

SOME OBSERVATIONS OF THE NESTING HABITS OF
THE BARN SWALLOW.

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THE following notes are concerned with a pair of Barn Swallows (*Hirundo erythrogaster*) that nested in one of a group of buildings close to the observer's home. This building was a shed, the loft of which was used for the storage of hay. Underneath the V-shaped roof there always exists a varying amount of open space and upon a rafter at one end of the loft, near the only window, the nest was located. A projecting nail afforded support for this, and a similar foundation slightly lower on the same rafter bore the remnants of an older nest. Whether due to the restricted size of the lighted area, the absence of any more projections for support, or other factors, the breeding birds of this species were limited to the one pair. As other suitable locations were some distance away, no difficulty was experienced in following their activities during most of the nesting season. We were handicapped in our observations, by insufficient light from the one window; by the short distance separating the nest from the window, which afforded means of entrance and exit, making impossible a satisfactory view at times, and by lack of time for continuous observation. With a few exceptions some time each day was spent in watching and we feel that the notes, although fragmentary, may be of some value.

It is probable that the pair arrived on May 8, 1930, for while Barn Swallows had been seen for one week before that date, they had not frequented this particular territory as did the pair that appeared on the 8th. Three days later, on the 11th, they were seen examining the nest in the loft and on the 13th, transportation of nesting material began. This consisted of clay mud and bits of straw obtained from the vicinity of a spring, one hundred feet distant. Work on the nest was not extensive but a new rim was built on and the lining was replaced. Both sexes took part in the work but the female was more actively engaged. We failed to notice how much time was spent in nest repairing, but this pair in preparing for the second brood, spent one day in that activity,

doing somewhat less work on the nest than at the beginning of the season, although for the second time new material was built into the rim and the lining was again replaced.

On May 20, at dusk, male and female were seen sitting side by side upon a completed nest. On May 23, egg laying began, the clutch being completed with the fifth egg on May 27. Incubation began on the 26th. On May 30, we found the eggs cold and felt that disaster had overtaken the first nesting, but at nightfall the female was again seen on the nest and incubation continued. During this period the male spent the nights perching beside his mate on the nest and when the young had grown to fill the nest, he changed to the older nest adjoining.

We watched the behavior of both male and female during the incubation period. The female left the nest for food and rest at rather irregular intervals for the most part, although there may be the suggestion of a schedule in the fact that on three days she left between 12.01 and 12.25 P. M.; on two days between 10.43 and 10.50 A. M., and also on two days absence was noted between 2.15 and 2.20 P. M. That feeding periods were frequent during part of the time is indicated by the absence of the bird on three occasions within an hour. Absences were short, however, one of those just mentioned, consumed eight minutes while the longest recorded occupied but twenty-six.

Sometimes the male would come through the window which afforded access to the nest, and, calling to his mate would approach. The female would answer, and, leaving the nest would pass through the usual means of exit, the male meantime assuming the vacant place on the eggs. There he would remain until his mate returned when he would yield his place to her. Many times, however, the female would leave without any interposition of the male.

Incubation required fifteen days, although with both broods, sitting began before completion of the clutch, so that for the first clutch of five eggs sixteen days were spent in sitting, while for the second clutch of four, seventeen were consumed.

There was frequent rolling of the eggs by the female and this was always done upon her return even though only a short time had elapsed since a previous return. On one occasion a movement on my part frightened the bird just after she had settled, causing

her to leave again and upon her return, two minutes later, she again went through the process of turning the eggs.

Three young of the first brood hatched on June 11, and the remaining two on the following day. Their development was watched and notes made, these later being compared with similar observations of the second brood. Measurements of young birds are made with difficulty because of their ceaseless movements but extreme care was exercised and these are at least approximately correct. On the first day the young varied in length from 35 to 37 millimeters. The tarsus averaged three millimeters. The daily rate of gain in length ranged from two to ten millimeters. The maximum growth in length did not occur at the same age period for individuals of the same brood. Minimum daily increase in length showed the same lack of uniformity. There was an appreciable difference in the daily amount of gain in length during the first ten days of life in comparison with the succeeding eight, the usual gain during the first period being seven or eight millimeters a day while for the later interval, a gain of five millimeters was the daily average. The tarsus reached maximum length on the 13th day and a decidedly slower rate of growth was noted after the 9th or 10th day. The primaries appeared on the 5th day as follicles, two millimeters in length. The daily rate of growth of these was subject to much variation and showed no tendency to uniformity at the same age period among the different individuals of the same brood. A day's increase in length of the primaries varied from two to ten millimeters and the rate of growth was more rapid from the 7th day. The vanes of these emerged from their sheaths on the 9th day. The rectrices appeared on the 6th day and the webs of the rectrices emerged on the 9th day. Their growth was slower and less regular than that of the primaries.

