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THE  
Food of the Myrtle Warbler



*The Myrtle Warbler*

BY

**CLARENCE M. WEED AND NED DEARBORN**

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NEW HAMPSHIRE COLLEGE  
OF  
AGRICULTURE AND THE MECHANIC ARTS  
DURHAM

TABLE I

## AUTUMN FOOD OF THE MYRTLE WARBLER

KINDS OF FOOD	No. of specimens	Per cent. of whole
ARTHROPODA.....	39	29.67
Insects (undetermined).....	28	7.58
Insect eggs.....	2	.07
Insect larvæ.....	4	1.50
COLEOPTERA.....	18	2.84
Aphodius inquinatus.....	6	1.07
Aphodius.....	1	1.02
Aphodius (?).....	3	.23
Oedionychis limbalis.....	1	.05
Chrysomelidae.....	1	.23
HEMIPTERA.....	18	6.41
Aphides.....	6	1.79
Aphides (?).....	2	.25
Melanoxanthus.....	3	3.12
Capsidae.....	4	1.53
Jassidae.....	1	.12
Aphid eggs (?).....	3	.25
HYMENOPTERA.....	9	.55
Aphidius.....	1	.02
Aphidius (?).....	1	.02
Apantales.....	1	.02
Ichneumon fly (?).....	1	.15
Chalcid fly.....	2	.05
Parasites.....	2	.23
DIPTERA.....	22	5.97
Lucilia (?).....	1	.30
Gnats.....	2	.20
Muscidae.....	2	.58
Musca domestica.....	1	.25
Blue fly.....	1	.23
Crane fly.....	1	.45
Eggs.....	1	.10
Larvæ.....	1	1.00
TRICHOPTERA.....	4	2.51
Caddice flies.....	4	2.51
LEPIDOPTERA.....	3	1.43
Caterpillars.....	2	1.12
Bucculatrix canadiensella.....	1	.30
ORTHOPTERA.....	1	.02
Eggs (?).....	1	.02
PLECOPTERA.....	1	.07
Stone flies.....	1	.07
COCOONS.....	3	.69
SILK.....	1	.02
ARACHNIDA.....	1	.02
VEGETABLE MATTER.....	38	62.25
Bayberries.....	37	61.20
Unknown fruit.....	1	1.05
UNDETERMINED MATTER.....	15	7.13
SUMMARY		
Insecta.....		29.65
Arachnida.....		.02
Vegetable matter.....		62.25
Undetermined matter.....		7.13
		99.05



A STUDY OF  
The Autumn Food of the Myrtle Warbler

BY CLARENCE M. WEED AND NED DEARBORN

It is only within a comparatively few years that the service rendered to agriculture by birds has been appreciated. It is becoming, however, to be more and more believed that the birds as a class are set over against the insects as a class to maintain a balance which shall prevent the latter from destroying plant life, both wild and cultivated. But the economic status of each species of bird has to be determined with precision before we can say that that particular species deserves protection and encouragement. Some studies of this sort have heretofore been made by the entomological department of this station,<sup>1</sup> while the present bulletin records a special study of the autumn food of the Myrtle or Yellow-rump Warbler, by the entomologist and Dr. Ned Dearborn, the latter at the time a post-graduate student in the college.

Of all the members of the warbler tribe that are found in southern New Hampshire, either as summer residents or passing migrants, probably none excel the Myrtle or Yellow-rump Warbler<sup>2</sup> in abundance, and certainly none approach it in apparent numbers. They are especially noticeable because, unlike most warblers, they largely neglect the woods in favor of orchards and scrubby pastures. They are hardy birds, wintering regularly as far north as Cape Cod, and presumably, in favorable seasons, along the coast, in this state, for they are recorded by Mr. William Brewster in Minot's Land

<sup>1</sup> Bulletin 54, "The Winter Food of the Chickadee." Bulletin 55, "The Feeding Habits of the Chipping Sparrow."

<sup>2</sup>*Dendroica coronata*.

and Game Birds, second edition, as having wintered at Scarborough, Maine. They have been observed at Durham on the first of December and the fifteenth of March, but not in mid-winter so far as is known.

