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## THE EASTERN CHIPPING SPARROW IN MICHIGAN

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THE Eastern Chipping Sparrow (*Spizella passerina passerina*), although one of our more common birds, has been comparatively little studied. The following paper on the migration and breeding habits of this sparrow in Michigan, particularly at Battle Creek, is based on data collected over a period of some 25 years and on a detailed study of six nests made in 1944.

### MIGRATION

On May 7, 1940, I observed 15 to 20 Chipping Sparrows feeding together along an old roadway, but as a rule in the spring the species is observed singly. During the autumn the species is regularly found feeding along fence-rows or roadsides, grouped in flocks which are often rather large (sometimes containing up to 30 individuals).

Compared with the Eastern Field Sparrow (*Spizella pusilla pusilla*), to which it is closely related, the Chipping Sparrow is a rather late migrant. At Battle Creek since 1918 I have made my first spring observation once as early as March 25 (1939), once as late as April 27 (1940), other years on dates between April 6 and 22. In 1937 I recorded the species on November 1, but it usually leaves during October. The Chipping Sparrow is present at Battle Creek for an average of 186 days of the year (174 to 199 days). Seasonal dates for the years 1918-25 and 1929-44 are listed in Table 1.

### TERRITORY

When first observed each spring male Chipping Sparrows have been already attached to certain territories, which they proclaimed by singing from some tree perch during most of the daylight hours. In Battle Creek they were not always completely surrounded by other Chipping Sparrows, so that their territories, although limited on one or more sides, were quite flexible on the others. Territorial defense consisted chiefly in chasing intruders, which then usually left at once. I have often observed a trespasser depart on the mere approach of the resident male with wings slightly lowered and feathers slightly raised. Trespassing birds were usually perched in a tree or bush on the other bird's



ADULT CHIPPING SPARROW, JULY 21, 1941



NESTLING COWBIRD AND CHIPPING SPARROW, JULY 26, 1941

*Photographed at Battle Creek, Michigan, by E. M. Brigham, Jr.*

TABLE 1  
MIGRATIONS OF THE CHIPPING SPARROW, BATTLE CREEK, MICHIGAN

Year	First record	Second record	Species common	Last record	Days present
1918	April 11				
1919	April 10				
1920	April 22				
1921	April 6				
1922	April 6				
1923	April 21				
1924	April 18				
1925	April 14				
1929	April 6			October 20	197
1930	April 10			October 12	185
1931	April 9	April 12	April 19	October 25	199
1932	April 15	April 17	April 24	October 9	177
1933	April 12	April 15	April 15	October 8	179
1934	April 9	April 15	April 18	October 21	195
1935	April 19	April 20	April 19	November 1	196
1936	April 15	April 16	April 19	October 18	186
1937	April 17	April 18	April 18	October 24	188
1938	April 13	April 14	April 14	October 21	191
1939	March 25	April 21	April 21	October 5	194
1940	April 27	April 28	May 5	October 18	174
1941	April 12	April 13	April 13	October 6	177
1942	April 13	April 14	April 13	October 5	175
1943	April 8	April 16	April 18	October 21	196
1944	April 20	April 27	April 27	October 18	181
Av.	April 13	April 17	April 19	October 19	186

territory. On one occasion a resident male drove away a trespassing female. (The two sexes often cannot be distinguished by plumage, but these observations were made on birds marked with colored bands.)

In 1944 three pairs of Chipping Sparrows built their first nests about 140, 180, and 220 feet apart, one in front of our house, the others in neighboring yards. The second nests were all built in our yard, in a small triangular area whose sides measured respectively 48, 33, and 20 feet. Often two pairs would sit on opposite sides of a small mountain ash or sumac bush. Two pairs used the same part of the street as a feeding area and frequently fed in close proximity to each other. Yet each male defended a definite territory around his nest (from an acre to an acre and a half in area) from other males. After the young left the second nests (August 8 to 14), they sometimes wandered across territorial boundaries, and at first the parents (which were now banded and seemed to know their own young) coaxed or led them back. But after mid-August no territorial behavior was observed; although each family group remained separate from the others, all three pairs and their young roamed over the same fairly large area.

