

eastern Washington, north and east to Cheney,¹ south to Walla Walla (Lyman)²; and west to Moses Lake (Cantwell) and Benton County (Decker); it is of accidental occurrence, during migration, in western Washington (A. K. Fisher).

Biological Survey, 1746 East Fifth St., Tucson, Arizona.

THE OUTER PRIMARY IN RELATION TO MIGRATION IN THE TEN-PRIMARIED OSCINES.

BY CHARLES K. AVERILL.

A FACT that seems to have escaped the attention of ornithologists is that the outer primary in the ten-primaried Oscines is not only of taxonomic value but that its length in relation to the wing length is an indication of power of flight and therefore of the extent of migration. The outer primary varies inversely as the wing varies in length, and, as extent of migration depends largely on wing length, we may determine much of distribution by this obscure member. This is well shown by the family Vireonidae, basing our tables on Ridgway's 'Birds of North and Middle America' from which work all the data used in this work, unless otherwise stated, are taken. The outer primary is called the 10th and the next one the 9th.

VIREONIDAE.

Group I. Five genera, *Neochloe*, *Laletes*, *Pachysilvia*, *Vireo-lanius* and *Cyclarhis*, containing altogether 175 species and subspecies. Wing generally averaging three times the length of the tarsus; outer primary about one half the length of the next. None of these species reach north to the United States.

Group II. Genus *Vireo*, 31 species and subspecies. Wing averaging three times the length of the tarsus; outer primary one-third to a quarter the length of the next. About 10 forms, breed within the United States mostly in southerly districts, none reaching the northern boundary except *V. huttoni obscurus*, which reaches Vancouver Island.

¹ Johnson, Condor, VIII, 1906, p. 26.

² Dice, 'Auk,' XXXV, 1918, p. 148.

Group III. Genera *Vireosylva* and *Lanivireo*, with 27 species and subspecies. Wing averages longer, three and a half to four and a half times the length of the tarsus; in about half the forms the outer primary is obsolete and when present is probably always smaller than in *Vireo*. Five species extend their breeding range beyond the northern boundary of the United States—the Red-eyed, Philadelphia, Yellow-throated, Warbling and Western Warbling, and Solitary Vireos. The first three lack the outer primary and are of easterly distribution or at least unrepresented in the southwest. The last two retain it and have affinities in the southwest which is the metropolis for birds of poor wing development. The following measurements from Coues' 'Key to North American Birds' are taken as evidence that the outer primary in the genus *Vireo* is longer relative to the wing than in *Vireosylva* or *Lanivireo*.

	Outer prim. in rel. to next.	Length of outer prim.	Ratio of wing to tarsus.
<i>Vireosylva g. gilva</i>	1/4-1/3	—	3.9
<i>Lanivireo s. solitarius</i>	1/4	.50-.66 ins.	4.
“ <i>s. plumbeus</i>	1/3	.75	4.
<i>Vireo vicinior</i>	1/2	.75	3.4
“ <i>n. noveboracensis</i>	1/2	.75	3.1
“ <i>h. huttoni</i>	less than 1/2	—	3.2
“ <i>b. belli</i>	2/5	—	3.
“ <i>b. pusillus</i>	1/2	—	2.9
“ <i>atricapillus</i>	=	.66	2.9

It should be remembered in regard to these measurements in inches that although they are not much greater in the genus *Vireo* the wing itself is much shorter. We have then in the *Vireo* family a somewhat regular decrease in the relative size of the outer primary with a northerly extension of breeding range and consequent increase of the length of the annual flight.

TURDIDAE.

The Thrushes show the same thing.

The genus *Planesticus* has the outer primary very variable in length. There are 14 species and subspecies of which *P. migratorius* is the only species to enter the United States. It has the shortest outer primary of all, about one-fifth the length of the next.

The genus *Hylocichla* may be arranged as follows:

I. Outer primary equal to or longer than the primary coverts.
Northern limit Canadian Zone: southern limit Guatemala.

	Wing	Tail	Tarsus	Rel. of Wing to Tarsus
<i>H. g. guttata</i>	87.8	64.8	28.8	3.

II. Outer primary shorter than primary coverts. All reach South America in winter and several breed north to the Hudsonian Zone.

	Wing	Tail	Tarsus	Rel. of Wing to Tarsus
<i>H. mustelina</i>	109.	71.5	31.6	3.4
<i>H. u. ustulata</i>	94.5	68.9	28.1	3.4
<i>H. a. aliciae</i>	104.	73.	30.3	3.4
<i>H. f. fuscescens</i>	105.	74.4	30.4	3.4

The genus *Catharus* has sixteen species and subspecies all of Tropical America. Wing two and a half to nearly three times the length of the tarsus, thus shorter than in *Hylocichla*; the outer primary is decidedly longer than the primary coverts.

Other genera of the family are *Cichlherminea* (five forms); *Mimocichla* (9), *Haplocichla* (1) all of semitropical America with wing rather long, outer primary longer than the primary coverts; *Zeledonia* (1) a remarkable semitropical type with a rounded wing yet of good length, and a minute outer primary; *Ridgwayia* (1) from Mexico with a long pointed wing and outer primary less than one-fourth of the next.

Myadestes (14) wing moderate to long, rounded, and outermost primary longer than the primary coverts, one-third (*townsendi*) to nearly one-half (*melanops*) the length of the next. Townsend's Solitaire with the longest wing and shortest outer primary of any of the species is the only one to push north into the United States, going on indeed to Alaska.

