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HOUSE WREN NEST-DESTROYING BEHAVIOR[1]

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Abstract. House Wren (*Troglodytes aedon*) nest-destroying behavior was studied by experimentally offering 38 wrens nests with eggs (or nestlings) throughout the nesting season. Individuals of both sexes pecked all six types of eggs presented, regardless of the nest type and location. House Wrens also attacked conspecific young. Older nestlings (nine days old) were less vulnerable than three-day-old young. Our results suggest that nest-destroying behavior is inherent in all adult House Wrens but is inhibited in mated males and breeding females. It is suggested that nest destruction may have evolved as an interference mechanism reducing intra- and interspecific competition.

Key words: *House Wren;* Troglodytes aedon; *infanticide; nest destruction; competition.*

INTRODUCTION

Destruction of eggs by small passerines is a relatively rare phenomenon which has been observed mainly in members of two families, the Troglodytidae and Mimidae. Species known to destroy eggs include the Marsh Wren (*Cistothorus palustris*; Allen 1914); House Wren (*Troglodytes aedon*; Sherman 1925, Kendeigh 1941); Cactus Wren (*Campylorhynchus brunneicapillus*; Anderson and Anderson 1973); Sedge Wren (*Cistothorus platensis*; Picman and Picman 1980); Bewick's Wren (*Thryomanes bewickii*; J. Picman, unpubl. data); the Gray Catbird (*Dumetella carolinensis*; Belles-Isles and Picman, unpubl. data), and four species of Galapagos mockingbirds (Bowman and Carter 1971). In contrast to "typical" predators that charcteristically consume eggs and nestlings, most of these species only peck and remove eggs and nestlings from the attacked nests (Sherman 1925, Picman 1977, Picman and Picman 1980, Belles-Isles and Picman, unpubl. data).

Egg destruction by the House Wren was first described by Hill (1869). Thereafter, in the early twentieth century, several isolated cases of this behavior by House Wrens were reported (e.g., Widmann 1905, Ridway 1905, Wright 1909, Creaser 1925, Gardner 1925, Weigle 1927, Lee 1927). However, most reported observations were based on circumstantial evidence, and the available information is therefore limited and often controversial.

In 1984 we began a long-term study on factors determining mating patterns in the House Wren. A part of this project concerns the role of nest-destroying behavior in the evolution of mating patterns in this species. We examined this behavior by asking the following questions: (1) What kinds of nests and eggs do House Wrens attack? (2) Do these wrens also kill conspecific nestlings? (3) Is this behavior exhibited throughout the breeding season? (4) Do individual House Wrens destroy nests throughout their breeding cycle? (5) How widespread is this behavior among individuals from a population? (6) Is this behavior a local phenomenon or is it characteristic of all House Wren populations? (7) What is the adaptive value of this behavior?

METHODS

This study was conducted at Presqu'ile Provincial Park, Northumberland County, Ontario, Canada, during the spring and summer of 1984. House Wrens were breeding there in nest boxes and hence were easy to study throughout their breeding cycle. Thirty-eight adult wrens (21 males and 17 females) were captured in mist nets or in a trap with a Red-winged Blackbird (*Agelaius phoeniceus*) nest and egg as bait (Picman 1980). Captured wrens were individually color-banded.

We conducted four series of experiments to examine the wren's nest-destroying behavior. To determine the type of eggs and nests they would attack, we offered them eggs of Yellow Warblers (*Dendroica petechia*), American Robins (*Turdus migratorius*), Blue-breasted Quails (*Coturnix chinensis*), Common Quails (*Coturnix coturnix*), and conspecifics in Yellow Warbler, American Robin, and Common Grackle (*Quiscalus quiscula*) nests as well as in nest boxes suitable for House Wrens (11 × 14 × 20 cm). The choice of eggs and nests used during these experiments was determined mainly by their availability. In addition, traps baited with Red-winged Blackbird eggs and nests were also presented. Experimental nests were attached to vegetation (0.5 to 1.5 m above ground) within 3 m of House Wren nesting boxes. To examine whether House Wrens attack nests throughout their territory, robin nests with Blue-breasted Quail eggs were also presented at 10 to 40 m from their nest box. House Wren responses to conspecific nestlings were

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TABLE 1. Summary of House Wren responses to various eggs, regardless of sex, time in a season and stage of nesting.

