

Nesting Studies of the Indigo Bunting (*Passerina cyanea*) at Thornhill, Indiana

FRED D. MORGAN

Department of Biology
Huntington College, Huntington, Indiana 46750

Abstract

Two all-day observations were made of a nest of the Indigo Bunting during the incubating period and when young were in the nest. Only the female was observed incubating the eggs, brooding, and feeding the young. Incubating constancy was determined to be 79.4%. Weights of 9 eggs ranged from 1.68 to 2.40 g with a standard deviation of 0.25 and a mean of 2.09. Weight loss of 5 eggs during the incubating period ranged from 12.7 to 17.9% with a mean of 15.8. The earliest nest was found with 3 eggs on 11 June and the latest egg in a clutch of 3 was laid 9 August. The incubating period was determined to be approximately 12 days and the nestling period 8 to 9 days. Weights of 5 nestlings were taken daily at 24-hour intervals. Out of 7 nests 5 were parasitized by the Brown-headed Cowbird and all 5 parasitized nests were subsequently deserted. Nesting success was calculated to be 22.5%. Location, nest measurements, and construction of nests are discussed. Nesting height of 7 nests ranged from 33.0 to 110.5 cm with a mean of 62.1.

Introduction

Seven nests of the indigo Bunting were observed during a study conducted on a farm of 31.6 ha owned by Huntington College. The research involved all the nesting species on the farm but enough information was gleaned on this species so that a limited report was thought feasible. The farm is located about 11.3 km directly north of Huntington, Indiana. Five summers (1964-67; 1973-74) were encompassed in the study. Conditions for nesting appeared to be ideal along the margins of woodland areas and open fields going through a successional state. Few nests were actually found though the area was searched diligently.

Materials and Methods

A portable blind was used for making nesting observations. Binoculars ($\times 50$) and a spotting scope (20X and 40X) were available for close-up monitoring. For the taking of weights in the field a dial-o-gram Ohaus scale was utilized. Weights to the nearest hundredth of a gram were possible. The scales were permanently mounted in a small wooden box with a sliding glass window. A leveling bubble was used for the rough field conditions.

Weights of freshly laid eggs were made. The eggs were marked sequentially when weighed on the days that laying occurred. When weights were obtained on freshly laid eggs, the weights of these eggs were also taken the day before hatching to determine weight loss during the incubating period. Upon hatching the feet of the young birds were marked and weights taken daily at a specified time period until the young fledged from the nest.

Results

Nesting Observations.—An all-day observation was made of a nest 11 August, 2 days after the last egg of a clutch of 3 had been laid. The cloud cover was broken with temperatures in the area ranging from 17.2° to 33.8° C at 1 m above the ground. The observation began at 05:00 and ended at 20:15. The female left the nest for the first time at 06:13 and was on the nest for the night at 19:23. Her active portion of the day totaled 13 hr and 10 min. Only the female did the incubating although the male was frequently near. He was heard singing several times in nearby trees throughout the day. The longest attentive period on the nest was 106 min and the shortest 22. The longest inattentive period was 25 min and the shortest 7. The average of 14 attentive sessions was 44.8 min; the average of 15 inattentive sessions was 10.9 min. The total incubating time was 10 hr and 27 min for an incubating constancy of 79.4%.

Forbush (7) relates that the male is reported to relieve the incubating female on the nest. My observations at Thornhill would tend to discount any such generalization. The all-day observation plus daily visits to the nest always found the female alone incubating the eggs. Another nest which was visited frequently indicated that only the female was performing the task of incubation. Bradley (4), Allen (1), Sutton (11), and Bent (3) report that only the female does the incubating.

This same nest was under an all-day observation again on 20 August. The sky was mostly cloudy with temperatures ranging from 16.1° C to 32.2° C at 1 m above the ground. The day of observation began at 05:15 and ended at 20:00. The status of the nest was checked at 05:45 when the female left the nest. Two eggs had hatched and 1 was still in the nest. The remaining egg hatched about 07:40 at which time the brooding female hopped onto the edge of the nest. She then took half of the egg shell and rotated the shell in her bill as she ate it. The female picked up the remaining half and consumed it also. Then she settled back on the nest to continue brooding. The active day at the nest extended from 05:45 to 19:48 or 14 hr and 3 min. During this time the female brooded for 6 hr and 9 min for a total of 43.7% of the active day. Of 37 brooding periods the longest was 27 min and the shortest being 1 with a mean of 9.97. Of 38 periods off the nest the longest was 27 min and the shortest 3 with a mean of 12.47. The female fed the young 54 times during her active day for an average feeding interval of 15.56 min. The food consisted of insects, larval forms, and small berry-like fruit. Fecal sacs of the young were removed from the nest 3 times and eaten 9 times.

The male did not feed the young during the day of observation. He was observed escorting his mate a few times when she left to feed and was with her on one occasion when she returned to the nest. Bent (3) cites evidence that the male feeds the young. Bailey (2) obtained stills and movies of the male feeding the nestlings. Bradley (4), however, observed no feeding of the nestlings or fledglings by the male. Sutton (11) indicates that the male may take complete charge of the fledglings while the female proceeds with a second nesting.

