

style of this sequence can hardly be described otherwise than by the word "romantic." RC, a large and very black bird and therefore probably a male, was perched in the cedar hedge overlooking the feeding bench about two feet below, where a second bird was feeding. Suddenly the latter darted to the hedge and crept up with extreme slowness from twig to twig, meanwhile reaching up toward the perching bird. RC kept its footing but slowly bent far down, likewise reaching toward the other. Finally their bills were about two inches apart. Then, as though at a signal, they sprang erect and opposite in the hedge, executed the head dance, the arc flight, and the second head dance, and disappeared after going through the undulating flight. RC was the pursuer in this flight.

These routines also occurred in a fragmentary way or in the form of a display by one bird to which the other did not respond. Sex recognition did not seem to be involved in these reactions, since there was no display which elicited different responses on different occasions. A curious fact was that some of the ordinary patterns of winter behavior seemed to become stylized. The pecks by which a junco shows its intolerance of a subordinate were not affected, but fights and threat postures altered their appearance in the direction of rigidity and preciseness. The regular junco fight is ritualistic, without pecking or clawing. The birds face each other and each appears to try to rise higher than the other. Usually there is a certain raggedness about this procedure, but the fights during the period under consideration became exact in the facing and the distance apart. In the normal, winter threat-posturing the birds merely draw up more or less tall, but now they were assuming a stiff, erect posture like that at the beginning of the head dance. So stylized had these reactions become that only one factor stood in the way of classifying them as sex rather than dominance reactions; they took place at the feeding bench and had the outcome expected from displays of dominance—that is, one bird stayed and the other left.—WINIFRED S. SABINE, 503 Triphammer Road, Ithaca, New York.

Nesting of Clay-colored Sparrow, *Spizella pallida*, in Northern Ontario.—The Clay-Colored Sparrow was first recorded in the District of Algoma in northern Ontario in 1931 by a party from the Royal Ontario Museum. In the spring of 1948, I found the species nesting in the Rankin Location, a rural school section about three miles east of Sault Ste. Marie. The habitat was made up of grassy fields with clusters of willows up to ten feet high and occasional solitary aspens twice that height. It was flooded to a depth of almost a foot by melting snow in spring, but thoroughly dry by mid-June. Sphagnum moss grew beneath the denser stands of willows. My first record of the species from such a field was on May 23. At that time the field was still ankle deep in water. Two more birds were seen five days later, in willows beside a stream, with a stand of aspens at one end of the shrubby border.

In the Rankin Location, I heard this species sing almost daily from May 26 until late in June. At least two males sang from the aspens, always perching above the tops of the willows. The singing birds stood erect, throwing their heads back, and pointing their beaks almost vertically upward.

Two males were singing one evening, permitting a direct comparison of their songs. One sang a series of 41 songs, each consisting of from two to ten buzzes, and averaging six. The three individual songs which consisted of only two buzzes were noticeably flatter in pitch and slower in tempo than the others. Meanwhile, the other male sang only seven songs, noticeably slower and shorter, from two to five buzzes long. At the only nest under close observation, the male sang less and less frequently until the evening before hatching.

Three nests were found, on June 13, 14, and 15. They were from four to 14 inches from the ground, anchored to several almost vertical stems of the willows in which they were built. Number 1, deserted when found, contained one egg. Number 2 was empty when found with no birds near it, but the first egg was laid in it before 8:30 a. m. on June 15. Number 3 contained four eggs, a complete clutch.

At Number 2, I found an adult on the nest every time I visited it during the next few days; three more eggs were laid during this period.

At nest Number 3, each bird of the pair had its own approach route to the nest. Although I was unable to distinguish the sexes of the birds, extensive watching convinced me that each route was used by only one individual. Both routes were about 18 inches in length, consisting of a number of perches which were used in an almost invariable sequence. As incubation progressed these routes became less definite, and by the last day of incubation the birds were often skipping half the usual stops.

Both sexes incubated, but one much more often and for longer periods than the other. The non-incubating bird fed in nearby trees, sometimes in the nest tree itself. Frequently both birds would leave the nest and feed together for five or ten minutes, often eating willow catkins. Changes of place at the nest occurred in silence, the incubating bird leaving the nest as soon as the newcomer entered the nest tree.

At noon, on the sixth day of my watch at nest Number 3, one sparrow approached the nest, "chipping" rapidly. The incubating bird stood beside the nest; the other approached, using neither habitual route; and both stood beside the nest for a few seconds, then left separately. This may have had some connection with the fact that the eggs were within a few hours of hatching.

