

LITERATURE ON THE FAMILY VIREONIDAE

A Paper for Zoology 314

by

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Table of Contents

	Page
Introduction	1
Purposes of Study	1
Methods of Study	1
Acknowledgments	1
Classification and Nomenclature	2
Food	4
Feeding Habits	5
Distribution and Migration	6
Territory	8
Song	8
Mating	9
Nests and Nest Building	10
Cowbirds	10
Eggs and Egg-laying	11
Incubation	12
Young and Their Development	13
Parental Care	13
List of References	I-XX

Introduction

This study of the literature on the Family Vireonidae was made at Carleton College, Northfield, Minnesota during the spring semester, February second to May thirty-first, of the year 1948. Approximately ten hours per week were devoted to this work. The private library of Dr. Olin Sewall Pettingill, Jr. was my main source of information. In addition, considerable time was spent gathering data from the libraries of Carleton College and the Museum of Natural History at the University of Minnesota. However, in spite of the completeness and excellence of the libraries utilized, the list of references given in this paper is not to be considered complete for undoubtedly a number of papers on this Family published by Latin American ornithologists and others, have been overlooked.

The purpose of this study was to acquaint myself with ornithological literature in general and especially that on the Vireonidae. The work has been of value because it has shown me not only what is known about Vireos, but also what specific information is lacking. Thus, in my future field studies it will enable me to concentrate my efforts on the aspects of the habits of the Vireos about which little is known.

I am deeply indebted to Dr. Olin Sewall Pettingill, Jr. of Carleton College for the valuable guidance and advice he gave me during this study and for his helpful suggestions and advice in the preparation of the manuscript. Also, I gratefully acknowledge his generosity in allowing me the use of his excellent library of ornithological literature.

Classification and Nomenclature

The Family Vireonidae, composed of eight genera which include approximately 70 species, is confined to the New World. Although Vireos occur in both temperate and tropical America, the majority of species are tropical in distribution. As a group they have a wide range extending throughout the temperate and tropical regions with the exception of the Galapagos Archipelago.

The following classification and nomenclature of the Vireos is, to my knowledge, the one accepted by present-day ornithologists. It includes all the Vireos which are known to occur in North and Middle Americas.

The information for this classification was obtained from the Check-List of North American Birds of the American Ornithologist's Union (Fourth Edition, 1931), and Robert Ridgway's Birds of North and Middle America (3:128-232, 1904). Species and subspecies occurring in North America as far south as Mexico are marked by an asterisk.

Phylum Chordata
Subphylum Vertebrata
Class Aves
Subclass Neornithes
Superorder Neognathae
Order Passeriformes
Family Vireonidae

Genus Vireosylva

Vireo magister magister, Belize Vireo
Vireo magister cinerea, Cozumel Vireo
Vireo caymanensis, Grand Cayman Vireo
Vireo calidris calidris, Jamaican Vireo
Vireo calidris barbadensis, Barbados Vireo
*Vireo calidris barbatula, Black-whiskered Vireo
Vireo calidris grandior, Old Providence Vireo
Vireo calidris canescens, Saint Andrews Vireo

- *Vireo flavoviridis flavoviridis, Yellow-green Vireo
- Vireo flavoviridis forreri, Forrer's Vireo
- Vireo insulanus, San Miguel Vireo
- Vireo chivi agilis,
- Vireo chivi chivi,
- *Vireo olivacea, Red-eyed Vireo
- *Vireo philadelphica, Philadelphia Vireo
- *Vireo gilva gilva, Warbling Vireo
- *Vireo gilva swainsonii, Western Warbling Vireo
- Vireo gilva brewsteri, Chihuahuan Warbling Vireo
- Vireo amauronota a., Orizaba Vireo
- Vireo amauronota strenua, Chiapas Vireo
- Vireo josephae josephae,
- Vireo josephae costaricensis, Brown-capped Vireo
- Vireo josephae chiriquensis, Chiriqui Vireo

Genus Lanivireo

- *Vireo flavifrons, Yellow-throated Vireo
- Vireo propinquus, Vera Paz Vireo
- *Vireo solitarius solitarius, Solitary Vireo
- *Vireo solitarius alticola, Mountain Solitary Vireo
- *Vireo solitarius cassinii, Cassin's Vireo
- *Vireo solitarius lucasanus, Saint Lucas Vireo
- *Vireo solitarius plumbeus, Plumbeous Vireo