### MATING

In 1944 the first female was observed on May 4, 14 days after the first male. Accompanied by her mate she was examining the small arbor vitae and a common juniper in our yard. The male and female of Chipping Sparrows remain almost constantly together between mating and nesting, as Field Sparrows and Clay-colored Sparrows (*Spizella pallida*) do. The pair in our front yard during May, 1944, were always feeding together, hopping along the ground searching for insects or seeds, usually in the driveway or along the weedier portion of a near-by roadside. After mating, the male very seldom sang until incubation started.

Copulation, which usually takes place on the ground, but sometimes on a horizontal branch, wire, or roof, is frequent during the days preceding egg laying and often occurs several times in succession. The female assumes a crouching posture with head and tail slightly raised and wings rapidly vibrating; the male approaches and hovers over her for a few seconds. During copulation the female (and perhaps the male) utters a rapid call, *see-see-see-see-see*.

### NEST BUILDING

The female did all of the nest building. The male usually accompanied her on her trips for nest material, which she gathered within 100 or 150 yards of the nest, but sometimes he merely remained near-by and sang. Most of the nest building was done in the early morning hours, and the nest was completed in three or four days. Dates for the beginning and completing of a number of nests are as follows: May 1-4, 1932; May 13-16, 1933; May 11-15, 1934; July 1-2, 1935; May 12-14, 1936; May 16-18, 1937; May 10-12, 1944 (average: 3.4 days). The completion of the July nest in two days would seem to indicate that later nests are constructed more rapidly than early ones as is often the case with other species.

The nests, made of dead grasses and rootlets, are lined sometimes with very fine grasses but oftener with very fine rootlets and hair. The hair is usually horsehair, but deer hair, human hair, and other kinds are also used. One typical nest had a lining of 752 horse and human hairs, an inner lining of 182 rootlets, and an outer cup of 145 pieces of grass, larger rootlets, and tumble weeds. The majority of the rootlets were less than three or four inches long; some of the hairs were more than a foot in length, but most of them ranged between two and five inches. The total number of pieces in this nest was 1,079, yet the nest was less bulky than many Clay-colored Sparrow nests (Walkinshaw, 1939a:18), and more compactly built than Field Sparrow nests (Walkinshaw, 1939c:110). The average weight and measurements of eight Chipping Sparrow nests are given in Table 2.

TABLE 2  
SIZE OF EIGHT CHIPPING SPARROW NESTS

	Exterior diam. at top	Interior diam. at top	Exterior depth	Interior depth	Weight (grams)
Av.	112 mm.	48.3 mm.	56.8 mm.	37.3 mm.	4.7
Max.	150 mm.	60.0 mm.	75.0 mm.	50.0 mm.	5.8
Min.	80 mm.	40.0 mm.	45.0 mm.	30.0 mm.	3.0

In the more settled areas of southern Michigan, Chipping Sparrows build their nests in a variety of places. Of 51 nests I have found near dwellings, one was on a mowing machine in a semi-open tool shed, and one on the ground in dead grass; two on the sides of old strawstacks; five in rose or spirea bushes; seven in the horizontal branches of horse-chestnut, pear, or apple trees, 12 to 15 feet above the ground; eight in grapevines. But by far the most were in common juniper (five nests), arbor vitae (eight), and spruce (fourteen) in the yards of residences, often very close to a porch. In the pine areas of northern Michigan (Crawford and Oscoda counties), I have found one nest in dead grass, two in white pine, and two in jack pine. In Crawford County, Edward M. Brigham, Jr., and William Dyer showed me a nest they had found in a small hawthorn, but the Chipping Sparrow does not use hawthorns nearly so often as the Clay-colored and Field Sparrows.