At nest Number 2, three eggs had hatched by 9 a. m. on June 28, 12 days after the first had been laid. The fourth egg hatched the next morning. One of these eggs had been incubated 10 days at most, and none more than 13 days. One egg in each nest hatched almost exactly 24 hours after the others. The incubation period is apparently 10 or 11 days.

When I flushed the adult sparrow from nest Number 3 at 8:30 a. m. on June 21, I discovered that one of the eggs had hatched. There was no trace of shell in the nest.

Within five minutes, both adults had reappeared in the nest tree. One, probably the male, went to the nest and picked a piece of eggshell from it, "chewing" it for a few seconds. He then flew six feet with it, apparently ate it, wiped his beak, and disappeared. When I approached the nest two or three minutes later, one of the adults was sitting. There were then two eggs and two nestlings, with no remains of the broken shell.

No change had taken place by noon. A slight tapping on the nest at 12 o'clock evoked no response from the young, although at 1:30 p. m. they attempted to beg in response to the same stimulus. One failed in its attempt, slipping from his support against an egg to the bottom of the nest. The other was able to extend his head upward for two or three seconds.

During the intervening period, two attempts were made by the adults to feed the nestlings. In the first case, the food was a light green caterpillar, almost one inch long. It was offered twice, but finally swallowed by the adult which then picked up a two-inch length of dry grass from the bottom of the nest, swallowed an inch of it, and flew away with the remainder projecting from its beak. (This fragment of grass had fallen into the nest while I did some pruning to improve my view of it.) Later, a similar caterpillar was offered to the nestlings at least 14 times before being dropped beside the nest.

By that evening, the young birds could receive food from their parents. Both sexes fed the young. The two original routes of approach were now neglected, and a new one, less well defined, was beginning to be used.

A Marsh Hawk, *Circus cyaneus*, flew over the nest that evening as one of the sparrows was about to feed the nestlings. Immediately the sparrow crouched and froze, uttering three thin calls resembling the syllable 'eek.' When the hawk had passed, feeding was resumed.

A third egg had hatched the next morning before 8:30, but I was unable to spend much time at the nest that day. The fourth egg failed to hatch but was allowed to remain in the nest until finally destroyed.

Most of the food brought to the nest was small green caterpillars. However, on the third day after the beginning of hatching, a few large, dark caterpillars were brought. The first of these was offered unsuccessfully and finally eaten by the adult sparrow, but an hour later a similar caterpillar was eaten by a nestling.

Until the older nestlings were three days old, their excreta were eaten by the adult birds. However, after that time it was carried beyond my sphere of observation. By that time, the nestlings were able to maintain a begging position for a nearly a minute. The two-day-old bird held his neck fairly rigidly extended upward, but the two older nestlings swayed their heads through a small arc from front to rear, like an inverted pendulum. All were still blind.

Late in the afternoon of June 24, an unknown predator destroyed nest Number 3. Since the other was not as advanced, and I had to leave Algoma five days later, I was unable to observe the later stages of nesting.

SUMMARY

In the District of Algoma, the Clay-colored Sparrow nests in fields overgrown with willows, with aspens suitable for singing perches, and subject to spring floods. Singing occurs until the end of incubation and shows some individual variation. The nests are built a few inches above the ground in willows. Two complete clutches were of four eggs each. Both sexes incubate for 10 or 11 days; each sex uses a distinct approach route to the nest. In two nests, one egg hatched 24 hours after the others. Both adults fed the young. A new approach route was used by the adults after the eggs had hatched.—FREDERICK E. WARBURTON, *Owen Sound, Ontario, Canada.*

Definitions for the Analysis of Survival of Nestlings.—Considerable confusion exists in ornithological literature about the methods of calculating survival of young birds. This confusion results in part from failure to define the survival terms and in part from the problem of altricial birds which, in effect, are "born" twice. This paper attempts to clarify the definitions and gives some examples of their use.

These suggestions omit a discussion of the construction of a conventional life table which is organized to show the number of survivors at successive equal intervals of time. The life table can be easily constructed from data that are systematized according to the recommendations of this note. However, the life table concept is less satisfactory than the following concepts because of the varying duration of the stages of nest-life, monthly variations, and the short lives of most birds.

Mortality rate is commonly used to indicate some sort of a percentage of deaths but is very loosely used. It is suggested that the phrase be omitted to prevent confusion, since there are the following two kinds of mortality rate.

A. The probability of dying (q) is the fraction of the initial population dead at time t . For example, if 100 birds are alive on January 1 and 60 of these birds have