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Edited by **LYNDS JONES**

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INTRODUCTION.

NEARLY six years ago the writer issued a call to members of the Wilson Ornithological Chapter of the Agassiz Association, to begin a critical study of Warbler songs (family *Mniotiltidæ*). The object of this call was to secure a mass of notes descriptive of the songs, from many sources, so that by comparison and tabulation a fairly accurate representation of each song could be put upon paper. It was also hoped that the diurnal as well as the seasonal song period of each species could be determined accurately, and that many other little understood phenomena might become better known. The author of the scheme of study well understood the wide lack of acquaintance among the class of lay ornithologists with the large majority of the family, and hoped that this might be a means of awakening widespread interest in our most beautiful and interesting group of birds. But the responses were few indeed, indicating that the difficulties were greater than could be overcome by the average bird student. Lack of time to devote to the swiftly passing migrants in the early days of May was undoubtedly one great obstacle in the way of many a willing worker.

Failing in this plan, but anxious to bring the host of Warblers closer to those who do not already know them by their voices, the writer has undertaken the task of bringing together all printed descriptions of Warbler songs at his command, combining them with such contributions as have been made in manuscript, and his own notes representing fifteen years of study, thus presenting what is known to him of the songs of the Warblers. On another page will be found a complete list of the works consulted, including books and periodicals. The writer fully realizes that this is far from a complete bibliography of the subject, but it will illustrate the resources at hand.

The task of bringing together such a mass of printed and

manuscript descriptions has been second only to the task of determining in each case what must be allowed as a margin for the personal equation of the describer, and how much must be allowed for variation in the species. No intelligent comparison of the several descriptions could be made without a fairly satisfactory solution of these two difficulties. The method has been to select some species whose songs are clearly distinctive and not seriously variable. Three were selected: Oven-bird, Maryland Yellow-throat and Black-throated Green Warbler. The variation among the individual describers, when determined, will give the variation of the species.

There must be a large margin for mistakes allowed, particularly with the species whose songs are not personally known to the writer. A little study of ones notes in successive years will serve to show that we are prone to variations in our methods of representing the same songs from year to year, allowing as much as we please for variations of the individuals composing the species. The way our ears hear bird songs is often determined by our digestion. But there is always the possibility of finding an average for the whole series of notes. That has been the writer's effort in the body of the paper—to present the average of all notes of equal value.

Five years of teaching Ornithology in Oberlin College to all sorts of students, serve to show that descriptions of color patterns and habits are not adequate to the task of bringing this assemblage of small birds to the notice of the average person who becomes interested in birds. The song seems to be the missing link in the chain of acquaintance. Both the eye and the ear must be educated if one would learn the birds, and my experience indicates that the ear is the readier learner. Is that probably due to a tendency to color-blindness, or to weak eyesight on the one hand, and to a long series of unconscious ear training, on the other?

It is to the class of bird students who hope to find pleasure in acquaintance with the Warblers, rather than to those who already know them that this paper is addressed. It is hoped that by arranging the species in groups according to greater or less resemblance to each other it will enable the student to give special attention to one group before attempting the larger study of the whole group, thus some-

what simplifying the process of study. If this paper should prove of any assistance to lay ornithologists, and to those who find pleasure in casual notice of birds, the labor of preparing it will be fully repaid.

Acknowledgements are gladly made to Mr. H. W. Carriger, Sonoma, Calif. ; Mr. N. Hollister, Delavan, Wis. ; Miss Ethel Dane Roberts, Wooster, Ohio ; and Mr. Benj. T. Gault, Glen Ellyn, Ill., for valuable manuscript notes upon original field work. Particularly to Mr. Frank L. Burns, Berwyn, Pa., for painstaking study of several species not accessible to the writer, and for constant interest and encouragement when the future of the study looked dark and forbidding. Most of all are thanks due Professor Albert A. Wright for constant encouragement, and for patience and forbearance with me during "warbler time," when the many voices from the tree-tops proved more alluring than the duties which rightly called my attention away from the birds. Finally, it is with real pleasure that the writer reminds the reader of the close companionship, so often more than hinted in former numbers of this BULLETIN, between himself and Rev. W. L. Dawson, now of Ahtanum, Washington ; a fellowship to which the paper now presented owes far more than appears upon its pages.

While the serial arrangement of the species does not follow that adopted by the American Ornithologists' Union, the nomenclature does. The number following the name of the species will indicate its systematic position. It has seemed better to group the species according to their songs rather than according to their structural relationships. The geographical range, which always closes the discussion of each species, has been taken bodily from the A. O. U. Check List of North American Birds.

BIBLIOGRAPHY OF WARBLER SONGS.

THE following list of books and periodicals contains only those in which something of use bearing directly upon the subject has been found. General works on birds which contain no mention of Warblers are therefore excluded, but books treating the general subject of bird song, even tho they contain nothing specifically upon the warblers, are included. Neither here nor in the body of the report does it seem desirable to cumber the pages with exact references in the majority of cases. In many of the books the Warblers may readily be found in their systematic position, arranged in the accepted systematic order, and in nearly every book the index will prove a sufficient guide to the page from which the reference has been taken. With periodicals the case is somewhat different, and here specific references will be given where they seem necessary, in the body of the paper.

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Museum, The. W. F. Webb, Ed. Albion, N. Y.

Nidologist. H. R. Taylor, Ed. Alameda, Calif.

Oologist, The. Frank H. Lattin, Ed. Albion, N. Y.

Ornithologist and Oologist. F. B. Webster, Ed. Boston, Mass.

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WARBLER SONGS.

IN the development of birds away from the primitive reptilian type, there has been, in general, a tendency to decrease in size as well as to structural modifications brought about by changing environment. In order to increase greatly in numbers there must be a decrease in size if the world were to contain the host. Along with decrease in size there seems to have developed a tendency to vocal expression, culminating at the present day in utterances second only to speech—song. We are unable to attribute to a bird's vocal utterances, however complex they may seem, more than a momentary state of feeling, unless it be taught by man. Only the smaller birds truly sing; the muscles of their syrinx enabling them to give utterance to varied notes instead of a monotonous repetition of the same note.

In the higher development of the Oscines—the singing birds—there naturally grew differences in song just as there grew differences in structure and habits, producing more or less well defined groups. We might reasonably expect that if a group be sharply marked off from other groups structurally its style of song would also be sharply marked; that it would possess a distinct song-type; and if there be gradations between groups there would naturally be gradations in song likewise. In general we find this to be true, but in particular there are exceptions. Thus, while the Warblers certainly possess a song-type it distinctly grades off to the Sparrows, which are not otherwise closely related to them. So we are forced to find and define the song-type and work both ways from it out to the limits, and there seek to distinguish certainly between the two which seem to grade into each other.

The warbler song-type may be defined as a high pitched, hissing whistle consisting of two well defined parts, usually on a different pitch. There are many and decided departures from this type, the one extreme being a monotonous repetition

of a single note like the Chipping Sparrow, the other a composite song so varied that it approaches a mimicry of many songs. I have selected the Yellow Warbler as representing nearly the type song of the family. We might further say that this type song usually consists of about eight syllables, the first phrase of four or five uttered more slowly, the remainder more rapidly and on a different pitch, sometimes higher, sometimes lower. With some species the pitch is so high that it approaches the vanishing point to many ears. But there is an indefinable woodsy quality to all warbler songs which is not shared by the members of any other group which bears any troublesome resemblence to the warbler songs. It is a quality that can be learned in a little time with the birds as they sing, but cannot be transferred by word of mouth or printed signs. Before leaving the song-type let me define the hissing whistle. It can be closely imitated by forcing the breath over the tip of the tongue as it is held against the upper teeth, modulating the pitch of the resulting thin whistle with the lips instead of with the tongue as in the ordinary direct whistle.

SONG PERIODS. DIURNAL.

Having learned the Warbler song-type, we are prepared to begin a study of the separate songs as the species pass in review before us. We shall not proceed far in this study before we discover that certain times of the day are preferred for singing by most of the species. Their day begins in the early morning twilight with a burst of song, and is carried with the quest for food as the light strengthens; the intervals between songs gradually lengthening as the day advances, until the appetite is satisfied, when the bird ceases song to rest until the afternoon brings round the feeding time again. The afternoon song period is marked by less singing than the morning, and the twilight marks its close. It is difficult to say when the morning period ends and the afternoon begins in the case of any individual birds; but in general, we hear few songs between ten in the morning and three in the afternoon, especially during warm weather, when the noon hours are of high temperature. During cool or wet weather the morning period begins later and the evening closes earlier, while some

birds will be in song all day long. But it must be remembered that some species do not follow any rule about their singing, and that with the majority of the species we know little about them except as they pass us on their way to the north. It may well be that the all night journey, as they migrate, makes the noon-day sleep necessary, while at their breeding grounds they have little need for that rest and so sing all day. But with many of the species which remain with us to nest there is the noon-day resting time all the season.

SEASONAL.

There are seasonal song periods as well as diurnal. These will be spoken of in the discussion of the several species, so that I need only discuss here the general subject.

Most male Warblers sing more or less during their northward journey, and until the care of the young leaves no time for song. Singing begins at least as soon as the northward journey begins, reaches its height while the mate is brooding over the eggs, then gradually declines as the cares of the family increase, ceasing entirely with the beginning of the molt which follows closely the complete development of the young into independent foragers. After the plumage has been renewed, some species have a short song period before leaving for the south again. It is difficult to say how large a number thus renew their song, but the writer's list includes twelve species positively identified, with several others about which there may be some doubt. It is more than likely that a far larger number sing at some time during the autumn months, either regularly or occasionally. Few songs will be heard, during this second song period, except in the early morning hours under favorable conditions. With some species the second song period is marked by a somewhat different song, and with many by a weaker one.

It is suggestive that the species which are known to sing during autumn are those whose color patterns are practically the same at all seasons, or at least not markedly different in fall from the spring dress. The spring song period is accompanied by enlargement of the reproductive organs, but the resumption of song in the fall is rarely so accompanied. It is not likely that all individuals of a species which has a second

song period sing then, but that a few do. Many are too fat to sing, and no doubt many do not sufficiently recover from the debilitating effects of the molt to sing.

It is not unusual to hear feeble attempts at song early in the autumn from not fully fledged birds, sounding like a bird whose vocal chords were unable yet to respond to the will. Gradually the song becomes more and more perfect as the days pass until it again becomes normal. Many times these are not young birds, but old ones just completing the molt. Disuse of the vocal muscles, or change due to the molt may account for these first unsuccessful attempts at song renewal.

TWO KINDS OF SONG.

We shall not proceed far in our study of Warbler songs before we are greeted with surprises. We shall find that all of the individuals of a species do not sing alike, and that the same individual is not always confined to one style of song. Sometimes the variations may be considerable, sometimes scarcely worth noting. We shall not proceed far in our study of these variations before we may be greeted to a fresh surprise in the form of a song wholly different from anything before heard from the bird, which cannot be forced under the designation 'variation.' It is something apart from the ordinary utterance, both in quality and quantity. The manner of utterance strongly suggests that this is a passion song. We are now forced to distinguish between what we have before considered the song of the species and this newly discovered song. For convenience the first one may be designated the

CALL SONG.

What do we mean by Call Song? It is the song which we hear commonly: the song of every day, uttered under no special stress of circumstances, as a sort of accompaniment to the usual activities. It is an announcement to all other birds within hearing, of the singer's whereabouts. It becomes a distinct mate call when the breeding grounds have been reached, if it could not be so considered before. After mating and the selection of the nest site it becomes an announcement of ownership and a warning to all trespassers. During

mating it is often a challenge or cry of defiance, and may sometimes become the battle cry when the fight is on. With some, possibly many, species it is used during courting as a love song, when it may be somewhat modified, thus approaching the passion song. It is always an announcement of some sort to some other birds, and may, therefore, be properly termed a call song. Not usually being reserved exclusively for the mate nor for himself, it might also be designated the altruistic song, as distinct from the egoistic or

PASSION SONG.

