

4. That some starlings, especially those present in the roost in March, were still within 50 miles of the roost site in the nesting season after the roost had broken up.

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IDENTIFICATION OF EXPERIMENTAL BIRDS WITH THE AID OF FEATHER AUTOGRAFTS

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This paper describes a technique for permanently marking birds by grafting feathers on the birds' heads or elsewhere on their bodies. During a long-term study of the ecology and physiology of avian sterility, it was necessary to provide long-lasting marks that could be instantly identified on various treated groups of gulls (*Larus argentatus* and *L. marinus*). Several different methods of field marking had been tried; feather dyes, wing tags, nare rings, and colored leg bands (Wetherbee *et al.*, 1964). Since none of these are permanent tags, feather autografts on nestling gulls were tested.

The following procedure was used on Muskeget and Nantucket Islands, Massachusetts, during the summer of 1965. The chick's pollex (thumb) was snipped off with small surgical scissors, and a small hole was snipped in the skin of the crown. With chicks less than a week old, the pollex was held by forceps; with chicks over a week of age, the developing alula feathers were held by thumb and index finger. The excised pollex was inserted through the incision in the skin of the head with the alula feathers (if any) protruding in the desired angle. The area over and adjacent to the incisions were then covered with spray-on-bandage (Alberto-Culver Co.). The entire procedure, once perfected, required about one minute. Plate 1 illustrates a 10 to 11 week-old Great Black-backed Gull chick that was feather grafted when it was a few days old.

The pollex was selected as a transplant because it allowed the rapid removal of feather follicles without damage to the chick. Bleeding was minimal or nonexistent. Theoretically, any feather

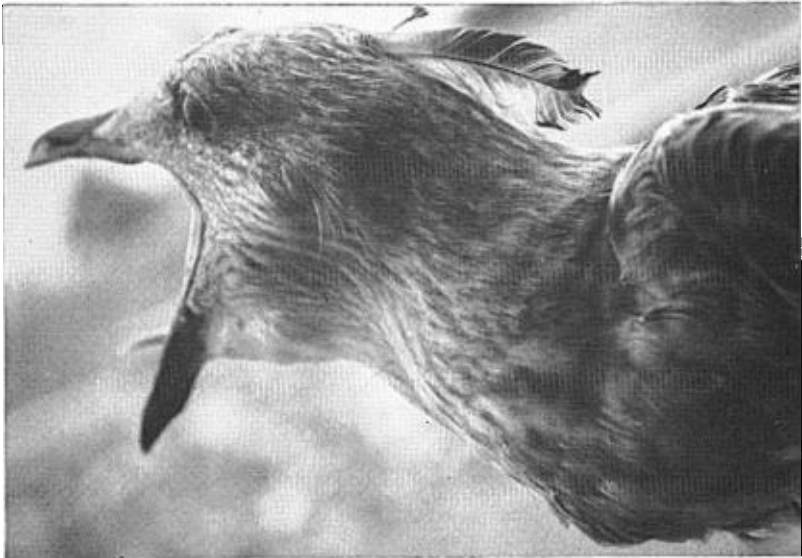
This study was part of the Ecology and Physiology of Avian Sterility Project conducted by the Massachusetts Cooperative Wildlife Research Unit (supported by the U. S. Bureau of Sport Fisheries and Wildlife, the Massachusetts Division of Fisheries and Game, the University of Massachusetts, and the Wildlife Management Institute) and the Massachusetts Agricultural Experiment Station.

follicles from the same bird can be used in such an operation. Primaries for example were also transplanted, but with consequent excessive bleeding. Damage to the feather follicle reduces the chances of a successful autograft.

The feather transplant proved to be ultimately successful if the pollex was still in place after 24 hours. There was apparently no adverse response from the attentive parent toward the treated chicks. As a further test of parental behavior, an area of skin 2.5 cm² was snipped from the crowns of several chicks to see if the exposed red area would elicit a pecking response. No response was noted, and the area healed over in five days.

Fifteen experimental Great Black-backed Gulls received transplanted pollices as young chicks. When seven of these birds were recaptured prior to fledging, the alula feathers were growing successfully. Several groups of experimental birds were identifiable by orientation of the pollex in different directions: pointing to the rear as illustrated in Plate 1, or forward; located on top of the head, back of the head, or in other feather tracts, especially of contrasting color; and by the missing alula of the right or left wing. Transplanted feather follicles generate feathers through successive molts according to the morphology of the place of origin. Color intensity, however, may be influenced slightly by endocrine activity in the new area (Danforth and Foster, 1929: 443).

In preliminary tests with quail (*C. coturnix*) and Starlings (*Sturnus vulgaris*), the molted feather has been replaced with a new one,



A Great Black-backed Gull which had a pollex transplanted to its head when it was a few days old.

which continues as the tag. The alula feathers did not all molt at the same time from the birds used in the preliminary tests, therefore at least one feather was always observable. None of the experimental gulls have reached adult plumage and the possibility of a color change has not yet been determined.

The successful use of this tag in the gull illustrates the potential usefulness of the technique in wildlife studies. This marking technique, which is an old one to the experimental embryologist, would be applicable to studies of most wild bird species and can be extended to include mammalian pelage grafting.

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GENERAL NOTES

Cedar Waxwing Response to Mirror. In October 1964 I acquired a Cedar Waxwing (*Bombycilla cedrorum*) with an injured wing. The wing was not broken but the bird couldn't fly so I put it in a cage. The waxwing had no difficulty in manoeuvring about in the cage and after about a week I opened the door to see if the waxwing could fly. It sat in the doorway and soon took off but flew only a few feet before falling to the floor. Every few days I would test its ability to fly as I was anxious to release it as soon as possible. The day came when the bird was able to fly quite well and this time it flew straight across the room and landed on the parakeet's cage. This cage is a large, home-made one measuring 18" x 22" x 30" high. Since it appeared as though the waxwing wanted to enter the parakeet's cage I decided to open the door and see what would happen. In a surprisingly short time the waxwing flew to the open doorway and then in to the nearest perch.

Once inside it flew from perch to perch, looked into both mirrors and settled down in front of one of them. In fact, it showed a great deal of interest in the mirror: it sidled up to it, "talked" or "sang" to it, nudged it, "danced" in front of it, raised and lowered its crest and at times literally shrieked at the mirror which suggested to me the calling together of the flock. Without doubt the waxwing was interested in its reflection in the mirror.

Earlier the waxwing had shown a preference for the fruit of red cedar so I put whole branches of cedar laden with fruit in a jar of water right in the cage, therefore when the waxwing moved into the parakeet's cage I put the cedar in there as it showed no signs of going back to the smaller cage for food. However, it got to the point where I was bringing in larger branches, too large to go in the cage conveniently so I placed them in a vase outside. The waxwing flew out to eat and then went back in again to perch near the mirror.