I have found nests during May as well as during July at least 305 cm. from the ground, but the average becomes progressively higher during the summer. The elevation of 15 nests in May averaged 109 cm.; 5 nests in June, 153 cm.; 7 nests in July, 229 cm. Some nests are built adjacent to the tree trunk, others far out on a horizontal branch. One built in a pear tree in 1944 was 305 cm. from the ground and 352 cm. from the trunk. All nests were well concealed in a dense mass of leaves or needles.

#### THE EGGS

Chipping Sparrow eggs are a beautiful greenish-blue with a wreath, usually at the larger end, of black or reddish-brown spots or scrawls. On some eggs in addition to the wreath there are a few spots scattered over the entire egg, and on some there are spots in a dense cap at the larger end. Twenty-four eggs (from May, June, and July clutches) averaged 17.23 x 12.82 mm. in length and diameter, 1.6 grams in weight. The largest egg measured 18.5 x 13.7 mm.; the smallest eggs, 16 x 13 mm. and 17 x 12.3 mm. Roberts (1932:413) gave .72 x .51 inches [18.28 x 12.95 mm.] as typical measurements; Bradley (1940: 37) gave "about 18 by 13 mm." (five eggs).

Eggs are laid at daily intervals, usually very early in the morning (between 5:00 and 7:00 A.M.), though the first egg of one set in 1936

was laid very close to 12 o'clock noon (May 16). The second egg of this set was laid before 6 A.M., E.S.T., on May 17, the third by 8 A.M., and the fourth by 6 A.M., on the following days.

In southern Michigan the Chipping Sparrow lays three or four eggs. Forty-five complete clutches averaged 3.62 eggs; these included one clutch of two eggs, but none over four, though Roberts (1932:413) lists a nest found in St. Louis County, Minnesota, May 4, 1902, which contained five eggs. As with other Fringillidae the average number of eggs per set becomes progressively smaller as the season advances (Table 3).

TABLE 3  
SIZES OF CHIPPING SPARROW EGG SETS (MICHIGAN)

No. of eggs per set	No. of sets				
	May	June	July	August	Total
2	—	—	1	—	1
3	4	4	6	1	15
4	17	11	1	—	29
Total sets per month	21	15	8	1	45
Av. no. eggs per set per month	3.81	3.73	3.0	3.0	3.62

Nesting usually starts in May and continues into August. In my records the earliest laying was May 8 (1938); the earliest hatching, May 21 (1938); the earliest fledging, May 27 (1922). Undoubtedly weather conditions affect the beginning of nesting. For example, the spring of 1938, when I made my earliest records for laying and hatching, was exceptionally warm (Walkinshaw, 1939*b*:64). I have recorded 13 other nests in which the first egg was laid on dates in May. At eight of these nests the date was known from direct observation: May 13, 14, 16 (two nests), 17 (two nests), 18, and 20; at the other five nests the date of the first egg was calculated on the basis of observations made later in the nesting cycle: May 10, 11, 18, 19, and 26. My latest record for the laying of the first egg in a set is July 26 (calculated date), but I have noted other nests where laying was almost as late: July 20 and 22 (calculated dates), and July 25. My latest record of hatching is August 7, and of nest-leaving, August 15.

Of 66 nests only three were parasitized by Cowbirds. Two of these were deserted immediately after the Cowbird egg was laid. In the third, a young Cowbird was raised alone; the Chipping Sparrow eggs had been removed or destroyed. Only one of the nests built in the shrubbery of our yard was parasitized.

## INCUBATION AND CARE OF YOUNG

The female incubates the eggs, but on one occasion, on a cool morning, I found the male incubating. The male of the Clay-colored Sparrow occasionally incubates and broods (Walkinshaw, 1939a:20), and on one occasion I found a male Field Sparrow brooding the young at night when they were several days old.

