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Evident Nest-Searching Behavior of Female Brown-headed Cowbirds While Attended by Males

Bill M. Strausberger[1]

ABSTRACT.—Unlike most birds, brood parasitic Brown-headed Cowbirds (*Molothrus ater*) must find host nests in which to lay their eggs. Female cowbirds have been reported using several methods to find nests. Here, I report on two observations of cowbirds near host nests that are consistent with two hypotheses, nesting-cue and "flush" method, regarding techniques cowbirds may use to find host nests. The nesting-cue hypothesis poses that cowbirds are directed to host nests by host's typically increasing aggressive behavior towards cowbirds as they approach the nest, whereas the flush method poses that cowbirds attempt to spot a concealed nest by rousing the host from it with intentionally noisy behavior near the nest. Unlike other reported observations of female cowbirds near potential host nests, male cowbirds were present during both observations. *Received 20 June 1997, accepted 27 Oct. 1997.*

Brown-headed Cowbirds (*Molothrus ater*) are obligate brood parasites that lay their eggs in the nests of other species, the 'hosts'. Norman and Robertson (1975) summarized three main methods female cowbirds use to find host nests: (1) secretive searching while walking; (2) active, noisy searching; and (3) cryptic, silent watching of nest-building hosts (Hann 1937, 1941; Norris 1947; Mayfield 1960, 1961; Payne 1977). While conducting field work at The Morton Arboretum in Lisle, Illinois, I observed what appeared to be all three of these methods. While cryptic watching of host nest-building has been well documented, other methods have rarely been described (Norman and Robertson 1975). Further, previous studies either state or imply that female cowbirds search for and approach host nests when alone (i.e., Friedmann 1929; Hann 1937, 1941; Norris 1947; Norman and Robertson 1975). Here, I report on my observations of female cowbirds seemingly searching (e.g., the flush method) for host nests by using conspicuously noisy searching and host nest defense that has not been previously described.

Seppä (1969) and Ficken (1961) first suggested that the European Cuckoo (*Cuculus canorus*) and cowbird, respectively, may use host nest-defense to locate nests. Robertson and Norman (1976) later proposed the "nesting-cue" hypothesis which poses that brood parasites take advantage of host nest defense to direct them to the nest. However, this behavior has never been observed in cowbirds.

Many species of birds react aggressively toward cowbirds (e.g., Robertson and Norman 1976, 1977; Folkers 1982; Smith et al. 1984; Folkers and Lowther 1985; Neudorf and Sealy 1992; Bazin and Sealy 1993; Peer and Bollinger 1997). Nest defense may be an effective deterrent to parasitism (Slack 1976) for relatively large host species (Friedmann 1929, Neudorf and Sealy 1992), as they can inflict injury on cowbirds (Leathers 1956). However, nest defense may be ineffective, especially for smaller host species and those less equipped

[1] University of Illinois at Chicago, Deptartment of Biological Sciences (M/C 066), 845 W. Taylor St., Chicago, Illinois 60607. E-mail: bstrau1@icarus.uic.edu

to defend their nests (Robertson and Norman 1977, Montgomerie and Weatherhead 1988). For species unable to prevent parasitism, it is unclear why some species act aggressively towards cowbirds, as the action may help direct cowbirds to their nest. It has been suggested that nest defense by such hosts may be an instance of a more general response to all potential enemies that approach the nest (Robertson and Norman 1976, Smith et al. 1984), although more recent studies have shown that some host species recognize the unique threat posed by cowbirds (Neudorf and Sealy 1992, Bazin and Sealy 1993, Gill and Sealy 1996). Cowbirds may be more likely to use host nest-defense to find nests when the host species is small and less likely to injure the cowbird.

Evidence that nesting-cues could potentially be used by cowbirds was provided by Uyehara and Narins (1995) and Gill and coworkers (1997), who found that some host defensive responses toward live cowbirds and models, respectively, increased with decreasing distance from the nest. In addition, Smith and coworkers (1984) found that the level of parasitism was positively correlated with the level of nest defense in Song Sparrows (*Melospiza melodia*). However, studying six different species, Gill and coworkers (1997) did not find a positive correlation, and they concluded that nest defense was unlikely to be used as a nest-locating cue by cowbirds. My observation of interactions between a female cowbird and nesting Field Sparrows (*Spizella pusilla*) is consistent with the nesting-cue hypothesis.

While monitoring a Field Sparrow nest in its third day of incubation, I observed a female cowbird, attended by two males, approach the nest. The incident occurred on 6 June 1996 at 11:10 CST when the pair of sparrows, perched within 2 m of their nest, began calling in response to a female cowbird that landed approximately 10 m away. As the female cowbird made short flights in their direction, the sparrows began to flit around the area of the nest and call more frequently. When the cowbird was approximately 1 m from the nest, the sparrows' calling and flitting became more frequent for approximately 30 s while the cowbird walked and hopped through the vegetation near the nest. When the cowbird was within 0.5 m of the nest, the sparrows began striking her repeatedly for several seconds until she reached the nest. She then immediately flew off, followed by the two male cowbirds. The cowbird did not defend herself. Although the male cowbirds never approached the nest, one remained within approximately 8 m of the female for the duration of her search. While the nesting-cue hypothesis poses that cowbirds use host nest defense to find nests to parasitize, the nest was never parasitized. This may be because the nest's completed clutch of four eggs indicated that the nest was in the incubation stage making it poorly suited for parasitism. Cowbird eggs laid in host nests undergoing incubation often do not hatch or hatch too late to compete successfully (Weatherhead 1989, Robinson et al. 1995). All four sparrow eggs eventually fledged young.

