

FAILURE OF BROWN-HEADED COWBIRD PARASITISM IN NESTS OF THE AMERICAN GOLDFINCH

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Abstract.—Brown-headed Cowbirds (*Molothrus ater*) parasitized 47 of 802 American Goldfinch (*Carduelis tristis*) nests at Guelph, Ontario, between 1968 and 1989, but cowbird eggs hatched in only 13 of them. In 12 of these nests the cowbirds died within 4 d of hatching. In the remaining nest the cowbird survived for 12 d, but at death was poorly developed and still incapable of nest departure. The most likely cause of the cowbird deaths, as suggested by observational evidence, was dietary inadequacy.

FRACASO DE MOLOTHRUS ATER EN PARASITAR NIDOS DE CARDUELIS TRISTIS

Sinopsis.—De un total de 802 nidos de *Carduelis tristis*, estudiados en Guelph, Ontario, entre el 1968 y 1989, el tordo (*Molothrus ater*) parasitó 47, de los cuales en sólo 13 eclosionaron huevos del parásito. En 12 de estos nidos los polluelos de tordo murieron dentro de los primeros 4 días de edad. En el nido restante el tordo sobrevivió hasta la edad de 12 días, pero al momento de su muerte se encontraba pobremente desarrollado e incapaz de abandonar el nido. Las observaciones sugieren ofrecer como explicación que la causa más probable de la muerte de estos tordos fue la alimentación inadecuada.

The diet of nestling cardueline finches is mainly composed of seeds, which is rare among birds (Newton 1967, 1972) because seed diets are relatively low in protein (Newton 1972:179; O'Connor 1984). Even in times of food shortage such nestlings, though underweight, still can maintain feather growth at a rate which is nearly normal (Newton 1972). By contrast, low protein diets in other groups of birds may significantly restrict all aspects of development (O'Connor 1984:141). This reality may have implications for successful brood parasitism because, not only must the parasite select hosts that can incubate its eggs but also those that can provide adequate nutrition for its nestlings. In this context, the relationship between the American Goldfinch (*Carduelis tristis*) and Brown-headed Cowbird (*Molothrus ater*) is of interest.

The American Goldfinch is regularly parasitized by the Brown-headed Cowbird (Friedmann and Kiff 1985, Middleton 1977). However, the success of the relationship, as defined by the production of fledgling cowbirds, is equivocal (Friedmann and Kiff 1985:266). Berger (1961, 1968) contended that it is unlikely that goldfinches can rear cowbirds and further suggested that the failure of cowbirds to survive the nestling period results from their inability to thrive on the granivorous diet of the goldfinch (Berger 1961:271). Although I have not rigorously tested this hypothesis, field data from my long-term study (Middleton 1988) support it.

METHODS AND RESULTS

Between 1968 and 1989 inclusive, 802 American Goldfinch nests were found at Guelph, Ontario, of which 47 were parasitized by the Brown-

TABLE 1. Body characteristics of Brown-headed Cowbird and American Goldfinch nestlings from a successful and an unsuccessful nest.

| Body characteristics | Brown-headed Cowbird (12 d) | | American Goldfinch (13 d) | |
|----------------------|--|-------------------------|--|--------------------------------|
| | Successful nest ¹ | Unsuccessful nest | Successful nest ² | Unsuccessful nest |
| Body weight (g) | 29 ± 1 | 26.5 | 11.6 ± 0.2 | 9.75–10.5 |
| Body length (mm) | 108 ± 2 | 90.1 | 85 ± 1.0 | 54.8–58.2 |
| Wing length (mm) | 64 ± 1 | 20.8 | >40 (Extrapolated) | 34.0–37.8 |
| Tarsus length (mm) | 24 ± 0 | 20.2 | 13 | 13.9–13.6 |
| Plumage | Teleoptiles fringing and well developed. | No teleoptiles present. | Teleoptiles fringing and well developed. | Teleoptiles in early fringing. |

¹ From Scott (1979). Age 11 d.

² From Holcomb (1969).

headed Cowbird. Thirteen of these nests produced cowbird hatchlings, but in 12, the cowbirds died by the fourth day (Mean = 2.1 ± 1.03 d SD). In one nest, the cowbird survived for 12 d. At the remaining nests 12 eggs failed to hatch, 8 were taken by predators, 7 disappeared during incubation and 7 were left in abandoned nests.

The nest in which the cowbird survived was found on 2 July 1981, 3 m high in an ornamental maple (*Acer* sp.) on the University of Guelph campus. The nest contained four goldfinch eggs and one cowbird egg. The cowbird egg hatched on 15 July and the two goldfinch eggs to hatch did so on 16 July. Both goldfinch parents were color-banded and daily observations were made at the nest. Incubation, brooding and feeding behaviors appeared normal (Nickell 1951, Stokes 1950). On 27 July the cowbird was found dead in the nest and was collected. On 28 July there was little parental activity at the nest and on 29 July the two goldfinch nestlings were found dead.

At collection the carcasses were weighed to the nearest 0.25 g on a Pesola scale, then preserved in formalin. Subsequently, total body length, wing length, and tarsus length were measured to the nearest 0.1 mm, for all three specimens, using a Vernier caliper and according to the methods used by Scott (1979) for the cowbird and Holcomb (1969) for the goldfinches. Compared to other nestlings of their species at the same age (Holcomb 1969, Scott 1979), development of all three nestlings was retarded, especially the development of the cowbird's plumage (Table 1). The goldfinch nestlings were emaciated and there was no sign of food in the gut.

DISCUSSION

Although the cowbird nestling survived beyond the 10 d usually associated with nest departure (Harrison 1978; Middleton, unpub. data) and survived longer than any other in my study, it was far from ready

to leave the nest. Despite being fed regularly, it had not thrived. Therefore, death was unlikely caused by undernourishment, but rather through malnourishment resulting from the inappropriate quality of the diet provided by its foster parents. The missing ingredient was presumably protein or its precursors (Newton 1972:196).

The goldfinches apparently starved after the nest was abandoned by their parents. Abandonment may have been caused by the death of the cowbird and/or, in their weakened condition, the young finches may have been unable to retain parental attention following death of the cowbird.

As previously suggested by Berger (1961, 1968) and Middleton (1977), my observations provide concrete evidence that cowbirds are unlikely to survive in goldfinch nests. In successful nests many cowbird eggs fail to hatch, which may be a result of incubation problems (Payne 1977). If the eggs do hatch most nestlings die within a few days, probably when the residual yolk reserves are finally depleted. In these nests the surviving goldfinches are not seriously affected and become fledglings (Middleton 1977). My results indicate that even if cowbirds survive beyond the first few days, they are still unlikely to become fledglings. Furthermore, in this rare situation the presence of the cowbirds is likely to result in total nest failure, as observed at Guelph.

Clearly, the American Goldfinch is an unsuitable host species for the Brown-headed Cowbird. My data strongly suggest the impossibility of successful fostering and cast further doubt on the validity of the early reports of such success (Friedmann and Kiff 1985).

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