

Chipping Sparrow

H. Bradley 1939

A LIFE HISTORY STUDY OF
THE EASTERN CHIPPING SPARROW

Hazel L. Bradley

Conducted at Douglas Lake during
the summer of 1939 under the
direction of
Olin Sewall Pettingill, Jr.
and
Theodora Nelson

data?

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For my study of the life history of a bird I chose the Eastern Chipping Sparrow, *Spizella passerina passerina*. This is a small member of the family Fringillidae and is distinguishable from other small sparrows by the presence of a chestnut cap over the head, a broad white line over the eye and a black streak through the eye. It has a streaked brown back, clear whitish throat and breast, and a slightly forked tail.

Adult chipping sparrows have both sexes colored alike. I found, however, in the pair that I studied most thoroughly, that the female had a light line in the middle of the forehead and a straw-colored lower mandible while the male had no noticeable line above the bill, which was entirely black. These slight differences were no doubt individual variations which might not be present in other birds of the same sex but which made it easy for me to distinguish between the particular male and female I was observing.

Distribution

According to Forbush, Chapman, and the A.O.U. Check List, the range of the Eastern Chipping Sparrow covers a large part of the Canadian, Alleghanian, Carolinian and Austroriparian zones. Another subspecies is found in much of the continent west of these zones. The Eastern subspecies winters chiefly in the southern states occasionally as far north as Oklahoma and southern New Jersey.

The spring migration of this bird takes place in April and May, a little later than many of the other sparrows. The chipping sparrow probably reaches the region surrounding Douglas

Lake early in ^{*}May and from then on throughout the summer is a friendly inhabitant of dooryards, orchards and roadsides.

Habits; Song

The chipping sparrow seems to like the company of human beings, often building its nest on vines or bushes next to dwellings. It is an early riser, often to be heard singing at 4:30 on a summer morning. The song is a rapidly repeated "Chippy, chippy, chippy, chippy" which often amounts to an insect-like trill all on one note. The alarm note is a sharp "Chip" and I have also noticed a soft twittering by both sexes when the male approached the female on the nest.

Nesting Areas

The camp area of the Biological Station on the shore of Douglas Lake seems to be a favored nesting place for several pairs of Eastern Chipping Sparrows. I made observations on five of these nests. One was located on D Street, but the young had left the nest before this study was started. A second pair built a nest in the area known as "Blissville", which nest was torn down by cedar waxwings before any eggs were laid in it. A third nest was found up on the hill a short distance east of the insect tower, a fourth in a tree near the beach at the foot of B Street, and the fifth in the maple tree at the corner of B and State Streets. The young were ready to leave the third nest when it was found. The fourth was deserted after one of the two eggs disappeared and the other failed to hatch. Observations on incubation were made on the last two nests and on feeding and growth of the young in the last-mentioned nest.

* Very abundant April 14, 1937 (T. Nelson)

Courtship

I had opportunity to observe mating in only one pair of these little sparrows. This took place while the female was building the nest and consisted of bursts of song from the top of a cabin interspersed with quick flights to the ground where the female was pulling up weed stalks for the nest. Copulation took place on the ground.

Nesting Season

Judging by the five nests observed, the nesting season seems to begin about the last week of May or the first week in June at Douglas Lake and to continue until the second week of August as the time when the last birds leave the nest.

I do not know whether any of these pairs renested after having raised one brood. I believe that both of the last two nests were built by the same pair of sparrows as they were very close together and the second was built very soon after the first was abandoned. As the birds were not banded I have no proof of this.

Nests

Chipping sparrows locate their nests in a variety of places, two of those I observed being placed in pine trees, two in maples and one in an oak. Four of these were on horizontal or nearly horizontal limbs some distance from the trunk of the tree. They were from four to eighteen feet above ground. A nest was started about 30 feet up in one of the topmost branches of the maple at E. and State Streets, but was abandoned in favor of the lower site after a high wind.

One nest was measured and found to be $4\frac{1}{2}$ in. outside diameter, $2\frac{1}{4}$ in. inside diameter, with an outside depth of $2\frac{1}{4}$ in. and inside depth of $1\frac{1}{2}$ in. The materials used were mainly fine weed stalks, peppergrass predominating, with some rootlets of grasses, a piece or two of thread and string, and a lining of hair. One nest had a few horse hairs and two were lined with human hair. Forbush states that fine plant fibers are sometimes used for lining, but I found none in the nests I examined.

Nest building usually requires three or four days and seems to be done entirely by the female, the male staying near and singing a great deal while this is going on.

Eggs

The eggs measure about 1.8 cm. by 1.3 cm. and are usually three or four in number. One nest I found had only two eggs, but the others had three or four each. They are greenish blue or bluish green in color with blackish streaks, lines and spots around the large end.

Incubation

Bergtold, quoting Burns in Wilson Bulletin No. 90 for authority, states that the incubation period for the chipping sparrow is ten to twelve days. In the one nest I watched, the process of nest-building, egg-laying and incubation all together took place in sixteen days. Allowing three days for each of the first two processes, it would seem that this clutch of eggs took ten days to hatch.

Activities of the parent birds were observed in two nests during the incubation period. The female did all of the incubating in both cases, not leaving the nest for more than

fifteen minutes at a time. The male brought food to her at intervals, sometimes feeding her while she remained on the nest and sometimes coming to a nearby tree or bush where she met him and received the food. No doubt she obtained a part of her food while she was absent from the nest.

Although the female covered the eggs most of the time, she did not sit still very long at a stretch. She often pecked at the bottom of the nest, moved the eggs about, or preened her feathers. She sat more quietly when a strong wind was blowing, as though sensing the need of better protection for the eggs at that time. Other things going on around her did not seem to disturb her and several times I approached within a few inches of the nest before the female took flight.

