

## NESTING HABITS OF THE EASTERN PHOEBE

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THE notes that follow, for the most part, cover a period of three years and are concerned with the habits of a pair of Eastern Phoebes (*Sayornis phoebe*) that claimed as territory the immediate vicinity of the author's home. As the adults were not banded, we do not know the identity of any of the individuals that bred during the seasons under observation. With only a limited amount of time available for this study the results were necessarily fragmentary.

Arrival dates, the time of selection of territory, and the acquisition of a mate differed to some extent. The following table summarizes these data:

	1935	1936	1937
Arrival of species . . . . .	March 31	March 31	April 8
Male claims territory . . . . .	April 15	April 19	April 18
Arrival of female . . . . .	May 2	April 30	April 20
Start of nest building . . . . .	May 15	May 2	April 30
Completion of nest . . . . .	May 18	May 6	May 2
Beginning of egg laying . . . . .	May 29	May 24	May 22
Period of incubation . . . . .	17 days	16 days	14 days
Young in the nest . . . . .	16 days	17 days	15 days
Period of parental care after nest leaving . . . . .	14 days	20 days	22 days

In one instance outside the limits of this study parental care of the young was observed for 23 days after nest leaving.

In a search for possible factors governing the variation in arrival and the inception of the different breeding activities, temperature was considered. Below, in tabular form, are given average tempera-

	1935	1936	1937
March 25-31 . . . . .	30.57	40.85	25.21
April 1-7 . . . . .	31.5	37.5	36.71
April 8-14 . . . . .	40.07	39.85	39.85
April 15-21 . . . . .	42.14	42.71	42.28
April 22-23 . . . . .	52	38.85	45.21
April 29-May 5 . . . . .	43.45	62.21	54.92
May 6-12 . . . . .	50.43	63.92	50.71
May 13-19 . . . . .	46	54.35	51.64
May 20-26 . . . . .	49.55	54.42	57.57
May 27-June 2 . . . . .	62.92	63.92	65.21
June 3-9 . . . . .	65.64	67.28	63.35
June 10-16 . . . . .	63	67.71	60.5
June 17-23 . . . . .	63.85	64.57	64.71
June 27-30 . . . . .	66.28	59.21	65.28

tures for each week of the three seasons, taken from the records of Mr. Wilbur Eastman of Wells River.

There seems to be no close correlation between temperature and any phase of the breeding activity. Arrival of the males is probably delayed by temperatures considerably below the seasonal average. Nest building and egg laying may also be affected by this factor although weekly temperature averages seem to offer little evidence in support of it.

Prior to mating, the male was observed sitting on different parts of a beam where nests had been located, in the posture of an incubating bird, while singing phrases of the characteristic song in alternation with a lower-pitched, rather slow trill, harsh in quality. The latter was often heard after mating when the female approached her mate or vice versa. This hovering over possible nesting sites was preceded by several days of intensive singing.

The actual work of nest building seemed to be carried on by one individual. That this was the female seemed certain from repeated observations of sexual behavior, although both individuals would take the initiative in hovering over the other as though about to engage in sexual union, but one was seen to do this much more often than the other and a few times copulation was observed. The identity of the male thus established, he could usually be recognized at other times by a distinctly grayer hue of the back. Singing also afforded a means of sex differentiation.

The work of nest construction was carried on during all hours of the day but the period between 6:00 and 10:30 A. M. was particularly favored. Working hours ranged from 5:20 A. M. to 5:30 P. M. Usually work began early but twice the first material carried was noted between 10:00 and 10:15 A. M. In general, more rapid progress was made at the beginning of nest construction with longer interruptions as the work advanced. A sample record of activity is the ten-minute period from 9:30 to 9:40 A. M. when four trips were made. Two for clay mud were to a spring, 150 feet distant, and two in different directions were for dried grass, a distance of 100 feet in each case. Three minutes were required for securing the first load of mud, and material was taken from three locations. The second load of mud required one minute, fifteen seconds, while grass collection consumed two minutes, forty-five seconds and one minute, thirty seconds respectively. At times shorter intervals were needed, when loads were secured in from fifteen to forty-five seconds. Considerable differences in the daily rate of construction were noted, from barely perceptible