What, then, is the Passion Song? It is an outburst of melody of such richness and fullness, such thrilling ecstasy, that the singer is lifted into the air on quivering wings to pour out his melody without a pause until the inspiration has passed. The call song is the product of a deliberate purpose, but the passion song wants no purpose. It bursts forth unbidden. We have supposed that the passion song is purely a love song, intended only for the mate, since it is usually uttered only in seclusion and at times when vulgar ears are not supposed to be listening. There is little doubt that during the mating and nesting season it is a love song, but I have repeatedly heard the song of Oven-bird long after the young had left the nest and were no longer dependent upon their parents. I venture the suggestion that this song is induced by an overflow of energy which finds expression in this way. It is a sort of hymn of praise for the mere privilege of life. It is so far different in execution from the call song that there is no ground of comparison. The performance is a continuous thrilling warble with no plan nor suggestion of pause, accompanied by fluttering flight or swift dartings about an open space in the woods. The favorite time is just as twilight begins to cast its hush over nature; but it may be heard in the morning twilight, or sometimes during a dark, damp day when there are twilight conditions. Once I heard it from an Oven-bird on the approach of a thunder storm about nine in the morning. While the song is so unlike the call song, it may be a medley of the notes of that song, or begin with a few notes of the call song and close with a complete rendering of it.

I doubt if a hard and fast line can be drawn between the two styles of song, and I question if even now there are not some species whose call songs are not growing toward the passion song. Certainly some show a tendency in that direction, both in the modification of the notes of the song and the manner of utterance at stated times or under peculiarly favorable conditions. Some species manifestly employ the call song for love making without much modification. When the song is given during the chase after the female it is uttered in the throat or only faintly warbled by many species, as tho the attention could not be divided between the flight and the song, each needing it all.

The writer knows of only a dozen species who have a fairly distinct passion song. Preeminent among these stands the Oven-bird, so often mentioned above. It is not likely that these are all that sing so, since nearly every year hitherto has seen the list swelled. I would not be bold enough to say that all Warblers sing a passion song that is unlike the call song, but there can be ltttle doubt that more than this dozen should be found to.

VARIABILITY IN THE CALL SONG.

To the most of us a Yellow Warbler is a Yellow Warbler be he number one or number one thousand in the list of individuals. We recognize no difference in the different individuals of a species in any limited region where we study. And it is true that the individual differences of color pattern, while sufficiently unlike to make a mistake among the birds themselves as to which is their mate unlikely, are practically alike to us. But it is not so universally true with the songs. A singer is not confined to one style of utterance, even under like conditions. I mean many species are not, possibly all. But some are far more variable than others. A common variation lies in shortening or lengthening the usual song by dropping or adding syllables. Another common method is the change of position of syllables that are somewhat different, or a change of accent. Sometimes a single syllabled song may become double syllabled, or vice versa. The closing cadence may either rise or fall at the pleasure of the singer. But these variations do not much affect the character of the song, nor

make it difficult to identify to any but the one who is hearing it for the first time. Another variation often indulged in by some of the more versatile singers is the substitution of one vowel sound for another. When this is accompanied with the variations noted above there may be some difficulty at first, but when the *style* of utterance is once learned variations are not deceptive, but rather pleasing for their variety. Each species has a style all his own which can be relied upon in any given locality, however variable his song may be.

There seems good evidence that there is also a seasonal variation, or a migratory variation. Some birds sing one style of song when they start from their winter homes for the north, another during the latter part of their journey, and still another when they are well settled for the summer. How universal this is I am unable to say. With some species the difference between the songs is decided, in others much less so. It would be interesting to know whether nesting birds of one species sing the same in all localities where they nest, or whether there is variation of much consequence. My own notes show only that with the few species which nest in Lorain county, Ohio, the songs of the birds which remain are somewhat different from the songs of those that pass further north. Do the Ontario nesting birds sing like the Ohio nesting ones? Probably.

Is there a longitudinal variation as well as a latitudinal one? If any probably far less marked. With some other species, notably the Dickcissel, there is a marked difference between the singing of the Iowa and the northern Ohio birds. If there is such a difference among the Warblers the notes at hand give no evidence of it. We might naturally look for some variability in the sub-species, growing into recognizable permanent differences, since they are variations in other respects from the species. But we might argue from this that since genera are assemblages of species which in some prehistoric time evolved from a common stock by differentiation, that therefore the songs of all the members of a genus should bear a closer resemblance to each other than to those of any other genus. Either this is not true, as we shall see, or else the present system of classification is wholly wrong; an unlikely supposition. Often species of widely separated genera resem-

ble each other more than species of the same genus. But it must be said that the closest resemblances anywhere found do lie within the genus, and between the species which are placed side by side in classification. An artificial key to the songs would therefore group the species as unnaturally structurally as an artificial key to their colors. But let us defer further discussion of variability until the study of the several species again brings it into prominence.

We have become somewhat biased, I am afraid, in our opinion that among the birds song belongs only to the males. In large measure that is undoubtedly true, but it is not universally true. The female Redstart sings at least one of the variations of the male, and I have heard a feeble song from the female Maryland Yellow-throat. The female Audobon's Warbler is said to sing. I have suspected the female Yellow-Warbler and the female Oven-bird of it.

DIFFICULTIES, AND METHOD OF PRESENTATION.

THE difficulties which one who attempts a description of the songs of the Warblers meets at the outset seem almost unsurmountable. First of all is the 'personal equation' of the describer as well as the 'personal equation' of the one for whom the description is attempted. This may be minimized by combining notes from many describers, thus securing a sort of Volapuk description, which will really be a generalized song possibly suggestive to most persons already familiar with the song, but practically useless to the novice. The writer's practice, where there is considerable difference in the descriptions, is to combine those that are alike into a type, and then illustrate each type. Where this is not done practical agreement may be assumed.

Another difficulty lies in the variability of individual birds composing the species. Without such variability there would be no progress of the species toward a more perfectly developed song. But the variation here is less of a hindrance to the intelligent understanding of a description than the difficulty stated above. Indeed, I am not sure but this difficulty is a blessing in disguise, for some one of the variations may fit the description for the learner, where an unvariable one would utterly fail.

The one great difficulty lies in the almost entire lack, among human signs and symbols, of anything to even approximately represent birds' voices. We can only suggest with the means at hand. Our systems of musical notation are wholly artificial and mechanical, theirs wholly natural and unhampered. Our ears have become so accustomed to certain fixed intervals in the chromatic scale that we are prone to regard them as absolute necessities to any sort of melody. But if that be not true, there yet remains the entire lack of characters with which to represent the avian music in terms of human music. The learner's first need, then, is to become accustomed to bird music experimentally. It is not necessary to know what species is singing;

that will follow in good time. Equipped with the knowledge of what bird music is, the student can go on to a study of the characters common to the members of some group, this in turn followed by study of the individual species. It is not at all necessary to know the songs of many species of a group before the group type is learned. The songs of a half dozen or less will be enough.

To appreciate the realness of these difficulties one need only scan the pages of a few books wherein bird songs are described. Taking each description at its face value we should be compelled to believe that there is no constancy to a song-type within the species. But these diverse descriptions are often descriptions of the same individual bird, sometimes written by different persons at the same time standing side by side. It simply illustrates the first mentioned difficulty: that we see things differently, hear sounds differently, call up the same impression differently, are differently impressed by the same thing; and, of course, represent the same thing differently.

In view of this it would be time and effort wasted to attempt a description of the melody in the song of each species. Rather let the effort go into a representation of the more mechanical production of the song. The melody can be hinted in word description, and more or less of it will appear if the attempt be made to reproduce the song from the description given.

THE METHOD.

There are objections to any system of representation, because each, and even all taken together, are wholly inadequate, but some method must be employed. The system most widely used is the system of syllables. The birds do not speak syllables, but our minds seem to need something of the sort to fix upon as a suggestion of the sort of sound produced. We seem to associate high pitched, shrill sounds with the vowel *e*, low whistling sounds with *o*, or *a* as in ah; terminal sounds not too high pitched become *u*. Short, high-pitched sounds are like *i* in it. The chief objection to this system probably lies in the great diversity of the vowel sounds, making uncertain what sound is intended. This may be obviated in large measure by agreeing what sound each vowel shall always represent.

In this paper *a*, *e*, *o* and *u* are long, but *i* as in it. Double vowels represent a prolongation of the note which the syllable represents. The consonants have the sounds which their position necessitates. In addition to syllables, a system of dots and dashes, which I have found valuable in field work, is given where greater clearness seems to be gained by its use. The chromatic scale has not been used enough in the printed descriptions, nor in my own field work, to make its use here practicable. It would no doubt prove of great value if used for every species, furnishing means for fairly exact comparisons, but when employed only here and there and for but a few species the gain over arbitrary characters would be slight.

The method employed for presenting the subject differs from that usually employed. Instead of treating the species separately and in systematic order, it has seemed better to largely disregard the systematic arrangement for the sake of grouping the songs according to similarities exhibited in method of delivery, expression, or what not. Assuming an evolution of song, the order within the group is, so far as practicable, from the most primitive to the most specialized. But where a type has been taken, the order is from the ones most similar to those most dissimilar to the type. This leads us to speak briefly of the probable origin of bird song.

Mr. Charles A. Witchell, in his book, "The Evolution of Bird Song,"* says in substance, that voice probably grew out of grunts and hisses accidentally uttered during extreme fright or during combat. These became call notes by bringing to the aid of the one in distress those of his own kind as helpers. Call notes grew into call songs by the repetition of the simple call notes, modification naturally following to produce, in time, a song more or less different from the call note. And I may add, the call songs have grown into passion songs by a process of still further modification induced by an overflow of physical and perhaps mental vigor at certain seasons, no doubt emphasized by the migratory habit of the larger proportion of the class. We cannot stop to follow out the steps in the development of bird song here. Those who desire to do so should read the book above referred to.

*The Evolution of Bird-Song; | With | Observations on the Influence of | Heredity and Imitation. | By Charles A. Witchell. | London. | Adam and Charles Black. 1896.

WARBLER SONGS.

THERE are, or were at the last count, fifty-seven species and sixteen subspecies of warblers accredited to North America north of Mexico. Of this number the writer has been able to find described more or less fully the songs of forty-six species, leaving eleven species yet to be studied. Of the subspecies it may be said that the songs are so similar to the songs of the species from which they have sprung that they are practically indistinguishable and so need not be counted in the final result. If there are exceptions I have been unable to find them.

These forty-six species (with their subspecies where any occur) can readily be divided according to the style of song, and the divisions subdivided, but it must be understood that this style of division plays havoc with the accepted systematic arrangement of the group. For convenience we may first distinguish two groups: Those with whistling songs; those with song otherwise. Treating the latter group first because it includes the more generalized species if not the more generalized types of song, the sub-group which seems naturally to stand first may be designated:

THIN, WIRY, HIGH PITCHED SONGS.

While this may seem an arbitrary and therefore unnatural group, it is convenient in bringing together songs which are readily over-looked amid the May medley of stronger voiced singers. If, as seems likely, this type of song is the more primitive one, the group is not an unnatural one.

Perhaps the only character strictly common to every member of the group as here constituted, is the high pitch of the song. Some songs are wiry, some insect-like, some thin without being wiry, but all are high in pitch—so high that some ears seem incapable of hearing them unless close at hand. But it does not follow that these songs are weak. On the contrary, some of them carry far, just as the shrilling of the cicada carries far.

