

FOOD MANIPULATION BY YOUNG PASSERINES AND THE POSSIBLE EVOLUTIONARY HISTORY OF IMPALING BY SHRIKES

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THE ability of shrikes of the genus *Lanius* to impale their prey is an effective behavioral substitute for the talons they lack. The ontogeny of impaling behavior of various European shrikes in this genus has been described in detail by Lorenz and von Saint Paul (1968); and both Wemmer (1969) and Smith (1972) have described its development in the North American Loggerhead Shrike (*L. ludovicianus*). In each species, the first motor pattern recognizable as being related to impaling consisted of taking an object in the bill, turning sideways, and placing it on the perch beside the bird. This was called "*Tupfbewegungen*" (spot-movements) by Lorenz and von Saint Paul (1968) and "dabbing" by Smith (1972). Both captive and wild young shrikes between three and four weeks old performed this behavior readily; typically after this age a pulling component appeared and the behavior was then called "dragging." These motor patterns were apparently innate.

The present study involves observations made during a comparative investigation of the ontogeny of feeding behavior of hand-reared Black-capped Chickadees (*Parus atricapillus*), Blue Jays (*Cyanocitta cristata*), and Catbirds (*Dumetella carolinensis*). None of these three is predatory or impales food, but nevertheless certain aspects of their early behavior bear remarkable resemblance to that of young Loggerhead Shrikes. The data will be interpreted in terms of the light they may shed on the possible evolutionary history of impaling by shrikes.

METHODS

Four chickadees from one brood, four Catbirds from two broods, and five jays from two broods were hand-reared in the summer of 1971. The chickadees were approximately eleven days old when they were taken from their nest; the Catbirds six to seven days old, and the jays approximately twelve days old.

The young birds were kept in cages made of half-inch hardware cloth attached to wooden frames 30 inches long and 18 inches in height and width. All four chickadees were kept in one cage. Two catbirds were kept in each of two cages. The jays were kept in double cages joined end to end making units 60 inches long. Two such double units housed two jays each and one contained a single bird.

The birds were all fed high protein diets with vitamin and calcium supplements. All three species were given canned dogfood regularly, as well as chopped fresh meat such as pork kidney or lamb heart. The birds were all initially hand-fed with forceps. The data reported here involve records made of the birds' behavior immediately after having received pieces of food.

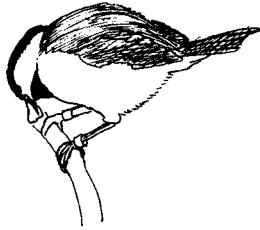


FIG. 1. Black-capped Chickadee performing dabbling behavior.

RESULTS

All three species raised in this study performed behavior that was indistinguishable from dabbling behavior of young Loggerhead Shrikes. Figures 1, 2, and 3 were drawn from photographs of captive birds performing this behavior. Each species behaved in this way with a variety of different kinds of food; as there were no differences in behavior obviously correlated with type of food, all records of dabbling behavior will be treated together.

Chickadees were first seen deliberately placing an item of food on their perch when they were 17 days old. These food items were apparently not aimed at any particular kind of location. Such undirected dabbling was observed 12 times, the last case being by a bird that was 28 days old. Later this behavior became modified to include a lateral component. This was usually a pushing movement; at the same time the behavior became directed toward corners or knotholes: areas where food could be stored.

Blue Jays were recorded performing undirected dabbling on eight occasions. The youngest jay seen dabbling was 19 days old; the oldest, 27 days old. As with the chickadees, in jays this behavior later became modified to include a lateral pushing component; the jays also often included a forceful bill-opening or wedging motion as well. Again, the movements became directed toward corners or holes similar to places where adult Blue Jays store food.

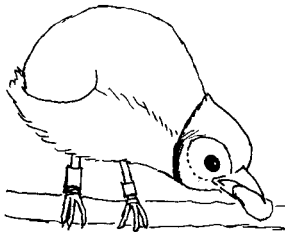


FIG. 2. Blue Jay performing dabbling behavior.

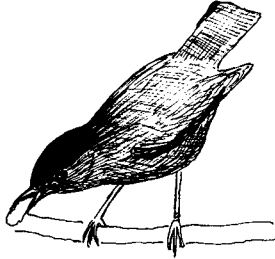


FIG. 3. Catbird performing dabbling behavior.