Their spring migration is usually at its height in this locality about the first of May, but it is so hurried that they are not so impressive numerically as in the fall, when, recruited by the young of the year, they journey southward with less haste.

Their breeding range extends from the mountains of Massachusetts and the northern New England states through the provinces at least as far as Labrador.

Owing to the fact that this species undergoes two moults a year, the spring and fall colorations differ considerably. In spring the prevailing color is bluish slate, heavily streaked with black; the sides of the head are black, and there are conspicuous spots of yellow on the crown, rump, and sides of the breast. In autumn there is scarcely a trace of blue anywhere; the black has wholly disappeared from the sides of the head, and the yellow spots and black streaks are much obscured by a suffusion of dull brown, though the yellow spot on the rump is always plainly visible, and serves as an unerring guide to the bird's identity. In this sober autumnal garb, Myrtle Warblers appear scatteringly in the interior of the state early in September, coming down from the mountains where they have passed the summer, to seek a livelihood on cultivated ground. Toward the end of that month an increase is to be noted, and the first cold snap in October brings them in perfect hordes from the northland to overrun this entire region. They usually go in flocks varying from a few to scores, passing from tree to tree, scrutinizing nooks and crevices everywhere, making side trips to stone walls and brush heaps, and even descending to the ground occasionally. They are not only diligent seekers for hidden tidbits, but are dashing pursuers as well, showing no little address in their manner of capturing flying insects which have taken wing at their approach.

In consulting the works of the earlier ornithological writers to see what they have to say concerning the food habits of this warbler, we find that Wilson states that these birds feed in

autumn largely upon the berries of the red cedar and myrtle. Aududon says, "This species feeds on insects, is an expert fly catcher, and a great devourer of caterpillars. During the winter, however, its principal food consists of berries of various kinds, especially those of the myrtle and pokeweed. They also feed on the seeds of various grasses." Nuttall's account is in the same tenor. Writing from Massachusetts he says of them, "Passing parties continue with us in gardens and woods till almost the close of November, feeding now almost exclusively on the myrtle-wax berry *Myrica cerifera*, as well as on those of the Virginia junipers."

#### FOOD VALUE OF BAYBERRIES

This bird is called the Myrtle Warbler because of its fondness for the berries of the bayberry or waxberry myrtle, a small bush common along the Atlantic coast. To determine the food value of these berries Professor F. W. Morse kindly made an analysis of them, which he reports as follows:

"The berries were extracted with hot alcohol and yielded 18 per cent. of waxy matter. After this treatment there was left on the seeds a loose coating which could easily be rubbed off, leaving the smooth, hard seeds in about the state in which they are excreted by birds. This coating was removed by rubbing the seeds with a stiff brush over a fine-meshed sieve. Thus separated the coating formed 12.5 per cent. of the original seed. The waxy extract was greenish in color and contained 1.06 per cent. protein. The loose coating was brown in color and contained 13.2 per cent. protein. Summing up, the total matter separated from the seeds amounted to 30.5 per cent. of the whole, of which over one half was wax. The protein formed 5.7 per cent. of the total matter removed, or 1.75 per cent. of the original seed."

#### THE RESULTS IN DETAIL

The following paragraphs give the results of a careful study of the food of the specimens examined:

A young female warbler was seen feeding, September 13, about the branches of a pine tree that had died during the summer and still retained some of its yellowed foliage. During the ten minutes it was watched it



was seen to take several objects from the branches. In its stomach were found 4 bayberries (.64), some caddice-flies (.18), two-winged flies (.03), undetermined insects (.11), and a little other undeterminable material (.03).

A Myrtle Warbler was seen at 6:30 a. m., September 27, along a brook at Durham to catch and eat some small objects among the leaves of willow shrubs. The stomach contents proved to consist of three bayberry seeds (.61), a lepidopterous caterpillar (.29), a spider, a beetle, and insect eggs (.01 each), and some remains of insects doubtfully identified as caddice-flies (.07).

