

HABITUATION OF ADULT EASTERN BLUEBIRDS TO A NEST-BOX TRAP

BY BENEDICT C. PINKOWSKI

INTRODUCTION

A variety of shutter traps have been recommended for capturing cavity-nesting birds. Some traps are automatic and are triggered when the bird enters the nest cavity (DeHaven and Guarino, 1969; Stewart, 1971); others are operated manually from a distance by a string (Fischer, 1944) or an electronic control (Kibler, 1968; Dhondt and Van Outryve, 1971). When a conspicuous trap is placed on a nest site after nesting is underway, the adult birds react initially with behavior patterns such as escape (fleeing) and alarm notes that are appropriate responses to a threat stimulus. A trapping attempt will be successful only after a progressive reduction of the initial response to the trap occurs, and such a gradual reduction of a behavioral response attributable to an unreinforced stimulus is commonly called habituation (Vowles and Prewitt, 1971). Information on the rate at which adult birds habituate to traps placed on or near their nests would help banders economize their time and, in those instances where both adult birds care for the young, it may permit some instructive comparisons.

In this paper I quantify the reaction of adult Eastern Bluebirds (*Sialia sialis*) to a simple shutter-trap attached to nest boxes after the young had hatched. Both male and female bluebirds feed the young although only the female broods (Hartshorne, 1962; Pinkowski, 1978), and I examine trapping data on males and females for intersexual differences and suggest a regime for trapping both adults at the nest with a minimum of disturbance.

METHODS AND MATERIALS

Between 6 May and 31 July in 1970 to 1977 I trapped bluebirds for banding in nest boxes located in Macomb Co., Michigan. Details of the study area and a description of the nest boxes are provided elsewhere (Pinkowski, 1975, 1976, 1977a, b).

The shutter-trap apparatus consisted of a small, teardrop-shaped piece of plywood measuring 9 cm × 7 cm × 6 mm and operated manually by a string. The shutter was attached to the nest box above the entrance by a tack inserted through a small opening in its narrow end. A second tack that was attached to the string held the shutter to one side of the entrance until the bird entered the nest box. I controlled the shutter while partially concealed behind vegetation at distances of 40 to 60 m from the nest box.

Many of the bluebirds nesting in the study area had been banded previously as nestlings. As a result, often only one adult of a nesting pair was unbanded and had to be captured. For each capture I recorded the following information: (1) time required to capture the bird; (2)

adult entering cavity first; and (3) number of entries by one adult prior to capture of the other. Time required for capture consisted of the interval from when the trap was in place (2 to 3 min after my arrival at a nest) until the bird entered the nest box. Both bluebirds of a nesting pair become somewhat wary following the capture of one of the adults; therefore, I did not include data obtained on a second banding attempt that followed the capture of one member of a nesting pair earlier in the same season. Thus all tabulations involve pairs initially encountering the trapping apparatus. Trapping activities occurred at all times of day but were somewhat more common at mid-morning than at other times. In each case the weather was generally warm and sunny.

Frequencies of occurrence are examined by Chi-square corrected for continuity, and times required for capture of males and females are compared by the Mann-Whitney U-test.

RESULTS

Of 63 trapping attempts on 30 males and 33 females, only two were unsuccessful—the adult was not captured after 2 hr of trapping effort. Nearly all of the birds displayed alarm in response to the trap. One female, however, unhesitatingly entered a nest box while I was setting up the trap and was only 10 m from the nest. Initially a trap elicited fleeing behavior and the adults were cautious in approaching the nest. After a time the adults would peck aggressively at the shutter while atop the box or to the side of the entrance. A certain amount of fluttering in front of the entrance almost always preceded landing at the entrance and entry.

Occasionally adults that were hesitant to approach the nest box consumed food items being carried to the young and then left to gather more food. One adult was more likely to enter the cavity with food if the other adult was near the nest and not foraging some distance away. If the male had food and the female did not, the female would often “beg” and the male would transfer the food to her. The female would either eat the food herself or enter the cavity and feed the young. Occasionally I have also observed this behavior when non-human predators are near a bluebird nest.

The two birds that were not captured were both males. Females were more likely to enter the nest box first, entered more often during trapping attempts, and were captured in less time than males (Table 1). Using the variances in the time required for capture parameter, I found that males were significantly more variable in their response to the trap than were females ($F = 3.7, P < 0.001$). Captured males required a maximum of 90 min to enter the nest box compared with a maximum of 57 min recorded for females.

The different trapping rates for males and females did not appear to be attributable to sexual differences in feeding and brooding frequencies. Average ages of the nestlings when males and females were captured were 6.2 and 7.0 days, respectively. At this age young bluebirds

TABLE 1
Response of male and female Eastern Bluebirds to the shutter trap.

	Male	Female	P^1
No. times entering first	23 (36.5%)	40 (63.5%)	<0.05
No. entries with trap in place	40 (34.5%)	76 (65.5%)	<0.01
Mean time (min) required for capture	22.4	13.3	<0.05

¹ Significance level using methods given in text.

are rarely brooded during the day by the female (Pinkowski, 1974) and are fed at nearly equal frequencies by males and females (Pinkowski, 1978). Also, during all banding attempts the young were small enough so that adults completely entered the cavity in order to execute a feeding.

Although feeding rates of adult bluebirds increase with nestling age (Pinkowski, 1978), I found no correlation between age of nestlings and time required to trap males ($P > 0.7$) or females ($P > 0.5$). Greater cautiousness exhibited by adults at nests containing older young appeared to offset the increased motivation to feed and negated an expected decrease in the time required for capture as the young became older.

