

# SHINY COWBIRD PARASITISM IN CENTRAL BRAZIL<sup>1</sup>

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**Abstract.** Recent human settlement in Brasília, Central Brazil, has greatly reduced the extent of native cerrado vegetation. This has favored the Shiny Cowbird, *Molothrus bonariensis*, which is common in farmland and certain urban sites. Between September and December of 1982 to 1984, we observed cowbird nestlings (n) or fledglings (f) attended by adults of *Mimus saturninus* (n), *Thraupis sayaca* (n), *Thraupis palmarum* (n,f), *Cypsnagra hirundiacea* (f), *Hemithraupis guira* (f), and *Ammodramus humeralis* (n).

The Fork-tailed Flycatcher, *Tyrannus savana*, is rarely parasitized (one of 87 nests) in Brasília, perhaps due to the availability of more suitable hosts. In Argentina, this flycatcher is reported to eject cowbird eggs from the nest; we performed artificial parasitism experiments, which suggest that in Brasília it might accept cowbird eggs placed during incubation.

A new host, the White-banded Tanager (*Neothraupis fasciata*) was found. It is heavily parasitized in disturbed sites, but virtually unparasitized in native cerrado. Cowbird pressure on cerrado birds is expected to increase with continued fragmentation of this habitat.

**Key words:** *Shiny Cowbird*; *Molothrus bonariensis*; *brood parasitism*; *Neothraupis fasciata*; *Tyrannus savana*; *Brazil*; *cerrado*.

## INTRODUCTION

The Shiny Cowbird (*Molothrus bonariensis*) is a widespread brood parasite in South and Central America, known to have parasitized over 200 species (Friedmann and Kiff 1985), with 55 host species in Brazil (Sick 1985:655). Recent settlement in Central Brazil is making more habitat available for cowbirds. Since the mid-1950s, construction of Brasília and agricultural expansion have reduced the native vegetation in the region. The dominant vegetation is the cerrado, typically a rather open tree and scrub woodland rich in woody species (Eiten 1984). Cowbirds are uncommon in undisturbed cerrado, being seen more frequently at the edge of gallery forests; however, they are common in rural farmland, and occupy remnants of cerrado in urban areas, together with species of undisturbed cerrado (e.g., Collared Crescentchest, *Melanopareia torquata*, and White-banded Tanager, *Neothraupis fasciata*).

This paper presents data on cowbird parasitism in Brasília. A new host, the White-banded Tanager, is reported. The Fork-tailed Flycatcher, *Tyrannus savana*, a common host elsewhere, is seldom parasitized in Brasília. New records are

added for seven other species, and results of artificial parasitism experiments reported.

## STUDY SITE AND METHODS

The climate of Brasília is markedly seasonal, with a dry season extending from May until September, and rains starting in late September or October. Several migratory insectivores, such as the Fork-tailed Flycatcher, arrive in July or August. Breeding of these species, as well as many resident passerines and the cowbird starts in late August and continues to December. We studied breeding birds at two sites, from September through December of 1982, 1983, and 1984. One site was the downtown campus of the University of Brasília, which included gardens, sports fields, a 96-ha plot of disturbed cerrado, and a small gallery forest. The second site was the University's experimental farm, 20 km from the city. It included farm buildings, a coffee plantation, a small orchard, vegetable plots, pastures, corn and sorghum plantations, and was at the edge of a protected 2,600-ha cerrado reserve with all the major native vegetation types.

We attempted to check nests every 2 days, and daily during egg laying. Eggs were measured with calipers to within 0.1 mm. Eggs and young were weighed with a Pesola balance to within 0.5 g. We performed artificial parasitism experiments, adding real cowbird eggs to host nests; the response was scored as an acceptance if the cowbird egg remained at least 24 hr in the nest.

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TABLE 1. Sizes of host and cowbird eggs in relation to frequency of parasitism. Species ranked by egg length.