Incubation began the night before the laying of the last egg and required 11 days at the four nests where the period was exactly determined: Nest 27, 1933 (Walkinshaw, 1934:304); Nest 54, 1938; Nests 1 and 4, 1944. At Nest 1, 1944, incubation began at 8 P.M., May 15, the night before the last egg was laid. Three eggs hatched during the day, May 26, the fourth egg on May 27. At Nest 4, 1944, incubation began July 26, when the nest contained two eggs. The third egg was laid July 27 between 6 and 8 A.M. Two eggs hatched at 6:50 and 8:00 A.M. August 6; the third, about 6 A.M. (down still wet) August 7.

I watched Nest 4, 1944, the day the first two eggs hatched, from 5:00 A.M., 67 minutes before night incubation ended, to 9:30 A.M. (a total of four hours and 30 minutes). The first young hatched at 6:50, and the female immediately ate the shells. She fed this young at 7:18. The second young hatched at 8, and she fed it at 8:20.

Both male and female approached the nest cautiously, usually alighting on several successive perches before entering the nest tree from

TABLE 4  
FREQUENCY OF BROODING OF CHIPPING SPARROWS  
1944, Nests 4 and 5

Date:	August 6 (N. 4)	August 8 (N. 4)	August 6 (N. 5)
Period of observation:	270 min.: 5-9:30 A.M.	115 min.: 5-6:55 A.M.	210 min.: 5-8:30 A.M.
Age of nestlings:	hatched	1 day (1) 2 days (2)	2 days (1) 3 days (2)
No. of brooding periods:	6	4	9
Av. length of brooding period:	41.1 min.	14.25 min.	11.1 min.
Av. length of interval:	3.83 min.	12 min.	13.7 min.
Brooding periods (extremes):	20-67 min.	5-25 min.	4-24 min.
Intervals (extremes):	1-7 min.	3-20 min.	2-53 min.
Total time brooded:	247 min.	57 min.	100 min.
Total time not brooded:	23 min.	58 min.	110 min.

below and working up through the foliage to the nest. Their flight away from the nest, however, was direct. Both chipped softly when approaching the nest and often chipped rapidly when leaving.

The female did most of the brooding, but on cool mornings the male occasionally brooded for a very few minutes. At Nest 5 on August 6, the male brooded from 5:45 to 5:48 A.M. while the female was away. Often one or both parents would stand on the edge of the nest examining the young or the bottom of the nest, where they sometimes tugged at things I could not see. As the young grew older, brooding decreased (Table 4); they were not brooded after they were six and seven days old. On the night of August 9, when the young of Nest 4 were only two and three days old, the female did not brood. She had apparently been kept from the nest at roosting time by a disturbance in the yard. The young were thoroughly chilled by morning but took food from the male at 5:32 after the female had brooded them for 10 minutes (5:15 to 5:25).

At Nest 5 the female's feedings decreased from an average of 3.2 per hour when the nestlings were one and two days old to an average of 2.77 per hour when the nestlings were two and three days old. But except for this, both male and female increased the frequency of their

TABLE 5  
FREQUENCY OF FEEDING OF YOUNG CHIPPING SPARROWS  
1944, Nest 4

Date:	August 6 <sup>1</sup>			August 8			August 13		
Period of observation:	185 minutes: 8-9:50 A.M.; 10:45 A.M.-12 M.			90 minutes: 5:25-6:55 A.M.			278 minutes: 12 M.-1 P.M.; 4:20-7:58 P.M.		
Age of nestlings:	hatched			1 day (1) 2 days (2)			6 days (1) 7 days (2)		
No. of nestlings:	2			3			3		
Parent:	Both	♂	♀	Both	♂	♀	Both	♂	♀
Total feeding visits:	6	1	5	12	7	5	52	24	28
Av. no. feeding visits per hour:	1.95	.32	1.62	8	4.7	3.33	11.2	5.18	6.04
Av. length of interval (minutes):	23.7	—	26	7.72	12.5	18.7	5.28	10.9	9.76
Extremes of intervals (minutes):	13-45	—	13-45	0-23	5-23	5-25	0-12	3-24	2-20

<sup>1</sup> The nest was under observation from 5:00 A.M. (see Table 4), but this table covers only the period following the hatching of the second young.