Grouping within this group seems so impracticable that a treatment of the species separately in systematic order would appear more desirable.

Black and White Warbler. *Mniotilta varia*. 636.

The migrating song of this warbler is a thin, wiry sibilant of repeated single syllables, or a series of double syllables, ending, in both cases, with two shorter syllables. The one type is well represented by the syllables *tse tse tse te te:* the other by *ki-tse ki-tse ki-tse se se*. Not seldom the performance seems to consist of a series of closely connected syllables, like "*che-a-wee-a-wee-a-wee*" (Burns). The accent on the syllable "wee." In every double syllabled song the accent is on the second syllable.

Apparently the migrants sing but little and then fitfully. Some seasons none are heard singing at any time. It is one of the last warbler songs that most of us are likely to learn, unless the circumstances be more than usually favorable. According to Nuttall the latter, presumably the breeding, songs are decidedly mellowed and somewhat resemble some songs of Redstart.

During the migrations the birds are to be found in considerable numbers in almost any sort of woods, as well as in village and city parks and tree lined streets. They are not found west of the Plains, but are birds of the eastern United States.

Blue-winged Warbler. *Helminthophila pinus*. 641.

The ordinary call song of this species has a decided insect quality. He seems to inhale a shrill *zre-e-e-e-e-e* and immediately exhale a buzzing *zwe-e-e-e-e-e*, the whole performance comprising a perfect double run thru about half an octave of the scale. Often it seems to be a simple *zwe-e-e-e-e-e ze-e-e-e-e-e*, the latter part merely a sputter. At its best the song is a drowsy, locust-like shrill, belonging rather to mid-summer than to spring.

There is another song which is usually given during the early summer months, but which I have heard shortly after the arrival of the bird in the last days of April or the first days of May. This song is far more varied and has a far

better claim to be called a song. Mr. Chapman renders it *wee, chi-chi-chi-chi, chur, chee-chur.* Mr. Burns reports still another: *che-de-de-e, che-e-de-de, che-de-de-dee,* resembling the Chickadee some what. These songs may possibly stand for passion songs, since they are far sweeter and more powerful than the other; but they are not flight songs.

There are two definite song periods, the first beginning with the bird's arrival and ending about the middle of June, during which time the insect song is given almost entirely; the second one beginning late in July or early in August and continuing to the third week in August, this period being characterized by the more varied song, but not to the entire exclusion of the other.

The Blue-wing delights in the second growth bordering uncut woods, where the ground completely dries only in midsummer. Here he perches on the topmost twig of some ambitious young sprout or high bush and sings his hours away. For his later song he seems to prefer a less conspicuous perch among the lower growth.

This is another eastern species, ranging west to Nebraska and Texas, and north to southern New England and Minnesota.

Parula Warbler. *Compsothlypis americana.* 648.

Parula's song is hardly wiry, but it is fine and delicate — more like hair than wire. The more delicate singers seem to say *pe-tse, pe-tse, pe see see,* with a slight accent on the second syllable of each phrase. A rendering less delicate and probably more commonly heard, Mr. Burns represents thus: *cher-re-re, cher-re-re, cher-re-re,* and *cher-er, cher-er, cher-er che-e-e-e.* This is heard often during the migrations. There is a tendency to an increase in volume to the end, the first notes being more softly uttered.

Mr. Bicknell recognizes two distinct songs. "In one, the notes coalesce into a fine insect trill; in the other, four similar notes are followed by four others, weaker and more quickly given."

It sings thruout its spring migration, and is sometimes heard during its return south. I have been unable to find any record of the time when its song closes at its breeding grounds.

Northern Parula Warbler. *Compsothlypis americana usneæ.* 648a.

The remarks on song are here given under the specific form for the sake of uniformity, but they really apply to the subspecific form. The Parula Warbler is the southern form, occuring in the south Atlantic and Gulf states, north in the interior to Mt. Carmel, Ill. ; the Northern Parula Warbler breeds along the norther tier of states and into Canada, and west to the plains. There is nothing to indicate that the songs of these two forms differ perceptibly.

Cape May Warbler. *Dendroica tigrina.* 650.

The lack of much definite information about the song of this warbler in the literature of bird songs, will attest the general rarity of the species. The only studied attempt at a description seems to be that of Prof. A. W. Butler in his Birds of Indiana. "*a-wit a-wit a-wit a-wit a-wit*, each pair of syllables repeated five times with moderate rapidity in the same tone, with no inflection." This description answers very well for the songs which I have heard if it be added that the effect is only less wiry than that of the Black and White Warbler. The birds sing on their northward journey but nave not been reported on their return south among the singers.

I have found more individuals in orchards than anywhere else. The only ones seen in Lorain County, Ohio, to my knowledge, have been in the orchards within the village. But they are known to flock with other members of the family in the woods.

In the nesting haunts the male seems to delight in mounting to the top of a tall tree and there pouring out his song while the female broods over the eggs in a low bush at some distance, thus misleading the nest hunter.

Another eastern species, west to the plains and north to the Hudson Bay Territory.

Cerulean Warbler. *Dendroica rara.* 658

Six different writers agree in their descriptions of this bird's song. It consists of two distinct parts, the first of several definite single syllables with a comma pause between

each two, followed by a trilled syllable of about double the length of the first part. There is thus a marked resemblance to Parula's song. The syllables *tse, tse, tse, tse, te-e-e-e-e-e-e-e-e*, serve to recall it to mind. The song rolls up the scale quietly and evenly. The effect is less delicate than Parula's song, yet not more wiry. A larger song from a larger bird.

My notes indicate that this warbler sings from his arrival in the first week in May until the third week in May, and again during the last of June and first week of July. I have never heard it sing during the fall migrations and find no record of a song period then.

This is a bird of the interior of the United States between the Alleghanies and the Plains and north to Ontario.

SONGS OF STRIKING CHARACTER.

Under this heading are grouped those species in whose songs there is not only distinct individuality to so great a degree that resemblance to any other species is too faint to be considered, but in which there is a decidedly striking effect. It does not follow that the songs are loud, nor that they are always sharp and clear, but simply that they arrest the attention by reason of their individuality. Here, again, we are unable to arrange the group logically, so that we must fall back upon the systematic arrangement. First in order and probably also first in prominence is

Protonotary Warbler. *Prothonotaria citrea*. 697.

It is sufficient to say that Prothonotaria rings out a *peet, tsweet, tsweet, tsweet, tsweet, tsweet*, which sounds like the Solitary Sandpiper in the distance. One could hardly mistake it. It is high pitched, penetrating and startling. Mr. Nehrling calls him a fitful singer, but heard at all times of day and in all weathers. Mr. Nehrling also reports a passion song which is like the Oven-bird's passion song, reserved for select occasions only.

This is a water-loving species, frequenting low trees and bushes which hang over the water or which grow in swampy places. But there are many instances of more upland occurrence during the breeding season. In some regions at least,

the birds are familiar objects about the premises, and may also nest about bridges which are in constant use. Dr. Thomas S. Roberts has an interesting article in the July, 1899, *Auk*, in which he figures nests of this bird in a bridge over the Mississippi River opposite La Crescent, Minn.

I find no evidence of a second song period.

This Warbler is found over the eastern part of the country west to Kansas and Nebraska and north into Minnesota, breeding thruout its United States range.

Sennett's Warbler. *Compsothlypis nigrilora.* 649

The only note relating to the song of this Warbler that I have been able to discover is contributed by the discoverer, Mr. George B. Sennett. He says of it: "Its notes are so clear that they can be heard at a long distance, and are readily distinguishable from those of all other birds. There is thus a marked departure from the type of the other member of this genus.

In the United States this species is confined to the valley of the lower Rio Grande in Texas.

Black-throated Blue Warbler. *Dendroica cærulescens.* 654.

This bird's versatility is one of his chief characteristics. And the college campus birds seem to be rather more musical and more versatile than those in the woods. Here, on the campus, in one season, I have recorded the following variations:

tu, euu euu eeee-e-e, soft at first, loud and rattling at the close.
chweu chweu chweu, uniform thruout.
chw' chw' chw' chwee, the last syllable strong and full.
twe twe twe z-z-z-z-z } indistinct at first, gathering force
te zwee zwee zwee-e-e-e, } and closing high and shrill.
we we z-z-z-z-z-z-z, harsh and penetrating.

All writers agree that the song begins faintly, rapidly gathering force until the shrilling climax of the last syllable is reached. It is difficult to describe; but perfectly distinctive.

The spring migrants are with us for two or three weeks in May, singing during their stay, and returning in September when they rarely sing.

The birds love the underbrush in the woods, but remain well up in the trees on the campus where they associate with the other tree haunting species.

Another eastern species which ranges west to the plains and north to Labrador. The form which inhabits the higher Alleghanies has been described as

Cairns' Warbler. *Dendroica cærulescens cairnsi.* 654a.

The song and habits are likely identical with the species.

Golden-cheeked Warbler. *Dendroica chrysoparia.* 666.

This species is given this place on the strength of a statement that its song of '*tser, weasy-weasy-twea*', bears a resemblance to the song of the next species. The song is described by Mr. Nehrling as composed of soft notes. It also suggests some of the variations of Redstart.

It is a Mexican species which crosses into south-western Texas.

Black-throated Green Warbler. *Dendroica virens.* 667.

While there is great diversity in the descriptions of this Warbler's song, there is clearly evident in all the descriptions the one peculiar type of song. No better illustration of the diversity in hearing and interpretation could be afforded than this list of syllable descriptions. The syllables which best describe the type song to me are: *pe, te, che-o, te*, or *pe, te, che-to, che*. The enunciation is clear cut and the effect very pleasing. It is an unique song. In musical notation it would stand something like this: ' ' ' . ' Not seldom there is a double variation which might be represented thus: ' ' ' . ' ' In every case the third and fourth syllables, and in the second case the fifth and sixth also are tied together, the others being staccato. It is the one Warbler song that students beginning the study of birds hear and heed.

During its stay, this Warbler is decidedly common on the college campus as well as in the woods. It also ranges the village streets—overhead.

The birds are usually with us for the first three weeks of May, singing during the whole time. They return again in

September, but I can find no evidence of another song period then.

The range is the same as the other eastern Warblers, reaching the Plains in the west and Hudson Bay Territory in the north.

Townsend's Warbler. *Dendroica townsendi.* 668.

Of this western species Mr. Merrill says: "The song is like *de, de, de-de, de,* all especially the first three notes, like Black-throated Green. It is different later in the season."

Western North America, east to central Colorado, north to Sitka, Alaska.

Prairie Warbler. *Dendroica discolor.* 673.

The remarkable quaintness of this Warbler's song cannot be suggested on paper, unless Dr. Coues has done so in his remark that it is "Like a mouse complaining of the toothache." The notes seem to suggest *zee* syllables repeated six or seven times, deliberate at first, increasing to rapid at the close. It is perhaps sufficient to say that no one, not even the novice, could listen to the song without having his attention instantly riveted.

I find no notes regarding the length of its song period, nor as to whether it has a second song period.

The bird delights in thickets and brushy fields and pastures, or almost any treeless thicket.

It is another eastern species, ranging west to the Plains and north to Michigan and southern New England.

Macgillivray's Warbler. *Geothlypis tolmiei.* 680.

Rev. W. L. Dawson's description of this western species' song seems to fit the case, *sheep, sheep, sheep, shear, shear, sheep,* or *sheep, sheep, sheep, sheep, shear, sheep,* bearing a good resemblance to the song of Dickcissel.

It is a bird of the western United States, from the eastern foot hills of the Rockies to the Pacific coast, and north into British Columbia.

Hooded Warbler. *Wilsonia mitrata.* 685.

