

A NESTING STUDY

of the

RED-EYED VIREO

Vireo olivaceus (Linnaeus)

by

Dwain Willard Warner

1941 22

University of Michigan
BIOLOGICAL STATION

August 17, 1940.

CONTENTS

	Page
Introduction	1
Acknowledgements	1
Description of Area	3
Territory	3
Courtship	6
Nests and Nesting Activities	7
Eggs and Incubation	10
Description and Care of Young	14
Food and Feeding of Young	16
Post-nesting Activities	18
Summary	20
Bibliography	21
Table	22

...the East Coast to the Rocky Mountains ... the mountains into British C...

ACKNOWLEDGEMENTS

My appreciation is here expressed to Dr. ... for critical reading of the manuscript and

INTRODUCTION

The following study of the Red-eyed Vireo (Vireo olivaceus (Linnaeus)) was made at the University of Michigan Biological Station, Douglas Lake, Cheboygan County, Michigan. The study was carried on between June 22 and August 14, 1940.

Because the Cowbird (Molothrus ater ater (Boddaert)) was so common in this region, it must also be included in this study.

The Red-eyed Vireo is in the Family Vireonidae. It is the only common summer resident of that family in northern Michigan.

This vireo is a sparrow sized bird with a greenish back and a dark cap edged with black, a white line above the eye and a dark line through it. The underparts are white passing into faint yellow on the flanks and sides. The iris is red in adults and brown in the young. After the post-juvenile molt, the birds have but one molt annually, the postnuptial.

The Red-eyed Vireo winters in northern South America and southern Central America. It breeds from the Gulf States to Great Slave Lake and from the East Coast to the Rocky Mountains in the United States and across the mountains into British Columbia in Canada.

ACKNOWLEDGEMENTS

My appreciation is here expressed to Dr. Olin Sewall Pettingill, Jr. for critical reading of the manuscript and for his numerous criticisms and suggestions which are always so worth while. I also wish to thank Dr. Theodora Nelson for her never-ending assistance in every way.

I here express also my appreciation to Miss Dorothy Holway,

Miss Kathrine White, Mr. Fred Goodell and Mr. Philip Smith who located nests for which I had vainly sought.

during the time the observations were made. An intensive study of the habits of this bird was made of two nests.

So little actual defense of territory has been observed in the Red-eyed Vireo, that it often appears that the birds have no definite territory except perhaps the actual nesting site.

Definite lines of demarcation between territories were determined only in cases in which nests were within one hundred yards of each other. In such cases the birds were observed to defend their territory against intruders.

GENERAL LOCATION AND DESCRIPTION OF AREA

Douglas Lake is situated in the upper edge of the Transition Zone in which are scattered areas of typical Canadian Zone flora and fauna. The area about Douglas Lake is a second growth aspen, (Populus grandidentata) - maple (Acer saccharum) association with pin cherry (Prunus pennsylvanicum), red maple (Acer rubrum), red oak (Quercus borealis), red pine (Pinus resinosa) and white birch (Betula alba) scattered throughout.

The vireos nested principally in mixed hardwoods. Most nests were found within three hundred yards of the lake shore. Beyond this area the dry sand hills supported a growth of aspen and red pine. No vireos were found here except where maples were present.

Seventeen nests were found within an area one-half mile long and three hundred yards wide. Twelve contained eggs or young during the time the observations were made. An intensive study was made of two nests. Perhaps it is the gregarious nature of this bird to be so tolerant.

TERRITORY

So little actual defense of territory has been observed of the Red-eyed Vireo, that it often appears that the birds have no territory except perhaps the actual nesting site.

Definite lines of demarcation between territories were determined only in cases in which nests were within one hundred yards of one another or where definite barriers were present.

At Central Camp nest, located in the approximate center of camp, territorial observations were made both during the incubation and feeding periods. The lake shore fifty feet north from the nest formed a natural territory boundary on that side. The southern

boundary was a combination of road, a row of low laboratories and a seventy-foot rise in the ground at a 60 degree angle.

To the east and west were rows of cabins and more shade trees with little shrubbery and underbrush present. The territorial lines were much less easy to establish here because of lack of natural barriers.

However, upon close observations of the adult birds over two periods, averaging ten hours, one during the last days of incubation, July 3 through July 6, the other at various times during the feeding of the young, I found that the adults never went farther west than approximately one hundred and fifty yards nor east more than two hundred yards from the nest.

