

but instead of sitting down she stepped from the nest and began eating egg remains. The male slowly walked south and the female walked in the opposite direction, but she soon returned and consumed more shell fragments. She then walked toward the male, giving alarm calls. The pair fed for 10 min, then again walked toward the nest but continued walking past it. The male stopped near the site and briefly danced. At 05:50 both gave an "arched-neck" threat display (Littlefield, Breeding biology of Sandhill Cranes, M.S. Thesis, Colorado State University, 1968), and copulated shortly afterward.

06:00-10:00. At 06:15 the pair gave a unison call (described by Walkinshaw, Mich. Acad. Sci. Arts Letters 50:75-88, 1965; discussed by Archibald, Proc. Int. Crane Workshop 1:225-251, 1976); the female then initiated nest construction behavior by picking up vegetation with the bill and dropping it back over the shoulder. The pair returned to the nest at 06:40 and picked up shell fragments which they broke in the water, eating the smaller pieces. When they flew back to the nest, the female assumed an "arched-neck" threat display upon landing. More alarm calls were given and after seven minutes they left the site. The pair walked to the south end of their territory and a conflict ensued with a neighboring pair at 08:15. The conflict continued for 40 min before feeding was resumed.

10:00-14:00. A male from an adjoining territory approached the pairs' territory at 11:21. The pair

gave a unison call and performed a "bill-down" threat display (Littlefield 1968) and then resumed feeding after the intruder left. At 13:38 they returned to the nest and gave a unison call. The male walked away, the female stepped onto the nest, stood briefly, then joined the male and both started to feed. Three unison calls were given within nine minutes.

14:00-19:00. At 15:27 several neighboring pairs gave unison calls, as did the pair being observed. Feeding continued until 16:44 when copulation occurred. The pair walked away from the feeding area at 18:08 and gave a unison call. After a brief departure from their territory, the birds fed until dusk.

Copulation occurred twice after the eggs were destroyed. This is the latest known date for Sandhill Crane copulation on Malheur Refuge. Perhaps copulation is normal shortly after a pair has lost a nest, even into June.

During the day of nest destruction, the cranes lost interest in the nest and spent more time feeding. From 05:10 to 12:10 they fed, preened or loafed 68% of the time (284 min), compared with 98.5% (414 min) from 12:10 to 19:10. The pair had left their territory by 1 June and did not attempt to renest.

Denzel E. Ferguson and Caryn E. Talbot reviewed and commented on the draft of this note.

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ALARM CALL OF CRESTED GUAN WHEN ATTACKED BY ORNATE HAWK-EAGLE

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On 7 January 1977 my wife and I were watching birds from a Mayan ruin at Tikal, Peten, Guatemala; the steep edge of a plateau enabling us to look into the surrounding forest at mid-tree level. Two Crested Guans (*Penelope purpurascens*), then two more, flew to an open limb 12 m from us. They appeared undisturbed until they suddenly flew off in four directions in response to a hawk my wife saw fly in among them. We then heard an outcry of screams from one of the guans. The screams were so loud and piteous that I wondered if the bird had not been caught and was being killed. Mixed with the screams were guttural sounds and growls that made me wonder whether the bird might not have been caught by a jaguar (*Panthera onca*).

When I crept forward for a closer view, I found the guan perched in the middle of a tree, apparently unharmed, but continuing both the screams and growls. It suddenly flew directly toward me pursued by a hawk. The guan slipped into the center of a medium-sized tree 6 m from me, but the hawk was stopped by the tangle of outer branches. Here it clung with tail outspread and wings beating for

some moments, then left. It was an Ornate Hawk-Eagle (*Spizaetus ornatus*).

While the hawk-eagle clung to the outside of the tree the guan continued its screams and growls, but when the predator left, it immediately changed to "cawk, cawk, cawk" notes at a rate of 144 per minute. These it continued for three minutes. The guan then became silent and began to preen.

The cries of the guan under attack might be rated with the roars of Howler Monkeys (*Alouatta palliata*) as one of the loudest and most dramatic sounds that one is likely to hear in the American tropics.

Alarm calls of passerines have been much discussed; older authors suggested that the bird giving the alarm calls is altruistic, exposing itself for the good of others. More recently Charnov and Krebs (*Am. Nat.* 109: 107, 1975) and Rohwer et al. (*Am. Midl. Nat.* 96: 418, 1976) have argued an opposite point of view. None of the ideas developed in regard to passerines appears to fit the situation of the Crested Guan. The loudness and variety of its vocalizations must have informed the conspecifics of its immediate flock, and probably those of other flocks, of the presence and location of the hawk-eagle.