Genus Vireo

- Vireo bairdi, Baird's Vireo
- *Vireo atricapillus, Black-capped Vireo
- *Vireo noveboracensis noveboracensis, White-eyed Vireo
- Vireo noveboracensis bermudianus, Bermuda Vireo
- *Vireo noveboracensis maynardi, Key West Vireo
- Vireo noveboracensis micrus, Small White-eyed Vireo
- Vireo perquisitor, Vera Cruz Vireo
- Vireo gundlachi, Gundlach's Vireo
- Vireo crassirostris crassirostris, Large-billed Vireo
- Vireo crassirostris flavescens, Large Yellow-billed V.
- Vireo crassirostris alleni, Allen's Vireo
- Vireo crassirostris approximans, Old Providence Vireo
- Vireo ochraceus, Ochraceous Vireo
- Vireo pallens, Pale Vireo
- *Vireo huttoni huttoni, Hutton's Vireo
- *Vireo huttoni obscurus, Anthony's Vireo
- Vireo huttoni mexicanus, Mexican Vireo
- *Vireo huttoni stephensi, Stephen's Vireo
- Vireo huttoni cognatus, Frazer's Vireo
- Vireo carmiolo, Carmiol's Vireo
- Vireo modestus, Jamaican Vireo
- Vireo hypochryseus hypochryseus, Golden Vireo
- Vireo hypochryseus sordidus, Tres Marias Vireo
- *Vireo vicinior, Gray Vireo
- Vireo nanus, Dwarf Vireo
- *Vireo bellii bellii, Bell's Vireo
- Vireo bellii medius, Texas Vireo
- Vireo bellii arizonae, Arizona Vireo
- *Vireo bellii pusillus, Least Vireo
- Vireo latimeri, Latimer's Vireo

Genus Neochloe

Neochloe brevipennis, Green-winged Vireo

Genus Laletes

Laletes osburni, Osburn's Vireo

Genus Pachysylvia

Pachysylvia decurtata, Gray-headed Pachysylvia

Pachysylvia ochraceiceps o., Tawny-crowned P.

Pachysylvia o. pallidipectus, Pale-breasted P.

Pachysylvia aurantifrons a., Lawrence's Vireo

Pachysylvia aurantifrons hypoxantha,

Pachysylvia viridiflava, Yellow-green Pachysylvia

Pachysylvia flavipes,

Pachysylvia griseipes,

Pachysylvia acuticauda,

Pachysylvia insularis,

Genus Vireolanius

Vireolanius pulchellus p., Green Shrike-Vireo

Vireolanius pulchellus verticalis, Carmiol's S.-V.

Vireolanius pulchellus viridiceps, Panama S.-V.

Vireolanius eximius,

Vireolanius melitophrys, Du Bus' Shrike-Vireo

Genus Cyclarhis

Cyclarhis flaviventris f., Mexican Pepper-Shrike

Cyclarhis flaviventris yucatanensis, Yucatan P.-S.

Cyclarhis insularis, Cozumel Pepper-Shrike

Cyclarhis flavipectus f.,

Cyclarhis flavipectus canticus,

Cyclarhis flavipectus subflavescens, Costa Rican S.-V.

Food

Collectively, Vireos are highly insectivorous, their food consisting of 91 percent insects and the remaining nine percent of vegetable matter. There is no evidence that any species eats any animal food other than insects.

The vegetable portion of the food of a Vireo is negligible, especially in North America. Undoubtedly, in tropical and semi-tropical regions where the vegetation is more abundant, the birds eat a larger percentage of berries and other fruits. At

any rate, the vegetable component of their diet consists principally of wild fruits, and Vireos are in no way injurious to domestic crops.

The insects taken by Vireos include many kinds economically destructive to man. Among them are several species of caterpillars, while scale insects, weevils, leaf-hoppers, and borers are also taken in large numbers.

While hunting, the Vireos hop slowly along the branches, deliberately searching both sides of the leaves and frequently examining unfolded leaves. Thus, they find and destroy scale insects and other protectively colored species that birds less thorough in their search would overlook.

The food habits of the Vireo have been thoroughly studied by members of the United States Department of Agriculture. The conclusion drawn by these experts is that economically they are among the birds most useful to man. The excellent paper by Chapin (1925) is recommended to anyone interested in the food habits of the Vireonidae. This study was made by examining the contents of the stomachs of 1951 individuals of North American Vireos. It is a very thorough study, sufficient for the needs of both ornithologists and agriculturists. Other satisfactory studies by Beal (1907), Dearborn and Weed (1903), Forbush (1905), and Henderson (1927) have been published. In addition, many state books briefly discuss the food habits of the birds known to occur there. Thus, I believe that at present this phase of the Vireos' life cycle has been very well worked out.