The dominant tree in the area was sugar maple (Acer saccharum) with white birch (Betula alba), pin cherry (Prunus pennsylvanicum) and red oak (Quercus borealis) as the next most abundant trees.

Perhaps it is the gentle nature of this bird to be so tolerant. On only two occasions did I ever see any of the adult vireos disturbed because of another species.

Once at the Central Camp nest a juvenile Purple Finch fluttered clumsily to a swaying position far out on a limb near the nest of the vireo. Immediately the female vireo arrived, and with head feathers erect, called "Qureee - qureee" several times but offered no further resistance. The Purple Finch was soon more comfortably perched on a large branch six feet from the nest.

From the nest the female vireo continued to tip her head from side to side and thus almost rhythmically observed the intruder with first one eye then the other for five minutes. It is hardly possible that the vireo recognized any resemblance to the Cowbird

in the Purple Finch for the memories of vireos are short-lived.

The only other time the vireos were disturbed by another bird was when I observed on one visit to the nest located near the Trailer Camp that the adult birds, both having just previously fed the young, flew vigorously at one another, snapping their beaks sharply. The head feathers were erect, giving the birds a Jay-like appearance. This may have been the females' reaction when the male did not bring to her the customary bit of food and not a territorial dispute, however.

Less than fifty yards away and in the next tree to the east of the Central Camp nest, the noisy Kingbirds raised a family. Although the Kingbird sat waiting on the tip-top of the vireo nesting tree and fed continuously in the air about the nest, he was never challenged. Nor, when occasionally the vireo moved slowly along the leafy branches of the Kingbird's nesting tree, sometimes hanging upside-down, peering for food, did the Kingbird ever utter a note of protest to the silent intruder.

These two species are mutually tolerant of one another because each have separate ecological niches which do not overlap. Since the Red-eyed Vireo characteristically inhabits the inner and lower branches of the trees and the brush, and the Kingbird, the higher outer limbs, except for nesting, and even more normally the spaces above and between the trees, it is seldom that these two insect-eaters ever need quarrel.

A Least Flycatcher, Phoebe, and three pairs of Cedar Waxwings also nested in this territory but no strife was noted between any of these and the vireos.

I noticed that most of the feeding was done in a particular

area in the territory. At the Trailer Camp nest a maple tree, thirty feet from the nest was inhabited by numerous Lepidopterus larvae and was continuously visited. The vireos moved slowly and methodically along the branches, always peering beneath leaves, under twigs and even in cracks in the bark. At times they would grasp a leaf or branch and would swing down head foremost, always looking carefully, first with one eye, then the other.

Such patient and thorough search always lead to food soon. It is apparent that no large area is needed for feeding when it is done so thoroughly.

COURTSHIP

At the time of my arrival at the Biological Station, June 21, apparently all the vireos had begun nesting activities. No courtship or copulation was observed. Several times, however, when the female was incubating, the male would sing near the female. A few of these times the female would utter a low "quit-quit" call and would quiver her wings and stand up off the nest on the branch from which it was suspended. The male would come hopping slowly along the branch calling softly but upon reaching the female, would stop and peer suspiciously about. The female would immediately return to the nest. On one such occasion, however, both birds left the area and were not observed for the next half-hour. The female then returned to the nest.

The song varies extremely to my ears but upon watching the female closely, as she sat on the nest, I noticed that she quivered only when the male was within sixty feet of the nest. At her "quit-quit" call he almost always came to the nest immediately.

The unending song of the vireo was heard all summer and only during the second week of August was it observed to wane. Trautman (1940:343) claims that in Ohio the Red-eyed Vireo's song begins to wane as early as June 15 and is practically gone by July 15.

It is noticed even by the casual observer that, although the vireo is a perpetual singer throughout most of the summer days, that on cloudy and rainy days his song is heard less often and with less volume.

NESTS AND NESTING

Details of all the nests will be found on the accompanying chart. The discussion will be limited to the two nests which were intensively studied, Central Camp nest and Trailer Camp nest, and to a few others which were of special interest.

