

A STUDY OF A NESTING OF BLACK-THROATED
BLUE WARBLERS.

BY MARGARET MORSE NICE.

ON the afternoon of June 24, 1928, in the Grey Rocks woods in Pelham, Massachusetts, I found a nest of *Dendroica caerulescens caerulescens* containing four young which I estimated to be three days old. It was placed 15 inches from the ground on two dead branches in the center of a nearly dead speckled alder; it was almost entirely constructed of yellow birch, the outer bark on the outside and shreds from the inner bark inside. Although in plain sight, it was inconspicuous because it looked like the top of a birch stub. From above it was protected from the sun and rain by alder leaves.

I watched the nest from a distance of 30 feet, sitting in full view against a hemlock; several times I attempted to move nearer but always had to retire again on account of the timidity of the parents, particularly the female. An hour was spent at the nest the first afternoon, then from three to seven hours each day until July 30, when nine and a half consecutive hours were devoted to observation. A summary of the various activities of each of the ten periods of observation is given in the table.

The Songs. The male Black-throated Blue Warbler sang 1285 times during the 36½ hours; the songs were of four different types which I numbered in the order in which I became acquainted with them.

I. This was a short song, given in a very husky tone; it consisted of three notes on the same pitch followed by a sharply rising one: *hee hee hee weeeeeee*. Semi-occasionally there were four preliminary notes. Its length was only 0.6 of a second. Fifteen intervals between beginnings of songs, as measured by a stop watch, varied from 5 to 21 seconds and averaged 10.7. It was sung more often in the afternoon than in the morning, for 73 songs were heard in 14 afternoon hours—or an average of once in 11.5 minutes, and only 50 were uttered in 22½ morning hours, or once in 27 minutes. Usually it was given by itself in series ranging from 3 to 12 songs, but occasionally it appeared in a series of II.

NESTING ACTIVITIES OF A PAIR OF BLACK-THROATED BLUE WARBLERS

Date	Time Eastern Standard	Hours	Number of times fed by		Av. rate of feeding in minutes once in	Num-ber of times brooded	Time in brooded minutes	Times faeces eaten by		Times faeces removed by	Number of Songs				
			Female Male					Female Male			Female Male		I	II	III
June 24	4:20-5:20 P.M.	1	3	5	7.5	5	37	1	0	0	1	20	22	0	0
June 25	7:40-11:40 A.M.	4	16	23	6.2	8	56	1	1	3	7	5	99	0	0
June 25	2:23-4:23 P.M.	2	6	11	8.0	3	24	2	3	2	1	27	7	16	0
June 26	7:24-11:24 A.M.	4	13	20	7.3	2	22	0	3	1	9	17	131	12	1
June 27	2:15-5:15 P.M.	3	10	11	8.6	3	55	0	0	3	4	4	20	3	0
June 27	8:00-11:00 A.M.	3	10	12	8.2	0	0	0	0	4	5	5	123	25	0
June 28	7:23-10:23 A.M.	3	18	18	5.0	1	6	1	0	4	8	2	120	1	0
June 28	2:13-5:13 P.M.	3	21	18	4.6	0	0	0	1	2	4	2	32	0	0
June 29	7:10-11:10 A.M.	4	26	32	4.1	0	0	0	0	4	12	19	180	1	0
June 30	7:40 A.M.-5:10 P.M.	9½	70	51	4.8	0	0	1	5	23	16	22	352	13	4
Total		36½	193	201	5.6	22	200	6	13	47	67	123	1086	71	5

II. This was the favorite song, for it was heard 1086 times. It was louder, longer (lasting a full second), much less husky than I—a drowsy, sweet little song. There were four preliminary notes and a final one that was usually slightly lower in tone, but occasionally was a little higher and sometimes on the same pitch: *hur hur hur hur weeeeeee*. Fifty-four intervals between songs varied from 10.7 to 32 seconds, the average being 17.4.

III. This absurd song sometimes gave the effect of a stutter—*di di di eeeee*, the *eeee* being sharply ascending; again it sounded like something mechanical, consisting of three or four *chitters* followed by a sharply ascending *cheeeee*. Sometimes I separated these into two songs, but finally decided to call them variants of one song. At times this was given in short series, and at other times interpolated into series of II. It was recorded 71 times.

IV. This rare song consisted of two notes, the second higher than the first: *dee dree*; its tone was as husky as that of I. It was recorded only five times in the following series: III IV III III; II II II II II III III III IV; IV IV IV I.

None of these four varieties correspond well to the songs of this Warbler on Mt. Monadnock as described by Thayer (Chapman, F. M., *Warblers of North America*. 1907, pp. 137-138).

My Warbler usually sang directly after feeding. He failed to sing after 15 of 133 morning feedings or 11 per cent, and after 21 of 68 afternoon feedings or 31 per cent (17 per cent of the total number). In the mornings he sang from 1 to 22 songs after feedings—an average of 4; in the afternoon from 1 to 15 songs—an average of 3. He sang shortly before 49 of the feedings.