Young: Description

Having miscalculated the incubation period, I missed seeing the birds hatch. When I first saw the young they were well dried off and I concluded that they must have hatched the afternoon before. On removal from the nest for the first weighing, the young appeared very small and naked with only a little fine gray down for covering. The three birds in the nest were of three different sizes, indicating that they had hatched at different times. It is possible that the largest bird may have been more nearly two days old at this time, for it seemed so much larger than the other two.

Young: Brooding

When the young were first hatched the female spent about 90% of her time on the nest, brooding. During this time the male did all of the feeding, even bringing some food to the female. Later when the young birds were older and demanded

more food the female assisted with the feeding, although she never went very far from the nest nor stayed away very long at a time.

During the heat of the day the female would stand over the young with her back to the sun and her wings raised in such a manner as to deflect the wind into the nest. The position of the nest with a south exposure made it easy for her to direct the air currents and to shade the young birds at the same time.

Young: Feeding

The method of feeding the young was quite interesting. At first the male would bring large caterpillars and break them into small bits, dropping each piece into an open mouth.

Usually the last third of the caterpillar was pushed into a mouth in one big piece. Later I noticed that he made no attempt to break up the food, but simply dropped a whole caterpillar into one mouth. If it failed to disappear at once he picked it up and dropped it into another. After this had been repeated several times the caterpillar was finally swallowed whole.

There seemed to be no regular order in which the three birds were fed. At one time I watched the largest one get several feedings in succession, at other times it received nothing for several feedings. The bird that happened to swallow the larva first was the one to get the benefit.

During the first day the frequency of feeding was much lower than on later days. The length of time between feedings varied from an average of 22.8 minutes on the first day to an average of 5.7 minutes on the fifth day, and those following.

I could not determine the nature of the food in all cases, but found it to consist of insects when I was able to identify it. The male showed a preference for capturing cater-

pillars, while the female brought in one grasshopper after another, only rarely returning with a larva.

Young: Growth

At the end of the first day the young chipping sparrows were very tiny, weighing between two and five grams each. All three were weighed and measured for seven consecutive days. At the end of the seventh day bird No. III fell from the nest onto the concrete walk and was killed. Only bird No. II could be found on the ninth day and no measurements were taken after that. The following chart shows the growth of the birds:

Age in days	Weight in grams	Length in cms.	Length of bill	Width of gape	Length of wing	Length of tarsus
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Bird No. I

1	4.36	3.8	.35	1.0	1.0	1.1
2	6.06	4.2	.35	1.1	1.2	1.2
3	7.45	4.4	.35	1.1	1.8	1.5
4	8.65	4.7	.40	1.1	2.4	1.7
5	9.58	5.2	.50	1.2	3.1	1.9
6	10.45	5.8	.50	1.2	3.3	2.0
7	11.03	6.2	.60	1.2	3.3	2.0
8	10.31	7.3	.60	1.1	3.9	2.0