TABLE 6  
FREQUENCY OF FEEDING OF YOUNG CHIPPING SPARROWS  
1944, NEST 5

Date:	August 5			August 6			August 8		
Period of observation:	75 minutes: 7-8:15 A.M.			260 minutes: 5:35-8:30 A.M. 10:45 A.M.-12:10 P.M.			90 minutes: 5:30-7 A.M.		
Age of nestlings:	1 day (1) 2 days (2)			2 days (1) 3 days (2)			4 days (1) 5 days (2)		
No. of nestlings:	3			3			3		
Parent:	Both	♂	♀	Both	♂	♀	Both	♂	♀
Total feeding visits:	8	4	4	28	16	12	20	13	7
Av. no. feeding visits per hour:	6.4	3.2	3.2	6.46	3.69	2.77	13.33	8.66	4.66
Av. length of interval (minutes):	6.71	13.33	11	9.61	17.8	16.3	4.15	6.91	12.83
Extremes of intervals (minutes):	2-12	5-18	10-12	2-25	7-35	7-25	0-15	3-15	6-19

feedings as the nestlings grew older (Tables 5 and 6). At Nest 4, for example, the nestlings were fed an average of 1.95 times per hour on the day the first two hatched (185 minutes observation); 8 times per hour when they were one and two days old (90 minutes observation); 11.2 times per hour when they were six and seven days old (278 minutes observation).

Both male and female took part in nest sanitation. They often swallowed the smaller fecal sacs, but they always carried away the larger ones, dropping them about 100 or 150 feet away from the nest, though once a male dropped one within 12 feet of the nest.

#### DEVELOPMENT OF YOUNG

A newly hatched Chipping Sparrow is quite different from the young of the closely related Clay-colored Sparrow and Field Sparrow. Its down is much longer and darker, described by Dwight (1900:198) as "mouse gray," though it seems to me darker than that and rather to be described as "Deep Mouse-Gray." The skin and legs are pinkish, the bill a darker pink, with yellowish tomsia. There is a small egg tooth, white in color, at the tip of the maxilla. No feather tracts are visible. When first hatched the nestlings lay curled up in the bottom of the nest in a position similar to that assumed in the egg, but they raised their heads and opened their mouths at the slightest movement or noise made near them, using their wings to help support them.

TABLE 7  
AVERAGE MEASUREMENTS OF NESTLING CHIPPING SPARROWS

No. of birds	Age	Weight (grams)	Wing (mm.)	Tarsus (mm.)	Culmen (mm.)
7	hatched	1.28	5.66	5.08	3.25
6	1 day	2.10	7.33	7.00	4.00
6	2 days	3.25	9.08	8.81	4.91
6	3 days	4.51	12.16	10.91	5.16
5	4 days	5.80	15.40	13.00	5.60
4	5 days	7.63	22.33	14.66	6.00
4	6 days	8.75	27.25	16.12	7.00
4	7 days	9.72	32.16	16.83	7.30
4	8 days	9.30	35.25	16.87	7.30
2	9 days	8.75	38.00	17.25	7.50
2	10 days	10.30	46.00	17.00 <sup>1</sup>	7.00 <sup>1</sup>

<sup>1</sup> The birds measured at the age of 10 days were not the same individuals measured at the age of 9 days.