One hypothesis is that the screams and growls cause hawks to fumble attacks, thus increasing the survival chances of the vocalizer. Predators, in general, depend on being undetected by their prey for success. A barrage of sound might, therefore, warn a hawk that it was not only observed, but that its

presence was being made known over a wide area. This might have a discouraging effect, leading the hawk to move well away before hunting again.

The idea that a barrage of sound, given in alarm, may act to deter or distract an attacking hawk has been discussed previously (Kilham, *Auk* 93:15, 1976) in regard to Chestnut-winged Chachalacas (*Ortalis garrula*) and Pileated Woodpeckers (*Dryocopus pileatus*) when feeding on fruit in exposed situations.

The hawk-eagle did attack the guan while it was screaming, when the guan flew from one tree to another close by. One might regard this as a "pursuit invitation" (Smythe, *Am. Nat.* 104:491, 1970) but the distance was, it seemed to me, too short. The guan flew, I believe, because the second tree offered more security. The guan had two escape advantages in this situation: one, that it could slip through outer branches more readily than the hawk-eagle and two, that it could run along inner branches with the agility of a squirrel. As soon as the hawk-eagle left, the guan switched to the entirely different "cawk, cawk,

cawk" vocalizations. These might have warned other guans that the predator had left.

Why should the alarm calls of Crested Guans combine two very different types of vocalizations, namely the screams and the "jaguar-like" growls? Could the latter serve to further confuse a hawk-eagle, making it think that it itself might be exposed to a predator? It is of interest here that Russell (*Am. Ornithol. Union Monogr.* No. 1, 1964) described a female Great Curassow (*Crax rubra*) with young as making a "threatening, mammal-like snarl, similar to that of an angry dog" in the course of a distraction display. The situation is a complex one in terms of evolution and would seem to merit further study of the family *Cracidae* (Delacour and Amadon, *Curassows and related birds.* *Am. Mus. Nat. Hist., New York*, 1973) as a whole.

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COWBIRD PARASITISM OF SAGE AND BREWER'S SPARROWS

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Friedmann et al. (*Smithson. Contrib. Zool.* No. 235, 1977) stressed the value of new records of parasitism by Brown-headed Cowbirds (*Molothrus ater*) where those records might be associated with changes in the environment. The following illustrates a situation where hosts probably have become newly available to cowbirds. Friedmann (*U.S. Natl. Mus. Bull.* No. 233, 1963) listed only one record for the Sage Sparrow (*Amphispiza belli*). Four instances of parasitized Brewer's Sparrows (*Spizella breweri*) have been reported, two in each of the works cited above. I add here two new records for each species. All four nests were found on a 10-ha study area of ungrazed sagebrush (*Artemisia tridentata*) in Bingham County, Idaho.

Sage Sparrow: Nest #1. This nest, the second of the pair, was found on 23 June 1976. It contained one unidentified young, one sparrow egg, and one cowbird egg. The nest was deserted on 24 June. Nest #2. This also was the second nest of a pair and was found on 5 July 1976. It contained one unidentified young and one cowbird egg which had been perforated. The nest was deserted on 7 July.

Brewer's Sparrow: Nest #1. On 21 June 1976 I found a nest with three sparrow eggs. On 3 July the nest contained one young sparrow, two sparrow eggs, and one cowbird egg. The nest was deserted on 4 July. Nest #2. When found on 5 July 1976, this nest contained three sparrow eggs. On 11 July it contained one sparrow egg and one cowbird egg. The nest was deserted by 13 July.

I considered the nests deserted when several subsequent visits revealed no change in their contents

and no parents in attendance. Two of four Sage Sparrow nests and two of 16 Brewer's Sparrow nests that I found were parasitized. None of 21 Sage Thrasher (*Oreoscoptes montanus*) nests contained cowbird eggs.

The Sage and Brewer's sparrows are regarded as "almost entirely dependent" on sagebrush for breeding habitat (Baker et al., *Wilson Bull.* 88:165-171, 1976). My own observations in Idaho indicate that the Sage Sparrow, in particular, may have specific requirements that preclude it from large tracts of sagebrush which otherwise appear suitable. Both species occur along the Snake River Plain in southern Idaho. This area has only recently undergone large-scale alteration for crop and grazing land. I found the nests on the edge of a large expanse of sagebrush that bordered a cattle ranch for about 15 km. Daily, I saw cowbirds flying into the sage from the direction of the pasture. Flight distance to the study area was about 3 km, but the cowbirds commonly flew farther.

This intrusion of grazing land into the sagebrush appears to provide a large contact zone where cowbirds have access to the breeding birds of the sage habitat. Cowbirds may be limited by the distance that they will fly in search of hosts, but it seems that the continued alteration of sagebrush habitat for grazing will provide further opportunities for the parasitism of species heretofore isolated from cowbirds.

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