I also observed behavior similar to that described by Wiley (1988) and Norman and Robertson (1975), studying the Shiny Cowbird (*M. bonariensis*) and Brown-headed Cowbird, respectively, in which they described cowbirds seemingly attempting to flush a nesting bird from hiding. On 13 May 1997 at 11:45 CST I spotted a female cowbird flying in a "hovering" fashion less than 1 m above 15 cm tall grass. The cowbird appeared to be searching as her neck was extended and head pointed down. She continued to fly in a slow circular motion, occasionally dropping with her wings outstretched causing them to contact the grass. After a few seconds on the ground, where she would walk without feeding, she would flit up and repeat the process approximately 20 cm away. All of her "hovering" and walking activities took place within a 2 × 2 m area. After 2 min, a male cowbird landed approximately 3 m away and called. I then spotted an approaching Song Sparrow issuing alarm 'tchunk' calls (Nice 1937) in flight approximately 15 m away. The sparrow flew directly towards the female cowbird who immediately flew away, followed by the male cowbird. The sparrow never got closer than 1 m from the cowbird. It is unlikely that the returning sparrow was off the nest as a result of being flushed by the cowbird, because the sparrow would likely have initiated nest defense immediately instead of departing for two minutes. Upon searching the area, I found a Song Sparrow nest with four cool sparrow eggs and two cowbird eggs within 0.5

m of where the cowbird had been walking and hovering prior to her retreat. The nest was under a tuft of dead grass and was not visible from directly above. The following morning a sparrow egg had been removed and a third cowbird egg was present, all of which were being incubated.

The benefits to cowbirds of using the flush method for finding host nests are unclear, because that method is most effective during the host's incubation stage when freshly laid cowbird eggs have a low chance for success. However, the flush method may be adaptive when a host is on the nest during egg laying or when incubation begins prior to host clutch completion.

In conclusion, unlike other studies, both of my observations confirm that male cowbirds may sometimes accompany females at host nests. Further, I witnessed a female cowbird behaving similarly to the behavior described by Norman and Robertson (1975), who hypothesized that the behavior's purpose might be to flush a bird from hiding. Finally, consistent with the nesting-cue hypothesis, I observed host defensive behaviors escalate as a female cowbird approached and found the hosts' nest. It is notable that in this observation the host species, Field Sparrow, is approximately one-third the size of a cowbird (Dunning 1993). Further work on the nesting-cue hypothesis should examine the effect of host size on cowbird employment of this search method.

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Characteristics of Florida Grasshopper Sparrow Nests

Michael F. Delany[1,2] and Stephen B. Linda[1]

ABSTRACT.—We examined nests of the endangered Florida Grasshopper Sparrow (*Ammodramus savannarum floridanus*) on the U.S. Air Force Avon Park Range, Highlands County, Florida. Nests (n = 20) were located on the ground in shallow (≤3.2 cm) excavations in the sand substrate. All were domed (>50% of the cup covered) and made of grass and grass-like monocots. Most (75%) were shielded by a low (<29.5 cm) growth of dwarf live oak (*Quercus minima*). Nest opening directions were randomly oriented ($P > 0.05$). Vegetation density was significantly lower in the nest opening quadrant than in other quadrants ($P = 0.003$). An exposed area at the nest opening would facilitate access and make predator distraction displays more visible. *Received 24 May 1997, accepted 4 Oct. 1997.*

The Florida Grasshopper Sparrow (*Ammodramus savannarum floridanus*) is an endangered subspecies endemic to the south-central prairie region of the state (Fed. Reg. 1986). Basic information on nesting ecology is needed to develop and implement conservation strategies for the sparrow (USFWS 1988). Nest location, structure, and orientation may have important implications for reproductive success and population stability. Previous descriptions have been anecdotal (Howell 1932, Nicholson 1936). In this paper we present data on the placement, composition, dimensions, and orientation of Florida Grasshopper Sparrow nests.

STUDY AREA AND METHODS

Data were collected during 20 May 1993–31 July 1996 on the U.S. Air Force Avon Park Range, Highlands County, Florida. The study area was a 700 ha grass, shrub, and saw palmetto (*Serenoa repens*) plant community described by Delany et al. (1985). The prairie was burned with head fires (burned with the wind) between December and mid-March on a 2–3 year rotation.

The study area was systematically searched by walking transects at 50 m intervals. Observations of Grasshopper Sparrows delivering food to nestlings and females flushed from nests indicated possible nest sites. Nests were found by searching these locations. After termination of the nesting attempt, we measured nest outside diameter, nest inside diameter, nest height above substrate, and orifice width (diameter of the nest opening). Orientation of the nest opening was measured with a compass and grouped in 90° quadrants centered to orientations N, S, E, and W. Nests were measured in place within 5 days of termination.

Features of the vegetation composition and structure were measured at each nest in the 4 cardinal directions. Point subsample measurements (4/nest) were made within 1 cm of the nest and included: (1) vertical density—the total number of vegetation contacts with a 7 mm diameter metal rod placed vertically into the vegetation; (2) height—the height of the highest contact with the rod; and (3) percentage cover—the total cover by each of the vegetation components (grasses, forbs, shrubs, litter, and bare ground) as determined by counting the number of cm of each component along a 1 m transect adjacent to point samples (Whitmore 1981). Plant species providing shielding to the nest were recorded. Time post-burn was recorded for all sample locations.

Fifteen nests were collected and plant species used in construction were identified, and their relative abundance was visually estimated. Plant names follow Wunderlin (1982).

To test the null hypothesis that nest opening direction was uniformly distributed against any alternative

[1] Florida Game and Fresh Water Fish Commission, 4005 South Main St., Gainesville, FL 32601.

[2] Corresponding author.