The dorsal, ventral, and alar tracts began to show when the young were two days old, appearing as dark dots underneath the skin. The sheaths of the primaries protruded 2 mm. at three days of age, 9 mm. at five days, and 18 to 19 mm. at seven days, when the feathers began to unsheath. The rectrices began to show at three days, but had grown to only five or seven mm. at seven days. By 9 and 10 days of age the young were well covered with unsheathed feathers. Sutton (1935:28; 1937:2) has summarized plumage changes and plumage coloration in the Chipping Sparrow. The streaking present on the breast of the nestling disappears in the fall, and the young of the Chipping Sparrow, except for its shorter tail and longer wings, resembles the young of the Field Sparrow for a time. The crown is striped before the birds leave in the fall.

Average weights of nestlings increased from 1.28 grams at hatching (seven individuals) to 10.3 grams at 10 days old (two individuals). During the same period average wing length increased from 5.66 mm. to 46 mm.; average length of tarsus, from 5.08 mm. to 17 mm.; average culmen, from 3.25 mm. to 7 mm. (Table 7). These measurements are close to those recorded by Weaver (1937:104). Bradley (1940:42) also gave measurements for the Chipping Sparrow, but the exact ages of her birds were not known. All the weights averaged in Table 7 were taken in the early morning. Several young while still wet from hatching weighed 1.1 grams. Wing measurements were taken with a straight-edge ruler from the bend (wrist) to the end of the longest feather.

When only two or three days old, the young uttered a low *zee-zee-zee-zee* call when they were fed. On leaving the nest they immediately began to use a *zip-ip-zip-ip-zip-ip* or *chip-chip-chip* call.

The nestlings began to show fear when they were six days old. Before this they paid no attention to me when I removed them from the nest, often opening their mouths for food, but at six days they cowered in my hand or tried to escape. On the seventh day they were hard to keep in the nest after removal. On the eighth day it was impossible to keep them in the nest.

The young left the nest when they were seven and eight days old. They hopped to the edge of the nest and remained there for some time. Then they moved gradually out into the branches of the nest tree. Sometimes one fell to the ground, and it was then led by one of the adults, usually the male, into a brushy area. By 10 days of age they could hop into the lower branches of bushes, where they sometimes remained for long periods on one perch. By 12 days of age they could fly a few feet, and at 14 days of age they were capable of sustained flight.

The adults from Nest 5 were observed feeding the young when they were 24 days old (August 27). I did not see this family again. The young from Nest 4 were still fed on September 9, when they were 33 days old. By September 20 they were foraging for themselves, though they were still accompanied by their parents. The male from Nest 4 fed a full-grown young (at least 35, perhaps 40, days of age) from an earlier nest on August 13, when the young in the second nest were 7 days old.

#### NESTING SUCCESS

The outcome of 50 nests (mostly in city yards or near farm houses) was known. Young hatched in 33 (66 per cent) of these, and young were fledged in 31 (62 per cent). Of 152 eggs, 104 (68.42 per cent) hatched, 93 (61.18 per cent) produced fledged young. Kendeigh (1942: 20) found that young were fledged in 59 per cent of 174 nests, and that 40 per cent of all Chipping Sparrow eggs laid developed into fledglings. Of my 31 nests which produced fledged young, 11 had broods of four; 13 had broods of three; 3 had broods of two; and 4 had one young each.

#### FOOD

In the spring Chipping Sparrows feed on small weed seeds along roadsides. In the summer they feed on larvae and grasshoppers, which they also feed to the young. The adults mash the grasshoppers on some hard surface before offering them to the young. In September they again feed on weed seeds. Forbush (1907:303) and Judd (1901:76) give excellent reports on the food of Chipping Sparrows.

#### ROOSTING

When not brooding, the female from Nest 6 spent the night in a thick globe arbor vitae four feet from the nest; the female from Nest 4,

in a thick clump of lilacs 45 feet from the nest. The males often roosted in arbor vitae. Time of roosting was recorded for one female: 8:10 P.M. to 5:15 A.M. (August 7-8). A male began singing that morning at 5:12, half an hour before sunrise. Occasionally males sang during the night.

