

AN APPLICATION OF BEHAVIORAL RESEARCH IN ZOOS:
IMPROVING THE BREEDING ENVIRONMENT FOR CAPTIVE KING PENGUINS
(Aptenodytes patagonica)

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Originating as "sideshows," zoos have become institutions with important public responsibilities. Modern zoos educate as well as entertain the public, conduct animal and veterinary research, and work for wildlife preservation and conservation. Zoos and wild animal parks throughout the world maintain captive populations of thousands of species of animals. In maintaining such populations, zoos have become the last bastion for species on the verge of extinction in the wild.

Behavioral research is a relatively new activity at zoos, but it is fast gaining acceptance. The reasons for behavioral studies of wild animals in captivity are multiple. In addition to contributing to the general body of scientific knowledge, such studies provide specific information which may be applied directly in the conduct of a zoo's essential functions. When a wild bird or mammal is placed in a captive environment, problematical changes in its behavior often occur. Behavioral research is used to pinpoint these problems and to help find their solutions. Knowledge from behavioral research is used to improve captive environments and to contribute to the mental and physical well-being of the animals. With regard to the zoo's function in the preservation of a species, such knowledge may suggest ways of inducing successful reproductive behavior in a captive population.

At the Stone Zoo in Stoneham, Massachusetts, the Department of Behavioral Research, aided by zoo staff, students, and research volunteers, has been conducting several studies on avian behavior. One of these studies concerns the breeding behavior of the zoo's population of King Penguins. The following description of the King Penguin study is intended not only to inform you, but also to entice you to visit the zoo and to spend some time observing the avian collection yourself.

The King Penguin (Aptenodytes patagonica) is an impressive-looking species. Standing 36 inches tall, it is the second largest member of the penguin family, Spheniscidae (the Emperor Penguin, A. forsteri, is the largest at 48 inches). The King Penguin is colorful as penguins go, with vivid yellow tear-drop-shaped ear patches, a dusting of yellow at the top of the white ventral surface, a silvery tinge to the shiny black back, and a bright-pink lower mandible. Males and females look alike; indeed, they cannot be distinguished by external examination.

In the wild, these penguins are highly social, colonial-nesting birds. They nest in the Falkland Islands, which are located east of the southern tip of South America. Both the male and female of a pair take turns sitting on the sole egg, switching about four times during the 54-day incubation period. They also share parenting duties, which last about ten months before the offspring finally becomes independent.

The six King Penguins housed at the Stone Zoo are currently being studied because they have not reproduced successfully here. Reproduction involves a sequence of behaviors, including courtship, copulation, incubation, and parenting. For several years, the three original penguins of the Stone Zoo group occasionally produced eggs. Some of these eggs were determined to be infertile, and the others failed to hatch for unknown reasons. Mating had been observed and eggs had appeared, so it was known that both sexes were represented in the group of three birds. However, which was male or female remained a mystery. On one occasion, a bird sat on an egg for one week, then switched off to another bird. The second bird continued to incubate for another eight weeks without a break! The infertile egg was finally removed by the staff, but not without a struggle. (Infertile eggs rot from the warmth of incubation.)

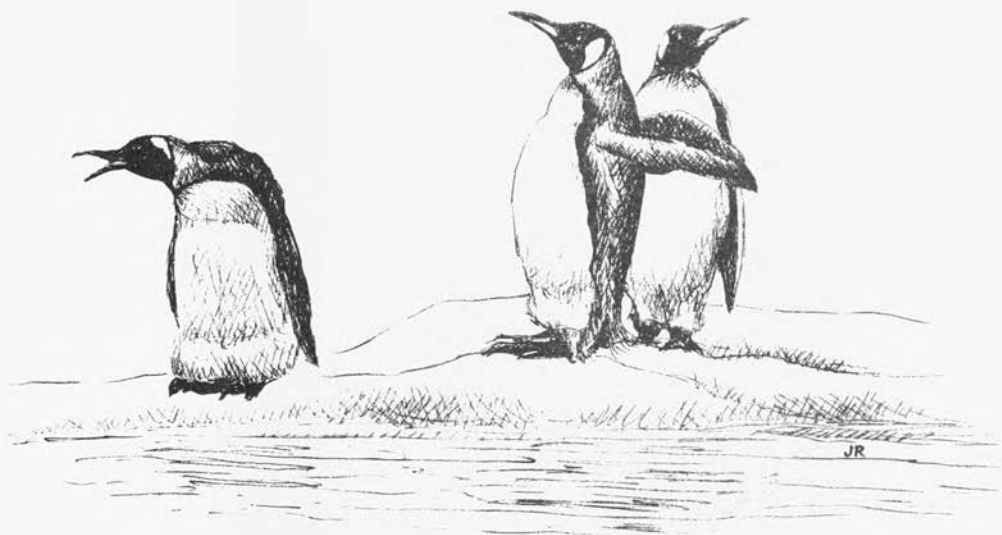
Research on other groups of penguins indicated that three birds may not be "social" enough to form a thriving penguin group. Perhaps three is insufficient for adequate social stimulation, such as competition for mates and breeding sites. On the basis of this information, three additional birds were acquired from a New York zoo this past spring.

The introduction of the three New York King Penguins to the Stone Zoo three went smoothly. For some time the birds remained in two groups of three, interacting infrequently, and apparently avoiding contact. If one group needed to pass the other, it would pass at a distance as far as the exhibit would allow. During the summer, intermingling between the two groups occurred with increasing frequency. In August, the first egg appeared. In September, mating was observed, and a few weeks later a second egg appeared. The two incubating pairs were switching incubation duties regularly. The two remaining birds appeared to be courting.

On an October evening, close to the expected hatch date of the first egg, a bizarre incident was observed by a research volunteer. The first egg was observed to have a large hole near the top. The penguins began pecking at the egg as if to eat it, and in a bout of excited activity, destroyed the egg. Bits of shell were strewn everywhere. The following morning, staff members attempted to remove a piece of the shell to determine what went wrong. With the entrance of the staff, the penguins again burst into activity, and the second egg was destroyed. Samples of the second egg were also collected.

Analysis of the shells revealed no evidence of fertility. Both shells were extremely thin, indicating a lack of calcium.

These observations and the associated analyses are providing much information which should be useful in improving the chances of successful breeding by the King Penguins. It is now known that there are two pairs of penguins, and that at least two females are capable of producing eggs. It appears that a third pair is forming. The analysis of the egg shells has led to a re-examination of the penguins' diet, working toward a diet with increased calcium for a thicker, stronger egg shell. The observations also point to areas of the exhibit that need to be redesigned. For example, the surface design does not appear to facilitate incubation. The penguins must move within close proximity to any incubating bird in order to pass from one place to another. The slight incline of the surface area could also be a problem if an egg should roll off of its foot-top "nest." The egg could easily crack or be difficult for the penguin to retrieve. The staff are optimistic that, with the modifications suggested from the behavioral studies, the King Penguins will indeed be able to thrive and successfully reproduce. Maybe next season!



King Penguins by Julie S. Roberts