Species	Egg size (mm)		n	n <sup>a</sup>	Parasitized nests
	Length (SE)	Width (SE)			Contents <sup>b</sup>
Chalk-browed Mockingbird	28.00 (0.171)	20.50 (0.092)	39	4/15	3h:1c (2); 3h:2c (2)
Palm Tanager	24.50	18.20	1	1/1	1h:2c (1)
White-banded Tanager	22.91 (0.184)	16.80 (0.085)	9	5/6	1h:5c (1); 2h:3c (1); 3h:2c (3)
Shiny Cowbird	22.28 (0.171)	17.51 (0.092)	31		
Fork-tailed Flycatcher	22.17 (0.094)	16.30 (0.045)	129	1/87	2h:1c (1)
Rufous-collared Sparrow	21.30 (0.314)	15.19 (0.268)	7	5/6	1h:3c (1); 2h:1c (1); 2h:4c (1); 3h:1c (2)
White-rumped Tanager	21.10 (0.272)	15.63 (0.281)	5	3/3	0h:5c (1); 1h:3c (1); 2h:3c (1)
Grassland Sparrow	19.46 (0.226)	14.93 (0.108)	7	2/7	1h:1c (1); 3h:1c (1)

<sup>a</sup> Nests parasitized/(nests parasitized + unparasitized).

<sup>b</sup> h = host eggs; c = cowbird eggs; sample sizes in parentheses.

## RESULTS

We found evidence for cowbird parasitism in nine species. Most had egg dimensions within 15% of those of the cowbird; tanagers were heavily parasitized (Table 1). All cowbird eggs found were of the spotted type (Friedmann 1929). The number of cowbird eggs per nest varied considerably, single eggs being the most frequent (Table 1). Host responses to the cowbirds are described below.

### *TYRANNUS SAVANA*, FORK-TAILED FLYCATCHER

In the only nest parasitized, the cowbird egg disappeared 3 days before the host egg hatched. Low rates of parasitism could be explained by ejection of cowbird eggs, since this flycatcher is a rejecter in Argentina (Mason 1986a). Seven nests were artificially parasitized in 1982, two during laying and five during incubation. Acceptance occurred in all. However, rejection occurred later (within 4 days) at one of the nests parasitized during laying.

### *MIMUS SATURNINUS*, CHALK-BROWED MOCKINGBIRD

Cowbirds hatched in two nests. In one, with three hosts and one cowbird, the parasite died within 6 days. In the other, two cowbirds and two hosts hatched. Both cowbirds survived until day 4, but by day 6 one had disappeared and the other weighed 11 g, while the two hosts weighed 30 g

and 26 g. Observations were interrupted by predation, but the data are consistent with reports of cowbird starvation in nests of this host (Fraga 1985). We artificially parasitized two nests: one with a spotted cowbird egg, and one with an immaculate white egg of the Ruddy Ground-Dove, *Columbina talpacoti*. Both were accepted.

### *THRAUPIS SAYACA*, SAYACA TANAGER

This species is parasitized in Brazil (Sick 1985: 655) and has been reported to rear cowbirds (Friedmann and Kiff 1985). In a nest with one host and one cowbird egg, both hatched, but we did not follow further.

### *THRAUPIS PALMARUM*, PALM TANAGER

In one nest, two cowbirds and one host hatched. By day 12, the host and one cowbird had disappeared, and the remaining cowbird weighed 33 g. This host is not reported to rear cowbirds (Friedmann and Kiff 1985), but the large size of the cowbird nestling indicate this occurs. Twice we also observed pairs of adult Palm Tanagers feeding fledgling cowbirds.

### *CYPSNAGRA HIRUNDINACEA*, WHITE-RUMPED TANAGER

Records of parasitism for this species do not indicate dates or exact localities (Friedmann and Kiff 1985). We found parasitized nests on 17 November 1982, 24 September 1983, and 21 November 1983. None were successful. We once

observed two adults attending a young cowbird, suggesting that this host can rear the parasite.

*HEMITHRAUPIS GUIRA*, GUIRA TANAGER

It is reported as a host in Minas Gerais, South-eastern Brazil, but no further data are given (Friedmann et al. 1977). We saw a male feeding a young cowbird on 30 November 1983.

