

Several years ago I was working on a study on the breathing of birds in flight and needed a large bird. I felt that a gull could be easily captured by putting a sedative in a sardine, rather than erecting complex and heavy nets. About a half teaspoon of chloral hydrate was put in a sardine and thrown to a gull. The bird swallowed it very quickly, regurgitated it, and took a drink of sea water. The drug took effect very quickly: the gull rocked back on its tail feathers and flopped over on its side. When approached, the gull, which immediately took off in company with a number of other gulls, flew several hundred yards as well as any of the other birds! Upon landing, it immediately collapsed and flopped around on the ground.

Two problems were then considered: 1) is this sensitivity restricted to the Western Gull, and 2) is the sensitivity limited to the effect of chloral hydrate; or is it the general effect of sedatives on birds?

White-crowned Sparrows were trapped on the campus of San Francisco State College and hand-fed with very small crystals of chloral hydrate. The sparrow would tend to squat on its legs, rather than flop over, and refused to hop. After some urging it could fly handily, however.

To test the specificity of the sedatives, ethyl alcohol was also tried. The sparrows were strongly sedated with 0.2 ml of ethyl alcohol, and again they could fly but would not hop. During the recovery from light anesthetization with ether or chloroform similar results were observed.

In both species, recovery was complete.

In addition to the sedatives mentioned, additional drugs with sedative action were tried: potassium bromide and meprobamate ("Miltown"). Crystals were hand-fed to the sparrows. In both of these cases the birds appeared uniformly affected. They refused to hop or to fly.

Lorenz (1956. In "l'Instinct dans le comportement des animaux et de l'Homme," page 260, Masson & Co., Paris), mentions the work of von Holst who found that decerebrated pigeons or those with labyrinth disturbances could fly and not walk.

This work was initiated under grant RG-8623 of the National Institutes of Health, U.S. Public Health Service.—JACK T. TOMLINSON, *Biology Department, San Francisco State College, San Francisco, California, 11 March 1966.*

Breeding behavior of a uniquely marked Starling.—The escape of an adult male Starling (*Sturnus vulgaris*), instrumented for telemetering physiological parameters, provided an opportunity to observe the breeding behavior of a uniquely marked bird. This bird had been equipped in October 1964 at the Wildlife Research Center, Denver, Colorado with two electroencephalogram sensors, two electrocardiogram sensors, a respiration transducer, and a temperature transducer (Thompson, 1964. *Proc. 2nd Natl. Biomed. Sci. Instrum. Symp.* 2:123-130). The bird was marked by white masking tape on its back, which served to protect a cannon plug and the exterior wires from the internal sensors and transducers, and also by an elevated white "cap" of dental cement on its head, protecting the two electroencephalogram sensors (Fig. 1).

The Starling escaped 15 March 1965 and was first sighted 2 April feeding on a lawn one-quarter mile away. Identification was made by the "cap" on its head and tape on its back. The bird was observed courting a female in the same area 16 April, and was observed regularly until 6 May to determine any effects of surgery, color marking, and laboratory confinement. Motion pictures were taken of the feeding and nesting activities of the two birds. During this period the male copulated with his mate and, on one



FIG. 1. Adult male starling with the white "cap" on the skull and white tape on the back.

occasion, with a visiting female while his mate was present. The mated pair carried food to their nest constructed in the attic of a wooden building.

On 7 May an unsuccessful attempt was made to capture the male with a mist net. The female was captured, however, and subsequently released, but this resulted in abandonment of the nesting site by the pair. Sounds of nestlings were heard at this time. Two days later entrance to the attic was gained and four dead nestlings, about 5 days old, and one egg were in the nest.

On 30 June 1965 the male Starling, too weak to fly, was captured 4 miles from the escape point by Kevin Krabacher of Lakewood, Colorado. The bird was returned to confinement but died the following day. Gross examination showed the "cap" and sensors missing and the respiration transducer torn loose from the body musculature. At death the bird weighed 57 grams, a loss of approximately 20 grams. Death was attributed to weight loss, and infection caused by loss of the sensors and the transducer.

In the wild the bird showed no abnormal deviation in its territorial breeding behavior. The stress of surgery and the implantation of sensors and transducers apparently did not affect reproductive physiology; for example, plumage changes and the ability to fertilize ova. Nor did the resultant color marking with the "cap" and tape interfere with mate selection and acceptance. The absence of disruptive effects on the breeding of this color-marked starling agrees with observations on breeding color-marked Canada Geese (*Branta canadensis*) (Helm, 1955. *J. Wildl. Mgmt.*, 19:316-317; Ballou and Martin, 1964. *J. Wildl. Mgmt.*, 28:846-847), and Mourning Doves (*Zenaidura macroura*) (Goforth and Baskett, 1965. *J. Wildl. Mgmt.*, 29:543-553).—C. VAL GRANT, Bureau of Sport Fisheries and Wildlife, Wildlife Research Center, Denver, Colorado, 6 May 1966.