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A Study of the Growth Rate and Other Factors in the Life History of the State Colored Junco (*Junco hyemalis*) and Vesper Sparrow (*Poecetes gramineus*). (Report of the Ornithology Problem (259d)).

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I. Introduction

During the 1928 summer school session of the Michigan University Biological Station, the author of this paper made a study of the growth rate and other factors in the life history of the State Colored Junco (*Junco hyemalis*) and the Vesper Sparrow (*Poecetes gramineus*). This work was conducted under the direction of Professor A. O. Gross of Bowdoin College, Maine.

II. Location and General Description of the Region.

The Michigan University Biological Station is located at Douglas Lake, which is in the northern part of the lower peninsula of Michigan, in the central part of Cheboygan County. It has an elevation of about 712 feet. The soil is sandy and is mixed with gravel or clay, the result of the work of the glacier. The region is located in the transition zone between the Northern Coniferous province and Central or Deciduous province.

III. A Study of the Growth Rate and Other Factors in the Life History of the State Colored Junco (*Junco hyemalis*).

The range of the State Colored Junco (according to Chapman) is eastern North America. This species breeds from the northern part of the northern tier of states northward and winters south to the Gulf.

In the Douglas Lake region the State Colored Junco is moderately common having been seen thirty-nine days out of fifty-three days of observation. The nests are hidden very carefully; so it seemed, for the one finally discovered when the problem was started was located in what is known as the Gorge. It was in an embankment (Western slope) underneath the roots of a tree within a hundred feet of a small running stream. It was 60 x 30 mm. in size and consisted mainly of fine grasses. The nest was surrounded by rush-like plants and protected somewhat by three or four leaves of maple shoot.

It was discovered on June 26, and the study continued until the nest was broken up (supposedly by a snake) on July 8. The day's further search was spent in trying to locate other nests but with negative results. The following is an account of the data that was collected concerning the State Colored Junco. The nest was visited at least twice a day and two of the twelve days of study were all day observations.

There were five greyish white eggs speckled reddish brown over the larger end. They averaged 1.5 cm. in width, 1.96 cm. in length and 2.2 gms. in weight. One egg was outside the nest (cold) and did not hatch.

On June 26 a bird blind (a tent-like arrangement about three feet wide, three feet long and six feet high in the center) was set up about five feet from the nest; later it was moved to within three feet in order to permit more intimate observation of the Junco's activities and behavior during incubation and care of the nestlings.

General observations showed that while perching, the adults were easily recognized by the pinkish bill and when flying, by the con-

spicuous white outer tail feathers and the gray and white plumage. They were extremely nervous and sensitive to the slightest sound. They frequently left the nest on the least provocation. Their song was a sweet simple trill; the call or alarm note was more of a short, sharp chirp.

On June 28, observations were made from 7:50 A. M. to 2:45 P. M. One of the parents (male and female were not distinguishable) left the nest no less than eight times during the first hour and a half, increasing the stay at the nest each time until at 9:30 A. M. it had remained more or less quietly for twenty-five minutes. Each time the parent entered the nest from the same position, flying from the left of the observer to alight on the right side of the nest. After circling above and to the left, the parent would enter and turn half way around before finally settling down, its head in the same direction from which it entered the nest (to the left of the observer). Its head was continually moving both sideways and up and down, seeming to detect the slightest sound from the surroundings, the road above or the blind.

The parents made several trial trips (3-8) to the nest before deciding that it might be safe to enter.

The observer visited the nest twice on the 29th and 30th of June. Observations were taken from the blind from 2-4 P. M. on July 1. Two visits on July 2 found everything as it had been. On July 3, eggs No. 1 and No. 3 (previously marked) had hatched. Egg No. 4 hatched on July 4. Egg No. 2 did not hatch and No. 5 was outside the nest when it was located (see page 2). (The nest had not been located until the eggs were all laid so there could be no record of the incubation period).

On July 5 the entire day was spent in the blind and the detailed observations and notations follow.

8:20 A. M. Entered the blind. Parent flew ahead a short distance to remain close by while the blind was arranged before entering. The calls of the bird soon brought its mate.