Egg	Color	Size* (mm)	No. of birds tested	Response +	Response −	% of positive trials with broken eggs	Nest used
House Wren	pinkish, speckled	16 × 13	3	3	0	100	nest box
Yellow Warbler	creamy, spotted	17 × 13	8	3	5	100	Yellow Warbler
Red-winged Blackbird	light blue, spotted	24 × 17	26	20	6	**	Red-winged Blackbird
American Robin	light blue	28 × 20	5	3	2	100	American Robin
Blue-breasted Quail	creamy	29 × 20	28	28	0	75	American Robin
Common Quail	creamy, spotted	32 × 24	2	2	0	0	Common Grackle

* Most of the egg measurements were taken from Harrison (1978).
** Unbreakable eggs (covered by several layers of transparent glue).

studied by offering unmated males 3- and 9-day old House Wren nestlings in nest boxes. To examine nest-destroying behavior throughout the breeding cycle, we offered Blue-breasted Quail eggs to the resident birds in robin nests. Experimental nests were presented at the same location from nest boxes during pre-mating (males only), pre-laying, laying, incubating, and nestling stages. Within a given breeding stage, some birds were tested up to three times.

Offering a nest with one egg (or young) was considered a single trial. No more than one nest per day was presented to a given wren. A positive response was defined as pecking an egg or nestling, whereas a negative response occurred when the bird appeared to ignore the experimental nest while nearby (within 1 m from the nest). Individual trials were continued for 2 hours, but were stopped when a wren responded positively. All experiments were conducted between 0600 and 1000.

RESULTS AND DISCUSSION

NATURE OF NEST-DESTROYING BEHAVIOR

In general, House Wrens responded to nests with eggs by vigorously pecking the eggs. Following pecking, they removed broken eggs, often carrying them away before dropping them (see also Hill 1869, Widmann 1905). In 15% of our observations (n = 13), they also removed nesting material (see also Swanson 1925, Sherman 1925, Weigle 1925, Baldwin 1925). Damage inflicted on the nests ranged from the removal of some nest lining to the destruction of one side of the nest. In only 2% of our observations (2 females) wrens used the removed material as lining for their own nests.

House Wrens attacked all six types of eggs, regardless of their size and color or type of nests in which they were offered (Table 1). Wrens were successful in breaking all smaller eggs up to the robin size, but their success decreased for the larger eggs (Table 1; Fisher's exact probability test for smaller versus larger eggs combined, $P < 0.001$). Eggs of allopatric species such as Blue-breasted and Common quails were also pecked. In all seven cases when House Wrens approached the experimental nests placed 20 m or farther from their nest boxes, they pecked the eggs. In four of these cases nests were located outside the aggressors' territories. Previous reports mention 23 other species whose nests were attacked by House Wrens (i.e., Widmann 1905, Sherman 1925, Creaser 1925, Lee 1927, Kendeigh 1941). Only 13 of these species breed in cavities, which suggests that House Wrens exhibit a generalized type of nest-destroying behavior.

Offering conspecific nestlings in five trials resulted in three positive responses by adult wrens. In these cases, one female and two male House Wrens pecked the young, and in two instances the 3-day-old nestling was also removed from the experimental nest box. The 9-day old nestling survived the attack after it was returned to its original nest. In two additional cases, males removed nest material but did not inflict any injuries or remove the 9-day old young from nest boxes. In all five cases, adult wrens removed nest material from experimental nest boxes. These results suggest that House Wrens may also have an important impact on each other's reproductive success through their attacks on nestlings, even though the older nestlings seem less vulnerable. To our knowledge only one direct observation of House Wren infanticide has been previously reported although the age of the attacked nestling(s) was not given (Baldwin 1925). In contrast, killing of heterospecific young by House Wrens was reported by Weigle (1925), Dales (1926), and Kendeigh (1941).

INCIDENCE OF NEST-DESTROYING BEHAVIOR

At the individual level. Contrary to the previous belief that only males exhibit nest-destroying behavior (Sherman 1925), we observed both males and females pecking eggs. House Wrens attacked eggs throughout the breeding season from mid-May to late July. Males however, did not attack eggs once paired (Table 2; Fisher exact probability test for com-

TABLE 2. Summary of House Wren responses to eggs throughout their breeding cycle.