I found no nests in the process of being built. However, Nest No. 12 contained four Cowbird eggs only and was being incubated when it was located. The side with no supporting branch was not complete. It sloped out and none of the strands and fibers had been drawn together. This showed that the side away from the crotch is the last to be completed. This was conclusively proved by return to the Herrick (1911:351-354). Herrick states that the building begins at the crotch with several heavy bast fibers securely fastened to the twigs which form the crotch, as well as to any others which might be close enough to be advantageous in strengthening the nest. These fibers are attached to the branches by clever manipulation and by fresh spider cocoons which have great strength and adhesive powers.

To these bast fibers are added smaller bark strips and fibers.

Gradually the nest is extended farther out on the two crotch-forming branches. This part lasting about two days. At the same time it is built downward and somewhat outward. The bottom is then built from the crotch toward the open side which is the last to be made. Various sized and shaped pieces of birch bark are usually added and are held in place by long strips of bast and grapevine bark which are secured by weaving and by numerous spider cocoons. The nest is usually completed in about four and one-half days. (Herrick, 1911:351-354). The male occasionally brings nesting material to the female. Forbush (1929:vol. II:180) has found that it takes a week, depending on the weather conditions.

The seventeen vireo nests which I located varied considerably in the amount of birch bark and cocoons on the outside. One nest had very few spider cocoons on it and the few pieces of birch bark on it were large and loose, giving the nest a ragged appearance. On the other extreme one nest appeared silvery white and woolly in the sun because of the extraordinary amount of cocoon material used.

Most of this material, however, was added after incubation had started. I observed the adult return to the nest twenty-six times in three days. Eighteen of these times the bird brought spider cocoons and carefully placed them on the outside of the nest.

The bird would sit as if to incubate, then would reach far down the outside of the nest. After tucking one end of the cocoon neatly into cracks between the fibers and bark, the bird would take the other end and string the cocoon out along the side of the nest to the top if it would reach, and would weave it into the rim.

On two other occasions this same bird was seen to bring small

pieces of birch bark and to tuck them carefully into the bottom of the nest.

It is my belief, arrived at from these observations, that much of the external variation in nest structure takes place after the first egg is laid. The nests varied extremely little in general form and basic structure, however.

Lining in the nests consisted in long strands of bark fibers, dried pine needles and a few fine grass stems.

Much variation was observed in the use of pine needles as lining. One nest was very heavily lined with needles. Five contained no needles. It was noted that no pine trees were located in the immediate vicinity of these nests.

Of the seventeen nests found three were in red oak (Quercus borealis) and the rest were in maples, (Acer saccharum and rubrum). All were built in or near the last crotch of side branches from the main trunk except one. This one was built in the terminal crotch of a bent maple five and one-half feet above the ground. The heights varied from five and one-half feet to fifteen and one-half feet. Exact heights for each is included in the chart.

Why the vireo built in only the oaks and maples in this area of a period I do not know. I never heard a vireo sing where maples were not in the vicinity.

EGGS AND INCUBATION

This preference for nest trees varies with the locality. Trautman (1940:343) found that at Buckeye Lake, Ohio in a beech-maple association, the Red-eyed Vireo preferred the beech (Fagus grandifolia), taking silver maple (Acer saccharinum), red maple (Acer rubrum), white elm (Ulmus americana) and slippery elm (Ulmus fulva) as next choices. The heights varied from eight to eighty feet.

Although the vireos built their nests in oaks and maples at Douglas Lake, most of their singing was done from song perches high in the aspens and birches. Of twenty-seven male birds observed at least eight times, twenty-one sang from aspens averaging about forty-feet in height. Two of the remainder sang most from white birches (Betula elba) and the rest from the oaks and maples.

About seventy-five per cent of the singing was done from this perch. At other times the male birds could be heard singing softly as they fed among the trees. At still other times they sang from perches very near the nest.

Forbush (1929:180) has stated that the males incubate and may even sing on the nest. I observed males to sing very near the nest but never was I able to prove that the male incubated.

Toward the latter part of the incubation period in two cases I marked both females with indelible ink soaked into cotton which had been placed along the rim of the nest. Because of their almost continuous presence at the nest and lack of song, I presumed that these were females. In ten hours of observations at one nest and four and one-half at the other I failed to see any but the marked birds incubate. These observations were made over a period of three days after which time the marks began to fade rapidly.