Mrs. Wright represents this Warbler's song thus: *che-*

wee-tsip, tsip, che-we-ee. While Mr. Chapman makes the bird say, "You must come to the woods or you won't see me." Rev. J. H. Langille recognizes a day song, *che-ree-cheree, chi-di-ee;* and a twilight song, *whe-ree-whee-ree-eeh.* The first three syllables of the day song are loud and bell-like, the next two uttered rapidly, the last with falling inflection.

According to Mr. Bicknell, the first song period closes late in June or rarely as late as early in July, the second during the fourth week in August. He recognizes the two sorts of song which seem to be of the nature of individual variation rather than two distinct sorts.

Eastern North America, west to the Plains, north and east to southern Michigan, southern Ontario, western and southeastern New York, and southern New England. Breeds from the Gulf of Mexico northward.

SONGS RESEMBLING THAT OF CHIPPING SPARROW (AND JUNCO).

The common character of this group is the trilling. Some of the songs are decidedly shrill and almost wiry, but lack the distinctive characters of the first group. Some are fairly round and full, but could not properly be designated whistles. Some are somewhat striking in character, but all are distinctly trilled. It must not be understood that the songs necessarily bear a close resemblance to the monotonous trill of the Chipping Sparrow because that species has been used as a comparison, but simply that the sparrow is the bird most likely to be most generally known. The order adopted in this group will be from the closer to the less close resemblance to the song of Chipping Sparrow, which is a trill or twitter of successive chipping syllables, monotonous, high pitched and weak in utterance.

Worm-eating Warbler. *Helmitherus vermivorus.* 639.

Song of the Chippy quality, but weaker, and bearing some resemblance to that of Junco. Mr. Burns describes a song that resembles that of Goldfinch: *chat-ah-che-che chee-chee-chee,* which seems to correspond well with a passion song in the manner of utterance.

The favorite resort of this bird is a dry, wooded, moderately rough region, where the brushy hillsides and ravines furnish a cover. He sometimes ventures into the open also.

This Warbler sings from his arrival in early May until the end of the first week, rarely into the second week, of July. Mr. Bicknell records a second song period during the latter part of August.

Eastern United States, west to Nebraska, north to southern New York and New England. Breeds throughout its United States range.

Bachman's Warbler. *Helminthopila bachmanii.* 640.

According to Mr. O. Widmann, this Warbler, the Worm-eating, Junco and Chipping Sparrow sing remarkably alike. But the song of Bachman's Warbler is shriller than that of Chippy instead of being weaker. There is a little unconfirmed evidence that it also has a passion song. Mr. Brewster describes the migrating song as resembling that of Parula Warbler.

I find no evidence of a second song period.

While migrating it keeps well to the treetops, but Mr. Widmann found the breeding birds in the St. Francis region of Missouri singing in the trees perched rarely higher than forty feet. His paper on the finding of the first nest of this species, in the *Auk*, Vol. XIV, page 305 to 309, is an admirable account of the habits of the birds.

Hitherto Bachman's Warbler has been assigned to the south Atlantic States (southern Virginia and Florida) and westward to Louisiana, but Mr. O. Widmann's labors have extended its range into south-eastern Missouri.

Golden-winged Warbler. *Helminthophila chrysoptera.* 642.

The monotonous is emphasized in this bird's song by its being lazily and and drawlingly uttered. It is an unmusical song. Mr. Samuels has described it: *zee-zee-zee-zee-zee.*

There seems to be nothing relating to the length of the song period, nor whether there may be a second one.

The bird haunts the scrubby second-growth, or even the

borders of dense woods, but when singing prefers the tops of the taller trees.

Eastern United States, north to southern New England, southwestern Ontario, and southern Minnesota, breeding only in the northern parts of its range.

Tennessee Warbler. *Helminthophila peregrina.* 647.

The song would be scarcely distinguishable from that of Chippy but for the first two syllables. They are not the ordinary "chip," but more like "twip." There is also a tendency to acceleration and increase in volume as the song proceeds, in this also being unlike Chippy.

It arrives during the first week in May and tarries well into the third week, singing during its stay. There is no second song period on its return, about the middle of September.

My experience indicates that this Warbler is far more common in orchards than anywhere else, particularly orchards in the middle of village blocks. Comparatively few are met with in woods. Others, however, in other places, find him commonly in the woods with other Warblers.

Eastern North America, north to Hudson Bay Territory, breeding in the northern parts of New York and New England northward.

Hermit Warbler. *Dendroica occidentalis.* 669.

The song is a penetrating twitter, harsher and more run together than that of Chippy. Mr. Chester Barlow describes the song thus: *tsit tsit tsit tsit chee chee chee*, the first four syllables gradual and of uniform speed, ending quickly with *chee chee chee*.

There is no mention of the length of the song period, nor of a second one.

This species ranges from the Rocky Mountains to the Pacific coast and from Washington southward.

Pine Warbler. *Dendroica vigorsii.* 671.

Mr. Chapman says of the song of this Warbler, that the southern ones sing like Field Sparrow, but the northern ones like Chippy. I have heard but one sing, and his song

closely resembled the song of Chippy, but was higher pitched and more deliberate.

The birds probably sing during their stay in the migrations, but I find no record of a renewal of song on the southward journey.

Eastern United States, west to the Plains, north to Manitoba, Ontario and New Brunswick.

Palm Warbler. *Dendroica palmarum.* 672.

The trill remains as a prominent feature, but the note is no longer a true chip. Better *tsee tsee tsee tsee*, with a distinct swell. Each syllable should be given a half double utterance except at the middle of the swell, where the greater effort seems to completely coalesce the half double quality into one distinct syllable. There is a little similarity to the song of Myrtle Warbler, but lacking the liquid quality of that species.

The Palm Warbler arrives late in April and tarries well into the third week of May, singing fitfully the while. He returns again in the second week of September, but does not sing.

The Spring setting for this Warbler is a low, damp or wet woods with a profusion of undergrowth.

This specific form occupies the interior of the United States, north to Great Slave Lake. Rare in the south Atlantic States during the migrations. While the

Yellow Palm Warbler. *Dendroica palmarum hypochrysea.* 672a.

Occupies the Atlantic States, north to Hudson Bay. This sub-species, from all I can learn, does not differ in song from the species.

Myrtle Warbler. *Dendroica coronata.* 655.

There is some variation in utterance with this species, but the general effect is a trill or twitter, therefore bearing a closer resemblance to the Chippy than to any other group. The syllable *tsee* repeated several times gives a fair idea of the quality.

The Myrtle Warbler is with us from the third week in April until the third week in May, singing constantly; and

again throughout October, when no song has been heard nor reported.

Except when Myrtle bushes entice him away, the Myrtle Warbler keeps well to the higher woods during the vernal migration, but seems just as partial to fields during the return.

This is a bird of North America, chiefly east of the Rocky Mountains, breeding from the northern United States northward. A Pacific coast form has been described as

Hoover's Warbler. *Dendroica coronata hooveri.* 655a.

Audubon's Warbler. *Dendroica auduboni.* 656.

Dr. Coues states that the song of this species closely resembles the song of Myrtle. Without describing it Mr. Merrill states that the male has two distinct songs, and that the female sings.

The species replaces the preceding one west of the Rockies, north to British Columbia. It is accidental east to the Atlantic coast.

Black-poll Warbler. *Dendroica striata.* 661.

In execution the song resembles that of the Myrtle—all in the same pith and containing a perfect swell, but sounds more like "striking two pebbles together," therefore lacking the liquid quality of Myrtle. There are two renderings, the more musical one containing a prelude of three or four distinct notes, like *tsip tsip tsip*, followed by a twittering *tsee tsee tc*. The other song is merely a twitter.

The Black-polls arrive late and make but a short stay, singing the while. They have no song period on the southward journey.

They remain well up in the trees, and seem rather partial to the woods to the almost entire exclusion of parks.

Nearly the whole of North America east of the Rockies, and to Alaska and Greenland. Breeding from northern United States northward.

SPECIES WHOSE SONGS RESEMBLE THAT OF YELLOW WARBLER.

Considered according to the manner of utterance this is a

fairly satisfactory group, and as to quality of tone there is evident correspondence, but beyond these it is an unsatisfactory arrangement. The four species which sing alike in many ways may perhaps be sub-grouped by themselves, leaving the remaining four in another sub-group.

This type of song has a marked singleness and earnestness of purpose which at once arrests attention. The song is not given as a sort of afterthought, or a thing of secondary importance, but it requires a pause in the other activities until the lay is finished. The syllables are clear cut, and the song has a distinct beginning and as distinct an end. It is complete in itself. The earnestness of utterance often becomes vibratory, approaching the passionate, yet distinctly non-passionate in style.

All of the songs are high pitched, but clear and smooth, just too high to be called a shrill whistle. They are simple songs, every one, yet with a distinct touch of sweetness that makes them pretty. Perhaps no better idea of the style of this song-type can be given than by a careful description of the song of the

Yellow Warbler. *Dendroica æstiva.* 652.

While there is no little variability there is little likelihood of confounding any of the variations with other species. Now it is *sweet sweet sweet sweet sweeter sweeter*, now *sweet sweet sweet sweetie*, again *wee-chee, wee-chee, wee-i-u;* once more *wee-chee, chee, chee, chur-wee.* Over all presides the bird's distinct individuality. In all the variations I have heard the penultimate syllable is at a higher pitch, if the last phrase be three syllabled, lower if the last phrase be two syllabled. There is also a tendency to an increase in cadence to the last. The whole song is forcible and loud, but smooth and pleasing. It will be seen that in each variation there are two parts, though the last may be but a double syllable.

There is no second song period, because singing does not cease until the last of July or the first week in August. It should be remarked, however, that there is a marked decrease in singing after the middle of July, at least in northern Ohio. Sometimes individuals are heard singing after the middle of August for a few days.

This Warbler's haunts are even more distinctive than his song. He frequents brushy woods and low gardens which abound in small shrubs, and is a well known orchard singer. But his favorite nesting place is a swamp tangle of small trees, bushes, vines and weeds. He does not hide in the foliage while singing, as some others do, but mounts to the top of some conspicuous tree or bush and makes a business of it. He is not to be seen within the taller woods, but about its edge in the fringing brush.

In southern Arizona, western Texas and north-western Mexico this species is represented by

Sonora Yellow Warbler. *Dendroica æstiva sonorana.* 652a.

And in the coast region of Alaska by

Alaskan Yellow Warbler. *Dendroica æstiva alaskensis.* 652b.

Otherwise the true Yellow Warbler may be found in North America generally, breeding nearly throughout its range.

Chestnut-sided Warbler. *Dendroica pennsylvanica.* 658.

While the resemblance to the Yellow Warbler is certainly close in many respects, the song is distinctly weaker and usually shorter, uttered with less vehemence. Miss Ethel Dane Roberts' description is happy: "*tsee tsee tsee*, happy to meet you." To my ear the syllables *te te te te we chu* are the most suggestive. But allowing just a little for poetical license in Miss Roberts' rendering, there is no difference at all. In both the next to the last syllable must be given a third higher than the others, which are all on the same pitch . . . . . would suggest the same arrangement. The song is often shortened at either or both ends, but six syllables seem to be the limit. It is refreshing to find such uniformity of description among writers. Nowhere is there greater discrepancy than in the two descriptions given.

This Warbler arrives about the first of May and remains two or three weeks, singing during his stay. On his return in September he is silent.

The Chestnut-side also frequents brushy places, but more wooded ones where the brush forms an under-brush. He shuns swamps, for the most part, as well as villages, preferring the woods; yet he regularly visits the college campus—that Mecca of the Warbler host.

His range is eastern North America, west to the Plains, and north to Manitoba and southern Ontario, breeding in the northern part of the range.