DISCUSSION

When confronted with a shutter trap attached to the nest box during the nestling stage, female Eastern Bluebirds evidently habituate to the trap more rapidly than males. Females, therefore, are quicker to resume parental feeding after they encounter the threat stimulus and experience the fear and arousal response caused by the trap. Males are much more variable than females in their response to the trap. Individual differences in the agonistic response to the trap may be attributable to hormonal differences (Lazarus and Crook, 1973) or previous associative learning involving the outcome of nesting attempts or encounters with potential predators.

Adult bluebirds often react to a trap after executing a feeding, either on the same visit to the nest or on a subsequent visit. At such times habituation is evidently incomplete at the time of the feeding and the adult enters the nest box despite the threat stimulus presented by the trap apparatus. That some male bluebirds cannot be captured suggests that males and females may tolerate different levels of risk for the sake of the nestlings. Different risk tolerance by males and females is also suggested by the more rapid capture rate for females, and it offers a possible explanation for the behavior wherein male bluebirds that are hesitant to enter a nest box equipped with a trap may give the food to the female which in turn enters the box and feeds the young.

In early spring male bluebirds are easier to trap at the nest site than are females. Stewart (1976), using an automatic trap to capture bluebirds after they entered a box, caught 1.7 cavity-hunting males per female early in the season. During April in 1970 to 1976, I captured 21 bluebirds in cage-type traps placed on top of empty nest boxes and baited with mealworms (*Tenebrio* sp.). Most of the traps were in the territories of bluebirds that were already paired, but 15 of the captured birds (71%) were males. Thus although late in the nesting cycle female bluebirds evidently can be trapped more rapidly than males, males can be trapped more quickly before nesting begins. This suggests that cavity-hunting, a major activity of bluebirds in early spring, is more of a male function and males may take greater risks than females when this activity is performed. Caring for the young may result in greater risks taken by the female even though both adults are feeding at nearly equal frequencies and the female is not brooding. As a result there may be unequal parental investment by male and female bluebirds in the various stages of the nesting cycle.

Kibler (1969) noted that there is usually no danger of a female bluebird deserting a nest because of capture and banding if the capture occurs after the eggs hatch. I found one instance of desertion after banding at a nest containing young, however, and that occurred when I banded both adults successively on the same day. Because females are easier to capture than males, if both adults are to be banded I recommend capturing the male first and the female on a later date. Both adults should be banded during the nestling period when the young are about one week old. Difficulty in capturing the male and excessive disturbance to the nestlings are more likely to occur if the female is captured first or the adults are banded early or late in the nestling period.

SUMMARY

Data are examined for 28 male and 33 female Eastern Bluebirds trapped at nest boxes in southeastern Michigan from 1970 to 1977. When a shutter trap is installed on the nest boxes of bluebirds during the nestling stage, females are more likely than males to enter the nest box first and females enter more often with the trap in place. Consequently, females were captured for banding in less time than males. The different rates of habituation to the trap may be related to differences in the risks that are tolerated by males and females for the sake of the young, but in the prenesting period males are more likely to be captured than are females. Because during the nestling stage female bluebirds are easier to trap than males, banders should capture the male first in those cases where both adults must be captured for banding.

ACKNOWLEDGMENTS

I thank P. A. Stewart, H. W. Power, and K. Shiovitz for their constructive criticisms of this paper.

LITERATURE CITED

- DEHAVEN, R. W., AND J. L. GUARINO. 1969. A nest-box trap for Starlings. *Bird-Banding*, **40**: 48-50.
- DHONDT, A. A., AND E. J. VAN OUTRYVE. 1971. A simple method for trapping breeding adults in nesting boxes. *Bird-Banding*, **42**: 119-121.
- FISCHER, R. B. 1944. Suggestions for capturing hole-nesting birds. *Bird-Banding*, **15**: 151-156.
- HARTSHORNE, J. M. 1962. Behavior of the Eastern Bluebird at the nest. *Living Bird*, **1**: 131-149.
- KIBLER, L. F. 1968. A radio-controlled trap for Bluebirds and other hole-nesting birds. *Eastern Bird Banding Assn. News*, **31**: 167-173.
- . 1969. The establishment and maintenance of a Bluebird nest-box project: a review and commentary. *Bird-Banding*, **40**: 114-129.
- LAZARUS, J., AND J. H. CROOK. 1973. The effects of luteinizing hormone, oestrogen and ovariectomy on the agonistic behaviour of female *Quelea quelea*. *Anim. Behav.*, **21**: 49-60.
- PINKOWSKI, B. C. 1974. A comparative study of the behavioral and breeding ecology of the Eastern Bluebird (*Sialia sialis*). Ph.D. Dissertation, Wayne State Univ., Detroit, Mich.
- . 1975. Growth and development of Eastern Bluebirds. *Bird-Banding*, **46**: 273-289.
- . 1976. Use of tree cavities by nesting Eastern Bluebirds. *J. Wildl. Manage.*, **40**: 556-563.
- . 1977a. Blowfly parasitism of Eastern Bluebirds in natural and artificial nest sites. *J. Wildl. Manage.*, **41**: 272-276.
- . 1977b. Breeding adaptations in the Eastern Bluebird. *Condor*, **79**: 289-302.
- . 1978. Feeding of nestling and fledgling Eastern Bluebirds. *Wilson Bull.*, **90**: 84-98.
- STEWART, P. A. 1971. An automatic trap for use on bird nesting boxes. *Bird-Banding*, **42**: 121-122.
- . 1976. Movements of cavity-hunting Starlings and Eastern Bluebirds. *Bird-Banding*, **47**: 274-275.
- VOWLES, D. M., AND E. PREWITT. 1971. Stimulus and response specificity in the habituation of anti-predator behaviour in the Ring Dove (*Streptopelia risoria*). *Anim. Behav.*, **19**: 80-86.

245 County Line Rd., Bridgeville, PA 15017. Received 27 September 1977, accepted 5 December 1977.