EGGS AND INCUBATION

The eggs according to Forbush (1929, vol. III:180) measure from 21 to 25 mm. by 12 to 17 mm. They are white with brown and black dots and spots of varying sizes scattered mostly at the larger end. Two to four are usually laid. The average number in my nests were 1.8 eggs. The most in any nest was three (vireo eggs) and the fewest none.

The eggs were laid just one day apart and sometime between 8:00 P.M. and 10:00 A.M., probably in the morning. In one nest which I found just after it had been completed one egg was laid each day for three days, June 27- 29. On July 6 the nest contained only 2 vireo eggs and a Cowbird egg..

Cowbird eggs were found in all nests. The eggs are 18 by 25 mm. usually short and ovate, white or very light buff, spotted with varying shades of brown. According to Friedmann (1929:180-181) the variation is in the bird and not in the individual eggs. Thus it is possible to determine in some cases whether or not the Cowbird eggs were laid by one individual or more than one. In two of the nests I observed, one of which contained four Cowbird eggs, the other two, one egg in each nest varied considerably in the spotting. These two had larger but fewer spots.

The only nest which I observed from the completion of nest-building through seven days of incubation was destroyed at the end of that time. This might have been done by either a Cowbird or the vireo itself in trying to remove the cowbird egg.

It has not been proved which bird removes or destroys the eggs. Bendire (1895:435-438) states that it is in all probability the June 26 and cowbird which does, either by accident or purpose, puncture the eggs.

By placing two punctured eggs, one each day, in a vireo's nest, I observed that both eggs were removed within four hours.

Friedmann (1929:186) records that there is absolutely not proof that the Cowbird removes or punctures the eggs of its hosts and that the negative evidence is practically overwhelming.

It was my highest nest that was such a problem. On June 27 it was found unfinished but containing four Cowbird eggs. On

July 6 only one cowbird egg remained. July 7 a new egg was present. I marked them both. The next day, July 8, the oldest egg was gone and another new egg had been laid. This bird had already been incubating at least eleven days but continued for eight more days on the two new eggs.

At about the fifteenth day I noticed that the Vireo was quite restless. She got off the eggs several times each minute and seemed very uncomfortable on the nest. However, after nineteen days of continuous incubation, this bird deserted. Upon opening the Cowbird eggs, I found that they were infertile.

Since I either did not find the nests before they had eggs or young or the eggs were destroyed before hatching, I was unable to determine the exact length of incubation.

Forbush (1929, vol. III:180) records the incubation period to be twelve to fourteen days, and that the incubation period of the Cowbird is from ten to twelve days. (vol. II:422). Friedmann (1929: 187) states that ten days is usual for the Cowbird, as also does Bendire (1895:436).

As stated before only one bird, the female, was seen to incubate the Central Camp nest. This nest was located June 26 and a tower blind was erected within four feet of the nest.

The nest contained two vireo and one cowbird eggs. The adults paid little attention to the blind when it was not being moved but their sharp eyes always detected the slightest movement of either the blind or me if the opening was more than a few inches long.

Their eyesight was remarkable for when the sun shone directly on the nest and the blind was quite dark inside, the least motion of my face or hands across the opening would immediately cause the

bird to raise its head feathers and to stand up on the nest. The bird became quite tame in a few days, however. I was able to draw the nesting branch within one foot of the blind and watch the bird at close range.

The great regularity of this bird's attendance at the nest has been a wonder to me.

The bird spent almost half of its time off the nest. My notes for Thursday, June 27 show this well.

- "1:20 Observations resumed. Bird on nest. Day hot and sunny.
- 1:40 Bird left nest. Quickly hopped to branch six inches from nest and flew away (always left nest in that direction.)
- 2:00 Bird returned; called, 'quree' several times before approaching nest. Hopped to nest and began incubation at once. Always faced crotch in which nest was built.
- 2:15 Bird left nest.
- 2:35 Returned; gave no approach call.
- 3:02 Left nest.
- 3:15 Returned; gave one short call."

This regularity was observed all during the incubation period. The periods on the nest, however, almost doubled toward the end of incubation.

My notes for Saturday, July 7 read as follows:

- " 8:30 Observations begun. Bird sitting quietly.
- 8:40 Bird left nest.
- 8:57 Bird returned; called softly several times. Turned eggs before sitting.
- 9:30 Bird left.
- 9:50 Bird returned. Brought spider cocoon which it strung a tiny along outside.
- 10:22 Bird left. Returned in two minutes with male. Male sang just above nest as female continued to incubate.
- 10:46 Bird left nest."