American Redstart. *Sctophaga ruticilla.* 687.

In general tone and quality there is a strong resemblance to the Yellow, but the range of variation is greater, and the song distinctly belongs to the "ringing aisles" of the woods. The commoner utterance can be recalled by *che che che che-pa*, the last syllable abruptly falling and weakening. A soft, sweet song is like *wee-see, wee-see-wee*, with a suggestion, at least, of lower pitch for the last syllable. Mr. Chapman represents a strongly accented song by *ching ching chee, ser-wee, swee, swee-e-e-e.* The fundamental difference between this bird's song and that of the Yellow Warbler is that there is a tendency to acceleration in the Yellow, while there is always a retard in Redstart. But even more distinctive, the two are not found in the same situations. Redstart builds him a house within the woods, singing to the accompaniment of his own echo.

It is well known now that the female of this species sings at least the more simple of the variations. I have never heard her sing the *staccato* described by Mr. Chapman.

My observations all point to continuous song from the early May arrival well into August, but Mr. Bicknell has found that there may or may not be a period of silence in July, followed by a second song period in August.

The Redstart inhabits the whole of North America to Fort Simpson, west regularly to the Great Basin, irregularly to California. It breeds from the middle of the United States northward.

Magnolia Warbler. *Dendroica maculosa.* 657.

Here the song differs from Yellow Warbler in ending in a falling inflection and from the Redstart in having the first

part distinctly double syllabled. I am now speaking of the commoner songs. There is such great variation that one is at a loss how to make comparisons. During the few days of migration I have already distinguished five variations, while Mr. S. E. White, in the Auk, describes seven. Rev. J. H. Langille distinguished the three types for three stages of the migration northward. In the south the song is a soft *whee-cho, whee-cho, whee-cho, whee-cho;* in the north it is *chee-to, chee-to, chee-to-ee;* while the breeding song is *cree-e-e-e-e-e.*

To Mr. Galloway the song suggests a "twisted caterpillar."

Mr. White's seven variations are well worth reproducing here.

1. Three notes, followed by one lower: *che-weech che-weech che-o.*

2. Three sharp clear whistles with a strong sound, then a warble of three notes, the middle the highest, the latter clear cut and decisive: *pra pra pra r-e-oo.*

3. Two quick sharp notes, followed by a warble of three notes, the middle the highest; the warble is soft and slurred: *prut prut purreao.*

4. A soft falsetto warble, different in tone from any other bird song: *purra-e-whu-a.*

5. Of the same falsetto tone, uttered rapidly: *prut-ut-ut-ut-ut.*

6. A harsh note like, in miniature, the cry of a Jay: *d kay kay kay.*

7. A harsh *k-e-e-e-dl*, the last syllable higher by a shade, quick, and subordinated to the first part. The alarm is a sharp *seek.*

These fully cover the five which I have heard. The first is distinctly like the Yellow Warbler.

This species sings during its stay in spring, but I find nothing to indicate that it sings on its return journey.

The species inhabits the spruce and hemlock woods when breeding, but in the migrations it is found in any woods, and not seldom in village parks.

Eastern North America, west to the base of the Rocky Mountains and north to Hudson Bay Territory, breeding mostly north of the United States.

The remaining four species may be regarded as forming a transition to the Chipping Sparrow Group, the transition being most marked in the last species to be described under this heading. Yet it must be borne in mind that these species in no small sense belong to this group, all of them, rather than to the other one.

Canadian Warbler. *Wilsonia canadensis.* 686.

Without being very marked, there is a certain similarity to Yellow Warbler. The pitch is higher, lending a shrill effect, the song averages shorter, or if longer there is a distinct swell or small run, before the end instead of at the end. – – – – – – might serve to represent it. Or – – – – The syllables I have written are *tu tu tswe tu tu*, the long syllable being higher pitched. Retaining this general character, the song may be lengthened or shortened. Mr. Thompson's *rup-it-chee, rup-it-chee, rup-it-chit-it-lit* must be a variation of rendering which I have never heard. The style of utterance suggests both the Yellow Warbler and Goldfinch.

The birds keep well to the trees, but are common on the college campus as well as in the woods. They seem to rather prefer the smaller growths.

Singing during its stay in spring, but silent in fall.

Eastern North America, west to the Plains and north to Newfoundland and Lake Winnipeg.

Orange-crowned Warbler. *Helminthophila celata.* 646.

The song is full and strong, not very high pitched, and ends abruptly on a rising scale. My note book renders it *chee chee chee chw' chw'*. The first three syllables rapidly uttered, the last two more slowly. One heard late in the season sang more nearly like Mr. Thompson's description: *chip-e, chip-e, chip-e, chip-e, chip-e*, but with the first vowel changed to *e*, thus eliminating what would appear to be a marked similaaity to the song of Chippy. Even in this song the ending is retained.

The Orange-crown sings while migrating northward, but I find no evidence of any song during the southward movement.

One must look for this bird in the bushes fringing woods,

or in the dense undergrowth of woods, where he conceals himself when singing.

Eastern North America, breeding as far north as the Yukon and Mackenzie River districts. Rare east of the Alleghanies, north of Virginia.

In the western United States, from the Rocky Mountains to the Pacific, the species is represented by the

Lutescent Warbler. *Helminthophila celata lutescens.* 646a.

And on San Clemente, Santa Cruz, and Santa Rosa Islands, California, by the

Dusky Warbler. *Helminthophila celata sordida.* 646b.

Wilson's Warbler. *Wilsonia pusilla.* 685.

There is a variability in this Warbler's song which lies wholly within the group. Miss Roberts has summed it up in the following sentence: "It is sometimes like the ordinary song of Yellow, sometimes more like Redstart, sometimes almost unaccented." But it is always shriller than either, besides showing a tendency to marked *z* sounds. Mr. Nuttall describes it by the syllables *ts tsh tshea*, which strongly suggest a short song of Yellow Warbler. It is a small song, both in volume and quantity.

This black-capped Warbler sings during his northward journey, and I have heard weak songs on its return in autumn.

Brushy underwood is its favorite haunt, occasionally going higher up in the trees. It seems partial to places near water.

Eastern North America, west to and including the Rocky Mountains, north to Labrador, Hudson Bay Territory and Alaska. Breeds north of the United States chiefly.

From the Great Basin to the Pacific and north to Alaska the form is

Pileolated Warbler. *Wilsonia pusilla pileolata.* 685a.

Nashville Warbler. *Helminthophila rubricapilla.* 645.

There is considerable variation in execution of the song,

some renderings approach closely to the song of Yellow Warbler, while others resemble Chipping Sparrow. This is the pivotal species of the transition from one group to the other. Those which resemble the Yellow Warbler type are halting and less rotund. Mr. Minot represents this type by the syllables *wee-see, we-see, wit-a-wit-a-wit.* Rev. J. H. Langille by *ke-tse, ke-tse, ke-tse; chip-ee-chip-ee-chip-ee-chip*, which satisfies my ear better. Mr. Galloway also well represents it by *ka-cheepa cheepa cheepa cheepa, pichepe chip;* the transition syllable from the first to the second part of the song is admirable. The more Chippy-ward song may be represented thus: *k-chip; k-chip; k-chip; k-chip; che-che-che-che.* The manner of utterance is also transitional, but the whole song is on the same pitch.

The Nashville spends little more than the first two weeks of May with us, singing constantly, but on his return he is silent.

I have found this Warbler everywhere that trees are growing, but rather more numerously in moderately brushy woods than elsewhere. There he ranges rather low, but spends much time in the trees.

Eastern North America, west to the Plains, north to the Fur Countries.

West of the Rocky Mountains it becomes

Calaveras Warbler. *Helminthophila rubricapilla gutturalis.* 645a.

WHISTLING SONGS.

Of the Whistling songs little need be said in general, except to define what we mean by whistling. True, there are a good many different kinds of whistles. Well, this is none of them. You make it yourself: pucker your lips and blow! That's the kind! The types selected are the Cardinal and the *pe-tee* whistle of Chickadee. Here, again, we clearly recognize a few transition species which it seems best to place last.

The group is readily subdivided into two sub-groups: Yellow-breasted Chat, all others. Giving them this order, we may first treat

Yellow-breasted Chat. *Icteria virens.* 683.

The song of the Chat is unique, not merely in this group, but in the whole class of birds. It is ventriloquil to a marked degree, but it possesses a timbre all its own. It would be far more proper to call the Chat's a performance rather than a song. To the uninitiated he appears to imitate every other sort of bird in the woodland, from the Crow and hawk to the sparrows; but to one familiar with him the Chat appears in it all. The imitation is not perfect, but approximate. Mr. Burns gives the best syllabled description of the describable part of the performance that I have seen: *cop! chick! cock! chack! co-co-co-co-co-co.*, the first softly, second, third and fourth emphatically, the remainder loudly and rapidly. There is usually a considerable pause between each of the first four syllables. There is endless variation in the performance, but these syllables are conspicuous and form a large part of the so-called song proper. While the Chat's range of imitation embraces nearly every voice of the woodland, he does not attempt an elaborate imitation, but rather snatches here and there from such parts as best suit his purpose.

The "flight song" of this species is apparently not a passion song at all, but rather comparable to the broken wing tactics of so many birds, or to the pitiful undone flutter of Killdeer, since danger seems necessary to call it forth. You have been cautiously searching hither and yon for a bird that ought to be attached to that voice, but all in vain, when you suddenly become aware of a loose bundle of feathers apparently suspended in the air above you, jerking like a witch and gradually settling down; while the air seems filled with a most bewildering medley of every sort of bird voice. You are too near his nest.

While performing, the bird remains well concealed high up in the foliage of some small tree, or in a thicket, but he will unmask if approached unawares. He is wary and alert. His favorite haunts are the brushy thickets bordering woods, or brier thickets with a few small trees.

He is one of the few night singers, singing at all hours of the night, but less frequently from twelve to two. It is no dreamy performance, but a wide-a-wake intentional song that rings and rings again on the still air.

He is singing when he arrives in the first week in May, and does not cease until the last of July or first of August. He has no second song period.

This species occupies nearly the whole of the United States to Ontario and southern New England, west to the Plains; west of the Plains to the Pacific it becomes

Long-tailed Chat. *Icteria virens longicauda.* 683a.

The remainder of the group need not be definitely subdivided. The transition species will be mentioned when they are treated. For lack of any evident logical order, we may begin with the best known species.

Oven-bird. *Sciurus aurocapillus.* 674.

The well-known double syllabled cry of this bird would scarcely need more than mention were it not that there is honest difference of opinion regarding the place of accent. As Mr. Chapman has well said: "It is a long, ringing crescendo chant, to which Mr. Burrough's description of 'teacher, *teacher*, TEACHER, TEACHER, *TEACHER*,' is so applicable that no one would think of describing it in any other way." The accent must evidently be upon the first syllable. The birds that I have heard have persisted in accenting the second syllable, the first one being weak and short: *p*'-CHEE. But this difference is rather technical than fundamental, since any one could readily identify the bird by Mr. Burrough's description. The description of the passion song will be deferred so that the "Water Thrushes" may be treated together.

The birds arrive very near the first of May, usually many together, and are singing. They sing well into the middle of July, but after the third week of June there is a marked waning. Song is resumed, but less vehemently, in August, usually ceasing before its close. Very few songs are full and strong during this second period.

The accompaniment of the Oven-bird's chant is a high, damp to wet woods where the upturned roots of fallen trees leave hollows for little ponds to form.

North America east of the Plains, north to Hudson Bay Territory. The breeding range extends from Kansas, the Ohio Valley and Virginia northward.

Water-Thrush. *Seiurus noveboracensis.* 675.