Eggs.—Two nests contained 3 eggs each. Another nest held 3 bunting eggs and 1 Brown-headed Cowbird's (*Molothrus ater*) egg when first discovered. Four other parasitized nests were *deserted before* clutch size was attained. Bent (3) gives evidence of clutches varying between 2 and 4 eggs. Phillips (10) observed 6 nests which demonstrated an average clutch size of 3.3 eggs. Trautman (12) records that of 16 nests examined at Buckeye Lake 5 contained 3 eggs or young each; 3 parasitized nests held 3 eggs or young of the host and a cowbird's egg or young each; 6 demonstrated 4 eggs or young each; and 2 parasitized nests disclosed 4 eggs or young of the host and a cowbird's egg or young each. Bradley (4) found 2 nests with 4 eggs and 2 nests with 3 eggs.

Nine eggs were weighed on the day they were deposited in the nest and ranged from 1.68 to 2.40 g with a standard deviation of 0.25 and a mean of 2.09. Holcomb (8) reports the weights of 7 eggs, weighed the day following the laying of the final egg, as ranging from 1.5 to 2.3 g with a mean of 1.89. Weight loss of 5 eggs during the incubating period ranged from 12.7 to 17.9% with a mean of 15.8.

The earliest active nest was found with 3 eggs on 11 June and the latest egg in a clutch of 3 was laid 9 August. In 1966 and 1967 there was evidence that 2 nesting attempts were made in the same territory as the first nest in each instance was located close to a second nest. In 1966 the first nest was deserted on 13 July and a second nest in the same territory was found under construction on 5 August. The first egg appeared in this nest on 7 August. In 1967 the first nest was deserted on 24 June and a second nest was found under construction about 20 m away on 10 July. In this latter nest the first egg appeared 13 July. Both of the early nests were parasitized by the Brown-headed Cowbird whereas the two later nests were not.

Incubating and Nestling Period.—One nest demonstrated an incubating period of nearly 11 days. In this nest the last egg appeared 9 August and hatched at about 07:40 on 20 August. This egg was probably laid early in the morning on 9 August making the incubating period extend just beyond an interval of 11 days. In a second nest the third and last egg did not hatch. However, the second egg in the clutch of 3 hatched in 12 days. Cleveland (5) observed a nest in which the last egg hatched in 12 days. Bent (3) cites evidence that indicates an incubating period of 12 to 13 days. Temperatures at the time of nesting probably hasten or slow down the development of the embryo thus shortening or lengthening the incubating period.

The nestling period is not too reliable because the young were weighed daily. One had no difficulty until the fear reaction began to develop about the sixth or seventh day. To avoid this problem of early fledging, I would cup my hand over the nest after returning the older nestlings from weighing. After the nestlings had settled in the nest and appeared calm, I slowly removed my cupped hand from over the nest and retreated. This process was successful with the Indigo Bunting as the young remained in the nest while I was present at the nesting site. The question still remains whether the handling of the young

distance from the bottom of the nest to the top edge—7.49cm, (2) the inside depth—3.86 cm, (3) the inside diameter—5.09 cm \times 5.40 cm, and (4) the outside diameter—8.81 cm \times 9.35 cm.

Two nests were collected and studied in relationship to their fabrication. The bases and outer bowls of both nests contained mostly leaves which were held together primarily with the leaves of coarse grass. One nest contained a piece of soft plastic. The leaves used were small, soft and well-weathered with much of the inner venation exposed. The inner bowl was formed almost exclusively of fine grass stems. Small bits of webbing, thistle down, and cat-tail down were present. An upright crotch was used in the small trees with strippings woven around the rather small limbs to help anchor the nest in place. In the thorn bushes the nest was largely suspended by plant fibers woven around the stems. Being built close to the ground the nests were protected from strong winds and withstood storms well. One nest was still intact after passing through a winter season.

Literature Cited

1. ALLEN, A. A. 1933. The Indigo Bunting. *Bird-Lore* 35:227-235.
2. BAILEY, A. L. 1954. Indigo Bunting nesting in Colorado. *Auk* 71:330.
3. BENT, A. C. 1968. Life histories of North American cardinals, grosbeaks, buntings, towhees, finches, sparrows, and allies, part 1. (O. L. Austin, Jr., Ed.). U. S. Natl. Mus. Bull. 237.
4. BRADLEY, H. L. 1948. A life history study of the Indigo Bunting. *Jack-Pine Warbler* 26:103-113.
5. CLEVELAND, L. 1903. Nesting of the Indigo Bunting. *Bird-Lore* 5:87-88.
6. DEARING, H. and M. DEARING. 1946. Indigo Buntings breeding in Arizona. *Condor* 48:139-140.
7. FORBUSH, E. H. 1939. A natural history of American birds of eastern and central North America. Houghton Mifflin Company, Boston. (Revised.) 553 p.
8. HOLCOMB, L. C. 1966. The development of grasping and balancing coordination in nestlings of seven species of altricial birds. *The Wilson Bull.* 78:57-63.
9. MAYFIELD, H. F. 1975. Suggestions for calculating nest success. *The Wilson Bull.* 87:456-466.
10. PHILLIPS, R. S. 1951. Nest location, cowbird parasitism, and nesting of the Indigo Bunting. *Wilson Bull.* 63:206-207.
11. SUTTON, G. M. 1959. The nesting fringillids of the Edwin S. George Preserve, southeastern Michigan, part III. *Jack-Pine Warbler* 37:77-101.
12. TRAUTMAN, M. B. 1940. The birds of Buckeye Lake, Ohio. University of Michigan Mus. Zool. Misc. Publ. No. 44. 466 p.