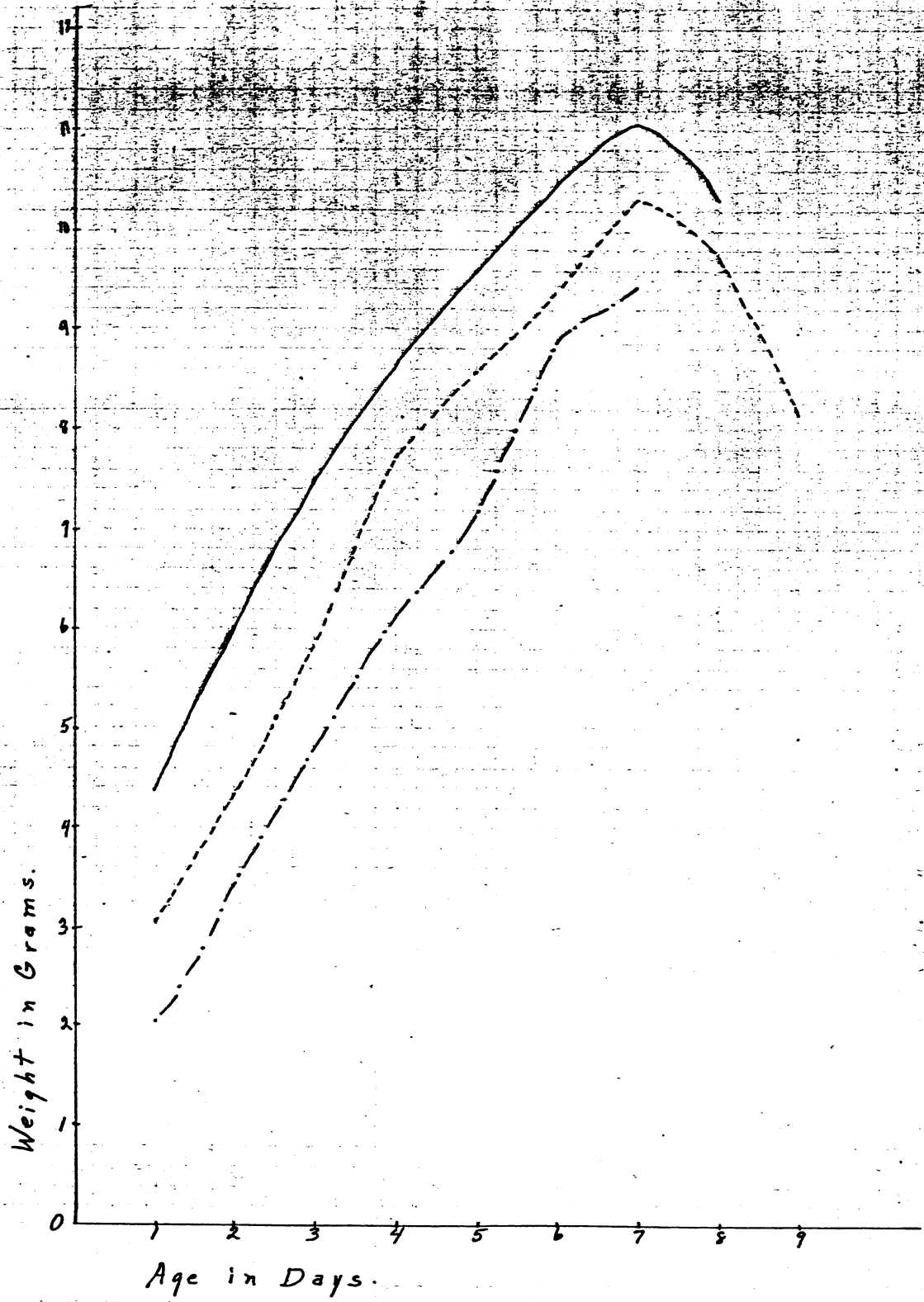
Bird No. II

1	3.04	3.3	.30	.9	.9	1.0
2	4.30	3.7	.30	1.0	1.0	1.1
3	5.81	4.2	.30	1.0	1.5	1.2
4	7.74	4.6	.35	1.1	2.0	1.4
5	8.56	5.0	.40	1.1	2.6	1.5
6	9.35	5.3	.50	1.1	3.3	1.7
7	10.32	5.6	.50	1.1	3.3	1.7
8	9.73	6.2	.60	1.1	3.7	1.8
9	7.95	6.7	.60	1.1	3.9	1.8

Bird No. III

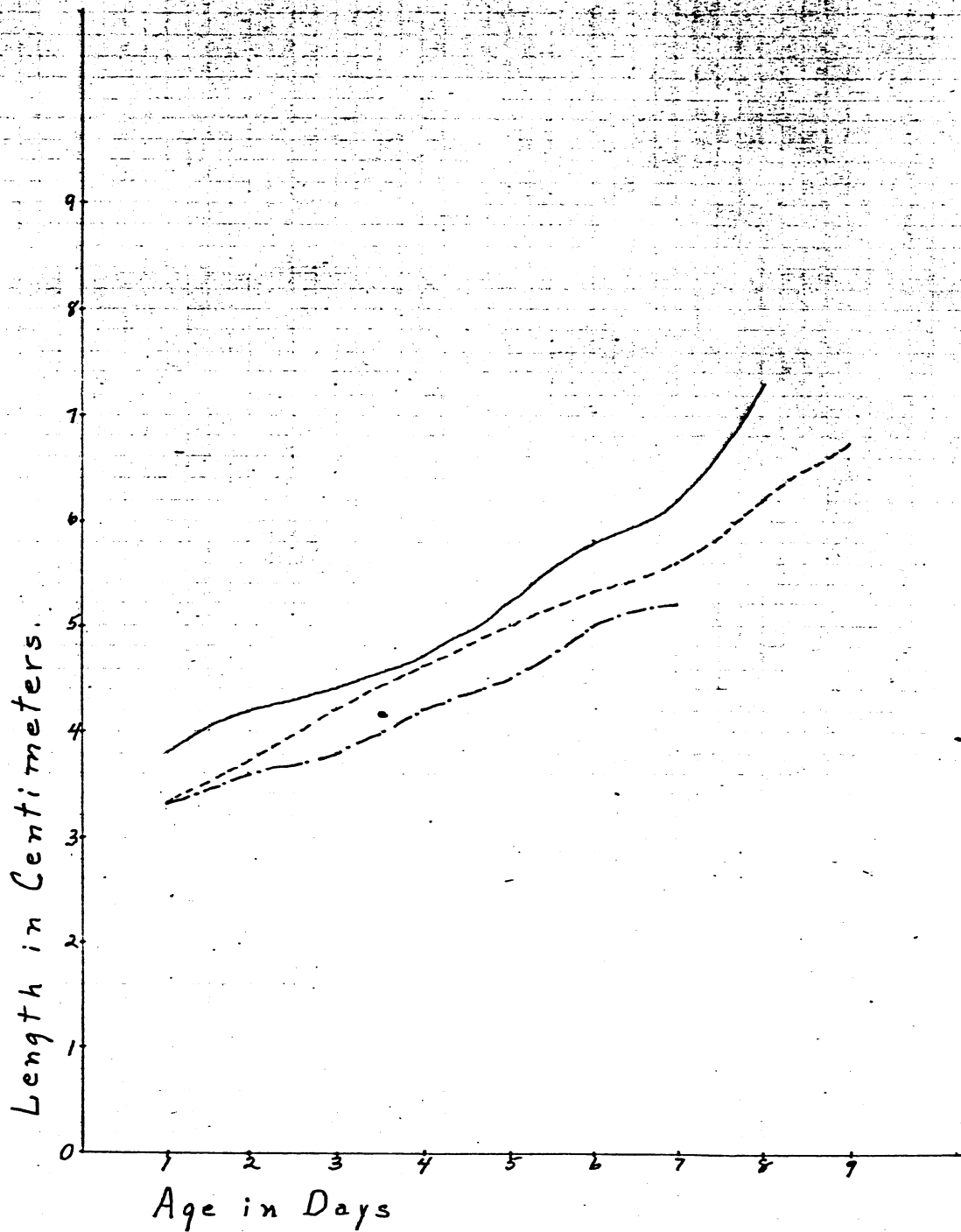
1	2.20	3.3	.30	.8	1.0	.8
2	3.40	3.6	.30	.8	1.0	1.0
3	4.80	3.8	.35	1.0	1.1	1.0
4	6.13	4.2	.40	1.0	1.5	1.3
5	7.15	4.5	.40	1.1	2.0	1.5
6	8.90	5.0	.50	1.1	2.6	1.7
7	9.40	5.2	.50	1.0	3.1	1.9

GRAPH SHOWING RATE OF INCREASE IN WEIGHT OF YOUNG CHIPPING SPARROWS.