His greater enthusiasm for singing before noon is shown by the 969 songs given in these 22½ hours in contrast to 316 in the 14 afternoon hours; i.e. he averaged 43 songs an hour in the mornings and 22.5 an hour in the afternoons. Probably the difference would have been even more marked if I had reached the nest before dawn, instead of between 7 and 8 o'clock. The amount of singing each day did not vary much, averaging between 40 and 50 songs an hour in the mornings, except on the 25th when they averaged only 26.

There was not a single hour when there was no singing. The number of songs per hour ranged from 8 to 42 in the afternoon (except from 12.40-1.40 on June 30 when he sang the greatest

number of all—84 songs), and from 18 to 78 in the mornings. The average number of songs, when the whole week is considered, decreased each hour in the morning from 7.15 to 12.15 as follows: 57, 49, 41, 37, 34.

Brooding. The length of the broodings depended on the visits of the male, since he never delivered any food to his mate. Harding reports that a male of this species occasionally fed the female as she brooded (Bull. Northeastern Bird Banding Ass'n., II, 1926, pp. 66-68). Only the last of the 22 broodings was terminated by the female independantly of the arrival of the male—on June 28 at 9.00 she left after a 6 minute stay. Once she refused to leave immediately; June 25 at 10.08 she had settled down and 9 minutes later her mate came to the west edge of the nest with an insect, but she remained motionless; he flew away returning in about a minute from the east side, whereupon she left. She did not brood again until 10.54. On June 24 he came to feed after she had been on the nest only two minutes; in this case she left but returned a minute later and resumed brooding without feeding. Although disturbed four other times after two-minute broodings, she never again returned without bringing food.

Broodings varied from 2 to 20 minutes in length (except for one of 41 minutes on the afternoon of June 26 during and after a rain); the average time was 9.1 minutes. The percentage of time spent in brooding was 22.2 on June 25 and 18.9 June 26. She brooded after half the feedings on June 25 and after 22 per cent of them the next day.

On June 24 the female faced east when she brooded the first two times, but always after that she faced west. She shaded from the sun only once—on June 29 from 9.41 to 9.47; the nest was well protected since it was in the woods and also because of the large leaves just above it.

Feeding. The male fed 201 times, the female 193, an average of once every 5.6 minutes. The average rate during the first four days was once every 7.3 minutes, during the last three days once every 4.6 minutes. The male increased his rate one fourth during the later part of nest life, but the female doubled hers. His rate for the first four days was once every 12.4 minutes, for the last three once every 9.8 minutes; her rate was once every 17.6 and 8.7

minutes during the same periods. From the 24th to the 27th he fed 82 times, she 58; on the 28th and 29th he fed 68, she 65, but on the 30th he fed 51 and she 70.

In both the nests watched by Mousley (Auk, XLI, 1924, pp. 263-268) the males did only a small proportion of the feeding: In one case 16 times in comparison to the female's 46 in 15½ hours of observation from hatching to the age of five days; in the other only once in contrast to his mate's 349 trips in 14 hours with 7 and 8 day young. The two young in the first nest were fed once every 15 minutes, the four in the second once every 2.4 minutes—a truly remarkable record for the mother bird.

Both parents at my nest were apt to give several feedings in quick succession and then to stay away for a while. This tendency is shown by the following sets of figures: the average interval between the male's feedings was 10.9 minutes; yet 122 intervals were shorter—from 1 to 10 minutes, and only 74 were longer—from 11 to 52 minutes. The average interval for the female was 11.3 minutes; 123 of these ranged between 1 and 11 minutes and 66 between 12 and 47. With the male 62 intervals were only 1 to 5 minutes long and with the female 66. With both birds about half the intervals fell between 2 and 7 minutes, 91 with the male, 86 with the female. Possibly this grouping of feedings is an adaptation to the brooding of the female; if the male came punctually every 10 minutes he would continually disturb his mate at her occupation of warming the young.

As to the time spent at the nest in feeding and inspection, I measured it with the stop watch in 57 cases with the female and 75 with the male. With the former the periods during the first four days varied from 10 to 34 seconds and averaged 16.4; during the last three they ranged from 3 to 16.5 and averaged 8.1. The male stayed at the nest during the first four days from 2.5 to 21 seconds, averaging 12.1 seconds; during the last three, he stayed from 3 to 28 seconds, averaging 10.5. It is interesting to note that the female near the end of nest life made her visits twice as brief and twice as numerous as they had been during the early part. The speeding up on the part of the male was much less noticeable.

Usually the parents brought but one insect at a time. Small green caterpillars were recorded frequently, other morsels being

white grubs, white moths and a crane fly. The male often gave larger insects than did his mate.

When coming to feed, the female usually reconnoitered the situation in the trees before going to the nest, but the male came headlong. She often left by mounting the tree next the alder, but he never did this. As a rule, both birds came to the east rim of the nest, and after feeding, hopped up on the branch a few inches above the nest, sitting there a moment or two before leaving. Twice, however, the female slipped directly out to the east, and 13 times the male did this. Fourteen times the female came to the west side of the nest and 46 times the male did the same. Occasionally they flew away to the south, west or east, but usually they left towards the southeast or southwest. Once, on June 30, the male came and left in an entirely new way, namely the north.