Ixoreus (1) with wing long and pointed has the outer primary one-quarter as long as the next and breeds north to Alaska. *Sialia* (9) also has the wing long and pointed and the outer primary very small. *Saxicola* and *Cyanosylvia*, old world groups, breed far north and winter south and have the outer primary sometimes longer sometimes shorter than the primary coverts.

As in the Vireonidae the long wing goes with the small outer primary and the migrants all have this form of wing.

MIMIDAE.

In this family the outer primary is usually as long as the next (much less than one-half in *Oreoscoptes*), and as long as the longest secondary in *Calyptophilus*. Now the last genus is represented by only one species, in the island of Haiti while *Oreoscoptes*, with one species, reaches British Columbia.

Mimus, *Galeoscoptes* and *Toxostoma* stand intermediate in length of outer primary, with the Mockingbird, Catbird and Brown Thrasher as their most northern representatives. There are several tropical genera all with the outer primary longer than in *Oreoscoptes*.

SYLVIIDAE.

Group I, Polioptila (20). Wing moderate, rather rounded at tip; tail equal to the wing or longer; outer primary less than half the length of the next. Tropical and warmer temperate regions, *P. c. caerulea* reaching farthest north.—New Jersey, Pennsylvania and Iowa.

Group II, Regulus (6). Wing rather long but rounded at tip; outer primary about one-third the length of the next. Distribution northerly.

Group III, Acanthopneuste. Wing rather long and pointed; outer primary minute. Represented in North America by the Alaskan Willow Warbler migrating to southern Asia.

TROGLODYTIDAE.

The family of Wrens contains seventeen genera and 135 species in North and Middle America. Seven genera have the outer primary decidedly more than half the length of the next, and of these, six range wholly south of the United States while the other one furnishes a species, Bewick's Wren, which breeds in the United States but is rather southerly.

Four genera have the outer primary more than the length of the next, and of these one is semitropical, two (*Catherpes* and

Heleodytes) occur only in the southwest while *Telmatodytes* breeds north to our northern boundary.

Six genera have the outer primary about half the length of the next and here belong the Winter Wren (*Nannus*), breeding in the Canadian Zone, the Short-billed Marsh Wren (*Cistothorus*) which reaches Canada, the Carolina Wren (*Thryothorus*) of the southern United States and the Rock Wren (*Salpinctes*) which extends its range to British Columbia. The remaining genus *Leucolepis* is tropical.

Thus we see that in the Wren family where the migrations are never extended and the wing never becomes pointed we can still note the diminishing length of the outer primary in those species which do migrate.

OTHER FAMILIES

The Waxwings (*Bombycillidae*) are long winged birds, with the wing five times the length of the tarsus, while the outer primary is minute.

The Ptilognatidae have the outer primary much longer than the primary coverts, the most northern species being the Phainopepla of our southwest.

As may be guessed from the wing of the Starling as it passes overhead, the outer primary is minute.

The Skylark (*Alauda*) soaring as it sings till it becomes a speck in the heavens or passes out of sight, has the outer primary minute, much less than half the length of the primary coverts. The Shore Lark (*Otocoris*) breeding north to the Arctic Circle has the wing four and a half times as long as the tarsus and the outer primary hard to find. The Dippers (*Cinclidae*) Titmice (*Paridae*), Shrikes (*Laniidae*) and Creepers (*Certhiidae*) are wide ranging groups which furnish no long distance migrants and the wing is rounded. In the Nuthatches (*Sittidae*) it is rather pointed and the outer primary relatively smaller. In the Crows and Jays (*Corvidae*) the wing lengthens considerably in *Corvus* without any diminution in the outer primary, the only case of the kind noted, but the large size of this feather in the Crows and Ravens suggests the idea that it is large enough to function in flight instead of being a useless rudiment.

The remaining families—*Dulidae* and *Chamaeidae* have rounded wings and are of southerly distribution.

To sum up: No North American ten primaried oscine bird makes a long migration unless the outer primary is minute or apparently lacking; nor has any member of a tropical or semi-tropical group become a migrant in North America without showing the effect of its journeys in the form of the wing and the relative size of the outer primary.

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SOME RESULTS OF BIRD BANDING IN EUROPE.¹

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Plate XVIII.

THE phenomenal increase in the popularity of bird banding in North America, as a means of acquiring precise information bearing upon the problems of migration and life histories of birds, is responsible for a material interest in the results obtained by European investigators in this same field of research. The present

¹ In reading an account of bird banding in Europe the American reader should bear in mind that on a continent so divided politically and geographically as Europe, with the differences of race and language between different countries it has not been possible to organize banding, to use one system, or a uniform series of bands, nor one central control as in America; in Europe the banding has been done by single stations, or by scattered volunteers cooperating with the station in each separate country. American ornithologists have already seen and will appreciate more and more the very great advantage we have in the study of migration by reason of the uniform system extending the length of the continent, as well as the more uniform race of people and language; this advantage appears not only in greater probability of returns, but it makes it possible to organize banding stations along definite routes of migration.

While many American birds may travel far beyond the limits of the continent, many other species do not go beyond these limits or beyond this uniform system of banding control.

Again, the World War was a severe blow to progress in bird banding in Europe. Professor Mortensen had started serious study by means of banding in Denmark as early as 1899, and gradually it had been taken up by certain ornithologists in other countries and made good progress, especially from 1910 to 1914, but of course was largely prevented during the war and has made slow progress since.

Systematic trapping for the purpose of banding adult birds, and to recover them, has not been adopted in Europe to any such extent as in America. A