Bird No. I. —————
Bird No. II. - - - - -
Bird No. III. - · - · -

GRAPH SHOWING RATE OF INCREASE IN LENGTH OF YOUNG CHIPPING SPARROWS



Bird No. I —————

Bird No. II - - - - -

Bird No. III - · - - -

This chart shows that on the eighth and ninth days there was a decided loss in weight of the two remaining birds. On the evening of the seventh day they would not remain in the nest when returned there after weighing, so I placed a cage below the nest and attempted to keep the birds in there. It was open so the parents could enter and leave at will. The young were so active, however, that they were out on the ground several times during the following day. I was afraid some predator might capture them so I finally partially closed the cage so they could not escape. Then the parents found it difficult to feed the young and a noticeable loss of weight occurred.

The following day I was unable to visit the nest until late in the afternoon when I found that someone had picked up one of the young birds and had shut it up in the cage where the parents were unable to feed it properly. It had lost still more weight, although continuing to increase in length. Finding the use of the cage unsatisfactory I let the last bird go at the end of the ninth day.

The accompanying graphs show the rate of increase in weight and length of the young chipping sparrows through the first nine days. It will be noticed that the length continued to increase even during the days when there was a sharp decrease in weight. This was due to the fact that the feathers continued to unsheath and thus to add to the total length.

Nest Sanitation

The matter of nest sanitation was well handled by the adult sparrows. At each feeding the parent picked up a fecal sac from the nest or took one from the body of the young bird as it was voided. In some cases the feeding of the bird seemed to stimulate excretion of waste, in others the parents stimulated

this process by pecking the body near the vent.

While the birds were small some of the fecal sacs were small and then were usually eaten by the adults. The larger sacs were carried away from the nest. I observed a total of 21 of these sacs removed, only five of which were eaten, the other 16 being carried away in the parents' bills.

While the female was brooding the young in the nest I often watched her pecking at their mouths or at other parts of their bodies as though cleaning them. She also dug at the bottom of the nest every little while. I wondered if she were attempting to rid the nest and young of bird lice but was unable to get any positive evidence that this was the case.

Fear

That the young chipping sparrows develop fear at about the sixth day was quite evident in these birds. Though the eyes were opened on the fourth and fifth days, the birds seemed to show no fear whatever until the sixth day. Then they tried to elude me when I reached to take them from the nest for weighing. At this time the largest bird did a great deal of struggling and squawking. When I returned them to the nest they all fluttered out onto the ground. After that there was considerable squawking whenever I touched any of them.

The adult birds showed no fear of my presence until I touched the nest or young. Then they flew about, sometimes very close, uttering one sharp "Chip" after another. The female on the nest took no notice of people passing on the walk below but was much upset on several occasions by the presence of a small kitten playing around the base of the tree.

The manner in which the adult sparrows approached the nest when feeding the young appeared to indicate an instinctive fear of predatory enemies. They flew to another part of the tree first, then to the inner part of the limb holding the nest before coming to the birds along that limb. Their movements were well screened from outside observers by the leaves.

Territory

Noticing that the parent birds often left the nest in the same general direction, I decided to try to locate their feeding territory. First I found that they fed more to the south and east of the nest than they did in other directions. The boundaries of the territory were, roughly, the lake shore on the north, about half way between B and C Streets on the east, the Upper Drive or a little beyond it on the south, and A Street on the west. This seems to me to be a very small area, but the family appeared to have sufficient food.

In this study I also observed that the adult chipping sparrows did much of their searching for food on or near the ground. I saw no other chipping sparrows in this area at any time.

Relations to Other Birds

In connection with the study of territory it was observed that these birds were not in the least annoyed by the presence of other bird species, with one exception. Once a kingbird came very near the nest and uttered a loud cry which seemed to alarm the female on the nest. Other birds commonly seen or heard in the area were goldfinches, cedar waxwings, purple martins and red-eyed vireos.

A brood of young waxwings left their nest in the same maple tree while the chipping sparrows were incubating. Another nest was built at about that time across B Street, but there was no evidence of such interference as was noticed at the "Blissville" nest. A pair of vireos nested in the same tree with the sparrows but I was unaware of their presence until the young sparrows were old enough to make a fuss when I removed them from the nest. Then the adult vireos protested. Afterward one of the young vireos fell from its nest and I placed it in the cage with the sparrows. I did not see either vireos or chipping sparrows feed it and when I opened the cage for my birds to leave, the vireo also disappeared.

Chipping sparrows are often victimized by the cowbird. In the nest on top of the hill I found three young sparrows and one cowbird in the same nest. All were well feathered and left the nest immediately.

In some regions the English sparrow has driven the chipping sparrow from its favorite nesting sites around lawns and buildings.

