

EXPERIMENTS ON SOCIAL BEHAVIOR IN NONBREEDING BREWER BLACKBIRDS

By THOMAS R. HOWELL and GEORGE A. BARTHOLOMEW, JR.

In a previous paper (Howell and Bartholomew, *Condor*, 54, 1952:140-151), we described a series of experiments on mating behavior in the Brewer Blackbird (*Euphagus cyanocephalus*) in which the responses of the birds to stuffed specimens (dummies) were studied during the breeding season. The present study is concerned with similar experiments on behavior during the nonbreeding season.

As in our previous work, the experiments were performed on the campus of the University of California, Los Angeles. We prepared dummies in approximately lifelike form and placed them in locations where they would be noticed by the blackbirds, sometimes scattering crumbs to attract attention. Dummies of the Brown Towhee (*Pipilo fuscus*), the California Thrasher (*Toxostoma redivivum*), the female Red-winged Blackbird (*Agelaius phoeniceus*), and both the male and the female Brewer Blackbird were used. Experiments were carried on from October 21, 1951, to March 23, 1952, and from July 26, 1952, to November 23, 1952.

All dummies were arranged approximately in the precoital posture of the female Brewer Blackbird, a position which elicits vigorous responses from males of that species during the breeding season. By using dummies of both sexes of the Brewer Blackbird, we tested for seasonal changes in the mating and aggressive responses. By using dummies of other species of somewhat similar size and color, we tested for seasonal changes in the specificity of responses.

In addition to the reactions described in our earlier paper, which follows the terminology of Williams (*Condor*, 54, 1952:3-47), we observed two other types of response:

Mounting by the male.—Males frequently mounted the dummy and stood or crouched on its back without attempting copulation. This response contrasts with "incomplete copulation," in which copulation apparently is attempted but semen is not deposited.

Gathering by both sexes.—This is a group response in which virtually all the blackbirds within sight of a dummy assemble around it in a dense flock (fig. 1). This response is also present in the breeding season, but is more fully developed in the fall and winter, when the birds spend most of their time in large flocks.

RESULTS

The responses of Brewer Blackbirds to the various dummies are described below. Documentation is supplied by citations from our field notes of typical incidents.

Male Brewer Blackbird Dummy.—A male dummy with yellow eyes, which had evoked avoidance and intimidation responses in the spring of 1951, was tested in the fall of 1951 and the winter of 1952. It evoked only slight avoidance with no sign of aggression.

October 28, 1951.—The dummy was placed 30 feet from a flock of blackbirds and crumbs were scattered. Females came up immediately, but they approached no closer than about four feet. Males were more wary and stayed 12 to 18 inches farther away.

February 6, 1952.—The dummy was placed about 40 feet from a flock of blackbirds, and crumbs were scattered. During the next ten minutes three females and two males approached the dummy, looked at it alertly, but did nothing else.

Female Brewer Blackbird Dummy.—Responses to this dummy from fall until late winter were not uniform, but they followed a general pattern. The gathering response was strong, with as many as 100 birds assembling within a radius of 15 feet. Females