Distribution and Migration

In general, it may be stated that the Vireos accompany the second spring migratory wave, thus arriving in the United States after the insect fauna has again become active. In Minnesota, for example, the Vireos arrive the first part of May.

The subject of the regional distribution of the Vireos has been studied in some detail. Such studies have revealed that the habitats of the various species of Vireonidae are quite diversified and thus must be studied individually. For example, The Philadelphia Vireo is a bird of the Coniferous Forests, while the Red-eyed Vireo and a Yellowthroated Vireos prefer a Deciduous Forest climax.

Another phase of regional distribution has to do with the range of the various species. Since Vireos are migratory birds they have both a summer and winter range. These have been worked out and the results published in the A. O. W. Checklist and Ridgway's Birds of North and Middle America.

The ranges of the Vireos seem to be controlled by the biotic communities to which the birds are adjusted, while climate and food supply also play a role. Therefore, the present day ranges are determined by more or less elastic factors and are subject to change. As the forests are cleared or burned over and as the inland swamps are drained, ranges may be extended or limited. Odum and Burleigh (1946) have noted such a change in the Mountain Solitary Vireo. This bird is gradually extending its range southward into Georgia.

Today, owing to almost eighty years of bird-banding and other field studies, the migration routes followed by the Vireos are fairly well known. Definite information concerning them is contained in the papers by Cooke (1905), and Lowery (1946). In addition, The Migration of American Birds by Lincoln (1939) contains much valuable information. In this book the author has constructed a map showing the breeding and wintering grounds of the Red-eyed Vireo and also the routes followed by this bird. Such maps provide an excellent method for presenting this type of information and similar ones should be worked out for all the North American species of Vireonidae.

Although literature on migration is abundant some is unreliable and some need to be substantiated. A new method of watching bird migration has been devised by George H. Lowery, Jr. He and his co-workers all over the United States are engaged in this work and it is hoped that additional knowledge will be gained by it. Studies in migration are difficult to carry on individually and people interested should associate themselves with some institution which is directing the work.

A small amount of literature dealing only indirectly with the subject of distribution and migration of birds, including Vireos, is also available and should be mentioned. Averill has made several studies in an attempt to show the relation between the form of the egg and the extent of migration (1923), the emargination of the long primaries in relation to the power of flight and migration (1927), and the geographical distribution in relation to the number of eggs laid by certain species (1933).

Bird Territory and Song

It is assumed that all Vireos establish a territory and that they show strong territorialism. However, the above assumption was made from the study of bird communities rather than direct studies of the life cycles of Vireos.

I could find no direct references on the establishment and maintenance of territory. However, during the study which I conducted at the University of Michigan Biological Station during the summer of 1947, it was determined that the Red-eyed Vireo established both a mating and nesting area and a feeding area. This finding, however, needs to be substantiated. Before attempting such a study, one should carefully study the book by Howard (1920). This is a basic work on territory and while it contains no information on Vireos, it deals with the establishment and maintenance of territory in passerine birds and will undoubtedly be of value.

Singing is the way in which male birds proclaim their established territories. The songs of all North American Vireos are well known for they are among our most vociferous birds. Fry (1916) in his study of the seasonal decline of bird song learned that the Red-eyed Vireo continued to sing while undergoing the postnuptial moult. Thus, they may be heard in late August and occasionally early September when most birds are silent.

Descriptions of the songs of many species of Vireos may be found in Chapman's Handbook of the Birds of Eastern North America. Their songs are also recorded by the use of symbols in the Book of Bird Life by A. A. Allen.

Two interesting papers on the song of the Red-eyed Vireo should also be mentioned. One by Blincoe (1924) tells of a Red-eyed Vireo with a vocal defect, and another by Wallace (1945) tells of another bird of this same species which frequently mimicked the call of the Crested Flycatcher.

In conclusion, it may simply be stated that although territory and song are closely related subjects, practically nothing is known about the former while the literature on the songs of the Vireos is very complete.

Mating

A great deal of information on the subject of the courtship and display of birds has been published by such modern workers as Allen (1930), Armstrong (1942), Lack (1940), and Nice (1943). Nevertheless, practically no information on the mating habits of Vireonidae was found. The papers by Baker (1932), Townsend (1920), and Tyler (1914) were the only references found which pertained specifically to this family. They are all in the form of general notes and, in my opinion, of little value.

Undoubtedly Vireos display prior to copulation but very little has been published about these courtship and display activities. Information concerning the mating relations of the Vireos is lacking, but such information can be obtained by intensive watching of marked individuals during the breeding season.

In conclusion, it may be stated that the literature on the mating habits of Vireonidae contains conspicuous gaps and that

this phase of their life cycle offers excellent opportunities for original research.