I shall not soon forget the anxious days and nights that this water sprite caused me before I could rightly say that I had seen him singing. The song was burned into my memory: *sweet sweet sweet chu-chu-wee-chu.* . . . . . The first three syllables strongly accented and staccato, the last four short and run together into one phrase, the next to the last a third or more higher. Occasionally one sang *to to che-we che-we che.* . . . . . The first two indistinct, the third, fifth and last strongly accented and a sixth higher, the fourth and sixth a little lower than these. Both songs are high pitched, clear, liquid whistles that carry far.

The Water-Thrush comes to northern Ohio near the first of May, and sings during his stay of three weeks. On his return early in September he is singing as vigorously as when he departed, for aught I can tell.

I have heard the song only in wet brushy places, preferably low woods or brushy clearings. The bird has sometimes been seen in wooded uplands. One regularly visits a wet tangle well within the village of Oberlin.

From Illinois eastward, north to Arctic America. From Illinois west to the Pacific coast the form becomes

Grinnell's Water-Thrush. *Seiurus noveboracensis notabilis.* 675a.

Louisiana Water-Thrush. *Seiurus motacilla.* 676.

The ordinary song is, to my ear, a series of double syllabled, clear, ringing whistles, followed by a soliloquizing twitter. It is a thrilling burst that is startling and wild. The proper accompaniment is a wild, wooded glen in which a stream tumbles over its rocky bed.

Like the Water-Thrush, this species has two song periods, the first closing late in June or early July, the second beginning early in August. I have heard the passion song in August also.

West to the Plains, north to southern Michigan and southern New England, casually to Lake George.

The passion song of the water thrushes are so much alike that a description of one will serve for all. There is in each

the same ringing ecstacy of joy. The song seems to swing once round a great circle with incredible swiftness but perfect ease, ending in a bubbling *dimiduendo* as the performer lightly touches the perch or ground with half rigid wings held high. The song is a flight song, usually occupying less than half a minute, but packed with the intense life of the bird. I have seen the Oven-bird suddenly vault into the air, mounting to the tree tops on quivering wings, then dart back and forth in a zigzag course swift as an arrow, and finally burst into a song as he floated gently down. There is some difference in the passion songs of the three species, which seems to be in the use of some notes of the ordinary song at the close, rarely at the beginning. Sometimes the Oven-bird closes his passion song with a burst of the perfect call song.

It seems hardly fair to say that the songs of the Water-Thrushes are thrush-like, since there is almost nothing of the true thrush timbre to their songs. On the contrary, a careful analysis discloses, rather, a true Warbler timbre, obscured as it is.

Swainson's Warbler. *Helinaia swainsonii.* 638.

Mr. O. Widmann, who has probably given the breeding song of this Warbler more careful study than any other person, says of it: "It begins like the Water-Thrush and closes like the Louisiana Water-thrush." Mr. Wm. Brewster describes the song as "A series of clear ringing whistles, the first four uttered rather slowly and on the same key, the remaining five or six more rapidly and in a descending scale." He also says that in general effect it resembles the song of Water-Thrush. The Warbler is not a regular singer, according to Mr. Widmann, but seems to wait for an inspiration, and when it comes he must needs deliver his message.

I can find nothing definite concerning the song period, nor as to whether there may be a renewal in the fall.

The haunts of this bird are the vast swamp tracts of the southern states, as far north at least as the southern-most counties of eastern Missouri, where Mr. Widmann found it nesting. It apparently ranges to south-western Indiana and west to Texas.

Mourning Warbler. *Geothlypis philadelphia.* 679.

In quality and style this Warbler's songs bears a strong resemblance to that of Water-Thrush, the variations having the same general quality, but the song is considerably less in volume and lacks the wild thrill of the Water-Thrush. The song which I have heard most frequently is *tee te-o te-o te-o wee-se*, the last couplet accented and much higher pitched. A less common form slightly resembles the *creschendo* chant of Oven-bird, but is weaker. It is rather a swell than a *creschendo*. Dr. Merriam describes a variation which I have never heard: *true true true true too*, the last and next to the last syllables with falling inflection and more softly. The song is clear and whistling.

Song is incessant during the northward movement, but there is apparently none on the return journey.

This Warbler frequents low brush thickets in rather damp places, and appears to be solitary in its habits when migrating.

West to the Plains, north into Canada, breeding from the northern states northward.

Olive Warbler. *Dendroica olivacea.* 651.

Very little seems to have been written of the song of this Warbler. From that little one would be led to expect a high pitched, melodious, liquid, whistling song, on a descending scale; the separate notes not unlike the first note in the Whipporwill's lay; possibly resembling the last cadence of Swainson's Warbler.

The Olive Warbler lives in the highlands of Guatemala and Mexico, north into southern New Mexico and to Mt. Graham, Arizona.

The songs of the next three species bear a resemblance to the clear whistles of Carolina Wren; but the resemblance is rather in the quality of the whistle than in the manner of utterance.

Yellow-throated Warbler. *Dendroica dominica.* 663.

This song seems to resemble that of Indigo Bunting as well as Carolina Wren, but it is wilder and more ringing than

the Indigo. Mr. Brewster describes it thus: *twee-twee-twee-see*, the last two rising and terminating abruptly. I find no mention of a song period in fall. The song has a certain ventriloquial quality.

The birds frequent the tops of trees bordering streams, moving about rather leisurely for warblers.

This species is confined to the southern United States, north to southern Maryland and Virginia, rarely to southern New England. The sub-species

Sycamore Warbler. *Dendroica dominica albilora.* 663a.

Is the form which inhabits the Mississippi Valley from western North Carolina to the Plains, north to southern Michigan.

The described songs seem to be practically identical with those of the species. Prof. A. W. Butler gives the fullest description: *twit, che-e, che-e, che-e, che-e, che-a*, the first abrupt with rising inflection, the next four following after a pause, all on the same pitch, the last rising sharply. While the syllables are different the description is almost exactly as above.

As the name indicates, this Warbler is most at home among the upper branches of sycamore trees which fringe the streams. His untiring activity makes study tantalizing.

Kirtland's Warbler. *Dendroica kirtlandi.* 670.

The song of this rare Warbler shows a marked tendency toward the Maryland Yellow-throat type, with a full oriole-like quality, "in marked contrast to the high notes of many warblers." It also resembles the song of the Yellow-throated Warbler. There are no syllable descriptions.

The rarity of this Warbler makes his geographical distribution somewhat uncertain. But he seems to be one of the warblers of the eastern part of North America, west at least into Illinois and Wisconsin, and east to Washington, D. C. He probably breeds north of the United States

Kentucky Warbler. *Dendroica formosa.* 677.

The song of this species is probably more like the whistle of the Carolina Wren than any other Warbler. Mr. Burns has

studied the song so carefully that he is fully qualified to speak for his locality at least. He has clearly distinguished a type for the earlier migrants and another for such as remain to breed. The migration type is: *peer-ry peer-ry peer-ry peer-ry peer-ry*, often *chee chee chee pere-ey pere-ey pere-ey*. The breeding song is: *too-dle too-dle too-dle too-dle*. The style of delivery is Cardinal-like, but weaker and finer in tone. The song carries far, ringing thru the woods. The bird seems to prefer to sing while perched, and rarely if ever does so while feeding.

One must look for this Warbler in rather densely grown wet or well watered woods, more often on the ground than in the trees. He is one of the Warblers that walk.

Mr. Burns states that the song period ceases about the middle of July (17 in 1899), and no mention is made of renewal of song later.

West to the Plains, north to southern Michigan. Breeds from the Gulf states northward.

This properly closes the group of true whistlers. While the species which follow are transational they are more closely allied to those which precede than to any others. They are strong-voiced birds whose songs possess a carrying power second only to the preceding species, and exceeding some of them. The most familiar one is

Maryland Yellow-throat. *Geothlypis trichas.* 681.

The call song is a repetition of three or four syllabled phrases, one of the syllables strongly accented. Sometimes the accent is on one, sometimes on another syllable. The variation is neither individual nor seasonal, as any one may readily prove by listening to an individual sing for half an hour. The song is well represented by the syllables commonly used to describe it: *witchity, witchity, witchity*, or *wee-chete*, for the three-syllabled song, and *wee-te-chee-te* or *wee-tee-see-tee*, for the four-syllabled. In every three-syllabled song that I have heard the accent has been on the first syllable. In the four-syllabled it may be on either of the four, at the pleasure of the performer. The accented syllable has the appearance of being longer than the others, and it is often on a higher pitch. Not infrequently the third and fourth syllables

are raised in pitch more or less, in which case the accent is likely to be spread over both, the third taking rather more of it. The song usually increases in volume as it proceeds.

The tone is shrill, but loud and clear, and closely approaches a whistle, but having a suggestion of the Warbler hiss. The bird throws his whole being into the utterance. His perch is usually elevated somewhat above the surrounding brush, while singing, but is seldom on the topmost twig.

This species has a passion flight song which is delivered much after the fashion of the Oven-bird, and is not unlike it in being a medley of its call song notes.

The Maryland Yellow-throat arrives singing with the host of warblers in late April or early May, and sings well toward August. After about a month's rest he resumes the song, but ceases again about mid-September. Rarely one may hear the song all summer long. Mr. Bicknell regards the September singing rare, but my record of four years shows no late August singing, but always early in September full songs.

The specific form is confined to the region east of the Mississippi River and south of Hudson Bay and Labrador. From the Mississippi Valley to the Cascade Mountains it becomes

Western Yellow-throat. *Geothlypis trichas occidentalis.* 681a.

And from Florida to southern Georgia the

Florida Yellow-throat. *Geothlypis trichas ignota.* 681b.

The Pacific coast form is

Pacific Yellow-throat. *Geothlypis tricas arizela.* 681c.

It seems likely that the two south-western forms,

Belding's Yellow-throat. *Geothlypis beldingi.* 682.

which inhabits the southern part of Lower California, and

Rio Grande Yellow-throat. *Geothlypis poliocephala ralphi.* 682.1.

which is found in the lower Rio Grande Valley, are not

greatly unlike our eastern form in song. At any rate this is as good a place for them as could well be found.

Connecticut Warbler. *Geothlypis agilis.* 678.

In this song there is a mixture of Oven-bird and Maryland Yellow-throat, but the resemblance is no doubt closer to the latter. Mr. Thompson's *free-chapple free-chapple free-chapple-whoit* will recall it to some. Mr. Butler prefers the word "beecher." Mr. Gault describes six variations which seem well worth repeating here.

1. *Wheat-a; wheat-a; wheat*, gradually increasing in volume to the last.
2. *Wheat, our winter wheat*, or *our winter wheat.*
3. *Chip chee-a-wee; chip chee-a-wee; chip chee-a-wee.*
4. *Wheat, winter wheat, winter wheat, winter wheat.*
5. *Wheat here*, and sometimes only *wheat*: this on bright moon-light nights.
6. *Wheat-it-ta, wheat-it-ta, wheat*, the last syllable sometimes omitted.

No one could doubt the resemblance to Maryland Yellow-throat from these representations.

I find nothing to indicate the duration of the song period, nor whether there is the recurrence of song in fall.

The northern tamarac swamps and bogs are the home of this Warbler. It is one of the "ground warblers," spending much time on the ground.

It is another of the numerous company of warblers of eastern North America, breeding north of the United States. It passes north with the Warbler host in early May.

There are several species whose songs have not been described at all, or inadequately described for the purposes of this paper. They may be given in systematic order.

Lucy's Warbler. *Helminthophila luciæ.* 643.

Arizona and extreme southwestern Utah, from the Santa Clara Valley southward to Sonora; New Mexico.

Virginia's Warbler. *Helminthophila virginiæ.* 644.