Catbirds were only seen performing this behavior on four occasions. The earliest record was from a 12 day old bird; the latest, from a 19 day old bird. No lateral component was ever observed associated with this behavior, nor was dabbling by Catbirds ever seen directed toward any particular kind of location.

In every record for each species, the individual that performed dabbling had swallowed at least three pieces of food immediately beforehand.

DISCUSSION

Since behavior indistinguishable from dabbling was performed by all three species studied, it clearly is not restricted to species that impale their prey. It is true that young shrikes performed this behavior even when hungry, whereas chickadees, jays and catbirds showed it only when apparently satiated. Nevertheless the motor patterns themselves appeared to be identical.

The dabbling observed performed by young jays and chickadees in this study might be interpreted simply as an early form of food storing. This hoarding has been recorded for many species of jays, including the Blue Jay (Hardy, 1961). Similarly, it is well documented for many species of *Parus* (see, for example, Hinde, 1952 and Hart, 1958).

The records for young Catbirds are more difficult to explain. Adult Catbirds certainly do not regularly store food; indeed, I am unaware of any published records of hoarding for this species. Perhaps the dabbling by these birds was simply modified bill-wiping, or merely one way of getting rid of unwanted food accepted from the keeper as a conditioned social response. The underlying motivations of dabbling are really irrelevant to the present study; the important thing is that Catbirds could and did perform motor patterns apparently identical to those of the other two species and of Loggerhead Shrikes. Furthermore, it is extremely unlikely that these motor patterns are part of the natural ontogeny of hoarding behavior in this species.

Similarity in behavior does not necessarily indicate homology. Never-

theless, hand-reared young of all four species have shown, at approximately the same age, remarkably similar behavior. Shrikes, chickadees, jays, and Catbirds are not particularly closely related. Further experiments with other passerine species should be done to find out just how widespread this behavior really is.

It might be that dabbling behavior is a very general phenomenon, performed by any young passerine that is not hungry, regardless of whether or not adults of that species manipulate food as in impaling or storing. If this motor pattern is in fact widespread among modern passerines, it might even be a very old behavior, and may actually have been performed by ancestors of *Lanius*. Tropical Africa, the center of shrike species abundance, is the probable center of shrike evolution; much of this area has abundant thorny vegetation. Dabbling may have originally been performed by an ancestor of *Lanius* simply when not hungry enough to eat its prey. Such dabbling in thorny vegetation may have occasionally caused pieces of food to become caught accidentally on thorns. If this made a sufficient difference in the bird's ability to deal with larger prey, then any modification that increased the likelihood of dabbling being directed toward a suitable location (and hence impaling) would yield a selective advantage. This is particularly applicable to sit-and-wait hunters like shrikes, that spend approximately the same amount of energy in the capture of each prey item, regardless of its size.

Certain species of *Lanius* such as the European Woodchat Shrike (*L. senator*) rarely if ever impale their prey (Ullrich, 1971). It would be extremely interesting to find out if young Woodchat Shrikes ever perform dabbling behavior. Certainly a great deal more experimental evidence is needed before any conclusions can be made. Nevertheless, it is possible that the generalized behavior "dabbling" may have been the original motor pattern that eventually became modified into the specialized impaling behavior typical of most modern species of *Lanius*.

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NEW LIFE MEMBER

Dr. Cameron B. Kepler, a Research Biologist with the Endangered Species Program of the Bureau of Sport Fisheries and Wildlife is a recent addition to the list of Life Members of The Wilson Ornithological Society. After earning two degrees at the University of California, Santa Barbara, he obtained his doctorate at Cornell University. His work on the Blue-faced Booby on Kure Atoll while a part of the Pacific Program of the Smithsonian Institution has been published by the Nuttall Ornithological Club. After leaving Cornell he spent three years in Puerto Rico studying the Puerto Rican Parrot. While on that island he and his wife discovered the Elfin Woods Warbler (*Dendroica angelae*) (named for Mrs. Kepler), the most recent new species to be discovered in the northern half of the Western Hemisphere. Dr. Kepler is a member of the AOU, the BOU, the Cooper Society, and the Association of Tropical Biology. The picture shows him at the first nest of the Red-billed Tropicbird to be discovered in Puerto Rico.