Custom care for royal chicks

King penguin and emperor penguin chicks have been successfully raised by hand for the first time, report scientists at the Hubbs-Sea World Institute in San Diego. The two king penguin chicks recently raised came from eggs abandoned by their parents. The emperor chick was taken for hand rearing when it was six weeks because it received inadequate parental care. Because of their success, the scientists now plan to bring back only eggs, not birds, from future expeditions to Antarctica. "The logistics of transporting eggs are not as difficult as of transporting birds," says Frank Twohy, Assistant Curator of Birds. Sea World hopes to establish colonies of chinstrap and gentoo penguins, as well as other Antarctic and sub-Antarctic birds.

Penguins have been hand-reared at Sea World since 1976. Two dozen Humboldt penguins have been raised, and about 80 Adelies. Once they join the colony, most will have nothing to do with the keepers, except of course to take a fish, Twohy says.

The two king penguin chicks, hatched in an incubator, appear to have thrived on human care. They fledged—replaced their juvenile down with waterproof plumage—at seven months of age instead of up to 13 months, as in the wild. The scientists say the rapid development occurred because the birds were fed daily, whereas in nature they may go without food for weeks at a time. Hand-rearing of a third king penguin has just begun.

Photos: Sea World

E.P., the hand-reared emperor, with "security" dog; a rear view at left.

The recently hand-raised emperor penguin, which the scientists call "E.P.," is one of seven emperor chicks hatched at Sea World since 1980, when the facility achieved the first emperor penguin hatching outside the Antarctic (SN: 11/8/80, p. 297). Because emperor chicks sit on the feet of their parents and are covered with a fold of abdominal skin, the young penguin was given a large toy—a stuffed dog—that it could nestle under for security. The chick, which weighed less than 4 pounds when it was taken (underweight about 30 percent), now at five and a half months is normal for its age, a strapping 40 pounds.

—J.A. Miller

Monkeys too: Relentless immunity disease

A research center that breeds monkeys has suffered from four outbreaks of a disease resembling the mysterious and deadly human illness called acquired immunodeficiency syndrome (AIDS). The recently recognized human disease has reached epidemic proportions in male homosexuals and has also been recognized among Haitians, hemophiliacs and intravenous-drug abusers (SN: 11/14/81, p. 309; 9/25/82, p. 202). Victims appear to have depressed immunity and succumb to a wide variety of infections and to a rare form of cancer.

The monkey disease may provide an animal model to help scientists determine the cause of the human disease. In the Feb. 19 LANCET, Roy V. Henrickson of the California Primate Research Center in Davis and colleagues describe the most recent epidemic, which was set up as an experiment, as "a striking outbreak of disease with a relentlessly progressive clinical course ending in the death of all animals affected."

The experiment began in August 1981 when 56 rhesus monkeys were added to eight seemingly healthy juveniles of a group suffering from a previous outbreak. Over the next 15 months, 24 of the animals died, including two of the original eight. Symptoms of the monkey disease and human AIDS include fever, diarrhea, weight loss and infections with fungi, bacteria and viruses, including cytomegalovirus. In addition, the monkeys developed a type of tumor not previously seen in the colony. The New England Regional Primate Research Center has also had monkeys die of an illness resembling AIDS.

So far, data suggest that direct contact, the licking, biting and scratching that is part of monkey social life, is required for disease transmission. Asked whether the investigators fear the AIDS-like disease will be passed to people, Kent G. Osborn of the California group says, "Not really." But he points out that anyone handling rhesus monkeys takes precautions against viral infection.

—J.A. Miller

Ear implant conveys robot-like speech

Clinical tests of an electronic implant for the inner ear confirm that at least primitive hearing can be restored to some people who are now profoundly deaf. The eight persons who have had devices implanted describe what they are now able to hear as "some sort of unnatural type of speech — like a robot's," according to Yit Tong, a member of the research team developing the implant system at the University of Melbourne in Parkville, Australia.

The implant system consists of four basic parts: a speech processor, pulse transmitter, signal decoder and a 20-electrode array. Only the last two parts are actually implanted. Using a microphone, the pocket-sized speech processor picks up speech signals and filters the acoustic data, Tong explains, "extracting the important information in the speech signal and converting this information into electric impulses." Specifically, the electronic circuitry filters out three important components of the speech waveform: the fundamental frequency (frequency of vocal cord vibrations), the second formant (a series of resonant frequencies of speech formed by the shape of mouth and lips) and second-formant energy (second-formant volume, measured in decibels).

These three pieces of information are then converted into a pulse pattern, which is in turn converted to a series of digital signals. Transmitter coils, connected to the processor and fitted to the outside of the ear, relay the digital signals via radio waves to an implanted "electronic package." (The package resides in a well that has been drilled into the mastoid bone.) It is the responsibility of this unit to decode the digital message into a series of electrical pulses.

Electrodes attached to the package are positioned along the cochlea's scala tympani, deep within the inner ear. The position of each electrode corresponds to a region of the inner ear that is sensitive to the stimulation of a different frequency, Tong says. When electric pulses are delivered to the electrodes, they stimulate — either simultaneously or individually — nerve fibers corresponding to different frequency sensations. Tong says each processed speech signal is relayed as a combination of two pitches delivered together. A report in the Feb. 25 SCIENCE by Tong and colleagues describes how the implant system processes speech signals into coded electrical impulses. It employs processes similar to techniques being used by "artificial ear" researchers in the United States (SN: 11/27/82, p. 340).

Though the Melbourne team is still refining their system, Tong says a Sydney-based biomedical firm named Nucleus is preparing commercial models of an existing design.

—J. Raloff