

SCISSOR-TAILED FLYCATCHERS EJECT BROWN-HEADED COWBIRD EGGS

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Abstract.—In a study of the nesting biology of the Scissor-tailed Flycatcher (*Tyrannus forficata*), 180 active nests were monitored during 1991 and 1992 and three cases of nest parasitism by Brown-headed Cowbirds (*Molothrus ater*) were observed. In two of these cases the cowbird eggs disappeared from the nest within 48 h of their appearance, whereas in the third case, the entire nest was destroyed by a severe storm within 24 h of parasitism. Additionally, cowbird eggs were placed in three *T. forficata* nests, and in all three cases the cowbird eggs disappeared within 72 h of their introduction whereas the host eggs remained intact. These data indicate that *T. forficata*, like at least five of its congeners, should be considered a cowbird egg ejector.

EXPULSIÓN DE HUEVOS DE *MOLOTHRUS ATER* POR *TYRANNUS FORFICATA*

Sinopsis.—En un estudio de la biología de nidificación de *Tyrannus forficata*, se monitorearon 180 nidos activos durante el 1991 y el 1992, y se observaron tres casos de parasitismo de nidos por *Molothrus ater*. En dos de estos casos, los huevos de *M. ater* desaparecieron del nido durante las primeras 48 horas de su aparición, mientras que en el tercer caso, una tormenta destruyó el nido completo durante las primeras 24 horas del parasitismo. Además, se colocaron huevos de *M. ater* en tres nidos de *T. forficata*, y en cada caso los huevos introducidos desaparecieron en las 72 horas posteriores a su introducción, mientras que los huevos de la especie hospedera quedaron intactos. Estos datos indican que *T. forficata* se debe considerar un rechazador de huevos de *Molothrus* al igual que por lo menos cinco de sus congéneres.

The Brown-headed Cowbird (*Molothrus ater*) is an interspecific nest parasite that occurs throughout much of North America and is known to parasitize no fewer than 220 species of birds (Friedmann and Kiff 1985). Although many host species readily accept cowbird eggs, a number of species have evolved a variety of apparently adaptive responses to nest parasitism. Such responses include nest desertion, building an additional nest layer over the cowbird eggs, and cowbird egg ejection (Friedmann 1963).

Only eleven species are known to eject Brown-headed Cowbird eggs (Friedmann 1963, Rothstein 1975). Rothstein (1975) placed Brown-headed Cowbird eggs in the nests of a variety of other passerine species and if the cowbird eggs disappeared while the host eggs remained intact, he concluded that the host was ejecting cowbird eggs. Rothstein thus observed that eight species eject *M. ater* eggs, and Friedmann (1963) listed three additional ejector species. In addition, at least three species are known to eject Bronzed Cowbird (*Molothrus aeneus*) eggs and another three species eject Shiny Cowbird (*Molothrus bonariensis*) and/or Scream-

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ing Cowbird (*Molothrus rufoaxillaris*) eggs (Carter 1986, Mason 1986). An additional nine avian species were reported by Cruz et al. (1985) to reject *M. bonariensis* eggs though it is unclear to what extent rejection took the form of egg ejection in these species.

I conducted a study of reproductive success and sexual dimorphism in the Scissor-tailed Flycatcher (*Tyrannus forficata*) during March–August 1991 and 1992 on Fort Sill in southwestern Oklahoma (34°39'N, 98°26'W). The habitat consisted of mesquite (*Prosopis juliflora*) mixed grass prairie dominated by little bluestem (*Andropogon scoparius*), and landscaped areas with mowed grass and planted trees including hackberry (*Celtis reticulata*), American elm (*Ulmus americana*) and honey locust (*Gleditsia triacanthos*). *T. forficata* is a known host of the Brown-headed Cowbird, but documented cases of parasitism are rare and *T. forficata* is known to have fledged *M. ater* nestlings only once (Fitch 1950, Friedmann 1963, Friedmann and Kiff 1985). Here I present data on three nests naturally parasitized by *M. ater* and three nests into which I introduced cowbird eggs.

During 1991 I studied 69, and in 1992 111 active Scissor-tailed Flycatcher nests. Of the 180 nests from both years, 26 nests were found with complete clutches, 54 nests were checked daily during the egg-laying period, and 39 nests were checked on all but one of the egg-laying days. The remaining 61 nests were either checked less frequently during the egg-laying period or were found with partially completed clutches or both.

