

which do not spend the night in the nest cavity. The report by Fendley (1980) of dead ducks with broken necks in nest boxes associated with rat snake nest predation would suggest that it might be advantageous for adults to be absent during nocturnal snake visits.

Acknowledgments.—L. Mellott electronically synchronized cameras, flash units, and infrared beams on the nest boxes. M. Cassidy graciously allowed us use of his hayfields. P. Gowaty, T. Haggerty, J. Jackson, D. James, J. Neal, D. Petit, and C. Riley made helpful suggestions on the manuscript. Our research was funded by a National Science Foundation grant BSR-8408090 to KGS (principal investigator).

LITERATURE CITED

- FENDLEY, T. T. 1980. Incubating Wood Duck and Hooded Merganser hens killed by black rat snakes. *Wilson Bull.* 92:526–527.
- FITCH, H. S. 1963. Natural history of the black rat snake (*Elaphe o. obsoleta*) in Kansas. *Copeia* 1963:649–658.
- HAGGERTY, T. M. 1981. Rat snake preys on nestlings of Rough-winged Swallow and Common Grackle. *Chat* 45:77.
- JACKSON, J. A. 1970. Predation of a black rat snake on Yellow-shafted Flicker nestlings. *Wilson Bull.* 82:329–330.
- . 1977. Notes on the behavior of the gray rat snake [*Elaphe obsoleta spiloides*]. *J. Mississippi Acad. Sci.* 22:94–96.
- MIRARCHI, R. E. AND R. R. HITCHCOCK. 1982. Radio-instrumented Mourning Dove preyed upon by gray rat snake. *Auk* 99:583.
- NOLAN, V., JR. 1959. Pileated Woodpecker attacks pilot black snake at tree cavity. *Wilson Bull.* 71:381–382.
- STICKEL, L. F., W. H. STICKEL, AND F. C. SCHMID. 1980. Ecology of a Maryland population of black rat snakes (*Elaphe o. obsoleta*). *Am. Midl. Nat.* 103:1–14.
- THOMAS, R. H. 1946. A study of Eastern Bluebirds in Arkansas. *Wilson Bull.* 58:143–183.
- WEATHERHEAD, P. J. AND M. B. CHARLAND. 1985. Habitat selection in an Ontario population of the snake, *Elaphe obsoleta*. *J. Herpetol.* 19:12–19.
- WHITE, S. C. AND G. E. WOOLFENDEN. 1973. Breeding of the Eastern Bluebird in central Florida. *Bird-Banding* 44:110–123.
- R. CRAIG HENSLEY AND KIMBERLY G. SMITH, *Dept. Zoology, Univ. Arkansas, Fayetteville, Arkansas 72701. Received 14 Jan. 1986, accepted 7 Apr. 1986.*

Wilson Bull., 98(4), 1986, pp. 603–605

Destruction of heterospecific eggs by the Gray Catbird.—Destruction of eggs by passerines is a relatively rare phenomenon that has been observed mainly in members of 2 closely related families: Troglodytidae (Belles-Isles and Picman 1986) and Mimidae (Bowman and Carter 1971, Temple 1978). Among North American mimids, 4 cases of egg destruction by the Gray Catbird (*Dumetella carolinensis*) have been reported (Pearson 1936, Bent 1948). Because egg destruction by this species was rarely observed, Bent (1948) concluded that such behavior was aberrant. Here we provide evidence showing that the behavior is more common than previously suggested.

The study was conducted in the summers of 1984 and 1985 at 2 sites in southern Ontario:

Presqu'île Provincial Park (44°N, 78°W) and Mer Bleue Bog near Ottawa (46°N, 76°W). Catbirds from 10 territories (7 at the Presqu'île Park, 3 at the Mer Bleue Bog) were involved in our experiments. From mid-June to mid-July we offered birds that were feeding nestlings eggs of Domestic Hens (*Gallus domesticus*), Common Quail (*Coturnix coturnix*), Blue-breasted Quail (*Coturnix chinensis*), Budgerigars (*Melopsittacus undulatus*), American Robins (*Turdus migratorius*), Yellow Warblers (*Dendroica petechia*), House Sparrows (*Passer domesticus*), and Common Grackles (*Quiscalus quiscula*) in American Robin, Yellow Warbler, Swamp Sparrow (*Melospiza georgiana*), Red-winged Blackbird (*Agelaius phoeniceus*), and Common Grackle nests. The choice of nests and eggs used during experiments was determined by their availability.

When adult catbirds were away from their nests, experimental nests with eggs were placed within 5 m (0.5–1.5 m above ground) of the catbird nests. During each experiment, one nest containing a single egg was offered to breeding catbirds (no more than one experiment per day per pair). A maximum of one trial per egg type was conducted on each breeding pair. We considered egg-pecking to be a positive response to the egg. We observed birds from at least 40 m from the experimental nests. Individual trials were continued for 2 h or until a catbird responded positively. All experiments were conducted between 14:00 and 19:00.

We observed egg destruction by catbirds in all 10 territories. In 6 territories, only one adult visited the nest. Because catbirds are sexually monomorphic we could not determine which adult pecked the experimental eggs. In the remaining 4 territories, however, we observed both adults pecking eggs. Catbirds responded positively in all 25 trials we performed. In all cases, catbirds responded almost immediately following their return to their nest by vigorously pecking the eggs. After pecking, catbirds usually removed a broken egg by picking it up and dropping it from the nest edge or carrying it several meters away. None of the birds were seen eating eggs they broke.