The bird always faced the same direction on the nest except vice versa on July 3 at 8:45 in the morning when it seemed particularly nervous. Then it would stand up, arrange the eggs again and would sit facing every direction for a second or two. Finally it again faced the north and quieted down.

During hot weather, especially when the sun's rays fell directly on the nest, the bird would spread her wings over the sides of the nest, open her beak, raise her crest and pant very rapidly. This pose is characteristic of nesting vireos.

DESCRIPTION AND CARE OF YOUNG

Only one of the vireo eggs hatched at the Central Camp nest. The other vireo egg and the Cowbird egg remained seventy-two hours longer in the nest and then were removed by the vireos.

I was not present at the time any of the eggs hatched but observed that the adults removed the shells soon after hatching.

The twelve hour Red-eyed Vireo differs considerably from the Cowbird of the same age. The most conspicuous points of a young vireo are the yellow mouth and the presence of dark gray down on the spinal, femoral and humeral tracts as contrasted to the white down of the ventral tracts. The Cowbird has a whitish-pink mouth and no down on the ventral tracts. The crown in both species has a 'halo' of down around the edge of the capital tract. Down is present in only a small amount. The young are quite altricial and must be brooded and cared for about ten days.

The eyes of both were closed and only the vireo made a tiny 'peep' sound. The Cowbird was the first to use the grasping reflex to any advantage and as early as the second day clutched the lining of the nest when an attempt was made to remove him. The vireo lacked control of its feet until about the end of the second day.

At the end of the third day after hatching, the Cowbird's eyes began to open. At 5:00 P.M. on the vireo's second day of existence he begged for food. His eyes were already beginning to open.

These rapid developments on the part of the vireos, however, were short lived for the Cowbird had gotten a twenty-four hour start on one vireo and a forty-eight hour start on the other. It was due primarily to the continuous feeding by the adults and to the shortness of the head start of the Cowbird that these two young vireos ever reached maturity.

The nestling vireos began preening the fourth day and seemed proud of the very white ventral feathers which were tinged with a little yellow on the belly. The Cowbirds preened less and seemed more cautious when I was about the nest. When food was brought, however, the Cowbirds always reacted first and called the loudest and the longest.

The Cowbird left the nest after nine days and the vireos after eleven days in the nest.

Weights of these three birds taken during the first days shows the comparative growths as follows:

	<u>Cowbird</u>	<u>Vireo No. 1</u>	<u>Vireo No. 2</u>
July 24	5.00 gm.	1.90 gm.	Not hatched.
July 25	7.90 gm.	3.02 gm.	2.60 gm.
July 26	12.25 gm.	4.30 gm.	3.83 gm.
July 27	17.99 gm.	6.95 gm.	6.45 gm.

From these few weights it is noted that the weight of the Cowbird tended to increase much more rapidly than weights of the vireos. If one considers with this weight the added strength and voraciousness of the young Cowbird, there will be left little doubt as to the usual fate of the nestling vireos.

Seven Cowbirds were hatched in six nests, one each in five nests and two in one nest. All matured with the exception of the two in the same nest. Both of these birds died five days after hatching. The vireo that hatched with them died in two days, apparently from starvation. The cause of the Cowbirds' deaths is

unknown.

The chart shows that of the eighteen Cowbird eggs in the twelve nests observed only seven hatched but five of these seven matured. The percentage of success in the vireo eggs was much less. Of the twenty-two eggs twelve hatched but only five reached maturity.

Herrick's statement (1911:351) that every Cowbird raised entails the loss of one to four other birds would seem quite true after having observed the nests of the Douglas Lake vireo population.

Nice (1939:82-83) states that the young Cowbird does not forcibly eject the host's young but its larger size and activeness has been observed to be cause enough to emit the weakened young vireos from the nest.

Of the vireos which hatched but did not reach maturity all lived less than seventy-two hours. All were missing from the nest except the one which was found dead in the nest three days before the young Cowbirds died.

FOOD AND FEEDING OF YOUNG

The food habits of the vireos have been worked out by Chapin (1925:6) who reports that seven-eighths of the food of the vireo is animal matter and the rest is vegetable matter.