increase in height to two and one-half inches. A gain of from one-half inch to one inch was common. Usually, the sides of the nest were partially raised, then some material was placed in the bottom and, after the sides were completed, lining was added. The materials used in construction were mud, dried grass, and moss; the proportion of each varied somewhat in the different nests. This was apparently not due to difficulty in securing any of the substances. During nest construction the male perched on nearby wires and fences. After work had progressed a short time and once as early as the second night, one of the pair spent the night on the structure. Light was insufficient to permit sex identification.

In 1935, the clutch contained four eggs while in the two following seasons there were five in each clutch. The time of laying varied although generally occurring between 5:30 and 6:30 A. M. On one occasion the egg was not laid until after 10:00 A. M. while at another time laying occurred between 5:10 and 5:30 A. M. One egg was laid daily from beginning to completion of the clutch.

Incubation began with the laying of the third egg in the clutch of four, with the fourth in one instance of a clutch of five, while with the other clutch of five it did not begin until the last egg had been laid although some sitting occurred after the fourth but not enough to keep the eggs warm. Similarly, after laying the second egg in the clutch of four, the bird spent a little time on the nest. As far as we could observe, the male performed none of the duties of incubation although poor light at times rendered sex identification impossible. Sample observation periods follow. One of one hour, from 4:04 to 5:05 P. M., five days after incubation began; bird on nest until 4:08.30 when it left to return at 4:19, flying to nearby perch and resting for a few seconds before entering nest. There she remained until 4:32.30 when another flight occurred lasting until 4:37. Before settling down in the nest she appeared to turn the eggs but our closer approach frightened her and she left to return at 4:42. The male voiced alarm and she again left but returned at 4:49 to remain to close of period. One minute before one of the female's departures, the male flew to a nearby wire and gave the usual call note several times.

Another period of observation occurred on the ninth day of incubation with the fifty-five minute period of 10:10 to 11:05 A. M. used; bird off nest but returned at 10:16, stayed until 10:38.30, left again to return at 10:47. Further absences took place at 10:58.30 for one and one-half minutes and at 11:02 after one minute, thirty seconds

on the nest. The last flight occupied one minute and the period closed with the bird on the nest. During six minutes of one absence, the pair were together. They left together, an unusual occurrence, for generally before the female's departures, the male flew to some nearby perch, gave the call note several times and remained at hand during at least part of his mate's absences. Often the female upon returning from a flight, preened or rested before entering the nest. Sometimes two or three minutes were passed in that way.

Parental care of the young in the nest was observed and the schedule for a period of one hour, eighteen minutes follows. From 10:15 to 11:33 A. M., parents away until 10:27 when female came to nearby post. Male came to wires overhead at 10:28. He repeatedly flew to post where female perched and hovered over her as though about to engage in sexual union. At 10:39, the male fed the young and soon left. The female continued to catch insects. The male returned at 10:49 and fed the young at 10:50. Feedings by the female occurred at 10:50.30, 10:53 and 10:54. The male, which had been perching nearby, left the vicinity at 11:08 but returned at 11:16 and fed thirty seconds later. At 11:22, the young were fed again by the male. No further feeding was noted but both adults remained about until the close of the period, the male singing from 11:27 to 11:29 and again as the period ended. The behavior of the female when approaching the nest was noticeably more cautious; she never flew directly to the structure as did the male, but alighted on perches within a few feet, apparently looking for possible sources of danger. At times the male would fly to the nest when his mate would not, although the cause of alarm was not evident. These observations were made when the young were five days old. Another period from 3:44 to 4:14 P. M. when seventeen-days old and within less than an hour of nest leaving yielded the following: During the half-hour, the young were fed ten times by the male, four times by the female, and twice by the parents jointly. One sac was dropped forty feet from the nest by the male. Perhaps slight allowance must be made for apprehension on the part of the female, due to our presence, as a cause of the disparity in the number of feedings by her in comparison with those by the male.

