

unknown period is necessary before pairs are capable of undergoing the physiological changes associated with normal breeding.

Discussions with others involved in keeping Starlings in captivity indicate that isolated breeding incidents have occurred elsewhere, specifically at the University of California, Davis (R. J. Planck, pers. comm.). Again, the situation was one of prolonged captivity in large enclosures. To my knowledge the events reported here represent one of the few deliberate attempts to breed the species in North America. As Starlings are frequent targets of avian control efforts, research on a captive breeding population would be advantageous, as in trying to assess the effects of anti-fertility chemicals on reproduction.—ROBERT L. MILLER, *Department of Conservation, Cornell University, Ithaca, New York 14850. Present address: State Conservation Department, Wildlife Research Laboratory, Delmar, New York 12054.*

Goslings descend from aerial nest, attacked by Bald Eagle.—On 30 April 1960, while engaged in a nesting survey of Canada Geese (*Branta canadensis*), Michael Stephen and I watched six goslings descend from an aerial nest and a subsequent attack on them by an adult Bald Eagle (*Haliaeetus leucocephalus*). The incidents occurred at midday near the mouth of the Flathead River, Flathead County, Montana. Fluctuating water levels have created islands where the river enters Flathead Lake and killed mature cottonwood trees on their perimeters. In winter and spring low lake levels leave many of these normally flooded areas dry.

While we searched one of these areas a goose, later identified as the male, circled us, honking excitedly. We suspected a nest was nearby and began searching for tell-tale tufts of down or feathers high in several trees with broken tops. We soon located the nest, with the female on it, about 50 feet from the ground in the top of a broken-off tree. As we approached the female flew from the nest. We immediately heard the calls of the young and could see their heads moving above the edge of the broken tree trunk. Within seconds a gosling climbed from the nest and fell to the sand at the base of the tree. It got to its feet at once and started for the water, about 80 yards distant, where both parents had landed and were calling loudly. The first gosling was followed in rapid succession by four others, two leaving the nest simultaneously, all landing safely in the sand. The sixth hesitated for perhaps 30 seconds before jumping. It struck a small limb protruding from a brush pile near the base of the tree, and at first seemed dead. But it was only stunned, and after 2 to 3 minutes it somewhat unsteadily followed the others which had joined the parents and had swum some 30 to 40 yards out from the shore.

Just as the sixth gosling recovered from its fall, the calls of the parents became more alarmed. Our attention had been on the stunned gosling for a minute or more and we had failed to see the approach of a mature Bald Eagle. We looked up and saw the eagle just as it dived on the goslings. The parents had taken positions, each with its wings partially extended, on each side of the five closely grouped young and were honking excitedly. The eagle dived again. As it approached, the parents raised up from the water, honking and striking at it with their wings. The eagle again pulled out of the dive to avoid the beating wings of the adult geese. Five times it dove on the geese. Each time it was repulsed in the same manner. After the last attack the eagle flew south about $\frac{1}{2}$ mile and landed in a dead tree. The entire encounter, from first attack until the eagle flew away, lasted perhaps 4 to 6 minutes. By this time the sixth gosling had reached the water and shortly joined the family. The eagle did not attack the geese again and when we left a half hour later it was

still perched in the tree. The geese had swum out about 300 yards and had ceased their alarmed calling.

Craighead and Stockstad (J. Wildl. Mgmt., 22: 206, 1958) describe the descent of goslings from an aerial nest and mention the death of a gosling by falling on, and being impaled by, a sharp stick. Bent (Life histories of North American birds of prey, U. S. Natl. Mus., Bull. 167, 1937) lists ". . . all kinds of ducks and geese" as included in the diet of the Bald Eagle, but makes no mention of young waterfowl. In this instance the adults clearly prevented the eagle from pressing its attack. Such protective behavior by the parents is important in the survival of goslings, and may be a factor in determining population size in geese.—MAURICE G. HORNOCKER, *Cooperative Wildlife Research Unit, University of Montana, Missoula, Montana 59801. Present address: Cooperative Wildlife Research Unit, University of Idaho, Moscow, Idaho 83843.*

Note on bill color of the Ruddy Duck, *Oxyura jamaicensis rubida*.—The adult male Ruddy Duck exhibits a seasonal change in bill color from black to blue to black each year. Hays has made the following observations on the timing of color changes. In flocks wintering along the east coast of the United States, a few males begin to show the bright blue bill color early in March. Most males have blue bills by the time they reach their breeding grounds in late April or early May. Bills begin to look black again toward the end of July or in August.

To our knowledge, this note reports the first investigation of the cause of this very striking bill coloration in the Ruddy Duck. Our purpose was to determine whether the seasonal changes in color are caused by a specific pigment or solely by structural characteristics resembling those that are responsible for blue feather color (Van Tyne and Berger, *Fundamentals of ornithology*, New York, John Wiley and Sons, 1959, p. 100).

Four male Ruddy Ducks were collected by Robert Nero near Minnedosa, Manitoba, Canada on 9 July 1968. Their heads were removed and placed on dry ice within 10 minutes of collection and were kept on dry ice during shipment and storage. Our analyses began on 16 July 1968.

When the bills were thawed under running tap water, we found that the bright blue color was well-preserved. The soft sheath dissected from the bone of the bill appeared blue on the surface with a black layer underneath that had been adjacent to the bone. Pieces (2 to 4 cm² in area) were soaked overnight in the following solvents: acetone, chloroform, diethyl ether, dilute NH₄OH, dilute HCl, and glycine-NaOH buffer (pH 9.5). These solvents were selected because they represent a broad spectrum of hydrophilic to lipophilic characteristics. After 16 hours at room temperature, the solutions remained colorless and there was no apparent pigment extraction, although in acetone some loss of color occurred. Dilute NH₄OH (1.5 M) loosened a colorless surface layer, leaving a spongy tissue that appeared blue above an underlying black layer.

Using sheath that had been soaked in NH₄OH (i.e. with the colorless surface layer removed) and working under a dissecting microscope, we next tried to separate the blue surface material from the underlying black tissue. Scraping the blue layer away removed only colorless material, and the underlying black layer remained. When the black layer was removed, the blue color disappeared from the remaining tissue. When the spongy layer was compressed, the blue color disappeared and only the underlying black pigmentation could be seen. It thus appeared that the only pigment present is the black substance located in the lower portion of the spongy sheath tissue.