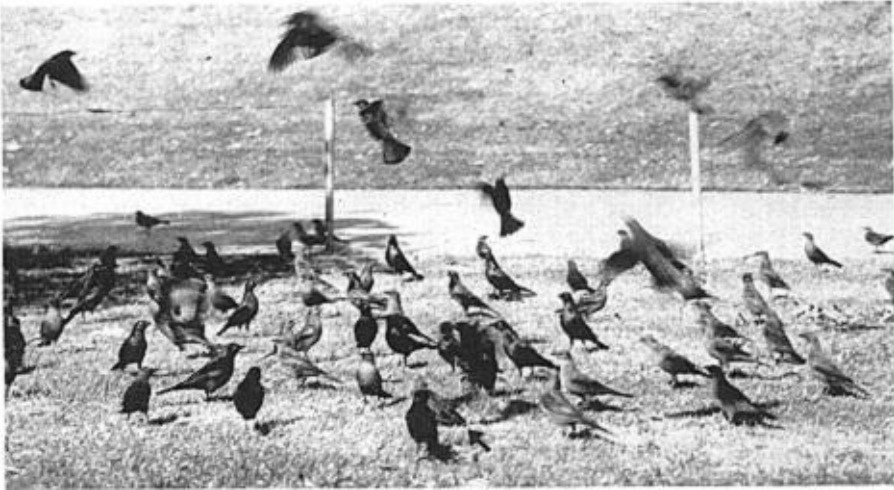


Fig. 1. Brewer Blackbirds gathering in response to a female dummy of their own species. The arrow indicates the position of the dummy; note the male hovering above and behind it.

were usually the first to approach the dummy, and they often pecked it aggressively. During the gathering response, males sometimes formed the innermost ring of the assemblage. The males directed no displays of any kind at the dummy, and there were no vocalizations. Some apparently strong copulatory attempts were made, but more often the males mounted and made either a weak attempt or none at all. Usually they pecked at the dummy's head. No semen was deposited at any time.

November 24, 1951.—A female dummy was placed on the ground near a flock of blackbirds. Immediately a male which had been standing about eight feet away walked to the right rear of the dummy, mounted it without displaying, crouched slightly, and pecked at its beak. He dismounted and then repeated the performance twice more. The dummy was placed in a new location, within 10 feet of several males. One came up at once, mounted for an instant, and was immediately displaced by another male. A few *keck* notes were uttered, and a flock of about 50 birds gathered—some alighting, some hovering—about the dummy within a radius of 12 feet. A passing automobile alarmed the flock slightly, and most of the birds rose into the air. We picked up the dummy and moved it to a point about 15 feet away; the birds actually followed and immediately gathered in a dense flock about it again. There were now 75 to 100 birds within a radius of 15 feet of the dummy. Those birds within 24 inches of it were mostly males. One of them mounted and seemed to attempt copulation, but he was displaced in a moment by another male. The second male made a less vigorous attempt, ceased after a moment, and remained standing on the dummy, pecking at the base of its bill. After about a minute he dismounted and another male mounted; the latter did not attempt to copulate, but pecked at the head of the dummy.

October 21, 1951.—A dummy was set out and crumbs were scattered. Six males and four females approached and one of the latter gave the dummy several hard pecks in the cloacal region. One male made five abortive mountings, hopping on the rump of the dummy and immediately hopping off. The dummy was moved to another location. Five females came up at once, and again one gave it several hard pecks in the cloacal region.

A female dummy provides a great attraction for Brewer Blackbirds during the non-breeding period and often evokes the mounting response of the male, but the lack of precoital displays and completed copulation is in strong contrast to the responses of the males during the breeding season.

In February and March, however, responses were intermediate between the general

type just described and the strong mating responses observed later in the spring. Blackbirds may give ruff-out displays at any time of year, but the earliest time that such a display was directed toward a dummy was the first of February.

February 1, 1952.—After most of the members of a flock of blackbirds which had been gathered around a dummy for about seven minutes had departed, a male approached the dummy from the right front and gave a weak ruff-out display with vocalization. The display was asymmetrical in that only the right wing was extended. This male mounted, performed a weak and incomplete copulation, and dismounted. He then mounted again without displaying and pecked gently at the bill of the dummy. He dismounted, and for two minutes walked back and forth in front of the dummy giving half ruff-out displays and vocalizing; sometimes he faced the dummy, sometimes he had his back to it. Then he left without approaching the dummy again.

In the latter part of March both positive and negative responses to the dummy were obtained.