I observed that both male and female fed the young. The male of the Trailer Camp nest fed about 40 per cent of the food. This is a greater percentage than that of the male of the Central Camp nest. This pair had only one young to feed while the former had three. The difference is probably due to the greater stimulus offered by the three begging young as against the one young who seldom begged for food. The lone bird had no competition for the food so had little need to beg.

On several occasions both adults brought food to the Trailer Camp nest at the same time. The female would usually feed first, then turn and take the food from the male. She would then feed this to the young but upon several occasions was observed to eat it herself.

The most conspicuous food of the young was Lepidopterous larvae. These were killed by a severe pecking by the adults before being fed to the young.

Several times the female would be quietly brooding the young when suddenly she would leave the nest. Immediately the male would appear with food. He would stand on the edge of the nest, sing softly for a moment or two, then peer at the young and the inside of nest. Usually he erected his head feathers as he fed the young. Always after feeding the adults would carefully survey the nest removing the fecal sacs.

The female was observed to eat the fecal sacs during the first two days but both adults carried them away after the second day.

I could determine no regularity in feeding at either nest. The irregularity at the Central Camp nest was undoubtedly due to the disturbances characteristic of beach life and a main thoroughfare. The other nest, although rather secluded, nevertheless displayed irregularity also. The periods between visits to the nest with food varied from one hour and thirty-five minutes to three and four minute intervals.

It was noticeable, however, that as the young birds grew and were able to call louder that the adults fed much more often. The presence of three young in one nest, of course necessitated more feeding than the one young in a nest. It is perhaps this reason which accounts for less feeding by the male of the Central Camp nest.

POST-NESTING ACTIVITIES

It is believed by some that the Red-eyed Vireo raises two broods during a single summer. From the high percentage of failures in June nests in the Douglas Lake region I believe that the late July and early August nests are the same birds still attempting a first successful nest.

The territories remained almost the same all during this time and no adults were observed feeding young out of the nest until July 8 when a Cowbird left one of my nests. This bird I had banded with a blue band to facilitate further observations.

The adult vireos were observed feeding this Cowbird often until July 16. At this time they left the immediate vicinity of the nest and moved to the top of the nearby ridge. Here on July 24 the trio were seen again but the vireos were not seen to feed the Cowbird. Again on August 3 in the same locality the three birds were seen together. This time one vireo fed the now fully grown Cowbird. The last time they were seen together was August 14. No feeding was observed at this time.

The five weeks that these vireos remained with the Cowbird was so long that even if these birds had nested early, it would not be likely that they would raise another brood at this latitude. This one case, however, is not conclusive proof and may have been only an extreme.

The single juvenile vireo from Central Camp nest was placed in an open cage and was fastened by string tied to his foot band. This was done July 19. I captured the female in this trap and banded her. From that date until August 13 I vainly tried to capture the male. However, I never saw him come to feed the young; although he remained in the vicinity and came immediately when the female or the young

were caught.

The abundance of Cowbird eggs in the nests of the Red-eyed Vireo in the Douglas Lake region leads to the question --- Why is this bird parasitized more than others? Perhaps, as Stoner (1932:695) suggests, it may be due to comparative abundance of the species and not to any selection.

It is true that the vireo is very abundant but so is the Oven-bird abundant in this area. If both of these birds have about equal populations in this region, comparative degrees of parasitism by the Cowbird would be an interesting study.

In all my observations in the field only two Cowbirds were seen. One day early in July a male flew over the camp. About the middle of July I saw a female moving silently through the maple thickets east of camp. There were many more of these quiet marauders in the region, however, for all of the nests under observation had been found by the Cowbirds.

My observations showed that only the females incubate. The regularity of incubation periods was observed at several

one that was six, the lowest one. The greatest number of eggs was three and in one nest all the eggs were Cowbird.

The males have definite song periods from which about 75% of their singing is done. The nest is done while feeding most.