Other Activities of the Parents. The female was considerably more timid than her mate. Even he was not as fearless as the Myrtle and Magnolia Warblers whose nests I have watched, for when I moved within 15 feet of the nest he refused to feed the young. He almost never gave any alarm notes, but his mate did so quite often.

She stayed in the vicinity of the nest much of the time, but the male after feeding once, twice or several times went entirely out of sight. Mousley (*Auk*, XXXVI, 1919, p. 348) says of the Black-throated Blue Warbler that he has "generally found him to sing much further away from the nest than any of the other Warblers." The "singing trees" of these birds were 50, 90 and 100 yards away from the nest, while the furthest "singing tree" of any other of the 42 birds observed by this writer was 34 yards.

As to the sanitation of the nest, both parents both carried away and ate the faecal sacs throughout the week. Twice (June 26 and 30) the male faced the situation of two sacs at one time; in both cases he ate one and carried away the other. At other times I could see no particular reason for his eating them. It is easy to understand why the female should do this as a matter of convenience when she intends to brood, but not clear why the male should have adopted the practice. With this pair the male devoured 13 sacs and the female 6 during the period of observation. In only a few instances could the disposal of the other sacs be determined; these were wiped off on branches of trees.

The female spent but little time cleaning the nest from parasites; four times she seemed to be thus occupied for periods of a few minutes on June 25, 26 and 27.

The Warblers were seldom troubled by neighbors. The female drove off a Black and White Warbler that came too near, but was seemingly overawed by a Solitary Vireo that seated itself above the nest; as soon as the male appeared, the Vireo had to leave. Once the male came to feed but waited for a full minute before going to the nest, possibly because of a Crow's loud cawing nearby.

Development of the Young. On June 24 the wing quills were one fourth inch long; on the 25th about one half inch, on the 27th an inch. On the 29th the little birds were feathered out as the Magnolia Warblers had been when 8 days old (Wilson Bulletin, XXXVIII, 1926, pp. 185-199). It was not until the 30th that I heard any sound from them, but on account of a severe storm I had not been able to visit them on the afternoon of the 29th. Although I tried to distinguish the sexes on the last day I was not sure of being able to do so; perhaps if I had taken the young in my hand I might have done it, but I was careful not to disturb them for fear of making them leave prematurely.

The Last Day. On June 30 the nest was overflowing with the pretty babies, one being perched on top of the others. Still on occasion they could disappear entirely into the nest. For the first time they were vociferous at most of their meals and also shortly afterwards, but seldom made a sound between their parents' visits. Fluttering the wings was also a new development; sometimes a nestling fluttered but made no sound. They stretched and preened and moved about and sometimes picked at each other's faces.

The female's 70 trips were distributed each hour beginning at 7.40 thus: 8, 10, 6, 6, 4, 10, 12, 5, 5. The hourly distribution of the male's 51 meals was as follows: 7, 6, 7, 5, 2, 9, 1, 5, 5. During the last half hour each brought 4 meals.

Near the middle of the day the young grew more and more demonstrative, chipping and fluttering at the appearance of the parents; sometimes they nearly left the nest in their excitement. Twice little birds almost fell out but managed to right themselves. At 2.12 one got on the edge of the nest, but quickly returned. At

2.54 they crowded and pushed and nearly tumbled out, but afterwards all subsided for a nap.

Finally at 4.15 a baby hopped out, shook himself as if greatly relieved to have escaped such crowding, then hopped about from twig to twig. He gave a little flight, saying *chip chip*. It was interesting to see how perfectly he could manage himself in the entirely new actions of hopping and flying (for a few feet), making no mistakes in judging distances. The mother came, viewed the scene and left. The adventurer hopped and hopped, then sat on a branch a yard from the nest and preened himself, remarking *chip*, while the others struggled about. Then he hopped further.

At 4.20 the male fed the nestlings. The outsider began to call, then flew across a tiny brook, twittering and cheeping. There was the greatest difference between the quiet young in the nest and the vociferous infant outside; evidently the act of leaving the nest had set in motion the food calling instinct. Almost constantly he clamored *tidderdée, tidderdée* as he wandered about over the dead leaves. The parents, however, were more interested in the nestlings than in this noisy child; it was not until 5 o'clock, after 7 meals had been given to the stay-at-homes, that he was served. He kept on demanding sustenance at the rate of 37 three-syllabled cries a minute, while the others were given four more meals.

I started to pack up my belongings and made a noise with the canteen, whereupon the little bird instantly stopped his cries. I went to look at him and both parents scolded, especially the male. I wished to catch him to examine him carefully and also see the reactions of his parents, but he hopped along over to the nest and clambered up a dead branch near it. Fearing to disturb the whole family, I left.

The next morning the nest was empty and the birds nowhere to be seen. I regret that I did not find the nest early enough to have studied it from the hatching of the young; but it was a gratification to have watched the departure of one little bird. Enough time was spent in observation to give a clear and consistent picture of the course of the later two-thirds of the nest life.

56 West Patterson Avenue, Columbus, Ohio.