

## ADAPTIVE BEHAVIOR UNDER HANDICAPS OF SEVERAL SPECIES OF MICHIGAN BIRDS

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**D**URING the last 33 years (1932–64), in the course of banding more than 120,000 birds, I have recorded numerous examples of foot, beak, and wing defects which might be expected to seriously handicap several species of birds in feeding, perching, and moving around in their normal environment. I have noted that many of these birds were able to adapt themselves to these handicaps, provided they were not too severe, in ways that enabled them to continue for some time to feed and move around the landscape. By far the greater number of these defects were of a minor nature, such as the loss of a whole front or hind toe, or only the forward joint on some of these appendages, or the lack of a small amount of both upper and lower mandibles and/or the loss of the tips of either. Occasionally a more severe defect was observed, as in the example of Mourning Doves losing part or all of their toes on one or both feet (Nickell, 1964. The effects of probable frostbite on the feet of Mourning Doves wintering in Southern Michigan. *Wilson Bull.*, 76:94–95).

Downy Woodpecker (*Dendrocopus pubescens*)—On 9 September 1961 I captured by net a female Downy Woodpecker at Cranbrook, Bloomfield Hills, Michigan. I immediately observed that this bird did not have a right leg nor was there any evidence that it had ever developed one in the embryonic stage. There was no scar nor any sign of a break in the skin. When I pulled the feathers aside and gathered the skin between my forefinger and thumb, I felt a small lump of what appeared to be cartilage at the place where the leg would normally be attached to the body. This bird was banded on the left leg and released. It immediately flew to about 10 feet above the ground on the trunk of a nearby tree and began its ascent, but in an abnormal fashion. Instead of climbing vertically, it climbed rather awkwardly at a diagonal. I observed this bird through 7 × 35 field glasses at a distance of about 30 feet for several minutes. Its right wing was open and the shoulder was pressed against the bark, evidently in compensation for the absence of its leg (Fig. 1). It was handicapped in its efforts to climb and move around the trunk of the tree. However, this bird had undoubtedly survived in this condition for some time as it was apparently healthy. The under portion of the shoulder of the wing was calloused and rough, indicating that it had used the wing in the fashion described above since leaving the nest.

Purple Martin (*Progne subis*)—In early June 1940 an adult male Purple Martin was brought to me with a badly injured right wing. I attempted to place splints on this wing as no bones were protruding, but the bird would



FIG. 1. Female Downy Woodpecker with wing extended, showing compensation for absence of right leg. Drawn by Betty Odle.

not accept the splints and bandage, tearing them off with its beak within a short time. I placed another splint and bandage on the wing with a neck-yoke attached in an attempt to prevent the bird's getting at the injured wing with its beak and feet. Almost immediately it grasped the neck-yoke with its feet, nearly strangling itself. I immediately removed the bandage and yoke, deciding to let nature take its course.

Realizing that this bird in nature obtains most of its food and water on the wing, I wondered if it could be taught to eat without force-feeding. I placed a shallow clear glass laboratory dish of mealworms (*Tenebrio obscurus*) before it and another dish with water. The squirming of the mealworms elicited some interest, but it made no effort to pick them up. It apparently did not recognize the water. This behavior lasted for about 4 days during which time I force-fed the bird. I also forced its beak down into the water, but it would make no attempt to drink. I therefore dropped water into its throat from a teaspoon. It swallowed the water also. After repeating the feeding-watering procedure for about 30 times during the 4 days, I decided to place the food and water before it (5th day) and leave it to its own devices for at least a half day. At first the bird stood for several minutes, showing considerable interest in the wriggling of the larvae, then without further hesitation waddled up to the food dish and began to gulp down the mealworms. When it had eaten an estimated 25 mealworms it moved to the water dish, dipped its beak in, and, after the fashion of the Robin or other small birds, drained the water down the throat by raising its head. For the next 3 months all I needed to do was to place the food and water before it in a regular place. This bird was not caged, but had the free run of the floor of a 30- × 20-foot room. A chair with rungs about 6 inches above the floor served as its roosting place. It became quite tame so that each morning when I came into the room it jumped down from its perch on the chair rung and waddled quickly over to the food and water containers, beginning to eat and drink immediately.

At the end of the 3 months' period I had to leave my laboratory for about 2 weeks after giving explicit instructions to our building janitor for the bird's care. When I returned I found that the bird had died, almost certainly from starvation. The wing had healed, but was useless for flying. I have often wondered whether this bird would have reassumed its normal feeding and watering habits if its wing had healed and if it had been released into the wilds again.