Results of a predation study conducted at Mer Bleue in July and August 1985 also suggest that egg-pecking by catbirds is relatively common, at least at unguarded nests. During the predation study, 18 automatic cameras were set near experimental nests with Blue-breasted Quail eggs. Movement of the eggs triggered a photograph of the manipulator. Experimental nests were randomly placed along 3 transects separated by at least 800 m. Birds destroyed 33 (31.1%) of the eggs. Catbirds and House Wrens destroyed 16 (15.1%) and 13 (12.3%) nests, respectively. Brown-headed Cowbirds (*Molothrus ater*) destroyed 3 eggs, and a Black-capped Chickadee (*Parus atricapillus*) destroyed one egg. Red squirrels (*Tamiasciurus hudsonicus*), short-tailed weasels (*Mustela erminea*), and raccoons (*Procyon lotor*) accounted for the remaining 73 (68.8%) depredated nests.

Gray Catbirds resemble Marsh Wrens (*Cistothorus palustris*), Sedge Wrens (*C. platensis*), and House Wrens (*Troglodytes aedon*) in their egg-destroying behavior (Picman 1977, Picman and Picman 1980, Belles-Isles and Picman 1986). Both males and females of these species peck and remove broken eggs from attacked nests and, in general, do not seem to consume their contents. Furthermore, all 4 species tend to destroy a variety of eggs in different nests. In contrast to the 3 species of wrens, catbirds did not remove any nest material during our trials.

Egg destruction by catbirds does not appear to be a form of food provisioning; however, by destroying the eggs of other birds Gray Catbirds might reduce competition for resources (cf. Verner 1975, Picman and Picman 1980, Belles-Isles and Picman 1986). The test of this hypothesis will require data on behavioral interactions between catbirds and other passerines, the degree of niche overlap among them, and the availability of resources important for their reproduction.

Acknowledgments.—We thank L. Sylvestre, J. McAllister, and D. Beedell for assistance

with field work. The Ontario Ministry of Natural Resources and the National Capital Commission kindly allowed us to conduct this research on their property. The University of Waterloo provided us accommodation at the Presqu'île Field Station. L. Best, K. Bildstein, P. Gowaty, A. Horn, L. Kiff, M. Leonard, S. Rothstein, J. Verner, J. Walters, and an anonymous referee reviewed earlier drafts of the manuscript. This work was supported by an NSERC grant to J. P., an NSERC postgraduate scholarship and University of Ottawa scholarship to J.-C. B.-I., and a University of Ottawa summer research scholarship to L.S.

LITERATURE CITED

- BELLES-ISLES, J. C. AND J. PICMAN. 1986. House Wren nest-destroying behavior. *Condor* 88:190-193.
- BENT, A. C. 1948. Life histories of North American nuthatches, wrens, thrashers and their allies. U.S. Natl. Mus. Bull. 195.
- BOWMAN, R. I. AND A. CARTER. 1971. Egg-pecking behavior in Galapagos Mockingbirds. *Living Bird* 10:243-270.
- PEARSON, G. F. 1936. *Birds of America*. Garden City, New York.
- PICMAN, J. 1977. Destruction of eggs by Long-billed Marsh Wren (*Telmatodytes palustris palustris*). *Can. J. Zool.* 55:1941-1920.
- AND A. K. PICMAN. 1980. Destruction of nests by the Short-billed Marsh Wren. *Condor* 82:176-179.
- TEMPLE, S. A. 1978. *Endangered birds. Management techniques for preserving threatened species*, Univ. Wisconsin Press, Madison, Wisconsin.
- VERNER, J. 1975. Interspecific aggression between Yellow-headed Blackbirds and Long-billed Marsh Wrens. *Condor* 77:329-331.

JEAN-CLAUDE BELLES-ISLES AND JAROSLAV PICMAN. *Dept. Biology, Univ. Ottawa, Ottawa, Ontario K1N 6N5, Canada. Received 20 Nov. 1985, accepted 19 Mar. 1986.*

Wilson Bull., 98(4), 1986, pp. 605-607

Fatal antipredator behavior of a Killdeer.—Adult birds often defend their young against predators (Gottfried 1979, Gochfeld 1984). Distraction displays are one form of defense employed by parents, presumably at some risk to the performing bird (Barash 1975, Andersson et al. 1980, Greig-Smith 1980, Walters 1982). Increased intensity of distraction displays, and decreased distance from the potential predator, probably increase the risk to the performing bird (Barash 1975, Andersson et al. 1980). Despite the problem of habituation to intruders after repeated encounters, several studies show a correlation between the intensity of a distraction display and the vulnerability of offspring as indicated by nesting stage (Andersson et al. 1980, Lemmetyinen 1971).

Killdeer (*Charadrius vociferus*) are ground nesting birds that suffer heavy nest and hatching mortality (Nol and Lambert 1984). Killdeer antipredation strategies include cryptically colored eggs and chicks and the use of distraction behavior. Distraction behavior ranges from "false brooding" to "injury-feigning" (Gochfeld 1984). Direct, aggressive antipredator behavior by Killdeer is less common (cf. Deane 1944). Gochfeld (1984) named this type of aggressive behavior the "ungulate display." Birds performing this display move off the nest towards the intruder with their wings held slightly away from the body, and the contour