*NEOTHRAUPIS FASCIATA*,  
WHITE-BANDED TANAGER

This species has not previously been recorded as a cowbird host (Friedmann and Kiff 1985). We found five parasitized nests in 1983, on 4 September, 26 September, 27 September, 8 October, and 15 October. We did not determine cowbird success. However, Edwin O. Willis (pers. comm.) saw a pair feeding a young cowbird out of the nest at Águas de Santa Bárbara, São Paulo State, on 15 December 1982. This tanager may be under heavy pressure from the cowbird in disturbed areas, as five of six nests found in this habitat were parasitized. In contrast, none of five nests in an undisturbed cerrado site were parasitized (M.A.S. Alves, pers. comm.).

*AMMODRAMUS HUMERALIS*,  
GRASSLAND SPARROW

This sparrow is known to be parasitized, but not recorded as rearing cowbirds (Friedmann and Kiff 1985). Cowbirds hatched in two nests. In one, only the cowbird hatched, growing normally to 14.5 g by day 5, before being lost to predators.

*ZONOTRICHIA CAPENSIS*,  
RUFIOUS-COLLARED SPARROW

This species is a major host of the cowbird in Brazil and Argentina (Friedmann 1929, Sick 1958, King 1973, Fraga 1978). It is common in Brasília, and heavily parasitized (Table 1).

DISCUSSION

HABITAT PREFERENCE AND THE  
EFFECT ON HOSTS

The Shiny Cowbird is common in disturbed habitats and rarely found in native cerrado. Human settlement in Brasília appears to be favoring the cowbird in at least three ways. First, the cowbird's preferred habitat has increased in area. Second, some cowbird hosts, such as the Rufous-collared Sparrow, apparently benefit from the expansion of mildly disturbed cerrado. Third, fragmentation of cerrado has allowed cowbird access to previously undisturbed areas and unexposed

hosts. Cerrado species, such as the White-banded Tanager, are probably now experiencing higher rates of parasitism. The combined effects of habitat alteration and brood parasitism will most affect species preferred by the cowbird and poorly adapted to disturbed cerrado. Although data are limited, the White-banded Tanager and the White-rumped Tanager may be in this category. Species common in disturbed habitats and poor hosts, such as the Chalk-browed Mockingbird and the Fork-tailed Flycatcher, seem not immediately vulnerable. However, eventual depletion of alternative hosts may increase pressure on these species. Such problems are similar to those caused by the Shiny Cowbird in Central America, and by the Brown-headed Cowbird (*Molothrus ater*) in North America, where cowbird range expansion and habitat alteration by man have been implicated in the decline of some hosts (Post and Wiley 1977, Friedmann and Kiff 1985).

HOST BEHAVIOR

In Brasília, the Fork-tailed Flycatcher is seldom parasitized, although it appears to accept most cowbird eggs. Studies on this species in Argentina show a different pattern. The flycatcher is heavily parasitized and may rear the cowbird (Fraga 1978, Salvador 1983), however experiments and observations in Buenos Aires Province indicate it may eject large numbers of cowbird eggs from the nest (Mason 1986a, 1986b). In Córdoba Province, ejection, and burial of cowbird eggs in the nest lining were observed (Salvador 1983).

Our experiments in Brasília may indicate variation in ejection response through the nesting cycle, with rejection occurring primarily during the host laying period, and acceptance of cowbird eggs placed during incubation. A similar type of variation in ejection response with stage of nesting cycle was found in the Cedar Waxwing, *Bombycilla cedrorum* (Rothstein 1976). Since the Shiny Cowbird incubation period (12 days, Fraga 1978) is shorter than the Fork-tailed Flycatcher's (13 days, Pimentel, unpubl.), cowbird eggs placed early in the host incubation period may hatch. Such a mechanism could account for finding both strong ejection responses and successful parasitism in this flycatcher. Alternatively, Fork-tailed Flycatcher rejection responses to cowbird eggs may vary between sites and regions, in Argentina and Brazil. However, experimental evidence is still limited. Mason (1986a) tested five nests, and

we tested seven at various stages of incubation. Further comparisons should be fruitful with other species. Our one experiment with the Chalk-browed Mockingbird using an immaculate egg resulted in acceptance. Fraga (1985), however, found complete selection against immaculate eggs in Buenos Aires, whereas Mason (1986a) did not.

