SOCIAL NESTING HABITS OF *CROTOPHAGA MAJOR*

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INTRODUCTION

A STUDY of the social nesting habits of *Crotophaga major* was undertaken as part of a series of researches on the habits of the Crotophaginae. The nesting habits of *C. ani* have been described by Davis (1940) and the habits of *Guira guira* have been investigated (Davis, 1940a). The reader is referred to Davis (1940) for a brief summary of the subfamily.

The studies on *C. major* were carried out in British Guiana, in part on Canje Creek near New Amsterdam, but mainly near the source of the Abary River, where, through the kindness of Mr. Albert Reid, I stayed at a ranch. Observations were begun at New Amsterdam on June 9 and continued until June 25. Since that locality was unsatisfactory, I moved to the Abary River and continued work till August 5, 1939. As a result of a series of unavoidable occurrences (malaria, in part) which prevented concentrated investigation until July 10, no nest with eggs was found. Nevertheless adequate data were obtained to elucidate the social nesting habits and territorial behavior of *Crotophaga major*.

A study of the nesting and territorial behavior of this species presents certain practical difficulties to the investigator, because the birds live only along streams. Even though using a canoe at all times, it is frequently impossible to keep up with the birds or to follow them when they go into the thick brush or flooded lands along the river course. Thus deficiencies in the records inevitably result. Although no birds were banded, individual identifications were made on the basis of tail-feathers; for since the molt is continuous, each bird has a different set of tail-feathers.

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GENERAL CHARACTERISTICS

This species demonstrates its cuculine affinities by its general behavior and its slow, lethargic movements. *C. major* resembles *C. ani* greatly in its habits of preening, raising the tail when alarmed, sunning to keep warm at every opportunity, and drooping the wings. But it does not appear so dilapidated and unkempt; the wings are usually neatly folded in their proper place and the feathers are less ruffled.

The larger size and iridescent color add to the appearance of the bird. The flesh has a disagreeable odor; a cat will not eat it.

HABITAT

This species inhabits the borders of streams and rivers exclusively and prefers streams with low, partly inundated banks. The species is abundant along the Abary River and Canje Creek, streams with thick, partly inundated vegetation along the banks. On the other hand the birds are seldom seen along the Essequibo River around Bartica; the banks there are fairly high and in many places rocky. Along the Canje Creek the birds thrive in the bundaree-pimpler (*Drepanocarpus*), an extremely thorny legume growing in the water. The birds may leave the river's border to feed along the open patches of savanna. In Argentina (Territorio de Corrientes and Formosa) the birds were observed in the same ecological habitat.

In the morning the birds fly out from their sleeping place in a thickly foliaged tree or shrub to feed before beginning any other activity. The food, consisting of caterpillars, grubs, and other insects and at times fruit or seeds, is found on the ground or sometimes in the trees. The flock may invade a clearing in search of food but seldom strays far from trees or other protection. During the middle of the day the birds usually return to the denser scrub where they remain inactive. In the afternoon they become more active till evening when they collect in the sleeping place again. On both the Canje and Abary Rivers it was noted that the birds always slept on the side which received the last rays of the evening sun. Considering the evident desire of these birds to keep warm and dry it seems likely that this behavior serves that function.

FLOCK BEHAVIOR

Like other members of the subfamily, *C. major* lives in flocks. The number of birds in the flock is most frequently four or six although sometimes an odd number of birds composes a group. For example the three groups most studied intensively (Skeet, Haley, and Benab) consisted of four, four, and six birds, respectively. Each flock is composed of two or three pairs and although during the day the group may spread out over a small area, nevertheless the pair organization of the colony is always apparent. The juvenile and immature birds, identified by the lack of development of the crest of the beak, may remain with the flock for in some cases at least six months. A flock consisting of an odd number of birds frequently contains immatures.

The flock spends the day feeding and resting or taking care of the

young. At all times the birds of the group are within calling distance of one another. Although at times the birds may sit in trees together, they never sit in a row on a limb as *C. ani* habitually does. The birds sleep adjacent to one another but do not touch each other. In British Guiana the birds are extremely wary and inhabit uncultivated and ungrazed districts. Wetmore (1939) reports the same behavior but Beebe (1909) in great contrast to the experience of ornithologists, reports that the birds are tame and follow cattle in British Guiana. When wounded the birds snap the bill vigorously and defend themselves.

