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AN UNUSUAL NORTHERN CARDINAL NEST: COOPERATIVE BREEDING OR NEST SHARING?

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Abstract—On 1 July 2008, I found a Northern Cardinal (*Cardinalis cardinalis*) nest in a residential neighborhood of Stillwater, Payne Country, Oklahoma, that was used by 2 adult females and 2 adult males. During the period of observation, females incubated individually and often while the other female roosted on the rim of the nest cup. Males were observed feeding the females and hatchlings. No intra- or intersexual agnostic behavior was noted among the adult cardinals. The nest was lost to a predator on 11 July 2008. Evidence suggests this was a case of shared nesting rather than cooperative breeding.

On 1 July 2008, I found a Northern Cardinal (*Cardinalis cardinalis*) nest 1.8 m off the ground in a common lilac (*Syringa vulgaris*) in a residential neighborhood on the northwestern corner of Boomer Lake, Stillwater, Payne County, Oklahoma. During 30 min of initial observation, the nest was visited simultaneously by 2 adult females on 3 occasions (Fig. 1); they did not incubate during this brief observation. The nest contained 7 eggs: 4 eggs of the Northern Cardinal and 3 eggs of the Brown-headed Cowbird (*Molothrus ater*). Because of the unique nature of these observations, I removed the 3 cowbird eggs; they were slightly smaller than the cardinal's eggs and were brown-speckled with a cream-colored base in contrast to the light greenish blue-colored base of the cardinal eggs (Baicich and Harrison 1997).

Fig. 1. Two adult female Northern Cardinals (*Cardinalis cardinalis*) at the same nest in Payne County, Oklahoma, July 2008.

From 1 July through 6 July 2008, the 2 female Northern Cardinals continued to visit, tend, and incubate the nest. Typically, 1 female incubated, and the other female sat perched on the rim of the nest cup, immediately adjacent to the incubating female; I could not differentiate between the 2 females to ascertain if incubation was shared. Based on 3 predawn observations, this pattern of shared nest tending seemed to occur throughout the night. One male Northern Cardinal came and left the nest throughout this period, but his visits seemed infrequent; I presumed that he was the same individual. Male cardinals do not incubate but do feed the incubating female (Halkin and Linville 1999), which I observed on only 1 occasion.

On 7 July 2008 at 1221 h CDT, the 2 females were perched on the rim of the nest cup directly across from each other. Each female looked attentively in the nest, softly "chipping" (Stokes and Stokes 1983), and occasionally picked up and ate what seemed to be egg shell fragments or excrement from the nest cup. After they left, I inspected the nest and noted that 2 eggs had hatched; no egg shells were present. The next morning, 8 July, 1 female was brooding and the other perched, as before, on the rim of nest cup. After they left, I inspected the nest and found that a 3rd egg had hatched. At 1138 h on 8 July, I observed a single male Northern Cardinal feeding the 3 nestlings.

On 9 July 2008 at 1238 h CDT, I was surprised to see the 2 females with 2 adult males at the nest. The 2 females were silently perched on either side of the nest as I had noted before (Fig. 1), and a male was perched about 12 cm directly above each female, starring at each other and softly "chipping" as I had heard the females before. The males did not display any agonistic behavior toward one another. After the males left, both females fed the nestlings. Later, a female arrived, landing next to a brooding female. After softly "chipping" for about 30 sec, the brooding female jumped off the nest, and the other female fed the nestlings.

On 10 July 2008 beginning at 1215 h CDT, 1 male fed the nestlings small insects twice in 5 min. Between 1220–1300 h CDT, the 2 females came and went 7 times, twice arriving simultaneously. On 1 occasion, 1 female fed 1 nestling while the other seemed to "groom" another nestling. The same general feeding pattern was observed later in the day between 1645–1728 h CDT.

At 0645 h CDT on 11 July 2008, I discovered that the nest had been depredated. The nest appeared untouched, but the 3 nestlings and the unhatched egg were gone. All that remained were 5 tail feathers from a female, and dried saliva seemed to cover the terminal one-half of the tail-feather "bundle." This evidence suggested that a snake first grabbed the female by the tail, but she was able to free herself; then the snake consumed the nestlings and unhatched egg. The Black Rat Snake (*Elaphe obsoleta*) is a frequent predator of birds' nests (Trepanowski 2003) in Oklahoma. I did not smell the musky odor of the Black Rat Snake (J. Shackford, pers. comm.), but my golden retriever was particularly interested in a novel scent around the nest site that morning.

I saw the 2 males together at the nest only once, so I can not be certain that each one regularly visited the nest. Furthermore, I have no way to tell if 1 female laid all of the eggs, or if it was a shared event. The former would suggest "cooperative breeding," the latter suggests "nest sharing" (Skutch 1935, 1961; Ehrlich et al.

1988), which I consider most likely because of the presence of 2 mature males. There is a chance that I misidentified the 3 cowbird eggs that I removed (albeit I view it as slim); if so, the 7 eggs originally in the nest were no doubt a shared clutch because Northern Cardinals have individual clutches of 3–5 eggs (Halkin and Linville 1999).

Nest sharing has been reported in other species: e.g., Groove-billed Anis (*Crotophaga sulcirostris*—Vehrencamp 1978), European Starling (*Sturnus vulgaris*—Stouffer et al. 1988), Acorn Woodpecker (*Melanerpes formicivorus*—Koenig and Pitelka 1979), Wood Duck (*Axis sponsa*—Bellrose 1943), and Guira Cuckoo (*Guira guira*—Davis 1842). In an interspecific case, a Lark Sparrow (*Chondestes grammacus*) and a Northern Mockingbird (*Mimus polygottos*) shared a nest near Willis, Oklahoma (Crowell et al. 1982). Skutch (1961) provides additional examples of intra- and interspecific nest sharing.

Nest sharing has been reported only twice in cardinals (Bent 1968; Hawksley and McCormack 1951). In 1 case, considerable territorial defense by the males and females and simultaneous incubation by the females were noted (Hawksley and McCormack 1951); that nest failed. I did not observe either behavior, but territorial behavior may have occurred during nest building or egg laying, both of which occurred before I found the nest. The other case was anecdotal (Hawksley and McCormack 1951). Nest sharing in Northern Cardinals appears to be rare, and its causes are unknown but could be associated with relatedness, late-season nesting when resources are less abundant, or nest-site availability (e.g., Stouffer et al. 1988).

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