On October 3, 1899, five specimens were collected at 12:30 p. m., at the Durham Point bridge. At the time they were all in willows, but they appeared to have come in from a pasture to the north where bayberries and sweet ferns were abundant. They had eaten the following ratios:

No. 1.	
	Per cent.
5 bayberry fruits.....	30
2 caddice-flies ( <i>Trichoptera</i> ).....	36
4 insect larvæ.....	24
Material undetermined.....	10
	—
	100

No. 2.	
	Per cent.
5 bayberry seeds.....	45
37 aphides ( <i>Melanoxanthus?</i> ).....	27
1 fly ( <i>Lucilia?</i> ).....	12
Insects undetermined.....	9
Material undetermined.....	7
	—
	100

No. 3.	
	Per cent.
5 bayberries.....	81
1 beetle.....	2
Gnats ( <i>Diptera</i> ).....	5
Aphides.....	1
Insects undetermined.....	2
Feathers.....	2
Material undetermined.....	7
	—
	100

No. 4.	
	Per cent.
5 bayberries.....	64
Caddice-fly.....	26
Gnats ( <i>Diptera</i> ).....	3
Material undetermined.....	7
	—
	100



## No. 5.

	Per cent.
6 bayberries .....	54
1 hymenopterous fly ( <i>Apanteles</i> ).....	1
1 beetle ( <i>Aphodius inquinatus</i> ).....	9
1 house fly ( <i>Musca domestica</i> ?).....	10
1 caddice-fly.....	18
Material undetermined.....	8
	—
	100

Seven specimens were taken at Durham, 2 p. m., October 10, 1899, in a pasture in which there was a small patch of bayberries interspersed with barberry bushes and garget plants. The warblers were coming and going so continuously that it was impossible to estimate their numbers. In the branches of this miniature forest, covering perhaps three or four square rods, there were always a dozen or more of the birds, while there was scarcely a moment when there was not at least one flitting from shrub to shrub. Apparently the birds were feeding exclusively upon the bayberries.

The examination of the stomach contents of these birds showed a large preponderance of bayberries in the diet. The first had eaten nine of these berries, forming 93 per cent. of the total food, the remaining 7 per cent. consisting of undetermined insects. The stomach of the second contained so little that one bayberry seed was estimated to make 56 per cent. of the contents, and undetermined insects, chiefly beetles, 44 per cent. The third had taken seven bayberries, 72 per cent., a small leaf-beetle (*Oedionychis limbalis*), 2 per cent., other beetles, 16 per cent., and undetermined insects, 10 per cent. The fourth had eaten six bayberries, 65 per cent., one larva, apparently Lepidopterous, 15 per cent., two leaf-beetles (*Chrysomelidae*), 9 per cent., and undetermined materials, 11 per cent. There was little in the fifth: two bayberry seeds formed 98 per cent. and remains of spiders and insects the rest. Similarly two bayberries formed 95 per cent. of the contents of the sixth specimen, the rest consisting of two orthopterous eggs, a leaf-hopper (*Fassidae*), a tiny bug (*Tingitidae*), and remnants of a spider and a fly. In No. 7, two bayberry seeds formed 90 per cent. of the contents, the remaining 10 per cent. consisting of fragments of beetles and other insects.

At 4:30 p. m., October 10, four specimens were taken in a rocky pasture at Durham. The examination of their food showed the following results:

## No. 1.

	Per cent.
3 bayberries.....	44
3 beetles ( <i>Aphodius inquinatus</i> ).....	22
1 fly ( <i>Muscidae</i> ).....	11
Insects undetermined.....	19
Material undetermined.....	4
	—
	100

No. 2.		Per cent.
12 bayberries (4 in gullet).....		62
2 flies ( <i>Musca domestica</i> ?).....		9
1 blue fly ( <i>Diptera</i> ).....		9
Beetles ( <i>Aphodius inquinatus</i> ).....		3
Beetles ( <i>Coleoptera</i> ).....		5
1 aphid (?).....		1
Feathers.....		1
Material undetermined.....		10
		<hr/>
		100

No. 3.		Per cent.
7 bayberries.....		82
Beetles ( <i>Coleoptera</i> ).....		6
Insects undetermined.....		7
Material undetermined.....		5
		<hr/>
		100