Economic Importance

Although during the nesting season the chipping sparrows eat much insect life, throughout the remainder of the year they also use much vegetable food. In discussing their diet, Forbush states that among insects the gipsy moth, army worm, canker worm, beet worm, cabbage worm, pea louse, weevils, grasshoppers and codling moth are favorite foods during spring and summer. In June, 93% of their food is insects, of which 36% are grasshoppers, 25% caterpillars, and 6% leaf-eating beetles. Henshaw found that on the whole their food consisted of 42% insects and 58% vegetable matter.

In his study of the relation of sparrows to Agriculture, Judd found that the vegetable food of chipping sparrows consists of oats, grass seed, clover, ragweed, amaranth, lamb's quarters, purslane, chickweed and crab grass. As most of these are harmful weeds, he concludes that this sparrow is a valuable aid to the farmer in weed control.

Conclusion

This study of the life history of a bird has been intensely interesting to me for several reasons. I have thoroughly enjoyed the activities of the chipping sparrows all through their nesting season and I now begin to realize what a wealth of material may be studied in relation to birds.

The feeding habits and rapid development of the young have proved to be most fascinating entertainment. If opportunity arises to continue this study, I shall seek to learn more of the details of nest-building, of the territory of nesting chipping sparrows, and of the post-nesting activities of both the young and the adult birds.

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1940

A FEW OBSERVATIONS ON THE NESTING OF THE EASTERN CHIPPING SPARROW

BY HAZEL L. BRADLEY

The Eastern Chipping Sparrow (*Spizella passerina passerina*) is found over the entire state of Michigan during the summer, arriving during the early part of April. In the southern part of the state it remains until late October. It seems to like the company of human beings, often building its nest in vines or bushes next to dwellings.

The camp area of the University of Michigan Biological Station on the shore of Douglas Lake, Cheboygan County, Michigan is a favored nesting place for several pairs of Chipping Sparrows. Here from July 3 through August 6, 1939 I made observations on five nests of this species.

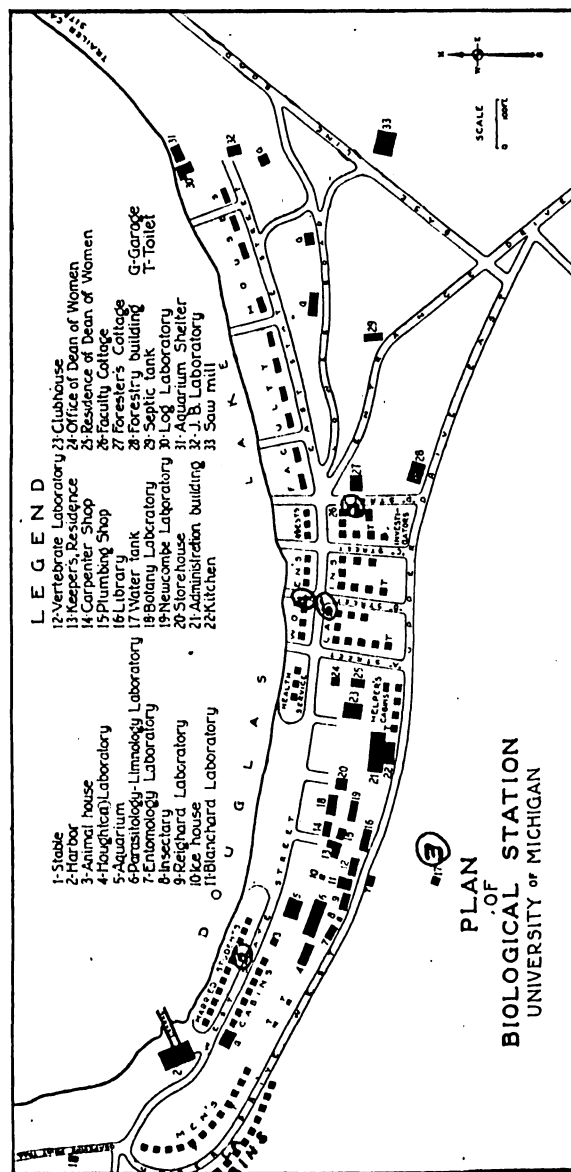
COURTSHIP AND MATING

I had opportunity to observe courtship and mating only once. This took place while the female was building the nest. It consisted of outbursts of song by the male from the top of a cabin, interspersed with quick flights to the ground where the female* was pulling up weed stalks for the nest. Copulation took place on the ground soon after this display.

NESTING

In Michigan Chipping Sparrows start nesting in May. With the birds which I observed, one pair continued until August 6 when the young left nest No. 5. The nests were located in a variety of places: two were placed in pine trees, two in maples, and one in an oak. Four of these were on horizontal or nearly horizontal limbs some distance from the trunk of the tree. They were from four to eighteen feet above ground. One of the two nests in maples, was started about 30 feet up in one of the topmost branches, but was abandoned in favor of the lower site after a high wind.

* (In adult Chipping Sparrows both sexes are colored alike. I found in this pair, which I studied, that the female had a light line in the middle of the forehead and a straw-colored lower mandible while the male had no noticeable line above the bill. The bill was also entirely black. These slight differences were no doubt individual variations which might not be present in other birds of the same sex, but which made it easy to distinguish between the particular male and female.)



Nest building was done entirely by the female, the male staying near and singing a great deal while she was working.

One nest measured 114 mm. outside diameter, 57 mm. inside diameter, had an outside depth of 57 mm. and an inside depth of 38 mm. The materials used were mainly fine weed stalks, pepper-grass predominating, with some rootlets of grasses, a piece or two of thread and string, and a lining of hair. One nest had a few horse hairs and two were lined with human hair. Forbush (1929, p. 79) stated that fine plant fibers are sometimes used for lining, but I found none in the nests I examined.

