

## USE OF HUMAN HAIR BLEACH TO MARK BLACKBIRDS AND STARLINGS

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In their annotated bibliography, Marion and Shamis (1977) identified 10 major types of bird marking techniques. Plumage coloring was first successfully tried by Moffitt (1942) who used a mixture of aniline dyes and alcohol to stain the plumage of Sage Grouse (*Centrocercus urophasianus*). Uses of rhodamine B, B-extra, malachite green, purple batik (Wadkins, 1948), and airplane dopes (Swank, 1952; Helm, 1955) were introduced later, but all techniques were limited because stains and dyes faded (Wadkins, 1948; Helm, 1955) or failed to color dark plumages (Moffitt, 1942). Enamels and dopes overcame these problems but caused feathers to mat (Swank, 1952) or required repeated applications to achieve an adequate mark (Cottam, 1956).

Our research on the foraging ranges of Common Grackles (*Quiscalus quiscula*), Red-winged Blackbirds (*Agelaius phoeniceus*), Brown-headed Cowbirds (*Molothrus ater*), and Starlings (*Sturnus vulgaris*) required a highly visible mark that could be applied economically to large numbers of birds. Bleaching of pelage with ammonium hydroxide has been used for over 20 years (Morejohn and Howard, 1956), and for our purposes a bleaching procedure seemed ideal because it would provide a sharply contrasting mark readily visible among a flock of blackbirds. Human hair bleach has been used successfully on pelage (LeBoeuf and Peterson, 1969; Farentinos, 1972), and recently Ellis and Ellis (1975) bleached small patches of feathers on immature Golden Eagles (*Aquila chrysaetos*). Our objective was to develop a technique to bleach rapidly all contour feathers (except head and neck) on large numbers of blackbirds and starlings.

### METHODS

The most satisfactory bleach was a commercial strength product, Roux Rapid Hair Lightener® (use of registered trade mark does not imply endorsement of the product by the U.S. Fish and Wildlife Service or The Ohio State University). This product, a dry powder, required mixing with 20-volume (2%) hydrogen peroxide. Mixing was done according to package instructions except that the volume of 2% hydrogen peroxide mixed with the bleaching powder was reduced to obtain a thin, pasty mixture rather than the more liquid state recommended for application on recently shampooed human hair. The bleach paste was then daubed on all exposed plumage surfaces except the head and neck. Birds were held in an incubator at 30–40°C for 20–30 min to allow the bleach to take effect, removed, rinsed thoroughly in warm running water, and returned to the incubation chamber to dry and preen.

Miscellaneous materials cost \$25, and the bleach and peroxide re-



FIGURE 1. A Common Grackle treated with human hair bleach.

quired to mark 619 birds cost less than \$175; thus the cost per bird, excluding labor, was about \$0.30. The most limiting factor of this technique was an average of eight minutes of processing time per bird.

#### RESULTS

The procedure yielded a blackbird that is best described as blond (Fig. 1). The color might also be described as yellowish, cream, ivory, buff, or orangish-white. Some flight feather damage was evidenced by split vanes and labored flight, a result of a severe bleaching under high temperatures or prolonged exposure. This damage was an unimportant mortality factor after we became familiar with the speed of the bleaching process at various temperatures. No damage to body feathers, important to thermal regulation, was noted, because the bleach paste was not applied (rubbed in) to proximal portions of body feathers; however, we did spread each wing to maximize bleach contact on all exposed surfaces of the primaries and secondaries.

Mortality rates as high as 50% in one group of 50 birds were reduced to levels of 6% or less by the end of the study. Most mortality was caused by aggressive behavior between birds, and in this respect grackles and cowbirds proved most difficult to handle. By isolating the most aggressive birds, handling birds by conspecific groups, holding birds in feed sacks rather than handling cages, and reducing workroom noise, we reduced mortality due to aggressive behavior. Remaining mortality was

attributed to stress during the bleaching process. Because no birds exhibited skin irritation, direct bleaching mortality was attributable only to improper incubation temperatures (hypo- or hyperthermia) or flight feather damage.

People within the foraging range of the roost readily reported sightings of blond birds. During three months when 619 blond birds were released, 95 sightings were reported (60 by area residents, 23 by project personnel, and 12 from 50–1,200 km from the roost). Most sightings were made in residential areas (57%) or at animal husbandry units (18%), and marked birds were generally with mixed flocks of up to 5,000 birds. Observations made by project personnel as well as the general public suggested that color marking caused no social rejection, loss of foraging abilities, or other abnormal behavior during this nonbreeding period. The visibility of marked birds was especially good when a marked bird was in a flock that had been flushed. In such cases marked birds were sighted from as far as 1 km.

#### DISCUSSION

The bleaching procedure was simple, but it was important to remember that an oxidation reaction was driving the entire process and the speed of this reaction was directly proportional to the amount of pigment oxidized. Cold feathers, a bleach mixture more than 1 hr old, or a mixture below 22°C contributed to poor results. An incubation temperature near 35°C (for 25 min) gave best results because it accelerated oxidation and held the birds in their thermal neutral zone while the insulative efficiency of their plumage was temporarily impaired.

Arnold and Coon (1971), who had 500 sightings from 2,500 marked Brown-headed Cowbirds (rate = 0.20 sighting/mark) using wing tags and leg streamers, reported a sighting rate higher than our 95 sightings per 619 marks (0.15 sighting/mark). The higher rate was probably achieved because they studied flock loyalty and were likely to note simultaneously numerous color marks in repeated sightings (Arnold and Coon, unpubl.). Guarino (1968) used leg streamers up to 10 cm in length and reported various sighting rates ranging from 0.0058 to 0.021. The latter rate was for color-marked Red-winged Blackbirds in a wintering situation similar to the conditions of this study. Thus, our technique was at least seven times more efficient.

Two changes would improve the bleaching technique described. First, an incubation chamber with forced air heating would shorten drying times and reduce aggressive behavior. Second, a method to spray the bleach on the birds would greatly reduce the labor and amount of bleach required.

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