Biota of the antarctic pack ice: R/V *Hero* cruise 76-6

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Previous studies of the crabeater seal (*Lobodon carcinophagus*) have dealt mainly with distribution patterns and biology during the austral summer when the pack ice is readily penetrated by ships and when these seals are sighted near the research stations that surround continental Antarctica. Most of the biological data have been derived from specimens taken from seals killed to feed dog teams, particularly in the area of the Weddell Sea. Data on aspects of social behavior and reproductive biology are minimal because partuition and breeding of crabeater seals takes place in late September and early October when the dense antarctic pack ice restricts ship movements.

Research on crabeater seals during their breeding season was initiated in 1975, using the National Science Foundation's research ship *R/V Hero* (Siniff and Reichle, 1976). *Hero* was well suited to support this research and was consequently used again in 1976 from 4 October to 5 November to work in the pack ice adjacent to the South Shetland Islands, Bransfield Strait, and the Gerlache Strait.

The main objectives of this research were to delineate (1) social structure and reproductive behavior, (2) daily activity patterns and local movements, (3) interactions between seals, ice, and other environmental conditions, and (4) population characteristics such as sex and age structure. distributional patterns, and density.

In addition to studies of crabeater seals, miscellaneous observations on leopard seals (*Hydrurga leptonyx*), elephant seals (*Mirounga leonina*), and Weddell seals (*Leptonyx weddelli*) were recorded.

For the crabeater, three types of social units were encountered: (1) groups consisting of a male, female, and pup, which we have termed "family groups" (figure 1), (2) pairs consisting of an adult male and female, which we have termed "mated pairs", and (3) concentrations of subadults of various sizes. Solo crabeater seals also were observed.

Whenever seals were encountered, we recorded their species, numbers, social group, location, and habitat type. In the pack ice we disembarked to work on crabeater seals when the floes were large enough for safe work. Such seals were immobilized using Sernylan (Phencyclidine hydrochloride), sometimes administered in conjunction with the tranquilizer Valium to reduce stress. Only adult seals were drugged. Through experimentation, we found that dosages of 0.2 to 0.3 milligram Sernylan per kilogram body weight worked well for most crabeater seals. There was some individual variation that may have been related to factors such as females with older pups being thinner and seemingly more susceptible to the drug. The males sometimes required heavier dosages. Detailed documentation of this aspect will be published later. In fast ice areas where there was plenty of room to maneuver, seals were immobilized without drugs, using a bagging technique (Stirling, 1966).

Following immobilization, we measured the heart girth and the straight line length from the tip of the nose to the tip of the tail. All seals handled were tagged with one number tag in each of the hind flippers. A nail from the fore flipper was collected for age determination, and a vaginal smear was collected from females to study time of ovulation. Radio transmitters were attached to the hind flippers of adults in selected family groups and mated pairs to make it easier to find them again. By relocating these seals we hoped to obtain data on pup growth rate and time of weaning, weight loss in lactating females, breeding behavior, and the duration of family groups and mated pairs. Transmitters were also set up on selected ice floes used by family groups to examine the fidelity of the seals to particular floes during the lactation period. Notes on behavior were made whenever possible, and limited sub-ice recordings of vocalizations were made.

Between 7 October and 1 November, 1976, we handled 30 family groups, 14 mated pairs, 3 subadults in pack ice, and 179 seals in fast ice areas, of which 74 were adults. In total, we tagged 306 crabeater seals, of which 24 were instrumented with radio transmitters. Unfortunately, none of the radios were found again.

In late October, we encountered several adult females alone on ice floes. These females were rather thin and appeared to have pupped earlier in the season. We speculate that these individuals had weaned pups and had either already mated and separated from males, or had not mated at all. Thus, the bond between the male and the female may last only until estrus is completed.

One of the more significant events of this past season's work was our discovery of concentrations of crabeater seals in some fast ice bays of the Antarctic Peninsula and the South Shetland Islands. The greatest concentration that we located was in Martel Inlet of Admiralty Bay, King George Island, where large numbers of crabeater seals were present from 12 October through 2 November (when we departed).

Figure 1. Family group on ice floe. *R/V Hero* behind.

In this area, fast ice remained across the major portion of Martel Inlet, and crabeater seals hauled-out along the ice edge. On 12 October we saw approximately 700 seals on the ice and estimated 1,500 in the vicinity. We worked in the area for 2 days taking measurements, returning again on 1 November to continue the work. Concentrations of 25 to 50 crabeater seals were also found in other bays along the Antarctic Peninsula and the South Shetland Islands, but none was as large as the one at Martel Inlet. We feel that large concentrations were present in other locations, but there were many bays we did not census. Moreover, the ice had already broken out in many of those we did search, so that any seals that might have been present previously were gone.

Such concentrations of crabeater seals have seldom been observed. Lindsey (1938) described concentrations of crabeater seals on fast ice at the Bay of Whales during February and March 1934. On the basis of body length, he classified the great majority of these individuals as less than 1 year old. Laws and Taylor (1957) noted large numbers of crabeater seals wintering together on fast ice in the Prince Gustav Channel off the east coast of the Antarctic Peninsula in the winter of 1955. Approximately 85 percent of these seals died of an unidentified epizootic that spring, and examination of a sample of the carcasses revealed that they were mostly subadult animals. Preliminary analyses of our data indicate that the concentrations we worked with were also mostly immature animals 1-4 years old. Most did not appear to be involved in pupping and mating.

The presence of crabeater seal concentrations such as we encountered probably puts a new perspective on the economics of sealing in the area. Previously it was considered that crabeater seals were mostly widely distributed in the spring, requiring considerable time and effort for harvest of significant numbers. Further study is needed to identify the population characteristics of seals involved in concentrations such as the one observed at Martel Inlet. Population parameters are particularly important because such concentrations may be composed of seals from a large area of pack ice.

Additional information was obtained on the different types of scars commonly seen on crabeater seals. We found further evidence to support the hypothesis that the parallel scars on crabeater seals are the results of wounds inflicted by leopard seals (Siniff and Bengtson, in press). We observed that the smaller, puncture-type wounds and scars around head and neck, front flippers, and upper rear flippers (figure 2) were caused by intraspecific interactions. On several occasions we saw females bite male crabeater seals in the area of the head, neck, and fore flippers producing puncture-type wounds rather than long gashes. We also obtained indirect evidence that male-male interactions result in wounds in similar patterns and locations.

Prior to the 1976 cruise, very little was known about newly born crabeater seal pups, and few had been collected (King, 1957). In addition to the pups in the 30 family groups we handled, we also found seven dead pups on ice floes. Five of the dead pups were alone, one was guarded by a lone adult male crabeater seal; and one was guarded by a female of a male-female pair. The skulls and other specimens were collected unless they had been damaged too badly by scavenging birds. Measurements and organ weights were also taken when possible.

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