Following is a list of the nests found at Douglas Lake, during 1939:

TABLE 1

Nests	1	2	3	4	5
Location	D St.	Blissville	Beach B St.	Near Insect Tower	B and State Sts.
Date found	July 3	July 3	July 5	July 12	July 14
No. eggs		0	2		3
Dates laid					July 16, 17, 18, ?
Dates young hatched					July 27, 28, ?
Dates young left nest				July 12	Aug. 5, 6
No. young hatched	3	0	0	3	3
No. young left nest	3	0	0	3*	2

* Also 1 young Cowbird.

Nest No. 2 was torn down by Cedar Waxwings before the birds could lay any eggs. Nest No. 3 had one egg which disappeared July 8, then the nest was deserted July 13. One notes that in these five nests at least 11 eggs were laid, of which 9 hatched (81.8% success) and 8 young lived to leave the nest (72.7% success). Three of the five nests were fully or partially successful (60.0%).

EGGS

Eggs of the Chipping Sparrow measured about 18 by 13 mm. and of the four nests observed, three contained three eggs and the fourth two (nest No. 2 did not contain eggs). The eggs were greenish blue or bluish green in color with blackish streaks, lines and spots concentrated or wreathed around the large end.

THE JACK-PINE WARBLER

INCUBATION

Bergtold (1917, p. 104) quoting Burns in the Wilson Bulletin No. 90 for authority, stated that the incubation period of the Chipping Sparrow was ten to twelve days. At nest No. 5 the process of nest building; egg laying and incubation, all together, required sixteen days. Although not quite definite, the incubation period was approximately ten or eleven days at this nest.

The female did all of the incubating at nest No. 5, not leaving the nest for more than fifteen minutes at a time. The male brought food to her at intervals, sometimes feeding her while she remained on the nest and sometimes coming to a nearby tree or bush where she met him and received the food. No doubt she obtained a part of her food while she was absent from the nest.

Although the female covered the eggs most of the time, she did not sit still very long at a time. She often pecked at the bottom of the nest, moved the eggs about, or preened her feathers. She sat more quietly when a strong wind was blowing, as though sensing the need of better protection for the eggs at that time. People moving around her did not seem to disturb her and several times I approached within a few inches of the nest before she took flight.

On July 26 I made observations of the female incubating at nest No. 5 for a period of two hours and 28 minutes. The following table shows the periods of incubating and time off:

TABLE 2

Time on nest	Time off nest
3 min.	2 min.
42 "	8 "
39 "	10 "
30 "	14 "
Total 114 "	34 "
Average 28.5 min.	8.5 min.

YOUNG—DESCRIPTION

Having miscalculated the incubation period, at nest No. 5, I missed seeing the birds hatch. When I first saw them they were dried off and on removal from the nest for the first weighing, they appeared very small and naked with only a little fine gray down for covering. The three birds in the nest were of three different sizes, indicating that they had hatched at different times. One weighed 4.36 grams, another 3.04 and the smallest 2.2 grams. The largest bird may have

BRADLEY, *Nesting of the Chipping Sparrow*

been nearly two days old when compared to figures presented by Weaver (1937, p. 103).

YOUNG—BROODING, FEEDING

When the young were first hatched the female spent most of her time at the nest brooding. During this period the male did all of the feeding, even bringing some food to the female. Later when the young were older and demanded more food the female assisted with the feeding, although she never went very far from the nest nor stayed away very long at a time. The following observations were made at nest No. 5 when the young were only a day or two old, on July 29, 1939:

TABLE 3

Time of day	Time female spent on nest	Time female spent off nest	Periods of time off nest
A.M.	123 minutes	17 minutes	1, 4, 8 & 4 minutes
P.M.	146.5 minutes	5.5 minutes	1, 1, 1, 1, 1 & ½ minutes
Total	269.5 minutes	22.5 minutes	½ to 8 minutes

Thus during this period of four hours and 52 minutes the female brooded for 92.29% of the time.

As to the number of feedings by both the male and female, the following figures were obtained:

TABLE 4

Date 1939	Time observed	No. feedings by male	No. feedings by female	Average time between feedings
July 29	292 minutes	13	2	19.46 minutes
August 2	178 minutes	12	22	5.23 minutes
August 4	55 minutes	6	4	5.5 minutes
Total	525 minutes	31	28	8.89 minutes

One notes that the young were fed much oftener during later nestling life, and that the female did much more feeding than earlier during the nestling life. The young left this nest on August 5 and 6.

During the heat of the day the female stood over the young with her back to the sun and her wings raised in such a manner as to deflect the wind into the nest. The position of the nest with a south exposure made it easy for her to direct the air currents and to shade the young birds at the same time.



Fig. 1—Chipping Sparrow at nest. Photographed at Battle Creek, Michigan, by Lawrence H. Walkinshaw.

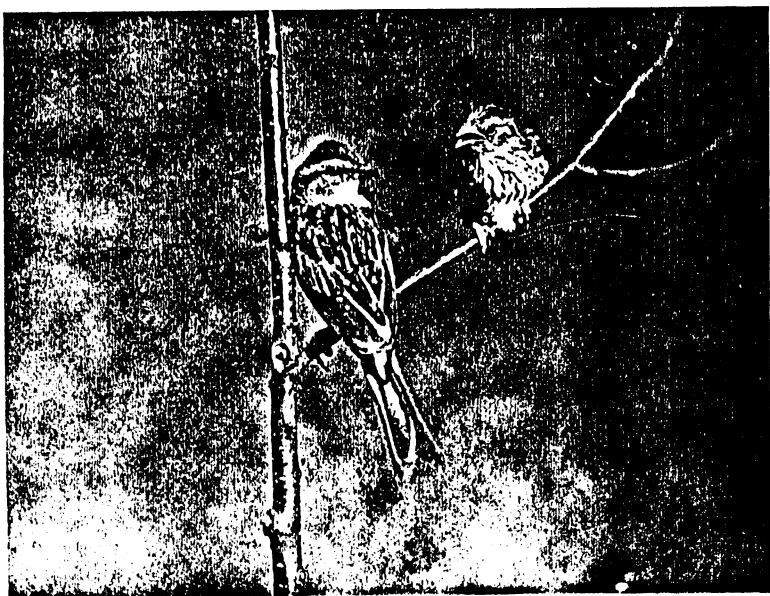


Fig. 2—Chipping Sparrow with fledgling. Photographed by Allen D. Cruickshank.