8:35 Distress calls ceased. Parents visited the nest four times before remaining, made two trips for food. Brought a caterpillar, moth and mosquito. Parent divided the caterpillar or had another either stored in its beak or regurgitated.

8:57 Trial trip.

9:00 Trial trip.

9:01 Attempted to enter the nest with a worm. The mouths of the three nestlings were just visible above the nest. Parent alighted above the nest in each of the three trial trips. Shadows on the east end of the blind told of the parents' various perches.

9:08 Entered directly, empty mouthed, to remain only a few seconds.

9:20 Entered to distribute food and hurriedly departed.

9:25 Brought more food for two nestlings.

9:31 Entered directly with a worm.

9:36 Food again.

9:40 Both parents were at the nest at the same time. They were so near alike that it was impossible to make an accurate identification.

9:41 Entered with food, which looked like seeds this time. The observer moved around considerably this morning for the first time without driving the parent from the nest. It remained quiet but alert.

9:50 Entered directly, unhesitatingly and empty mouthed. Nestled the young for two minutes.

9:53 Returned with food and remained until 10:08 altho voices were

faintly audible.

10:18 Fluttering wings told of the bird's observations from various angles.

10:21 Delivered an insect by the usual approach and remained on the nest for seven minutes.

10:47 Entered empty mouthed to nestle the young. Alighted above and came down and around from the left.

10:52 Nestled again. Quite content. The disturbances from the blind seemed to be less annoying.

11:05 Entered directly, almost to the nest. Nestled without any hesitancy but sharply watched the blind. The observer thought sometimes that tiny ears could hear the scratching of the pencil.

11:15 Regurgitated food into the widely gaping mouths of two hungry youngsters.

11:16 Food for the third youngster. Growth records started. Observer left the blind at 11:25 and returned at 1:50 P. M.

1:50 P. M. The parent was on the nest. Flew to a near by tree. While the blind was being moved to within three feet of the nest and the photographic equipment was being set up within the blind, the bird remained nearby scolding for about 40 minutes. Seven trips were made before the nestlings were fed.

3:15 Observer left the blind and gave up hopes of taking the Junco's picture on the nest. The nestlings were getting chilly.

On July 6, two nestlings were gone when the nest was visited at 6:35 A. M. and the third disappeared before the evening visit at 7:10 P. M. Their fate was unknown.

The incompleted record that follows necessitated the selection of a second problem.

	Bill	Wing	Length	Extent	Tarsus	Foot
July 5.	4	9	48	48	19	16
July 6.	7	11	50	60	24	17

IV. A Study in the Growth Rate and Other Factors in the Life History of the Vesper Sparrow(*Poocetes gramineus*).

This second problem was taken up only after enough material was at hand to permit it to be carried through to completion.

The study was conducted in the same manner as described in the report of the State Colored Junco. There were two daily visits to each nest and two all day observations from a bird blind at two of the nests.

Seven nests were under observation during the study. When found they contained the following.

- I. 2 eggs; II. 2 eggs and 2 young
- III. 3 eggs; IV. 4 young. V. 2 eggs and 2 young;
- VI. 4 eggs; VII. 3 eggs and 1 young.

The average length of the 15 eggs was 21.77 mm. The average width 16.00 mm. and the average weight 2.7 gms.

Invariably, the Vesper Sparrow remained on the nest until the observer came within four or five feet, then walked away at a distance of 30 - 60 feet through the grass before flying to a tree or fence wire. Like the State Colored Junco, the Vesper Sparrow would make several trial visits (1-4) before entering the nest, invariably, from the upper left.

Daily growth records of the nestlings in nest V and VI were followed from the date of hatching to the time they left the nest and where possible as long afterward as they could be found (never more

than two days). The detailed study of nest V was begun on July 12 and continued through July 20; of nest VI, from July 24 to Aug 1.

Daily growth records were taken for the following: (1) length; (2) weight; (3) length of tail; (4) middle tail feather; (5) bill; (6) Bill to eye; (7) bill to gape; (8) bill to nostril; (9) eye diameter; (10) extent; (11) right wing; (12) manus; (13) 5th primary; (14) wing to body; (15) foot to body; (16) tarsus; (17) tarsus to toe; (18) foot; (19) length of the four toes and nails.