No. 4.		Per cent.
10 bayberries.....		91
Fly ( <i>Diptera</i> ).....		5
Insects undetermined.....		4
		<hr/>
		100

Eleven specimens were taken in a pasture at Durham, October 16, 1899. There were many bayberry bushes in the pasture, some of which had already been stripped of their fruit by the birds. The food taken by these birds was as follows:

No. 1.		Per cent.
2 bayberries.....		62
4 hymenopterous parasites.....		7
Flies ( <i>Diptera</i> ).....		12
Beetles ( <i>Aphodius</i> ).....		4
Aphides.....		2
Bugs ( <i>Hemiptera</i> ).....		4
Undetermined insects.....		7
Feathers.....		1
		<hr/>
		100

No. 2.		Per cent.
3 bayberries.....		44
Plant lice ( <i>Aphides</i> ).....		33
Eggs of aphides.....		4

Insect eggs.....	2
Insects undetermined.....	16
Feathers.....	1
	<hr/>
	100

## No. 3.

Per cent.

2 bayberries.....	24
Aphides ( <i>Melanoxanthus</i> ).....	54
Aphid eggs.....	5
Flies ( <i>Diptera</i> ).....	6
Beetles ( <i>Aphodius inquinatus</i> ).....	6
Insects undetermined.....	5
	<hr/>
	100

## No. 4.

Per cent.

6 bayberries.....	41
Dipterous larva.....	39
Aphides.....	5
Flies ( <i>Diptera</i> ).....	6
Hymenopterous parasites.....	2
Insects undetermined.....	7
	<hr/>
	100

## No. 5.

Per cent.

6 bayberries.....	91
1 beetle ( <i>Aphodius?</i> ).....	4
Insects undetermined.....	5
	<hr/>
	100

## No. 6.

Per cent.

11 small cocoons.....	16
4 bayberry seeds.....	63
Insects undetermined.....	21
	<hr/>
	100

## No. 7.

Per cent.

5 bayberries.....	78
1 beetle ( <i>Aphodius?</i> ).....	4
Aphides (?).....	5
Insect cocoons.....	4
Material undetermined.....	9
	<hr/>
	100

## No. 8.

Per cent.

3 bayberries.....	48
3 bugs ( <i>Capsidae</i> ).....	8



1 beetle ( <i>Aphodius inquinatus</i> ).....	3
Flies ( <i>Diptera</i> ).....	8
Insect larvæ.....	22
Insects undetermined.....	11
	100

No. 9.

Per cent.

5 bayberry seeds.....	64
3 insect cocoons.....	7
Beetles ( <i>Coleoptera</i> ).....	4
Flies ( <i>Muscidae</i> ).....	12
Insect larva.....	7
Insects undetermined.....	6
	100

No. 10.

Per cent.

Unknown fruit.....	41
1 bayberry seed.....	18
Bugs ( <i>Capsidae</i> ).....	8
Flies ( <i>Diptera</i> ).....	4
Insects undetermined.....	29
	100

No. 11.

Per cent.

2 bayberry seeds.....	62
Beetles ( <i>Aphodius inquinatus</i> ).....	9
Bugs ( <i>Capsidae</i> ).....	13
Flies ( <i>Diptera</i> ).....	12
Insect larva.....	4
	100

The preponderance of bayberry fruit in the diet for October was well shown by a specimen taken at 5 p. m., the thirteenth of this month, which had eaten fourteen of these, five of them being found in the gullet. These were estimated to form 97 per cent. of the total contents, the only other items being insect remains which were doubtfully identified as belonging to a small beetle—*Aphodius*—(.01), and a stone-fly (.02). Another specimen, taken at 2 p. m. the twenty-seventh of the same month, had eaten seven bayberries, forming 95 per cent. of the food, a small, two-winged fly, 3 per cent., and undetermined insects, 2 per cent. In still another specimen, taken October 24, at 2 p. m., four bayberries formed 40 per cent. of the food, thirty-one aphides 31 per cent., six small larvæ, apparently those of the birch leaf-skeletonizer (*Bucculatrix canadiensella*), 12 per cent., a mass of silk probably taken with the larvæ, 3 per cent., two flies (*Diptera*), 10 per cent., one chalcis fly, 1 per cent., seven eggs (*Orthoptera* ?), 1 per cent., and undetermined insects, 2 per cent.