Nest leaving was spread over several hours and sometimes was prolonged through parts of two days. An individual would perch on the nest rim for a considerable time before launching on its initial flight that would carry it to distances varying from 25 to 150 feet. One exception to this was noted with a family of five. When seen, four

were perching on a beam within three feet of the nest while the fifth was on the eaves just above. Within a few seconds of each other the five took wing, flying to a board pile, 25 feet distant or, in the case of one, to the pile and back again. This brood seemed more efficient in the first flight than the others observed. That power of flight is poorly developed in this species is mentioned by Dayton Stoner in New York State Museum Circular 22, entitled, 'Temperature, Growth and other Studies on the Eastern Phoebe.'

Some observations were made of the broods after nest leaving. In the case of the 1936 brood for which the most detailed observations exist, the first day was spent at distances varying from 150 to 200 feet from the nest within a radius of 75 feet. The second day was passed in a Canada-plum thicket, just a few feet beyond the first day's limit of range. Shortly before dark of the third night, the young were seen sitting side by side on a limb some 300 feet from the nest. The fourth and fifth days were passed in an arborvitae tree, 175 feet from the nest. On the sixth day the young spent much time on a fence in the open within 100 feet of the nest. The seventh saw a return to the willow where the first day was passed. The eighth and ninth days were spent in the plum thicket. The tenth day gave a range of 100 feet not exceeding 175 feet from the nest and over territory frequented earlier. The eleventh day found them 550 feet distant at one time and back close to the nest at another hour. The twelfth day saw more movement within the area frequented but no extension of limits. The thirteenth day marked a wider extension of range and they were seen some 750 feet from the nest. The next few days saw the family back in its earlier haunts, but on the seventeenth day the young with one parent were seen 1300 feet distant, perching on a fence in a wide expanse of open field. On the eighteenth day they were back near the shed and that was the last time that the young were seen with the adults.

Observations of feeding by the parents after nest leaving were made on several occasions. During one-half hour on the sixth day after nest leaving the young were fed fifteen times, both parents taking part. Fourteen days after leaving the nest eight feedings were given during a half-hour period. In several broods, a considerable degree of self-dependence was shown by the young on the seventh or eighth day after departure from the nest. The evidence tended to show a gradual reduction in parental attention with a final separation effected by force at least in some cases. This was noticeably the case with the 1936 brood. On the last day that they were seen

together, considerable harshness was displayed by the parents. The young became importunate and approached the adults while they were resting, thrusting their bills against them accompanied by shrill calls. When the parents took refuge in flight, the young would pursue; then the adult would turn and buffet a young one with its wings; the young defended itself in similar fashion and both ascended for a number of feet until the young bird acknowledged defeat.

Little was seen of the young after desertion of the parents. In 1936, two young were seen together some 600 feet from the nest, five days after it had been abandoned, and in 1937, one was seen close to the nesting site, two days after desertion. The scanty evidence indicates an early separation of the young after abandonment by the parents.

Of migration only one fact is known. Nestling no. 38-162737, banded on June 16, 1938, was recovered in Grayson, Louisiana, on November 3 of that year.

Occasionally two broods have been raised in a single season. We have data for the year 1932 only and we give in tabular form dates of hatching and nest leaving for that year in comparison with the years of 1935-37 inclusive when but one brood in a single season was raised.

	1932	1935	1936	1937
First brood hatched.....	May 30	June 16	June 12-13	June 9-10
First left.....	June 16	July 2	June 29	June 24
Second hatched.....	July 14			
Second left.....	Aug. 1			

That early nesting is required for two broods is indicated. No apparent cause can be found for earlier nesting in 1932. The first migrant arrived on April 3, rather late. Weekly temperature averages for the season of 1932 do not differ greatly from those of the three later seasons although slightly colder.