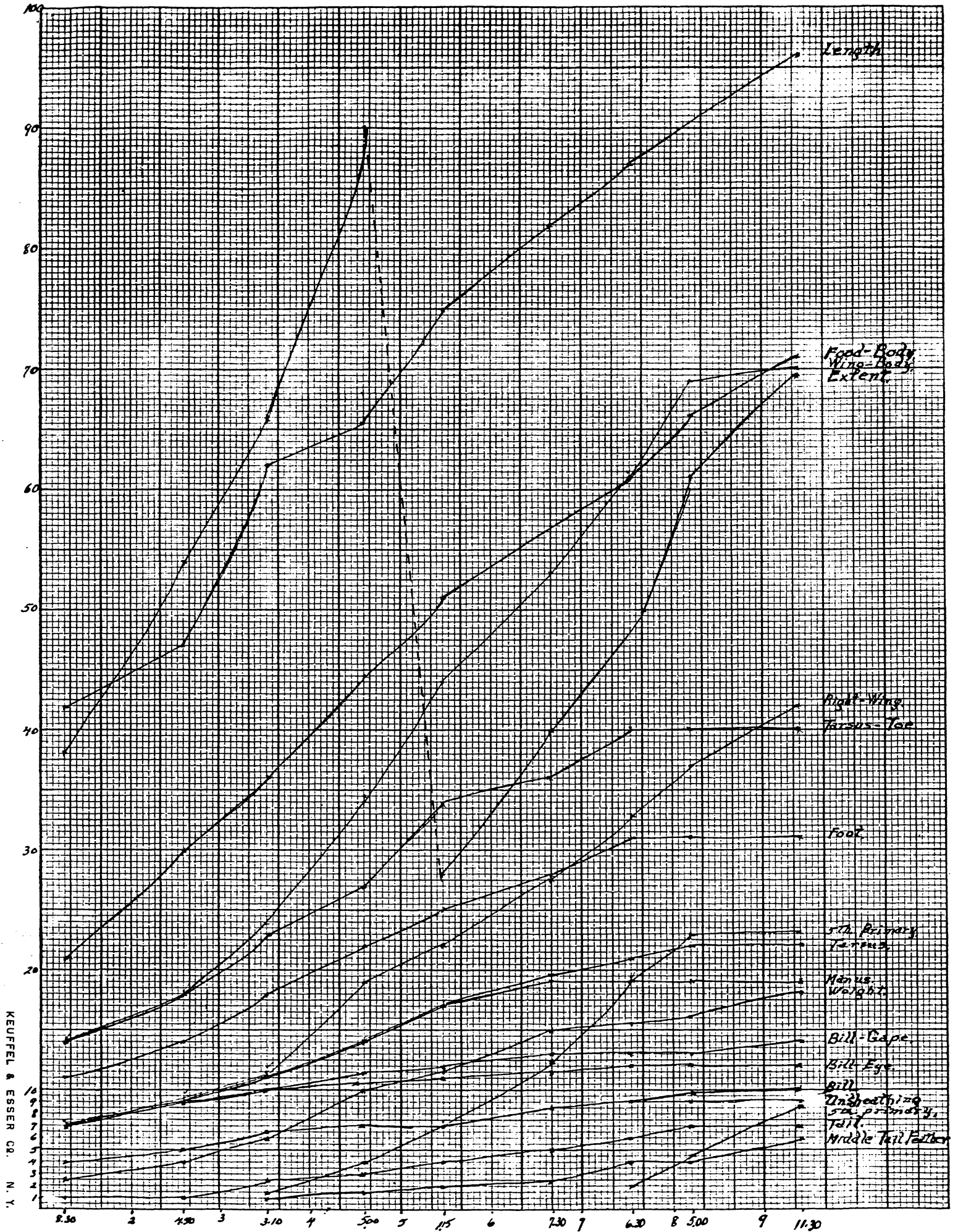
Averages for each of these items are given in the following table for the 1st and 9th days. The third column shows the number of times the measurements of the 9th day was increased over those of the 1st day.