The young vireos left the nest in ten and eleven days at

SUMMARY

1. This report on the nesting habits of the Red-eyed Vireo (Vireo olivaceus) represents the work done over a seven week period beginning in late June and ending in early August, 1940, at the University of Michigan Biological Station at Douglas Lake.
2. One territory was definitely known and several boundaries of others were noted. No territorial disputes were observed.
3. Nest building was not observed. External variations observed to be made after first egg had been laid. Inside lining varies according to availability of materials in the immediate vicinity.
4. No Courtship was observed.
5. Of a total of forty eggs found in twelve nests twenty-two were vireo eggs and eighteen were Cowbird eggs. Five of each species reached maturity.
6. My observations found that only the females incubate. Extreme regularity of incubation periods was observed at Central Camp nest. The incubation period was not determined.
7. The Cowbird parasitized all the nests. The most Cowbird eggs in one nest was six; the fewest one. The greatest number of vireo eggs was three and in one nest all the eggs were Cowbird eggs.
8. The males have definite song perches from which about 75 per cent of their singing is done. The rest is done while feeding and near nest.
9. The young vireos left the nest in ten and eleven days and one Cowbird left in nine days.
10. One young Cowbird was seen with the vireos five weeks after it had left the nest.
11. This leads me to question the statement that vireos have two broods per year.

Nest Chart

No.	Location	Species of Nest-Tree	Distance From Trunk Fe.	Height in Feet	Outside Depth cm.	Inside Depth cm.	Outside Diameter cm.	Inside Diameter	Weight in Grams	Eggs and Young of Red-eyed Vireo		Eggs and Young of Cowbird		Date of Location
										Eggs Destroyed	Hatched M=Matched	Eggs Destroyed	Hatched M=Matched	
1.	State Street Center of Camp	Acer saccharum	9	10½	6.7	3.7	8.5	5.2	9.5	1 (Infertile)	1 (M)	1 (Infertile)		June 27
2.	100 yds. E. of Trailer Camp	Quercus borealis	4	8	7.0	3.9	6.2	5.2	9.5		2 (M)		1 (M)	July 15
3.	Manville Cabin 11	Acer saccharum	4½	9½	6.2	3.0	7.2	6.0	5.7		2 Missing 3 and 4 days.		1 (M)	June 28
4.	50 yds. E. of Manville	Acer saccharum	0	6¼	8.2	4.4	6.5	5.3	8.0		1 died 1st day; 2 other in 3 days.		1 (M)	June 27
5.	South End of C. Street	Acer saccharum	4½	6½	7.6	3.7	7.3	5.0	8.1		2 (M)			July 18
6.	Faculty Row Cabin 42	Acer saccharum	¼	7½	7.5	5.0	7.5	5.5	7.5		1 Died in 2 days.		2 Died 5th day.	June 26
7.	200 yds. S.E. of Trailer Camp	Quercus borealis	5¼	5¾	6.4	3.8	6.5	4.8	7.7	2		1		June 26
8.	150 yds. S.E. of E. Line Road and 1st Fire Lane	Quercus borealis	6	9¾	6.2	3.5	7.3	4.7	9.4	2			1 (M)	July 9
9.	150 yds. S.E. of Sawmill	Acer saccharum	3¾	5½	6.8	3.7	6.7	5.4	-	2 (Deserted)		2 (Deserted)		June 26
10.	60 yd. N.E. of E. Line Road and 2nd Fire Lane	Acer saccharum	4	7	5.6	3.8	7.5	5.5	-		2 Missing 2nd day.		1 (M)	July 23
11.	50 yd. E. of Open Faculty Garage	Acer saccharum	5½	6¼	7.0	3.9	6.9	5.3	-	3		1		June 26
12.	Tower Blind Lot	Acer saccharum	4½	15½	7.1	3.8	6.9	5.5	-			6		June 27

BIBLIOGRAPHY

1. Bendire, Charles Life Histories of North American Birds.
Smithsonian Institute, 1895.
2. Chapin, Edward A. Food Habits of the Vireos.
U.S. Dept. of Agriculture Bull. No. 1355, 1925
3. Forbush, Edward H. Birds of Massachusetts and Other New England States. Massachusetts Dept. of Agriculture, 1929.
4. Friedmann, Herbert The Cowbirds
Charles C. Thomas Co., 1929.
5. Herrick, Francis H. Nests and Nest-building In Birds.
Journal of Animal Behavior, 1911.
6. Nice, Margaret Morse The Watcher At The Nest.
Macmillan Co., 1939.
7. Stoner, Dayton Ornithology of The Oneida Lake Region.
Roosevelt Wild Life Annals, 1932.
8. Stone, Witmer Bird Studies At Old Cape May.
Philadelphia Academy of Sciences, 1937.
9. Trautman, Milton B. Birds of Buckeye Lake, Ohio.
University of Michigan Press, 1940.