Various courtship activities were noted after the first brood had left the nest. In 1935, nest leaving occurred on July 2, first singing by male heard on July 9. Pursuit of the female was first noted on July 10, and on the 14th the male was seen sitting in the abandoned nest of a Barn Swallow. It was heard to utter the rather harsh trilling note while entering. Singing continued, more often in the morning and frequently near former nesting site, although elsewhere also, until July 27. Singing began to lessen on July 23. The pair were seen together on August 2, and the female scolded the observer when he approached the nesting site on August 11. In 1936, the

young left the nest on June 29, and the male began singing on July 4. Singing was heard on the 6th, but not on the 7th, but heard again at frequent intervals on the 9th and 10th, from a number of locations. Singing decreased after July 12, but continued at infrequent intervals, especially in the morning, until July 31. The pair were seen together on July 30, when attempted copulation was noted. After the 31st, no further courtship activity was observed. In 1937, the nestlings left on June 24, and singing was heard on June 27. The male was about alone and singing on the 28th. On that date he was seen in the old nest and heard uttering the harsh trill. "More often by himself and singing more frequently" is the record for the male Phoebe entered for July 1-2. On July 7, both adults were around former nest with the young but the latter were receiving less than the usual amount of attention. On the 8th, the female was seen flying to the shed beam as though engaged in nest building. The male attempted copulation on the 13th, but unsuccessfully. Singing decreased greatly after the 12th. On July 18, the male was seen in pursuit of the female, his bill grasping her tail, but sexual union was not consummated. No singing was heard after July 26, and no other courtship activities were noted after the 18th.

The male's defense of territory was vigorous and it was not often challenged. Relations with a pair of Starlings that nested in a ventilator shaft of the adjoining barn, 45 feet distant, were amicable. The only real contests were with another male Phoebe and with a pair of Barn Swallows that arrived later in the season and investigated possible nesting sites in the same shed. In the case of the swallows, more tolerance was shown and only after several visits involving a number of minutes was an attack made, the first of which was rather lackadaisical. Continued invasion brought more vigorous measures and the swallows went elsewhere. The intruding male Phoebe was attacked with vigor on sight and the fight ended promptly with the repulse of the invader. The casual intrusion of a male Canada Warbler, probably in search of insects, brought a fierce attack with the two birds turning somersaults but ended soon in the defeat of the warbler which departed protesting loudly.

#### SUMMARY

Breeding males (possibly later arrivals) claimed territory from ten to twenty days after the first appearance of the species.

Acquisition of a mate followed choice of territory in from two to seventeen days.

From two to eleven days intervened between mating and the beginning of nest construction.

Construction of the nest required from three to six days.

The incubation period varied from fourteen to seventeen days. Stoner found an almost uniform period of sixteen days, with the hatching period of a clutch not extending over more than twelve hours. In addition to the variation of three days in incubation, we found hatching extending at least through a twenty-four hour period in the case of the 1936 brood.

A period of from fifteen to seventeen days was passed in the nest.

After nest leaving the young spent from fourteen to twenty-two days under parental care.

Observation of the length of the day's activity showed the incubating bird's first absence from the nest for food occurred at 4:50 A. M. (Eastern Standard Time) on June 9. Last absence for food at night on June 6, took place at 7:25 P. M. At 7:24, the male was seen to enter a pine, 125 feet from the nest, for the night.

Of the fourteen eggs in the three clutches, all but one hatched, and of the thirteen young, all survived to leave the nest.

During two seasons the female showed considerable difficulty in deciding upon a nesting site. Fifteen separate structures were begun in one season, only to be abandoned at stages varying from inception to near completion. At times material would be carried to two structures in alternation. Another season showed attempts at nest building in six different locations.

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