March 23, 1952.—The dummy was set out and crumbs were scattered. A male approached to within three feet of the dummy and paced back and forth, giving ruff-out displays and vocalizing. He seemed wary, however, and came no closer. The dummy was moved to within 25 feet of another male, but he only watched it quietly and did not approach. Again the dummy was moved and placed near some other blackbirds. One male walked directly but not rapidly to within 12 inches of the dummy, circled around it, hopped back, and then advanced and mounted without displaying. He did not attempt to copulate but remained standing on the back of the dummy for about 90 seconds, and he gave a clear whistled note several times.

The dummy was again moved to a new location. A male flew up from more than 30 feet away, alighted, walked rapidly to the dummy, and mounted without display. He performed a vigorous but incomplete copulation. A second male flew up and attempted to dislodge the first, and a flock of about 20 birds gathered about the dummy. One of the males mounted, performed several incomplete copulations, dismounted, and began giving both preconditional and elevated-tail displays. A third male approached and then retreated as the male by the dummy gave a head-up intimidation display. No other birds approached or mounted the dummy.

Brown Towhee Dummy.—The posture of this dummy was similar to that of the female blackbird dummy, but its head was horizontal instead of pointing slightly up-



Fig. 2. Brewer Blackbirds gathered about a dummy of a Brown Towhee which has been blown over by the wind. The flock is about to depart.

ward. We tested it in the winter of 1951–52 and obtained both negative and moderately positive responses. The Brown Towhee dummy provided some attraction for the blackbirds, but it was decidedly less attractive than a dummy of their own species.

February 5, 1952.—The towhee dummy was placed near a group of about 50 blackbirds and crumbs were scattered near it. Birds of both sexes came up to pick at the food; some came as close as 18 inches to the dummy, but they seemed only slightly curious and a little wary.

December 9, 1951.—The towhee dummy was placed near a flock of foraging blackbirds, and crumbs were scattered. The flock moved toward the dummy from the rear. One male in the lead approached the dummy rapidly from a distance of about 10 feet, but when within 12 inches of it he hopped into the air, hovered about 24 inches above it, and gave several harsh scolding notes. Two or three other males then approached from behind and stood 12 to 15 inches from the dummy, looking at it alertly but not touching it. The flock then gathered loosely behind the dummy but did not form the usual tight circle around it (fig. 2).

California Thrasher Dummy.—The posture of the thrasher dummy was similar to that of the dummy of the female Brewer Blackbird, but the head pointed slightly downward. It was tested in February, 1952, at which time the blackbirds were occasionally directing displays to a female dummy of their own species. Like the Brown Towhee dummy, the thrasher dummy elicited a moderately positive response.

February 6, 1952.—The thrasher dummy was placed within 15 feet of a flock of 8 or 10 blackbirds, and crumbs were scattered. A female walking by about 12 feet away gave a sharp *tschup* note and about six birds gathered loosely about the dummy. Females approached to within three feet and three times took wing and hovered just above the dummy. Males approached less closely but also watched the dummy alertly. After about 10 minutes the group dispersed.

Red-winged Blackbird Dummy.—The posture of the female Red-winged Blackbird dummy was exactly the same as that of the female Brewer Blackbird dummy. Each time it was tested in the fall and winter of 1952 it was a source of interest and attraction to the blackbirds. It elicited a well marked gathering response, but it evoked none of the reactions associated exclusively or primarily with reproductive activity.

October 9, 1952.—A female Red-winged Blackbird dummy was placed on a lawn between two small flocks of blackbirds, about 25 feet from each group. After a minute or two a male from one flock flew toward the other flock, his course carrying him directly over the dummy at a height of about three feet. When directly above the dummy, he stopped abruptly as if he had hit an invisible barrier and fluttered to the ground about 18 inches behind the dummy. He then walked to within six or eight inches of it but stopped and did not come closer. After 45 seconds he faced away from the dummy, suddenly took wing, and hovered two feet above it. No sound was uttered, but all the blackbirds in both flocks immediately ceased foraging and gathered about the dummy, females in the lead. The birds remained assembled about the dummy for two and a half minutes and then simultaneously flew away. None had touched the dummy.