Three cases of nest parasitism were recorded: two (2.9% of 69) in 1991 and one (0.9% of 111) in 1992. As discussed by Rothstein (1977) and Murphy (1986), however, it is extremely difficult to estimate rates of cowbird parasitism for species that regularly eject cowbird eggs. In such situations it is best to check nests regularly during the morning hours when cowbirds are likely to be laying, though even this approach is likely to yield an underestimate of cowbird parasitism frequency. Thus, my observation of 3 of 180 (1.7%) nests being parasitized yields a minimum estimate of the frequency of cowbird parasitism in *T. forficata* nests.

The first parasitized nest was located in a black locust (*Robinia pseudoacacia*) on 17 May 1991, and contained four flycatcher eggs and one *M. ater* egg. On the morning of 19 May the nests contained just the four *T. forficata* eggs. Similarly, on 18 May 1991 a Scissor-tailed Flycatcher nest in a mesquite tree contained three *T. forficata* eggs and one *M. ater* egg, and only three flycatcher eggs on 19 May. Finally, the parasitized nest discovered in 1992 was in a mesquite, and contained two host eggs and one *M. ater* egg on 7 June. On 8 June, the nest and its contents were on the ground, apparently as a result of severe weather on the night of 7 June.

Following the procedure described by Rothstein (1975), I placed a single Brown-headed Cowbird egg in each of three Scissor-tailed Flycatcher nests during the egg-laying period. I did not remove any host eggs from the nest. The first Brown-headed Cowbird egg was placed in a nest containing three eggs at 0720 hours in the morning on 15 Jul. 1991. This

nest was continuously monitored until 1300, but during this time the cowbird egg was not removed. On the following morning at 0715, four *T. forficata* eggs were in the nest and the cowbird egg was no longer present. The second and third *M. ater* eggs were placed in Scissor-tailed Flycatcher nests on the mornings of 7 and 8 Jul. 1992, respectively. The second *M. ater* egg was still present on 9 July but was absent by 1843 on 10 July. The third experimentally introduced *M. ater* egg disappeared between 1800 on 8 July and 0656 on 9 July.

It is important to consider whether the loss of the cowbird eggs from the parasitized nests was a normal pattern of egg loss rather than active ejection by the parent flycatcher. During 1991 and 1992, out of a total of 157 unparasitized nests monitored, I observed 6 (3.8%) nests which experienced partial clutch reduction during the egg laying and/or incubation periods. In five of five (100%) cases where a nest not destroyed by weather contained a cowbird egg, the cowbird egg disappeared during the incubation period. Clearly, nests containing a cowbird egg were more likely than nests not containing a cowbird egg to experience partial clutch reduction prior to the nestling period (Continuity corrected $\chi^2 = 56.4$; $df = 1$; $P < 0.0001$ for 6 of 157 vs. 5 of 5). This observation, coupled with the fact that the cowbird egg was always the egg to disappear in the parasitized and experimental nests, strongly suggests that Scissor-tailed Flycatchers eject cowbird eggs. Additionally, the loss of *T. forficata* eggs occurred throughout the incubation period, whereas the loss of *M. ater* eggs always occurred within 72 h of egg introduction.

The observation that *T. forficata* ejects *M. ater* eggs is interesting because four other congeners, *T. verticalis*, *T. tyrannus*, *T. melancholicus* and *T. savana*, also eject *M. ater*, *M. aeneus* or *M. bonariensis* eggs (Carter 1986, Mason 1986, Rothstein 1975). A fifth congener, *T. dominicensis*, rejects cowbird eggs, though Cruz et al. (1985) did not indicate to what extent rejection took the form of egg ejection.

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MEETINGS OF INTEREST

8th North American Arctic Goose Meeting and Workshop, 10–15 Jan. 1995, Albuquerque, New Mexico.

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22nd Annual Meeting of the Pacific Seabird Group, 10–13 Jan. 1995, San Diego, California.

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Eastern Bird Banding Association, 21–23 Apr. 1995, Cape May, New Jersey.

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9th Annual Meeting of the Society for Conservation Biology, 7–11 Jan. 1995, Colorado State University, Fort Collins, Colorado.

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