"The male is very musical during the nesting season, uttering his *swee* ditty continually as he skips thru the bushes in search of his morning repast; or having satisfied his appetite, he mounts to the top of some tree in the neighborhood of his nest, and repeats at regular intervals a song of remarkable fullness for a bird of such minute proportions."—Mr. Aikin, in Nehrling's Our Native Birds of Song and Beauty, Vol. I, p. 189.

Rocky Mountain region of the United States, from Wyoming, Colorado, Utah, and Nevada southward on the tableland of Mexico and Guanajuato.

Grace's Warbler. *Dendroica graciæ.* 664.

"This beautiful Warbler is pre-eminently a bird of the pines. It is found as soon as the pine belt is entered, and continues almost to its upper limit; but I did not meet with any in the aspens, firs, or spruces above the pines. Its song is a sweet warble, frequently uttered from the lower boughs."—Dr. E. A. Mearns in The Auk, Vol. 7, p. 261.

Southern New Mexico and Arizona, and south into Sonora.

Black-throated Gray Warbler. *Dendroica nigrescens.* 665.

The only description that I have been able to find is that by Nuttall, "*t-shee-tshay-tshaitshee*, plaintive." It would be difficult to assign its position from so meagre a description.

Western United States, north to Colorado, Oregon and British Columbia west of the Cascades.

Painted Redstart. *Setophaga picta.* 688.

Mountains of Mexico, north to southern Arizona.

Red-bellied Redstart. *Setophaga miniata.* [689.]

Highlands of Mexico. Texas (Giraud).

Red-faced Warbler. *Cardinella rubrifons.* 690.

Southern Arizona and southwestern New Mexico, thru Mexico to Guatemala.

Red Warbler. *Ergaticus ruber.* [691.]

Highlands of Mexico. Texas (Giraud).

Brasher's Warbler. *Basileuterus culicivorus.* [692.]

Central America, from Panama north to Eastern Mexico. Texas (Giraud).

Bell's Warbler. *Basileuterus belli.* [693.]

Guatemala and Mexico, north to the temperate regions of Vera Cruz. Texas (Giraud).

CONCLUSION.

It is painfully apparent, from the foregoing discussion, that the subject is far from exhausted. We have hardly more than scraped the rind of it yet. We need first of all to learn the songs of the remaining species and sub-species. We need to devise some more perfect method of representing the songs which will admit of more fruitful comparisons than those now in use make possible. We need to follow the whole course of the migrating birds in order to learn what the variations are, where there are any, in the course of the journey northward; and if the breeding song differs from the migrating songs, what the difference is and why. We know so little about the second, or autumn, song period, that it is necessary to study it from the beginning with most species. We know that the females of some species sing, but under what circumstances and what part of the whole song of the species is not known. These are questions which can be answered by careful study.

There are other problems which belong more particularly to the wider subject of bird song, but which a study of Warbler songs will greatly help to solve. How far the sub-species

have departed from the song-type of the species; whether there is a recognizable longitudinal variation in keeping with color variation, as the process of differentiation grows toward the formation of sub-species from merely geographical races; what the difference is between young and old, bright plumaged and dull plumaged birds within the species; what is the effect of environment upon the same individual to determine its effect upon the species; how far imitation determines the quality of the song of the individual. And so we might go on suggesting topics for study to the end of the page. We need only to perceive that the subject is inexhaustable, and a fruitful one for investigation.

A FIELD KEY TO THE SPRING MALES.

I. Throat red, orange or chestnut.
II. Throat black or dark slate-color.
III. Throat yellow, white or whitish; under-parts without streaks or spots.
IV. Throat white or whitish; under-parts streaked or spotted.
V. Throat yellow; under-parts streaked or spotted.

I. Throat Red, Orange or Chestnut.

1. Throat chestnut.
   a. Top of head chestnut; sides of head black. Bay-breasted Warbler.
   b. Whole head rich chestnut. (Extreme south-west).
      Mangrove Warbler.
2. Whole throat, chest and head orange-rufous. (Extreme south-west). Olive Warbler.
3. Throat orange or flame-color; crown yellow. Blackburnian Warbler.
4. Throat red.
   a. Crown and ear-coverts black. (Extreme south-west).
      Red-faced Warbler.
   b. Ear-coverts silvery-white. (Extreme south-west). Red Warbler.

II. Throat Black or Dark Slate-Color.

A. Belly white.
   1. Back blue-gray; side of head black and white. (Western).
      Black-throated Gray Warbler.
   2. Back deep blue; a white spot in wing. Black-throated Blue Warbler.
   3. Back black; a white spot in wing. (Alleghanies). Cairns' Warbler.
   4. Back black; sides of head yellow and black.
      Golden-cheeked Warbler.
   5. Back gray and black; top and sides of head yellow.
      (Western). Hermit Warbler.
   6. Back green; cheeks and forehead yellow.
      Black-throated Green Warbler.
   7. Back olive-green; line over eye and breast yellow.
      (Western). Townsend's Warbler.
   8. Back grayish; a large yellow patch in wing.
      Golden-winged Warbler.
   9. Back black; patches of flame-color in wing, on sides of breast and in middle of tail. Redstart.

B. Belly yellow.
1. Throat slate-color.
a. No white eye-ring; breast with traces of black.
Mourning Warbler.
b. A white eye-ring; breast with no traces of black.
Connecticut Warbler.
c. A white spot on eyelid; sides of head black. (Western). Macgillivray's Warbler.
2. Throat black.
a. Forehead and cheeks yellow, rest of head black.
Hooded Warbler.
b. Forehead yellow; crown with a black patch.
Bachman's Warbler.

C. Belly red.
1. A large white patch on wing; no chestnut on head. (South-west). Painted Redstart.
2. No white wing patch; chestnut patch on crown. (South-west). Red-bellied Redstart.

III. Throat Yellow, White or Whitish; Underparts Without Streaks.

A. Large as a Catbird.
1. Back olive-green; throat and breast rich yellow.
Yellow-breasted Chat.
2. Back olive-gray. (Western). Long-tailed Chat.
B. Much smaller.
1. Throat yellow.
a. Whole head, neck and breast bright yellow.
Protonotary Warbler.
b. Forehead and cheeks black; line over yellow eye.
Kentucky Warbler.
c. A broad, rounded black patch on cheeks.
Maryland Yellow-throat.

(NOTE.—An artificial key to the Yellow-throats would be of such doubtful value a-field that the reader is referred to the habitat of the different forms in the body of the paper).

d. Head and back olive-green; two white wing-bars. Pine Warbler.
e. Crown bluish ash or gray.
1. Upper tail-coverts yellowish olive-green.
(a). Lower parts yellow.
(1). Yellow intense. (Western). Calaveras Warbler.
(2). Yellow less intense. Nashville Warbler.
(b). Lower parts white or whitish. (Western).
Virginia's Warbler.
2. Upper tail-coverts chestnut. (Western). Lucy's Warbler.

f. Forehead yellow; a black line in front of eye.
Blue-winged Warbler.

g. Forehead yellow; crown black.
1. Duller colored. Wilson's Warbler.
2. Brighter colored. (Western). Pileolated Warbler.

h. Head bluish; breast with a chestnut patch.
1. Underparts yellower; less black on side of head.
Parula Warbler.
2. Underparts duller; side of head blacker.
Northern Parula Warbler.
3. Same as 1 and 2. (Extreme south-west). Sennett's Warbler.

i. Head ash-gray; line over eye yellow. (South-west).
Grace's Warbler.

j. Top of head with black stripes.
1. Lores chestnut. (South-west). Brasher's Warbler.
2. Lores black. (South-west). Bell's Warbler.

III. Throat white or whitish.

a. Crown with two blackish stripes. Worm eating Warbler.

b. Crown plain brown. Swainson's Warbler.

c. Crown bluish-ash; back olive green. Tennessee Warbler.

d. Crown with a partially concealed patch of rufous brown; back dull olive-green; underparts pale yellow.
Orange-crowned Warbler.

ee. Above bright olive-green; brighter underneath. (Western). Lutescent Warbler.
Another western form, not very different, is Dusky Warbler.

IV. Throat White or Whitish; Under-parts Streaked or Spotted.

A. A patch of yellow on the side of the breast.

1. Crown and rump with a yellow spot. Myrtle Warbler.
There is no field character to distinguish the western form. The wing and tail are longer. Hoover's Warbler.

2. Yellow band on middle of wing and tail. Immature of Redstart.

B. No yellow patch on side of breast.

1. With conspicuous wing bars.
a. Back bright bluish. Cerulean Warbler.
b. Back grayish; crown black. Black-poll Warbler.
c. Back greenish yellow; sides chestnut. Chestnut-sided Warbler.

2. Without wing-bars. Walking Warblers.
a. Middle of crown with a rufous streak. Oven-bird.
b. Crown plain; line over eye buff. Water-Thrush.
The form from Illinois westward is larger.
Grinnell's Water-Thrush.
c. Crown plain; line over white eye. Louisiana Water-Thrush.

3. Everywhere streaked black and white. Black and White Warbler.

V. Throat Yellow, Under-parts Streaked or Spotted.

A. Belly white.

1. Line over eye yellow in front of eye. Yellow-throated Warbler.
2. Line over eye entirely white. Sycamore Warbler.

B. Belly yellow.

1. Streaks on the underparts rufous brown.
   a. Crown yellow, back greenish. Yellow Warbler.

(NOTE.—The south-western form, with back yellower and streaks underneath almost obsolete, is Sonora Warbler.

The darker form inhabiting Alaska to British Columbia, is Alaskan Yellow Warbler).

   b. Crown Chestnut, back brownish.
      (1). Underparts soiled yellowish-white. Palm Warbler.
      (2). Underparts entirely bright yellow. Yellow Palm Warbler.
2. Streaks or spots on the underparts black.
   a. A yellow spot on crown and rump. (Western). Audubon's Warbler.
   b. Back grayish, unstreaked; a necklace of black spots on the breast. Canadian Warbler.
   c. Back greenish, streaked with black; crown bluish. Kirtland's Warbler.
   d. Back greenish, streaked with black; ear-coverts rufous. Cape May Warbler.
   e. Back greenish, with a patch of rufous brown. Prairie Warbler.
   f. Back black; crown grayish; tail black with a white band across the middle. Magnolia Warbler.

INDEX TO THE ENGLISH NAMES.

ERRATA.

Page 3, 6th line from top, for "Anamalium" read Animalium.
" 10, 9th line from top, for "kind" read bird.
" 11, 9th line from bottom, for "kind" read bird.
" 13, 15th and 2nd lines from bottom, omit quotation marks.
" 14, 17th line from top, for "loss" read less.
" 15, 6th line from bottom, under "Average Date When Common" for "April 8" read April 3.
" 19, 6th line from bottom, insert **Autumnal** (to precede paragraph as subtitle).
" 35, last line, for "infloored" read unfloored.
" 38, 15th and 16th lines from bottom, for "Duckwood" read Kirkwood.
" 39, last line, for "Morrel" read Morrell.
" 42, 7th line, for "properties" read proportions,
" 45, 1st line, for "scientific" read intrinsic.
" 47, 11th line from bottom, for "exlcusion" read exclusion.
" 55, 4th line from bottom, for "harmless" read barbless.
" 61, 5th line from top, for "important" read unimportant.
" 62, 12th line from top, for "group" read ground.
" 66, 13th line from top, for "68" read 38.
" 66, 10th line from bottom, for "Sreech" read Screech.
" 72, 16th line from bottom, for "as something" read asymmetry.
" 74, 17th line from bottom, for "twenty-three" read fifty-three.
" 75, 6th line from bottom, for "corner" read cornice.
" 78, 3rd line from bottom, for "specimens" read specimen.
" 82, 1st line, for "natural" read material.