Eight bayberry fruits formed 88 per cent. of the food of a specimen taken at 1:30 p. m., October 10, the remaining 12 per cent. consisting of hymenopterous flies (.02), beetles (.03), feathers (.01), undetermined insects (.03), and undetermined material (.03).

On October 19, 1899, four specimens were taken at 8 a. m., in a pasture field where both food and birds were abundant. The stomach contents were as follows:

NO. 1.	
	Per cent.
2 bayberry seeds.....	26
21 aphides ( <i>Melanoxanthus</i> ).....	41
2 flies ( <i>Diptera</i> ).....	15
1 ichneumon fly (?).....	6
Insects undetermined.....	5
Material undetermined.....	7
	<hr/>
	100

NO. 2.	
	Per cent.
7 bayberry seeds.....	63
1 leaf-hopper.....	5
1 aphid.....	2
1 crane fly ( <i>Tipulidae</i> ).....	18
1 hymenopterous fly ( <i>Aphidius</i> ).....	1
Insect eggs ( <i>Hemiptera</i> ?).....	1
Feathers.....	1
Material undetermined.....	9
	<hr/>
	100

NO. 3.	
	Per cent.
9 bayberry seeds.....	90
Hymenopterous fly ( <i>Aphidius</i> ?).....	1
Insects undetermined.....	3
Material undetermined.....	6
	<hr/>
	100

NO. 4.	
	Per cent.
8 bayberry seeds.....	80
Insects undetermined.....	14
Material undetermined.....	6
	<hr/>
	100

Of two specimens taken at 9:30 a. m., October 23, in a pasture having many bayberry bushes, the first contained only the remains of food from the day before, one bayberry seed, 90 per cent., and fragments of insects, 10 per cent. The second, also, had eaten little that morning, 2 bayberry seeds

forming 52 per cent. of the stomach contents, the remainder being flies (*Diptera*), 22 per cent., eggs of flies, 4 per cent., a chalcid fly, 1 per cent., and undetermined insects, 21 per cent.

#### FOOD IN SPRING

On March 15, 1900, four birds were observed at Durham, and one was shot at 3 p. m. The intestines contained many of the little black kernels which are embedded in the wax of bayberries, while the stomach was nearly filled with a large caterpillar—a lepidopterous larva—which formed 85 per cent. of the total contents. There was, also, a small insect larva 4 per cent., 2 small bugs (*Capsidae*), 2 per cent., 1 small four-winged fly (*Hymenoptera*), 1 per cent., and a bayberry seed, 6 per cent.

A specimen taken May 2 showed that the spring food consists very largely of insects, the stomach being filled with insect pulp, of which 68 per cent. was undeterminable, while the remainder was identified as follows: 4 flies (*Diptera*), 15 per cent., 3 bugs (*Capsidae*), 9 per cent., 2 hymenopterous flies, 6 per cent., 1 spider, 2 per cent., 1 aphid, trace. There were neither seeds nor gravel in the stomach.

#### SUMMARY

It is evident, from these results, that the Myrtle Warbler is well named, as in autumn it finds a large proportion of its diet in the fruit of the waxberry myrtle. But this fact does not prevent it from being of considerable use as a check upon insect life, even in autumn, when 30 per cent. of its food consists of insects, while it is evident, from the limited study made of the spring food, that during the spring migration when the supply of myrtle berries has been to a considerable extent exhausted, the ration of insect food is greatly increased, and the insects taken include some of the sorts like the aphides or plant lice, against which man especially needs protection.

The vegetable food of the myrtle warbler has no economic value, and the bird eats various sorts of destructive insects, so that it is a fair conclusion to say that these modest little warblers are deserving of man's continual protection. These studies furnish additional evidence of the value of birds in general, and of the wisdom of protecting them and encouraging their presence on the farm and about the home grounds.



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