#### RESPONSE TO DANGER

The regular alarm note of Chipping Sparrows is a sharp rapid chipping. They are fearful of cats and squirrels, responding to their presence with persistent chips from some high perch. For hawks they give a special alarm call, a sibilant zeeeeeeee, similar to the hawk call of the Field and Clay-colored Sparrows. Even when this call is given by only one Chipping Sparrow, all the others in the vicinity dive into the nearest vegetation and remain there for several minutes.

#### SUMMARY

The migration and breeding habits of the Eastern Chipping Sparrow (*Spizella passerina passerina*) in Michigan, particularly at Battle Creek, were studied from 1918 to 1944, and a detailed study of six nests was made in 1944.

This sparrow is usually observed singly during the spring, in flocks during the fall.

It usually arrives at Battle Creek during the second and third weeks of April and leaves in October, being present an average of 186 days of the year.

Territory is taken up immediately on the male's arrival. An area around the nest from an acre to an acre and a half is defended against other male Chipping Sparrows, but pairs often feed side by side outside these areas. Territorial behavior stops about mid-August.

The male sings almost continuously from arrival until mating but sings very little between mating and the beginning of incubation.

The female builds the nest (usually during the early morning), taking (as a rule) three or four days to complete it.

For eight nests the average weight was 4.7 grams; average diameters at top, 48.3 mm. (interior) and 112 mm. (exterior); average depths, 37.3 mm. (interior) and 56.8 mm. (exterior). Nest materials were dead grasses, rootlets, and hair. In one nest 1,079 pieces were used.

Favorite nesting sites were conifers. Nests were found placed progressively higher from the ground as the summer advanced (averaging 109 cm. from the ground in May, 229 cm. in July).

Eggs were greenish-blue, spotted in a wreath or cap at the larger end. Twenty-four eggs averaged 12.82 x 17.23 mm. in diameter and length, 1.6 grams in weight.

Eggs were laid at daily intervals, usually between 5 and 7 A.M.

The average number of eggs per set (45 clutches) was 3.62.

The earliest laying recorded was May 8; the earliest hatching, May 21; the earliest fledging, May 27. The latest record for laying the first egg of a set was July 26 (calculated date); the latest for nest-leaving, August 15.

Of 66 nests, only three were parasitized by Cowbirds.

The male was once found on the eggs, but as a rule the female alone incubates. The incubation period was 11 days.

The young were fed less than an hour after hatching.

The male occasionally brooded for a few minutes on cool mornings.

Brooding decreased as the young grew older and stopped when they were six and seven days old.

Male and female shared in feeding the young and in nest sanitation.

Feedings increased in frequency as the young grew older.

The down of the Chipping Sparrow is longer and darker than that of the Clay-colored and Field Sparrows. Feather tracts began to show at two days of age; sheaths of primaries protruded 2 mm. at three days, 9 mm. at five days, and 18 to 19 mm. at seven days. Rectrices began to show at three days.

Average weights of nestlings increased from 1.28 grams at hatching to 10.3 grams at 10 days of age.

The nestlings began to show fear when they were six days old.

At 10 days of age the nestlings could hop to low branches of bushes; at 12 days they could fly a few feet; at 14 days they were capable of sustained flight.

Young were fed by their parents until they were 33 (perhaps 35 or 40) days old.

Of 50 nests (mostly near dwellings), 33 (66 per cent) produced young; 31 (62 per cent) produced fledglings. Of 152 eggs, 104 (68.42 per cent) hatched; 93 (61.18 per cent) produced fledglings.

In spring and fall, Chipping Sparrows feed on weed seeds; in summer, on larvae and grasshoppers, which they also feed to the young.

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- 1939b Additional information on the Prothonotary Warbler. *Jack-Pine Warbler*, 17:64-71.
- 1939c Nesting of the Field Sparrow and survival of the young. *Bird-Banding*, 10:107-114; 149-157.

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