#### PARASITE STRATEGIES

What we observed seems typical of the species in other regions. Multiple parasitism with cowbird eggs of different sizes and markings in the same nest was twice recorded for the White-rumped Tanager. We found punctured host eggs in nests of the Grassland Sparrow, White-rumped Tanager, and found three punctured cowbird eggs in a nest of the White-banded Tanager. Evidence for host egg removal followed by laying of a cowbird egg occurred in a nest of the Rufous-collared Sparrow.

The Shiny Cowbird is an opportunistic parasite which exploits a variety of hosts. In Brasília, it parasitizes species typical of the region, as well as those with wide distributions. Several hosts of the Shiny Cowbird have parasitism rates that vary between sites, and such rates may be affected by the structure of the host community (Mason 1986b). In Brasília, the Fork-tailed Flycatcher appears to be a less preferred host than it is elsewhere. The rapid and ongoing modifications of native habitats in Central Brazil have favored the cowbird, and new hosts will likely continue to be found.

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#### LITERATURE CITED

- EITEN, G. 1984. Vegetation of Brasília. *Phytocoenologia* 12:271-292.
- FRAGA, R. M. 1978. The Rufous-collared Sparrow as a host of the Shiny Cowbird. *Wilson Bull.* 90: 271-284.
- FRAGA, R. M. 1985. Host-parasite interactions between Chalk-browed Mockingbirds and Shiny Cowbirds, p. 829-844. *In* P. A. Buckley, M. S. Foster, E. S. Morton, R. S. Ridgely, and F. G. Buckley [eds.], *Neotropical ornithology*. Ornithol. Monogr. No. 36. American Ornithologists' Union, Washington, DC.
- FRIEDMANN, H. 1929. The cowbirds, a study in the biology of social parasitism. C. C Thomas, Springfield, IL.
- FRIEDMANN, H., AND L. F. KIFF. 1985. The parasitic cowbirds and their hosts. *Proc. West. Found. Vertebr. Zool.* 2:225-304.
- FRIEDMANN, H., L. F. KIFF, AND S. I. ROTHSTEIN. 1977. A further contribution to knowledge of the host relations of the parasitic cowbirds. *Smithson. Contrib. Zool.* 235.
- KING, J. R. 1973. Reproductive relationships of the Rufous-collared Sparrow and the Shiny Cowbird. *Auk* 90:19-34.
- MASON, P. 1986a. Brood parasitism in a host generalist, the Shiny Cowbird: I. The quality of different species as hosts. *Auk* 103:52-60.
- MASON, P. 1986b. Brood parasitism in a host generalist, the Shiny Cowbird: II. Host selection. *Auk* 103:61-69.
- NEGRET, A. J., AND R. NEGRET. 1981. As aves migratórias do Distrito Federal. Boletim Técnico No. 6, Instituto Brasileiro de Desenvolvimento Florestal, Brasília, DF.
- PIMENTEL, T. M. 1985. Biologia reprodutiva de *Tyrannus savana* (Aves: Tyrannidae), com uma comparação entre o forrageamento desta espécie e de *T. melancholicus* no Planalto Central. M.S.thesis, Universidade de Brasília, Brasil.
- POST, W., AND J. W. WILEY. 1977. The Shiny Cowbird in the West Indies. *Condor* 79:119-121.
- ROTHSTEIN, S. I. 1976. Experiments on defenses Cedar Waxwings use against cowbird parasitism. *Auk* 93:675-691.
- SALVADOR, S. A. 1983. Parasitismo de cría del renegrido (*Molothrus bonariensis*) en Villa María, Córdoba, Argentina (Aves: Icteridae). *Historia Natural* 3:149-158.
- SICK, H. 1958. Notas biológicas sobre o gaudério, *Molothrus bonariensis* (Gmelin) (Icteridae, Aves). *Rev. Bras. Biol.* 18:417-431.
- SICK, H. 1985. *Ornitologia Brasileira, uma Introdução*. Vol. 2. Editora Universidade de Brasília, Brasília, Brasil.