

OBSERVATIONS AT A BARN SWALLOW'S NEST

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A Barn Swallow (*Hirundo erythrogaster*) was noticed one afternoon flying around the cabin in which I was living on the Alleghany plateau at an elevation of 2300 feet. Joined by its mate the next morning, the pair gave an unusual opportunity for observation. Their summarized activities follow: The male arrived May 31, 1936, and its mate June 1; that same day they selected their place for nest building and began building the following day; nest building took six days, followed by a day of rest; two eggs were laid June 10 and 11; they rested the next day; incubation was exactly seventeen days for each young bird; the young flew from the nest when the older was nineteen days old, or thirty-five days from the beginning of nest building. There was no attempt at a second brood. All four birds left together on their southern migration on August 13, after a seasonal residence of seventy-four days. The adult male was banded C46504, the adult female C46505, the older young, presumably a female, C46502, and the younger, presumably a male, C46503. The investigation was made at Cherry Springs, Potter County, Pennsylvania.

Sitting at my window I first noticed the first bird late in the afternoon. Early the next morning he was joined by a mate, and both kept flying around the cabin, even up to my open window, as though in search of an entrance or place to nest. I at once nailed a board above the window, fastening it to the rafter. That afternoon it was evident that the birds had selected the shelf, as they went to it frequently. By 8:00 A. M. the following morning they began to build. From then on, many notes of their activities were made. No acts of mating were observed. It was soon seen that the male bird had the right outer tail feather about an inch shorter than the left, aiding in his identification while rapidly approaching the nest. In all my actions I had to be especially careful not to disturb the birds too much for fear they might abandon their undertaking. When reaching into the nest at first I did so immediately after they flew, but when handling the young I wanted them to watch that no harm would be done.

Nest building was done by both parents, beginning at 8:00 A. M. June 2 and completing the nest in six days. The birds would collect the mud by pushing the bill into it three or four times, then after carefully selecting the exact spot for each mouthful, would expel it as though by pushing with the tongue. There was no act of disgorgement as would be shown by extending the neck or by neck muscular movements. This was watched with binoculars at a distance of twenty

feet. The mud would be carefully pushed into place with the bill, and as the nest assumed its cup shape the bird would turn around as though giving the interior the correct shape and size. At no time would the feet be used to carry, to place, or to shape the mud. A mouthful of dried grasses or rootlets would alternate with several of mud. No green vegetation was used. The first pellets of mud were placed where the outer rim of the nest would be, and soon much mud was applied to the vertical rafter as though the side anchorage was necessary. Later I weighed thirty distinct pellets of dried mud at $120\frac{1}{2}$ grains, and determined from the dry sifted earth that the birds took 1359 trips to collect the mud, or approximately one hundred trips per day per bird, and traveled to the only two mudholes which were the source of the supply, a total distance of 137 miles. At a flying speed of twenty miles per hour (once carefully checked by my automobile) this gave about six hours of work to collect the mud. The nest was found to contain, besides nearly seven and one-half ounces of dried earth, 1635 rootlets over one-half inch in length, 139 white pine needles, 450 pieces of dried grass, 10 chicken feathers, 4 pieces of wood, 2 human hairs and a piece of leaf and cotton, and a tablespoonful of minute pieces of rootlets and grass.

The first egg was laid in the morning of June 10, the second the following morning before 7:20 o'clock. I felt into the nest frequently each day. The birds stayed away from the nest all day after each egg was laid, as far as I was able to determine by frequently looking for them. The third day was a very noisy one, with several tractors and men going past the nest frequently. They apparently frightened the birds from the nest and prevented egg-laying and perhaps destroyed the urge or ability to lay. The birds were not seen at the nest that day. Incubation began the next morning.

Incubation was performed by both parents, changing place every few minutes. After the birds had been incubating for a few days I placed a mirror in such position that I could distinctly see from inside my room what was going on at the nest but could not see the eggs. The effect of the mirror on the adults was striking and will be described presently. After the third day I noted that the birds would change places on the nest at intervals of between four and fifteen minutes. I recorded that the female spent each night on the eggs, quieting down at about 7:50 p. m. while the male rested on a perch alongside the nest shelf and would leave between 7:50 and 8:10 p. m. to spend the night in the woods, as I could see. On the eleventh day of incubation my notes show the parents were changing places at the nest at

intervals of six to thirty-six minutes. The morning when the first-born was to be hatched the birds changed at 10:10, 10:20, 10:28, 10:42, 10:51. Then the male, now on the nest, became very restless and flew off at 10:56 and back at 10:59 A. M. The female then flew to look into the nest at 11:00 $\frac{1}{2}$ and took her dutiful position at 11:06. Soon after noon that day I discovered a young bird had been hatched. Doubtless this occurred when the male was so restless; he seemed very fussy at 2:20, which may have been when the final act of getting rid of the shell occurred. At 7:20 the second morning I found two eggshells directly beneath the nest; one contained dark blood, the other fresh blood not yet coagulated. The second young bird was then felt.

The parents retired regularly, the mother going to the nest about 7:45 each evening. After I placed a trap under the shelf for catching the parents to band, when the older nestling was ten days old, the mother stopped spending the night on the nest, but was on the nest up to about 8:00 P. M.