Blue Jay (*Cyanocitta cristata*)—In July 1959 I captured an adult Blue Jay which had its lower mandible broken off to within about one-half inch of the skull. Though this was a jagged break it had apparently healed perfectly so that the bird had been able to gather food for some time.

Robin (*Turdus migratorius*)—In the early summer of 1946, also at Cran-

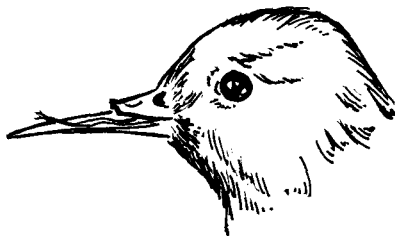


FIG. 2. Female Baltimore Oriole with part of upper mandible missing. Drawn from life by Betty Odle.

brook, I observed a male Robin which had lost its right leg. This bird moved apparently without great difficulty with a hopping gait as it probed for earthworms on my front lawn. I was unable to note whether it encountered any difficulty in perching as, when approached, it would fly over my house to land on the ground again. The next summer there was a male Robin with only one leg, which exhibited the same behavior at the same place.

Baltimore Oriole (*Icterus galbula*)—On 21 May 1964 at Cranbrook I captured a female Baltimore Oriole which had lost at least  $\frac{2}{3}$  of the upper mandible (Fig. 2). This had healed and was apparently causing the bird comparatively little difficulty, although I strongly suspected that it ran into more difficulty than was observable if it attempted to nest. That it may have been mated and perhaps nested close by was evidenced by my capturing an adult male in the same net at the same time. I was surprised to find that the tongue lying in the trough of the lower mandible was not dry, but appeared to be well moistened by saliva flowing from the mouth. This bird was not captured again, although the male which had accompanied it at the time of banding did repeat on 30 May. There is a possibility that the female may have struck the net two or three times after banding without becoming entangled, as on three occasions strands of bark fibers of swamp milkweed (*Asclepias incarnata*), which is the major nest structural material of the Baltimore Oriole, were found hanging in the net. As this bird had almost undoubtedly met its accident in the tropics or on its way north in migration, I am led to believe that it had overcome its handicap sufficiently to cover some distance and to feed itself in transit.

Common Grackle (*Quiscalus quiscula*)—On another occasion I noted an adult male Common Grackle which had lost more than  $\frac{2}{3}$  of the lower mandible. This also had healed and the bird showed no noticeable emaciation as a result of its accident. F. H. Allen (*in Bent*, 1958. *U. S. Natl. Mus. Bull.*, 211:412) observed during two summers a male grackle whose upper mandible was about twice as long as its lower. It was also decurved, flattened,

and had a squarish tip. When feeding on the ground this bird had to turn its head sidewise in order to pick up its food. This is the only reference I have found in the literature relating to this kind of defect in the grackle and its resultant adaptation.

White-throated Sparrow (*Zonotrichia albicollis*)—On 15 May 1950 I captured a brightly marked White-throated Sparrow at Cranbrook. When holding the bird for banding I noted that it had only one leg, the right. When the feathers were parted on the left side, I found no sign of a stump. As in the case of the Downy Woodpecker, mentioned above, I felt a small lump of apparently cartilaginous material underneath the skin. Again, this was evidently an embryonic defect. When I released the bird in an open field I observed no irregularities in its flight. When it perched on the branch of a large elm, it apparently made a perfect landing and showed no sign of imbalance.

Slate-colored Junco (*Junco hyemalis*)—On several occasions I have captured Slate-colored Juncos with portions of upper and/or lower mandibles missing with the wounds healed as in the examples mentioned above.

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#### CORRECTION

Charles E. O'Brien has kindly called our attention to a regrettable error in our description of *Icterus prothemelas praecox*, where the type is stated (*Wilson Bull.*, 77:298) to be No. 392316, American Museum of Natural History (R. R. Benson original field no. 797). The latter number is correct, but the museum number is actually 248065. We apologize for this inexcusable lapsus and thank Mr. O'Brien for his courtesy in pointing it out.—ALLAN R. PHILLIPS, *Instituto de Biología, Universidad Nacional Autónoma de México, México, D. F.*, AND ROBERT W. DICKERMAN, *Department of Microbiology, Cornell University Medical College, New York, New York, 1 December 1965.*