BRADLEY, *Nesting of the Chipping Sparrow*

The method of feeding the young was quite interesting. At first the male brought large caterpillars and broke them into small bits, dropping each piece into an open mouth. Usually the last third of the caterpillar was pushed into a mouth in one big piece. Later I noticed that he made no attempt to break up the food, simply dropping a whole caterpillar into one mouth. If it failed to disappear at once, he picked it up and dropped it into another. After this had been repeated several times the caterpillar was finally swallowed whole.

There seemed to be no regular order in which the three birds were fed. At one time I watched the largest one get several feedings in succession, at other times it received nothing for several feedings. The bird that happened to get his hold on the larva was the one to get the benefit.

I was unable to determine the nature of the food in all cases, but found it to consist of insects when I was able to identify it. The male showed preference for capturing caterpillars, while the female brought in one grasshopper after another, only rarely returning with a larva.

YOUNG—GROWTH

At the end of the first day the young Chipping Sparrows were very tiny, weighing between two and three grams each. All three were weighed and measured for seven consecutive days. On the seventh day bird No. III fell from the nest onto the concrete walk and was killed. Only bird No. II could be found on the ninth day and no measurements were taken after that.

On the eighth and ninth days there was a decided loss in weight of the two remaining birds. On the evening of the seventh day they would not remain in the nest when returned there after weighing, so I placed a cage below the nest and attempted to keep the birds in there. It was open so the parents could enter and leave at will. The young were so active, however, that they were out on the ground several times during the following day. I was afraid some predator might capture them so finally partially closed the cage so they could not escape. The parents now found it difficult to feed the young and a noticeable loss of weight occurred.

The following day I was unable to visit the nest until late in the afternoon, when I found that someone had picked up one of the young birds and had shut it up in the cage where the parents were unable to feed it properly. It had lost still more weight, although continuing to increase in length. Finding the use of the cage unsatisfactory I let the last bird go at the end of the ninth day. The length continued to increase even during the days when there was a sharp decrease in weight. This was due to the fact that the feathers continued to unsheath and thus to add to the total length.

THE JACK-PINE WARBLER

The following table shows the growth of the birds:

TABLE 5

Age	Weight in grams	Length in cms.	Length of bill	Width of gape	Length of wing	Length of tarsus
BIRD NO. I						
1 day	4.36	3.8	.35	1.0	1.0	1.1
2 day	6.06	4.2	.35	1.1	1.2	1.2
3 day	7.45	4.4	.35	1.1	1.8	1.5
4 day	8.65	4.7	.40	1.1	2.4	1.7
5 day	9.58	5.2	.50	1.2	3.1	1.9
6 day	10.45	5.8	.50	1.2	3.3	2.0
7 day	11.03	6.2	.60	1.2	3.3	2.0
8 day	10.31	7.3	.60	1.1	3.9	2.0
BIRD NO. II						
1 day	3.04	3.3	.30	.9	.9	1.0
2 day	4.30	3.7	.30	1.0	1.0	1.1
3 day	5.81	4.2	.30	1.0	1.5	1.2
4 day	7.74	4.6	.35	1.1	2.0	1.4
5 day	8.56	5.0	.40	1.1	2.6	1.5
6 day	9.35	5.3	.50	1.1	3.3	1.7
7 day	10.32	5.6	.50	1.1	3.3	1.7
8 day	9.73	6.2	.60	1.1	3.7	1.8
9 day	7.95	6.7	.60	1.1	3.9	1.8
BIRD NO III						
1 day	2.20	3.3	.30	.8	1.0	.8
2 day	3.40	3.6	.30	.8	1.0	1.0
3 day	4.80	3.8	.35	1.0	1.1	1.0
4 day	6.13	4.2	.40	1.0	1.5	1.3
5 day	7.15	4.5	.40	1.1	2.0	1.5
6 day	8.90	5.0	.50	1.1	2.6	1.7
7 day	9.40	5.2	.50	1.0	3.1	1.9

NEST SANITATION

The matter of nest sanitation was well handled by the adult sparrows. At each feeding the parent picked up a fecal sac from the nest or took one from the body of the young bird as it was voided. In some cases the feeding of the bird seemed to stimulate excretion of waste, in others the parents stimulated this process by pecking the body near the vent.

While the birds were small some of the fecal sacs were small and were usually eaten by the adults. The larger sacs were carried away from the nest. I observed a total of twenty-one of these sacs removed, only five of which were eaten. The other sixteen were carried away in the parents' bills.

While the female was brooding the young in the nest I often watched her pecking at their mouths or at other parts of their bodies as though cleaning them. She occasionally dug at the bottom of the nest. I wondered if she were attempting to rid the nest and young of lice, but was unable to get any positive evidence that this was the case.