Nests and Nest Building

A considerable amount of literature on this subject is available. The nests of most species of Vireos which breed in North America have been described as to their component materials and structure. This is also true of numerous tropical species. Such descriptions of the nests of breeding Vireos may be found in most state books and regional lists. In addition, this information, especially on the more familiar species, may be found in books which provide general information on bird life.

Since all Vireos build the pensile type nest, it may be assumed that their methods of attaching, weaving, shaping, and lining the structure are fairly uniform. Therefore, chapter eight in Herrick's Wild Birds At Home (1935), which deals with the Red-eyed Vireos nest-building habits should be referred to when studying this activity of any species of Vireo. It will be of considerable aid in interpreting the actions of the pair of birds. Equally satisfactory studies should be worked out for other species of Vireos.

Cowbirds

No study of the Family Vireonidae would be complete unless one section was devoted to the Cowbirds and their parasitic relationship to the Vireos. The numerous species of Cowbirds unquestionably important enemies of these birds. According to

Friedmann (1929:196-197), "no birds are more frequently affected, and none make less protest."

The problem of parasitism among birds has perplexed people as far back as the time of Aristotle. Thus, it is only natural that a huge amount of literature has been written about this method of reproduction. However, a large proportion of this literature must be considered as unreliable, and only a surprisingly small part is truly accurate.

Herbert Friedmann's excellent book, The Cowbirds, is a completely reliable book which deals with such phases of the problem as which species of Vireos are parasitized by Cowbirds, the evolution of the Cowbirds, and the origin and evolution of the parasitic habit. Friedmann and his associates are still carrying on their extensive studies and supplementary information appears from time to time in current North American ornithological journals.

Eggs, Egg-Laying and Incubation

Descriptions of the eggs of all North American Vireos have been made. Chapman's Handbook of the Birds of Eastern North America gives this information. Also, most state books contain accurate descriptions of the eggs of their breeding birds.

Since all species of Vireonidae are determinate layers, the size of the clutch of most North American species is known. The average size is from three to five eggs, although individual variation is more common than might be supposed. No such information was found on tropical species.

Characteristically, Vireos produce two clutches a year.

This is necessary for the perpetuation of the species since during the first ~~nesting~~ period the Cowbirds are also laying, and in a nest parasitized by Cowbirds a young Vireo's chances for survival are slim. However, in late July and early August the Cowbirds have ceased laying and the Vireos are able to build a second nest and raise their young unmolested.

Egg-laying is a phase of the life cycle of the Vireo in need of careful study. I was unable to find even one reference on this subject.

It is known that characteristically the Vireos begin to incubate after the last egg is laid. Thus, all the eggs hatch on the same day. However, Petrides (1944) has published a paper on the unusual incubation of one Red-eyed Vireo. This bird started incubation before the last egg was laid. However, this single incidence must be considered as an exception to the rule.

Since the sexes of all Vireos are superficially similar, whether the female alone incubates or whether both sexes participate in the activity is a question that has never been satisfactorily answered. Careful investigation on this phase of the breeding cycle should be undertaken in which some method for marking one of the sexes is devised.

The incubation rhythm has likewise not been worked out for any of the species of Vireonidae. Such information is needed and all data gathered from observations on the incubation birds be tabulated and later presented in the form of charts.

The incubation periods of only three species of Vireonidae are known. These were published by Bergtold (1917) and may be considered as reliable. The determination of this information

on other species should be undertaken as soon as possible.

In conclusion, it may be stated that the literature concerning incubation is far from adequate. The papers found on this subject are too numerous to mention here, but they are not presented in a scientific form. Thus, here, as in practically all phases of the Vireo's life cycle, there are numerous questions that need to be answered and many other points that need clarification.

Young and Their Development

As my study of the literature of the Family Vireonidae progressed, it became increasingly clear that very little work had been published on the development of young Vireos. Moreover, in my opinion, the available literature is of little value to students of ornithology, for it appears, in the main, as isolated facts that are difficult to correlate and thus of little comparative use.

It is true that the plumage coloration of young Vireos has been adequately described, but in every other phase of the Vireo's development, information is conspicuously lacking. More work needs to be done on this phase of the Vireos' life cycle than on any other.

Parental Care

This phase of the Vireos' life cycle has not been neglected by ornithologists for abundant material is available on nearly all species which breed in North America. However, here, as in

the literature on the subject of young and their development, the information is of little value in comparative ornithology. This is true simply because the observations of the authors are presented in such a generalized fashion that their interpretation and correlation are difficult.

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