Some changes in color affecting both the plumage and the soft parts were observed during the time spent by the young in the nest. Comparison was made with the plates in Ridgway's 'Color Standards and Color Nomenclature' and the terms used in the following description are from that work. The natal down was pale smoke gray and the bill on the first day was chamois shading to cream. On the second day a darkening of the skin on the dorsal, femoral, and alar tracts was noted and by the third day this in-

cluded all tracts but was less apparent in the capital and crural and almost imperceptible in the ventral. On the 4th day a darkening of the bill was observed and this became more pronounced on the 5th. At 12 days of age the feathers of the back which had been very dark, began to assume a greenish tint and at 15 days this had become markedly so. Just before the departure of the fledglings when 18 days old, plumage was noted and measurements made, these being as follows: Above, dusky gray green. Tail, olivaceous black. Throat, army brown. Breast, vinaceous buff. Bill, clove brown except the commissure which was yellowish. The length was 135 millimeters; the tarsus 11 mm., and the tail $38\frac{1}{2}$ mm. This compares with the measurements given in Ridgway's 'Birds of North and Middle America' as follows: average length of males, 166.8 mm., of females, 155.5 mm.; of tarsus 10.5 mm. in males, 11 mm. in females; of tail 89.1 in males and 76.4 in females. The discrepancies seem to be accounted for by the undeveloped tails of the fledglings.

Bands were attached when the oldest birds were 14 days old. Twenty-four hours after attachment one band was highly stained a light pinkish from contact with the feathers of the breast.

Among other developments observed was the opening of the eyes, a gradual process, beginning on the 5th day and being completed on the 8th. The use of the wings progressed from their being fluttered on the 9th day to short flights when removed from the nest on the 15th, although even on the latter date dependence was still largely placed upon crawling and hiding as a means of escape. Fear first became manifest at nine days of age, when, at the alarm note of a parent the young would retreat from the rim of the nest and crouch down in the bottom. When twelve days old they would shrink away if an attempt to handle them was made.

External parasites began to infest the second brood on the 9th day and they multiplied rapidly during the succeeding three days. On the 12th day numerous abrasions of the skin, evidently caused by the parasites, appeared on the head of the oldest and we feared that the whole brood were doomed but on the 13th a marked decrease in the infestation was noticeable and the injuries were healing.

Intermittent observations of the care of the young while in the

nest were carried on. When eight days old they were watched for one hour in mid-afternoon. During that time twenty-four visits were made by the parents with food. Because the differences in coloring between the sexes were so slight, it was not always possible to determine the sex identity of the parent, but the cases in which it was, indicated that the number of visits made by each was nearly equal. Once during the period, the female brooded the young for eighteen minutes. She also removed most of the cap-sules. Two days later the nest was watched for forty-five minutes in mid-forenoon. Forty visits with food were noted, probably fifteen of these by the male and twenty-five by the female although in seven instances the identity of the parent was somewhat in doubt. The parents would alternate in feeding for varying periods but more often one would be absent for a longer or shorter interval. The male was observed to have more of these absences and to stay away longer. During these, feeding continued by the remaining parent and was carried out at frequent intervals, the longest time noted between feedings being only four minutes.

The parents took advantage of every minute of daylight to secure food. They ceased from activity at 7.47 P. M. on June 21, when it was so dark that they had great difficulty in reaching the nest.

The first brood left the nest on June 29 and 30, five in number. The period spent in the nest was eighteen days for each of the first brood and this was true of the second with the exception of the youngest, for which the period was seventeen days. In both cases those individuals which hatched later than their companions had their nest leaving correspondingly delayed.

Inspection of an adjoining building for the purpose of selecting a nesting site by a pair of Barn Swallows was noted on July 10. A banded young bird of this brood had been seen on the shed roof on July 6. On the 11th, two adult Barn Swallows accompanied by four young were flying around the spring from which nesting material had previously been obtained. The adult birds were seen to be collecting mud and bits of straw, alighting for that purpose although their movements on the ground were most awkward. Meantime the young were flying about teasing for food. They circled around their parents repeatedly, often crossing the line of

flight of the adults when moving to and from the nest, seriously impeding the latter in their work. At last, the adults left off nest-building, apparently because of the annoyance of the young. Despite this persistent begging, no feeding of the young by the adults was seen. The identity of this family as the one which had occupied the loft was established by the sight of bands on two of the young. After this date the latter were not seen.

Evidently search for a new location for the second nesting had been unavailing, for the old nest was repaired and preparations for the second brood proceeded rapidly. The first egg was laid on July 16, and the clutch was completed on the 19th with the fourth. Incubation began with the laying of the second egg. Two of the eggs hatched on August 1, the third on the 2nd, and the fourth on the 3rd. The young left on August 19 and 20, four in number. No banded young were recognized after August 22, and none, young or adult, frequented the area after the 26th. On August 21, the four young of the second brood were seen on an eave spout in company with two other juvenile birds. The latter were more mature and might have been first brood young. Their behavior differed from that of the four as they did not assume an expectant manner upon the approach of the adults as the younger members of the group did. We were unable to detect bands on either of the two but it is difficult to do so in the case of a swallow. On the 25th of August six were seen flying about but as they did not alight, no opportunity for detecting presence or absence of bands or for determining age was afforded.

Much remains to be learned, especially about the behavior of the family after leaving the nest. One experiences great difficulty in following the fortunes of a family because of the practical impossibility of capturing the birds during the period immediately following nest leaving and frequent inability to detect bands. Further study may evolve means of solving some of these difficulties and the possibilities of future returns present an attractive prospect. Observations of this kind may in time become as complicated as researches in genealogy. That they are interesting can not be doubted and they possess the additional advantage of no family skeleton to discover and carefully put away.

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