

Summary.—A new packaging assembly for transmitter crystals is described. The primary advantage for long term studies is the ease of battery replacement upon recapture of a harnessed bird. The equipment was used on adult Herring Gulls in 1978 and 1979. There was no difference in the fledging success of harnessed pairs against control pairs.

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Belly-soaking by Incubating Common, Sandwich, and Royal Terns.—Belly-soaking consists of wetting the ventral feathers and transporting water to the eggs or chicks (Maclean, J. Bombay Nat. Hist. Soc. 72:74–82, 1975). It may function in cooling the incubating adult exposed to intense insolation, cooling of the eggs, supplementing the water intake of chicks, and/or increasing nest humidity (Maclean 1975; Grant, J. Bombay Nat. Hist. Soc. 75:148–152, 1978). Experimental studies in the Black-necked Stilt (*Himantopus mexicanus*) suggested that belly-soaking was a response of the parent to cool itself, with the eggs and/or chicks benefiting secondarily (Grant 1979, Ph.D. thesis, Univ. California, Los Angeles).

I observed belly-soaking by incubating Common (*Sterna hirundo*), Sandwich (*S. sandvicensis*), and Royal terns (*S. maxima*) on 25 May 1980 at a mixed-species tern colony near Morgan Island, Back Sound, Carteret Co., North Carolina. From a boat anchored 100 m offshore, I watched undisturbed incubation from 1500 until 1548 at an ambient temperature of about 30°C. The wind was light and the sun was unobstructed by clouds during the observation period. Indicative of the heat stress, most incubating terns were panting. During this time I observed belly-soaking by 6 Common, 2 Sandwich, and 7 Royal terns. During the belly-soaking flights, the incubating bird left the nest, flew to the water, wetted its belly by skimming low over the surface of the water, and returned to the nest. These flights resembled drinking on the wing but were “deeper” flights where ventral plumage appeared to plow through the water. Drinking occurred on most such flights. Most belly-soaking flights resulted in the eggs being exposed for 1 min or less. One Common Tern belly-soaked by dropping vertically from about 2 m above the water in such a manner that the ventral plumage contacted the water first (rather than bill first as in plunge diving). This “belly-first plunge dive” belly-soaking behavior has also been seen in heat-stressed incubating Forster’s Terns (*S. forsteri*) at the Salton Sea, California (Grant 1979).

Belly-soaking has not been previously reported in Common, Sandwich, or Royal terns but occurs in many species of terns nesting in hot environments (see reviews by Maclean 1975, Grant 1978, 1979). The stimulus which triggers belly-soaking behavior of incubating terns is still unknown.

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Mate-Swapping of Sandhill Cranes.—Normally, Sandhill Cranes (*Grus canadensis*) mate for life and return annually to the same breeding territory (Walkinshaw, *Cranes of the World*, Winchester Press, New York, 1973). However, if a pair member dies the other will remate (pers. observ.). On rare occasions an individual has remated while both members of the pair were alive.

On 5 August 1969 a Greater Sandhill Crane (*G. c. tabida*) pair and their 2 young were captured, banded, and released 52 km S of Burns, Harney County, Oregon, on Malheur National Wildlife Refuge (NWR). All 4 cranes were banded above the tibio-tarsal joint with a lock-on U.S. Fish and Wildlife Service band on one leg, and a plain metal band on

the other. Single 3.5 cm colored plastic bands were placed above the metal bands for individual identification.

Shortly after banding, the family group apparently migrated from Malheur NWR, and was not seen again until 14 December 1969. Accompanied by 1 young crane, the pair was seen near Thornton, San Joaquin County, California, where they wintered. On 3 March 1970 the pair was located on a nesting territory about 1.6 km NW of the banding site, and was regularly seen through 11 April 1970.

In 1971, the male returned to the territory, mated with an unbanded female. I assumed his former mate had died the previous winter. But, during August 1973, the color-marked female was seen with an unbanded male about 5 km SW of the banding site. On 1 May 1974, the marked female and this new mate were found nesting adjacent to her original territory. This pair was seen near Thornton, California, on 22 January 1976, and was last seen on 2 April 1977 on their territory. The color-marked male continued to occupy the original territory through 1978.

A similar incident of "mate-swapping" occurred at Grays Lake NWR, Caribou County, Idaho, in 1972 (R. Drewien, pers. comm.). The color-marked male also continued to occupy the original territory, while the female nested elsewhere. For several years the male and his new mate have been used successfully as foster parents for transplanted Whooping Crane (*G. americana*) chicks at Grays Lake.

Which pair member initiates "mate-swapping" is presently unknown; however, there is evidence suggesting the male could be responsible. Twice R. Drewien (pers. comm.) has seen males from nesting pairs copulate with other females on adjacent territories. In April 1967, I saw a male which attempted to copulate but was driven off the female by another male before coition was completed. The aggressive male had been involved in a territory dispute with several non-breeding cranes before the incident occurred. None of the birds was color-marked so it was not evident which male was mated with the female. It is possible the copulating birds were not mates.

Of the hundreds of Sandhill Cranes marked in North America during the past 15 years, I know of only these 2 records of "mate-swapping." Apparently, it rarely occurs and what is responsible for its occurrence is unknown.

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