Nesting stage	Males			Females		
	No. of individuals	No. of trials	% of positive responses	No. of individuals	No. of trials	% of positive responses
Unmated	19	38	100	—	—	—
Pre-laying	7	10	0	9	11	100
Laying	6	8	0	9	13	0
Incubating	7	10	0	8	10	0
Nestling	5	7	0	6	8	0

bined trials on unmated versus mated males, $P < 0.001$), and females ceased pecking eggs when they started laying (Table 2; Fisher exact probability test for combined trials on breeding versus nonbreeding females, $P < 0.001$). In one case, a male that acquired a mate stopped pecking eggs, but following his desertion approximately 20 days later he again started to attack eggs. Hence, we conclude that only unmated males and non-breeding females peck eggs.

At the population level. Based on their review of nest destruction, Widman and Eaton (in Creaser 1925) independently claimed that House Wren egg-pecking behavior is frequent if not common. In contrast, McAtee (1926) Baldwin (1925) and Kendeigh (1941) concluded that this behavior is rather rare. In the present study, eighty-four percent of our birds (19 males and 13 females) were observed pecking eggs. Only two males and four females did not so behave. However, these birds were breeding when tested, so the behavior could simply have been inhibited at that time. Therefore, we suggest that nest-destroying behavior is probably inherent to all individuals from our study population. The controversy on the incidence of nest destruction probably originates from inhibition of the behavior in nesting wrens.

At the species level. House Wren attacks on nests of other birds have been reported from several states and provinces throughout North America (Sherman 1925; J. Picman, pers. observ., this study). Hence, it appears that this behavior is not a local phenomenon but rather is characteristic of all House Wren populations.

ADAPTIVE VALUE OF HOUSE WREN NEST-DESTROYING BEHAVIOR

The occurrence of nest-destroying behavior in two closely related families suggests that this trait originated through common ancestry rather than having evolved independently due to convergent ecological pressures. Three species of wrens, however, the Canyon Wren (*Catherpes mexicanus*), Rock Wren (*Salpinctes obsoletus*), and Winter Wren (*T. troglodytes*) did not attack experimentally offered nests with eggs (J. Picman, unpubl. data), which suggests the presence of counterselective forces. Therefore, although common ancestry might have originally played a role in the evolution of nest-destroying behavior in wrens and mimids, the maintenance of this behavior should be explained in terms of benefits which it confers at present.

Nest-destruction by House Wrens might play a role in intraspecific competition. It has been proposed that cavity-nesting birds are limited by the availability of nest sites (von Haartman 1957, Hilden 1965, Scott 1979, Mannan et al. 1980). Because House Wrens do not excavate their own cavities, individuals may destroy conspecific nests to acquire suitable cavities for their own use. In addition, by doing so they may free potential mates, thereby increasing chances of becoming polygamous. Food supplies could also be a limiting factor for breeding House Wrens (Creaser 1925). Hence, by destroying nests of other conspecifics and forcing them to breed farther away, House Wrens may also reduce competition for food. These hypotheses of intraspecific interference competition are supported by the finding that the occurrence of intraspecific attacks on nests in a breeding population is positively correlated with the House Wren breeding density (Kendeigh 1941). But House Wren attacks on heterospecific nests suggests that competition may also occur at the interspecific level. At this level, competition for food and nest-cavities should also be considered. The food competition hypothesis seems to be supported by House Wren attacks on open-topped nests. This hypothesis is contradicted, however, by the fact that nest-destroying behavior is inhibited during breeding when food requirements should be highest.

By plundering nests of other birds, wrens may acquire a significant energy resource. We have no evidence, however, on consumption of contents of broken eggs or killed nestlings by House Wrens. It is nevertheless possible that when food is scarce, House Wrens might consume contents of attacked nests.

Since destruction of nests of other co-occurring birds might lead to conflicts, this behavior should be selected against during the House Wren breeding cycle. In addition, intraspecific nest destruction might increase chances of destruction of eggs or young by parents (i.e. filial ovicide and infanticide). These costs, however, appear to be reduced through the inhibition of nest-destroying behavior once eggs are laid. Therefore, the inhibition of nest-

destroying behavior by nesting House Wrens might be explained by strong selection for mechanisms reducing (1) interference from other birds and (2) filial ovicide or infanticide. Testing these hypotheses will require additional data.

In conclusion, several factors may control maintenance of the nest-destroying behavior in House Wrens. Our data are inadequate to establish the relative importance of competition for food and nesting sites at the intra- and interspecific levels.

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