	1st Day	9th Day	No. of times increase in 9 days.
1. Weight	2.5	19.4	7.76
2. Length	42.5	96.0	2.28
3. Tail	1.0	7.0	7.0
4. M. T. F.	0.0	6.0	6.0
5. Bill	4.0	10.0	2.5
6. Bill to eye	7.0	12.0	1.71
7. Bill to gape	7.0	14.0	2.0
8. Bill to nostril	2.5	5.0	2.0
9. Eye diameter	3.0	4.0	1.33
10. Extent	38.0	170.0	4.47
11. Right wing	7.0	42.0	6.0
12. Manus	7.0	19.0	2.71
13. 5th primary	0.0	23.0	23.0
14. Wing to body	14.0	70.0	5.0
15. Foot to body	21.0	71.0	3.38
16. Tarsus	7.0	22.0	3.14

		1st Day	9th Day	No. of times increase in 9 days.
17. Tarsus to toe		14.0	40.0	2.86
18. Foot		11.0	31.	2.86
19. Toes.	1.	4.5	12.0	2.66
	2	4.0	11.0	2.75
	3	6.0	15.0	2.50
	4	4.0	10.0	2.50
Toe nail	1	1.5	5.0	3.33
	2	1.0	3.5	3.50
	3	1.0	4.0	4.0
	4	1.0	3.5	3.5

The following ~~para~~graph summarizes and concludes the data gathered in the study of the growth rate of the Vesper Sparrow.

Growth Record of Vesper Sparrow. (*Poeyetes gramineus*).



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V. Summary

1. Two daily visits were made to each nest.
2. Two all day observations were made from a bird blind.
3. The average width of the eggs of the Vesper Sparrow was 16.0 mm, length 21.77 mm. and weight 2.7 gms.
4. Before the adult bird entered the nest, the number of trial visits varied from 1-4.
5. The average number of days that the young of the Vesper Sparrow remained as nestlings was 9 days.
6. During the stay in the nest, the weight of the nestlings increased 7.76 times.
7. The nestlings increased ^{their} ~~its~~ original length by 2.28 during ^{their} ~~its~~ stay in the nest.
8. The length of the tail on the 9th day was 7 times that of the 1st day; the length of the middle tail feather, 6 times.
9. The extent of the bird increased 4.47 times during its stay in the nest.
10. The length of the right wing on the 9th day was 6 times that of the 1st day.
11. The length of the 5th primary increased 23 times during the birds' stay in the nest.
12. The length of the tarsus on the 9th day was 3.14 times that of the 1st day.
13. The data showed that the growth rate increased the most for the factors that accounted for the nestling's ability to take care of its self at an early date, namely weight, length of tail, middle tail feather, extent, fifth primary and tarsus.

Ornithology (259 d)

The problem consisted of the following:-

1. Life History Study of the Slate-Colored Junco (*Junco hyemalis hyemalis*) until the one nest that had been located was broken up after a week's time and attention had been spent on it. Thereby it necessitated a change to another problem after three days further search had been spent in locating other nests with negative results.

The bird blind was used first at 5 ft., later within 2 ¹/₂ ft. of the nest, thus permitting more intimate observations. The report will include the description of the locality, abundance and distribution, descriptions and measurements of the adults, daily weights and measurements of the nestlings, general activities and behavior of the adults, song and food habits.

2. The second problem was taken up only after enough material was at hand to permit its being carried through to completion, namely, the life history study of the Vesper Sparrow (*Pooecetes gramineus gramineus*). Daily weights and measurements over a period of 17 consecutive days or the complete records of two nests from incubation to the time the nestlings left the nest. This was supplemented by data from 5 other nests and 3 all day observations pertaining to the nesting, general activities and behavior, daily weights and measurements of the nestlings, food habits and song, and furnishes the data for the report that will be turned in to the Station and the D spartment either in writing or if published, copies of the same.

Sincerely,

Wott. L. Black.