The young Barn Swallows were hatched June 27 and 28, being exactly seventeen days after each egg was laid. They were banded when the older was ten days old. They both left the nest when the older was nineteen days old. The young were just three centimeters long when hatched. Daily measurements were made, but no weights; complete notes of their developments, feather growths, and other activities were kept. When hatched they had tufts of black down, frontal, occipital, scapular, and mid-spinal. This down persisted and one bird still had a few wisps on the head when he flew from the nest. The eyes began to open on the sixth day, when the dorsal pin feathers began to develop. The young birds could make a slight noise when three days old.

Feeding was done by both parents. The method of early feeding was not observed. On the tenth day I distinctly saw a fly's wing protruding from the bill of the adult indicating that the young were then being fed raw food. When the young were fourteen days old they were removed to an artificially made nest in the windowsill, so I could watch from a distance of less than a foot. Attempts were made before this to transfer them but they were too young to make enough noise to attract the parents down from the upper shelf. Many observations were then made of their feeding. Usually flies were their diet, occasionally a moth and frequently a hairless green caterpillar, identified by Dr. Carl Heinrich, of the Bureau of Entomology, as the *Heterocampa guttivitta*, Wlk., an abundant species in the woods. Practically all the food was collected over a half acre of plowed field immediately adjacent. Many of the feeding trips were timed and closely watched,

and it was definitely determined that the nestlings were given raw, sometimes live insects, and not any bolus of predigested food, not even saliva-soaked. The times of returning with a newly caught fly were as short as ten seconds. It was easy to distinguish which parent was feeding at any time. The male was more highly colored, had a short right outer tail feather and a right leg band; the female was banded on the left. My notes show that on the fourth day of the older nestling the time for changing of the adults at the nest varied from ten seconds to three and one-half minutes, averaging one and one-third minutes; on the tenth day the feeding times varied between 15 and 120 seconds, averaging 53.

I placed green caterpillars on the rim of the nest and no attention was given them by the young birds. After freshly killed flies were placed on the windowsill shelf the young birds paid no attention, but the father advanced and ate four himself, then fed one to a nestling, four more for himself and one for the children, repeating. The young being banded on different legs it was easy to keep account of when each was fed. It was definitely determined that the parents did not select the young to feed in order or rotation. The parents were not selective. The food was always given to the young bird which was ready, which had its bill open first or which leaned forward, or in some cases the one which called with a little note. One bird frequently received every feeding and when satisfied would turn around in the nest and face the window, giving the other bird a chance. When it became satisfied it would settle down, and the parents fly off to the telephone wire. When the young were ready to be fed they would call out "*asch, asch, asch*" to the flying parents, and then feeding began again.

Sanitation of the nest is carefully observed by Barn Swallows. The nest is kept clean by the actions of the nestlings. When the mother was near, the nestling would give a little call, then turn around in the nest and raise the hind quarters above the rim of the nest and expel the white, pyriform, fecal pellet. The female adult would grasp by her bill the pellet before it was half expelled, but the male always waited until it was dropped on the outside of the nest. This was first noticed when the young birds were only a week old. The pellets were carried away and dropped at measured distances between twenty-five and fifty feet.

When the older nestling was nineteen days old I was sitting by the open window with the bird in my hand when it suddenly flew away, going out the window to a tree just 548 feet away. On the previous two days it had stood upon the rim of the nest and flapped

its wings, but made no attempt to fly. The mother seeing the bird fly away followed, and I found them together. An attempt to retrieve the young bird frightened it away, but a half hour later it was found on the same branch it had last seen its mother. The four birds kept together until they left on their southern migration, August 13.

Emotionally, the male Barn Swallow is more aggressive and defensive, more inquisitive and suspicious than the female. The female was the more cautious and wary. When the young were moved to the windowsill the female seemed resigned, but the male searched for the cause of their absence from the old nest. When the mirror was fastened up by the first nest the female disregarded it; her thoughts were to help the young. But the male looked into the mirror and attacked the supposed intruder, then looked around in back to see what became of it. A dummy nest placed on the other end of the shelf when the first nest was half built disturbed the male greatly, but not the female. When the young were moved to the window sill the male sat upon the old perch and listened; as soon as the young awoke and chirped the male flew directly to them, not having discovered them before. He began feeding at once, but the female did not go to the nest for two and one-half hours, and not to feed for another half hour. Noises did not disturb the birds as much as motion. A severe thunderstorm never bothered them, neither did blasting or slamming doors. But if I scratched upon the window they would leave the nest, believing I was going to reach into the nest, as they had seen me do repeatedly. When a person walked near enough to be seen by a bird on the nest the bird would leave. The respiratory rate of 120 per minute was not affected by heavy claps of thunder. The pulse rate was not counted. When I handled the young out doors the adults would make sudden darts, swerving past my head, the male always nearer, calling "*asch, asch, asch*". An extra male frequently came around, seemingly looking at the young in the nest, but never attempting incubating or feeding. Only once did he seem to bother the father. The parent birds would make the first morning calls, at 4:50 A. M. when the young were five days old; later recorded calling times were 4:40 and 4:44 A. M. When the older nestling was five days old I noted that the young awoke at 4:45 A. M., the next day at 4:40 and for six subsequent days they awoke exactly at 4:35 A. M. and began to call for breakfast.

These observations definitely determine a number of interesting facts about one pair of Barn Swallows, which differ from other recorded statements.

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