It is of particular interest that a group of *C. major* will mingle with a flock of *C. ani.* Frequently a colony of each species came close together and even intermingled. On June 15 two groups were seen to go to sleep near each other. "About sundown a flock of ten or more *C. ani* came in and went to sleep with the usual call. The two species mingled but there was no antagonism." *C. ani* and *C. major,* whose mingling is merely a coincidence, are completely indifferent to one another and show no interspecific social behavior.

TERRITORIAL BEHAVIOR

Each flock of *C. major* lives in a definite area and maintains a territory. This territory is protected by the good will of the neighbors; no severe fighting was ever recorded. The birds know the boundaries and keep to their localities except for short periods, as in this unusual example, on July 15. "The Skeet group continued on to the clearing (within the territory of the Benab group) and one went to the jamon tree. The Benab group (six birds) was there but no fight occurred" even though I forced the two flocks to come together more closely. On August 5, these two groups consolidated after several members of each group had been collected.

Proof that each group has a territory is shown by the behavior of the strangers seen traveling about. Usually one pair but sometimes two pairs may be seen going long distances. Although the travelers may remain in an occupied territory for a short time, eventually they go away even though not driven out. This maintenance of a territory by a group of pairs without any severe fighting is in great contrast to the behavior of *C. ani.*

CALL NOTES

The vocabulary of *C. major* consists of only five notes.

1. The flock call is a loud hoarse croak sounding like *kqua* repeated while the bird is flying from one place to another. This call is purely

social and serves to keep the members informed of the movements of an individual.

2. The alarm call is a harsh rasping note, repeated several times. This note is seldom used, and only when some unknown movement frightens the birds.

3. The most curious call is a gurgling, bubbling *brrrr* resembling the sound of boiling water. When making this sound several birds come together, usually sit on the same branch, gurgle and then stop very abruptly. Although sometimes the whole colony may take part, usually only a few birds perform. The most likely interpretation of this peculiar note is that it is an organization call used to maintain the group and define the territory, analogous to call no. 3 of *C. ani.*

4. The danger note used for hawks and other flying predators consists of three sharp croaks, uttered while the bird flies downward into a thick shrub. On one occasion this note was given when an *Ardea cocoi* flew over.

5. A throaty *kuk* is used at times. The function of this note is not understood but it is perhaps an indication of perplexity (that is, a new situation for the bird), analogous to call no. 9 of *C. ani.*

NESTING

The nests are built in trees or shrubs about three to five meters above the ground or, frequently, above the water. Since the rivers overflow their banks during the rainy season the birds have opportunity to build in trees standing in water. The nest is typically crotophaginine, composed of sticks and lined with leaves. The birds never pick sticks from the ground but always break them from the trees. During incubation the birds continue to bring in green leaves and put them on the nest. The number of eggs laid in the nest depends on the number of females laying. Each female probably lays from five to seven eggs. Young (1929) reports a nest with six eggs. In Formosa, Argentina, I found a nest containing five young. Four adults were nearby. The eggs are large and vary greatly in size. The shell is blue, covered with a thin layer of calcareous material.

DISCUSSION

The territory of *Crotophaga major* is a very clearly defined area of land, although the defense of this territory is not conspicuous. The birds seem to observe the boundary lines strictly and there is thus seldom a need for severe fighting. At no time was any severe fighting or intimidation display observed. Possibly the bubbling note (no. 3) is sufficient to warn off intruders. The fact that *C. major*

will mingle with *C. ani* could be interpreted as indicating that the territory is not defended. However, *C. ani* is a vigorously territorial species in British Guiana as well as in Cuba and would be expected to drive out so similar a species as *C. major*. Hence the mingling of the two species cannot be cited as evidence against the interpretation that *C. major* is territorial, because *C. ani,* a violently territorial species, does not demonstrate its territorialism by driving out *C. major*.

The important point in the social behavior of this species is that each colony is really a group of pairs. At all times the organization of the flock was in pairs, as checked by identification of individuals. Most observations were made at a time when the pairs would be least likely to remain together, that is, after the young are out of the nest and still with the colony. A comparison with the polygamy and promiscuity of *C. ani* indicates the significance of this type of flock organization.

SUMMARY

1. As part of a series of investigations of the social nesting habits of the Crotophaginae, the territorial behavior and nesting habits of *Crotophaga major* were studied in British Guiana during June and July, 1939.

2. The species lives in small flocks, composed of several pairs of adults, which spend the day together and have many social interactions.

3. Each flock maintains a definite territory, although active defense is seldom observed. Wandering birds do not mingle with the flocks.

4. The vocabulary consists of five distinct notes, each having a definite significance.

5. The nest, built of sticks and lined with leaves, contains the eggs laid by several females.

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