BRADLEY, *Nesting of the Chipping Sparrow*

FEAR

That the young Chipping Sparrows develop fear at about the sixth day was quite evident in these birds. Though the eyes were opened on the fourth and fifth days, the birds seemed to show no fear whatever until the sixth day. Then they tried to elude me when I reached to take them from the nest for weighing. At this time the largest bird did a great deal of struggling and squawking. When I returned them to the nest they all fluttered out onto the ground. After that there was considerable squawking whenever I touched any of them.

The adult birds showed no fear of my presence until I touched the nest or young. Then they flew about, sometimes very close, uttering one sharp "chip" after another. The female on the nest took no notice of people passing on the walk below, but was much upset on several occasions by the presence of a small kitten playing around the base of the tree.

The manner in which the adult sparrows approached the nest when feeding the young appeared to indicate an instinctive fear of predatory enemies. They flew to another part of the tree first, then to the inner part of the limb holding the nest before coming to the birds along that limb. Their movements were well screened from outside observers by the leaves.

TERRITORY

Noticing that the parent birds often left the nest in the same general direction, I decided to try to locate their feeding territory. First I found that they fed more to the south and east of the nest than they did in other directions. The boundaries of the territory were, roughly, the lake shore on the north, about half way between B and C Streets on the east, the Upper Drive or a little beyond it on the south, and A Street on the west. This seems to me to be a very small area, about 200 ft. wide and 300 ft. long, but the family appeared to have sufficient food.

In this study I also observed during the 3 days July 29, August 2 to 4, that the adult Chipping Sparrows did much of their searching for food on or near the ground. I saw no other Chipping Sparrows in this area at any time.

RELATIONS TO OTHER BIRDS

In connection with the study of territory it was observed that these birds were not in the least annoyed by the presence of other bird species, with one exception. Once a Kingbird came very near the nest and uttered a loud cry which seemed to alarm the female on the nest. Other birds commonly seen or heard in the area were Goldfinches, Cedar Waxwings, Purple Martins and Red-eyed Vireos.

THE JACK-PINE WARBLER

A brood of young waxwings left their nest in the same maple tree while the Chipping Sparrows were incubating. Another nest was built at about that time across B Street, but there was no evidence of such interference as was noticed at the "Blissville" nest. A pair of vireos nested in the same tree with the sparrows, but I was unaware of their presence until the young sparrows were old enough to make a fuss when I removed them from the nest. Then the adult vireos protested. Afterward one of the young vireos fell from its nest and I placed it in the cage with the sparrows. I did not see either vireos or Chipping Sparrows feed it and when I opened the cage for my birds to leave, the vireo also disappeared.

Chipping Sparrows are often victimized by the Cowbird. In the nest on top of the hill I found three young sparrows and one Cowbird in the same nest. All were well feathered and left the nest immediately.

Possibly in some regions the English Sparrow has driven the Chipping Sparrow from its favorite nesting sites around lawns and buildings.

ECONOMIC IMPORTANCE

Although during the nesting season the Chipping Sparrows eat much insect life, throughout the remainder of the year they also use much vegetable food. In discussing their diet, Forbush (1907; pp. 303-305) states that among insects the gypsy moth, army worm, canker worm, beet worm, cabbage worm, pea louse, weevils, grasshoppers and codling moth are favorite foods during spring and summer. In June, 93% of their food is insects, of which 36% are grasshoppers, 25% caterpillars, and 6% leaf-eating beetles. Henshaw (1927, p. 22) found that their food consisted of 42% insects and 58% vegetable matter.

In his study of the relation of sparrows to agriculture, Judd (1901, pp. 76-78) found that the vegetable food of the Chipping Sparrow consisted of oats, grass seed, clover, ragweed, amaranth, lamb's quarters, purslane, chickweed and crab grass. Since most of these are harmful weeds, he concluded that this sparrow was a valuable aid to the farmer.

SUMMARY

A study of the Eastern Chipping Sparrow was conducted by the author at the University of Michigan Biological Station on the shore of Douglas Lake in Cheboygan County, Michigan from July 3 through August 6, 1939.

Courtship and mating took place while the female was building the nest. The male sang a great deal.

Five nests were found of which two were placed in pine trees, two in maples and one in an oak. Four were on horizontal limbs some distance from the trunk four to

BRADLEY, Nesting of the Chipping Sparrow

eighteen feet above ground. Horse hair and human hair were found in most nests. One nest measured 114 mm. outside diameter, 57 mm. inside diameter and 57 mm. outside depth and 38 mm. inside depth.

The eggs of the Chipping Sparrow are bluish green wreathed at the larger end with blackish streaks, lines and spots. Incubation requires ten to twelve days. On July 26, late during the incubation period at one nest, the female spent 114 minutes on the nest and 34 minutes off the nest during a period of two hours and 28 minutes. She brooded the young for 92.29% of the time on July 29 after the young had recently hatched.

The young were fed once every 19.46 minutes on July 29, when very young, then once every 5.23 minutes on August 2 and once every 5.5 minutes on August 4. The female fed the young by far the most later during the nestling life, but the male fed them during the early days while the female was brooding.

Young weighed from 9.4 grams to 10.31 grams when they reached the age of leaving the nest.

The adults kept the nest very clean. When the young were small the smaller fecal sacs were eaten by the parents. Later only five of twenty-one were eaten, the other sixteen being carried away.

Fear developed about the sixth day of age in the young. They left the nest when about nine days old.

During a period of feeding the young, the parent sparrows were noted to feed from a small area about 200 feet wide and 300 feet long, usually searching for the food near the ground. They appeared, as a rule, little affected by other species of birds.

The Chipping Sparrow is a very beneficial species, eating many insects during the summer and vegetable matter later, during the summer and fall.

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