DISCUSSION

One reaction, the gathering response, was obtained with all the dummies tested. A similar group response occurs with dummies of the female Brewer Blackbird during the breeding season, but there are consistent differences. The chattering, bobbing, and displaying which are characteristic of a flock gathered around a mating "pair" in the breeding season are absent in fall and winter. Instead, there is less rapid and less frequent vocalization, or none at all; there is no bobbing, no displaying, and often the females attack the dummy. No group response to dummies of other species was obtained during the breeding season in 1951, but during the nonbreeding season the gathering response was obtained in greater or lesser degree with various species which were somewhat similar in appearance to the female Brewer Blackbird. It is noteworthy, however, that the male blackbirds never attempted to mount the dummies of these similar species and that none of these species was attacked by the female blackbirds.

Brewer Blackbirds will often gather around one or several individuals of their own species which have discovered food, but in such situations food seems to be the only interest. The gathering response to a dummy, however, often occurred when no food had been scattered, and often no attempt was made to forage in the vicinity of the dummy even if crumbs were present. It is unlikely, then, that food was ever responsible for more than the initiation of the gathering response. The gathering response seems to be more

pronounced in the fall and winter, but these are times when the blackbirds normally form large flocks, and it may be that the strong gathering reaction during the nonbreeding season is related to the pronounced flocking tendency apparent at this time. The significance, if any, of the gathering response is not clear. Possibly the response is an experimental artifact, but it does throw some light on the nature of blackbird behavior.

The significance of the aggressiveness shown to female dummies of their own species by the female Brewer Blackbirds during the nonbreeding season is likewise not clear. Nor is it clear why their attacks should be directed at the crissum; aggressive pecking by passerines is usually aimed at the head, especially the eyes.

The contrast between the response of the male Brewer Blackbird to a female dummy of that species in the breeding and nonbreeding season is of interest. In the breeding season the dummy almost always evokes a precoital display followed by mounting and a vigorous attempt at copulation. Frequently semen is deposited on the dummy. In the nonbreeding season, when the males are physiologically incapable of insemination, mounting and sometimes the motions of an attempt to copulate may still occur. Often the copulation "attempt" is weak, and sometimes the male does no more than step onto the back of the dummy and stand there, performing no other action that suggests a reproductive response.

These observations indicate that some activities which are involved in the response to the female Brewer Blackbird dummy during the breeding season may be elicited at any time of year whereas others are confined to the breeding season. It appears that mounting of a female dummy by the male Brewer Blackbird is a year-round response and that it is species-specific at all seasons. Precoital and intimidation displays with regard to a dummy seem to be forthcoming only during the breeding season or near its onset, but the gathering response is present throughout the year.

The data suggest that the mating performance of the male Brewer Blackbird depends only in part on a high level of testicular hormones, although this condition is obviously necessary for completed copulation. Definite evidence that precoital and intimidation display depend on testicular hormones, however, requires more extensive experimentation and a technique, at present unavailable, for directly determining the level of androgens in the blood of individual birds.

SUMMARY

The responses of Brewer Blackbirds in the nonbreeding season to dummies of their own species and other species of somewhat similar appearance were tested and compared with responses in the breeding season. Male Brewer Blackbird dummies evoked only avoidance or indifference from both sexes. Female Brewer Blackbird dummies evoked a variety of responses, including aggression by females, mounting with or without copulation attempts by males, and gathering about the dummy by both sexes. Dummies of other species (*Pipilo fuscus*, *Toxostoma redivivum*, and female *Agelaius phoeniceus*) evoked the gathering response but nothing more.

No displays were directed toward any of the dummies during fall and winter. Gathering by both sexes and mounting by the male seem to be year-round responses, while precoital and intimidation display are confined to periods of marked gonadal activity and are probably stimulated by testicular hormones. Completed copulations occur only in the breeding season.

Department of Zoology, University of California, Los Angeles, California, April 8, 1953.