fish species, and coastal pollution puts some seal species at risk.

The extensive field work conducted by Drs. Boness and Oftedal and their colleagues has answered many questions heretofore unknown about the life cycle of these interesting mammals. Their work continues, and in a subsequent letter I will report on the research being done via satellite tracking on the Juan Fernandez fur seal, a truly endangered species. For the geography buffs among you, the islands after which the seals are named lie about 500 miles due west of the Chilean coast from Santiago. The experiences of Alexander Selkirk, a sailor shipwrecked on one of these islands, inspired Defoe to write Robinson Crusoe.