INTRODUCTION.

WHILE the immense strides taken by American ornithology during the past score of years has seriously taxed the energies of the amateur to keep within hailing distance, and despite the volume of notes annually published in the various periodicals and books, the demand for complete life histories of even our most familiar birds have not lessened to any great extent. The life of one person would prove far too short to attempt a thorough study of a single species in all its characteristics; hence the absolute necessity for the co-operative work advocated and practiced by the Wilson Ornithological Chapter to obtain results at all satisfactory.

In spite of the devotion of the leisure moments of five years and the generous aid of a large corps of enthusiasts, the frank acknowledgment that the succeeding pages do faint justice to the subject of this paper, is not a matter of discouragement. Nature's Book will always contain fresh and delightful pages for the curious and observant.

Few have any idea of the magnitude of the literature under the title of a single name, and the unavailability of much of it for a work of this kind, because of its fragmentary or negative nature. A realization of the latter has caused the writer to go to the other extreme in frequent cases, with the hope that the mass of detailed information, while it may detract from the general appearance of the paper, will prove useful timber for a more competent builder, or of value for reference.

As far as it was practicable to do so, the compiler has conscientiously striven to place the credit of observations where it belongs, and the quotation marks are used when the exact language is extracted from publications.

All notes have been taken under the name that has held good for almost a century and a half. This, combined with the impossibility of the average student positively identifying any but the extreme types of the subdivided species, has necessi-

tated the present title. Since the difference which exists is purely geographical, the detraction from the value of the paper on this account can scarcely be more than fictitious.

The enumeration of the localities from which notes were taken, together with those represented in the publications examined, is dispensed with for the simple reason that the list would occupy too much space. It is sufficient to state that no considerable section of the habitat of the Flicker is unrepresented.

I am greatly indebted to the following gentlemen for valuable information, ranging from a local name to extended notes: Stephen J. Adams, Jos. H. Armfield, Paul Bartsch, James Newton Baskett, Jacob Bastion, Jr., Frank A. Bates, A. C. Bent, Allen Brice Blakemore, Lionel F. Bowers, J. H. Bowles, Clement S. Brimley, Verdi Burtsch, Virginius H. Chase, J. N. Clark, W. W. Colburn, Willard N. Clute, Fred A. Colby, Francis R. Cope, Jr., Rev. W. L. Dawson, E. A. Everett, W. A. Foxhall, Prof. Angus Gaines, Albert O. Garrett, Benj. T. Gault, Otto Grady, Russell Gray, John H. Flanagan, Esq., Fred Hamlin, Henry C. Higgins, Ned Hollister, Walter Hoxie, Ernest Ingersoll, J. Warren Jacobs, Prof. Lynds Jones, Prof. Ora W. Knight, Gustavus Kohn, Frank H. Lattin, J. Eugene Law, Dr. Walter W. Maires, Dr. Willard L. Maris, C. C. McGinty, E. A. McIlhenny, C. D. McLouth, H. Harvey McNairn, J. C. Mead, John C. Meisky, Harry Edward Miller, H. P. Mitchell, Walton I. Mitchell, C. H. Morrell, Arthur H. Norton, W. A. Oldfield, Rev. William Osburn, Rev. P. B. Peabody, A. L. Pearse, Amos Peifer, Chief Simon Pokagon, W. C. Purdin, James B. Purdy, Calvin L. Rawson, Fritz R. Raymond, Dr. Willet E. Rotzell, James Savage, W. G. Savage, R. P. Sharples, Burk H. Sinclair, Robert Windsor Smith, D. D. Stone, Reuben M. Strong, J. W. Suliot, Arthur T. Wayne, Julius Wendler. To Prof. Jones, Messrs. Jacobs, Smith, Strong, Gault, Baskett, Hollister and Law, especially, I wish to express my appreciation for valuable material and assistance.

FRANK L. BURNS.

Berwyn, Pa., March 1, 1900.

SYNONYMS.

SCIENTIFIC. Polynomials. *Picus varius major alis aureis*, Catesby, "Natural History of Carolina, Florida and the Bahama Islands," Vol. I, plate 18, full size colored figure, 1731.

Cuculus alis deauratis, Klein, "Historiae Avium Prodromus, cum Praefatione Ordine Anamalium," etc., 1750, page 30.

Binomials. *Cuculus auratus*, Linnæus, "Systema Naturæ," 1758, 10th Edition, Vol. I, p. 112.

Picus auratus, Linnæus, "Systema Naturæ," 1766, 12th Edition, Vol. I, p. 174.

Colaptes auratus, Swainson, "Zoological Journal," 1827, Vol. III, p. 353.

Colaptes auratus luteus, Part, Bangs, "Auk," 1898, Vol. XV, p. 117.

Modern nomenclature dates from 1758, when Linnæus introduced what is known as the binomial system, consisting of a generic, followed by a specific term; hence Catesby's many-worded descriptive name, though the earliest, receives no recognition. The same may be said of Klein who, almost a score of years later, erroneously placed it with the Cuckoos. Linnæus followed his predecessors closely, considering the difference in systems, and to him is given the credit of the specific term; while to Swainson, erecting a new genus almost a century after Catesby, is given that of the generic term.

According to Coues, *Colaptes* is of Greek derivation, signifying "a chisel, hammer," and *auratus*, "gilden, golden (colored"). More appropriate terms could scarcely have been chosen. Bangs' third term, reducing the northern bird to subspecific rank, follows to complete the synonymy, illustrating the instability of American nomenclature and the difficulties placed in the way of a study of the literature of a species.

Though the American Ornithologists' Union does not recognize hybrid forms as even sub-species, some of our lead-

ing authorities have at one time or another suggested designations for this peculiar form. Accordingly, as in the case of *C. a. luteus*, I have added such names in the sense of being pure synonyms, which apply equally to *C. cafer*.

Picus ayresii, Part, Audubon, "Birds of North America," 1843, Vol. VII, p. 348.

Colaptes hybridus, Part, Baird, "Pacific Railroad Exploration and Survey Report," 1858, Vol. IX, p. 123.

Picus hybridus, aurato-mexicanus, Part, Sundevall, "Conspectus Avium Picinarum," 1866, p. 72.

Colaptes auratus+Colaptes cafer, Coues, "Key to North American Birds," 1872, 1st Edition, p. 198.

Colaptes auratus hybridus, Part, Ridgway, "Nomenclature of North American Birds," 1881, p. 35.

Audubon's type, now deposited in the Philadelphia Academy of Natural Sciences, is a male in breeding plumage, exhibiting the yellow shafts of *auratus* and the red malar stripes of *cafer*, and in the absence of intermediate specimens was thought to have been a good species. Baird found it in all stages of blending in Nebraska, Wyoming, Montana and the Dakotas — principally in the Upper Missouri and Yellowstone river regions — and recognized its true relationship. It is said that at about this time Cassin was inclined to believe that it could be broken up into several distinct species; a belief which he did not act upon, however. Sundevall and Coues adopt forms which are comprehensive, while at the same time somewhat unique. Ridgway admits it as a sub-species. I am informed that in the next edition of Coues' "Key to North American Birds," it was the intention to have it appear as *Colaptes auratus ayresii*, going back to Audubon for the subspecific term, which Hargitt has already made use of in the British Museum Catalogue, omitting the middle term.

VERNACULAR. Happily our subject escaped the servitude of the prefixed personal name, laid on so many of its class, which in common with names of an indifferent, irrelevant or misleading nature, are the chief obstacles to the acceptance and common use of the official vernacular titles. Names descriptive of form, flight, plumage, notes, habits, habitat, characteristics, etc., or of onomatopoetic origin, are preferable if short and catchy. With its matchless array of marked charac-

teristics, any one of which would well deserve the adoption of a concise descriptive name in a species less excentric, no word in the English language would prove more apt than the one it now possesses—the name given it by the early settlers.

While the compilation of a dictionary of synonyms was not originally contemplated, the vulgar appellations or aliases collected from various sources number 124, all of which have been actually in use, either generally or locally. The probable derivation and meaning, as well as other notes, have been added, when it appeared necessary. Although apparently so varied in character, there is scarcely a name that cannot be placed in one of the three divisions: Descriptive, Onomatopoetic, Misnomers.

Antbird. Minnesota. So called from its well known taste for ants (*Hymenoptera*), of which it devours immense quantities.

Big Sapsucker. Northern States. Misnomer.

Carpintero. Spanish. Obsolete in the United States. Carpenter—the name given to the whole Woodpecker family in Spanish America.

Cave-duc. Maine. Of French Canadian origin. Apparently confounded with the hole-nesting species of horned or eared Owls and continued through ignorance of the original. Along the St. Lawrence river the natives call the horn-owl "cave-duc" or "horn-coot"—Russell Gray.

Clape, Claype. Western New York, Western end of Long Island. Ernest Ingersoll quotes Dr. DeKay as follows: "Said to have been some provincial word introduced by the early English colonists." In this instance it is doubtless misapplied, as our New York observers unite in the assertion that it is an imitation of the loud spring call note.

Common Flicker. Sometimes used in the East, but more frequently in some sections of the West, where both *auratus* and *cafer* occur.

Cotton-rump. Pennsylvania. From the conspicuous white patch of feathers on the rump. (A similar name—Cotton-tail—has been applied to *C. cafer* in California according to H. R. Taylor).

Crescent-bird. West. From the prominent black crescent on the breast, or the scarlet occipital crescent, or both.

Eastern Flicker. West. Its habitat from a western standpoint.

English Woodpecker. Long Island; Newfoundland. Probably traceable to the early settlers, who doubtless considered it nothing more nor less than a "degenerate offshoot" of a species inhabiting that country.

Fiddler. Cape Cod, Massachusetts. I feel pretty sure that this name is derived from the peculiar sew-saw motions indulged in by the males while courting the females during the early spring months.—Willard N. Clute.

Flicker. This is the most popular and generally used name. Some difference of opinion exists as to the exact derivation of the term, some contending that it is from the song—*wicher* and variations—hence onomatopoetic; while others are just as sure that it must have been suggested by the peculiar twinkling or flickering of the bright shafts when the wings open and close in flight. The latter would commonly suggest the name before the bird had uttered a sound.

Flicker Woodpecker. Middle States.

Flitter. Eastern Pennsylvania. A corruption of Flicker.

French Woodpecker. New Hampshire. Probably derived from the mongrel term, French-pie, which is one of the local names in common use in some parts of England for the Great Spotted Woodpecker (*Picus major.*)

Gaffle Woodpecker. Hudson, Massachusetts. Perhaps a provincial corruption for "gaffer"—a talkative old man.—Frank A. Bates. Or a corruption of "Yaffle," for which see same.

Gallie. Northern New Jersey. Pretty generally so called by the bird-nesting boys.—Willard N. Clute. Evidently an abbreviation of the old English title, "Galley-bird," which, according to Charles Swainson in "Provincial Names of British Birds," is the Sussex name for a woodpecker. The old time supposition was that all of this tribe were doomed to "incessant toil and slavery;" hence the term.

Gel Specht, Gelb Specht. Pennsylvania. German or "Pennsylvania Dutch." Pronounced gail spycht. Yellow Woodpecker.

Golden Sapsucker. Southern New Jersey. Common name in that region.—Dr. Walter W. Maires.

Golden-shafted Flicker, Golden-shafted Woodpecker, Golden-wing, Golden-winged Flicker, Golden-winged Woodpecker, Gold-wing Woodpecker, Golden-wing Woodpecker, Gold-winged Woodpecker. In more or less frequent use, chiefly through the influence of our earlier ornithological writers.

Golden Woodpecker. New York.

Golden-winged Woodcock. Iowa. Misnomer.

Grasshopper Woodpecker. Vermont. From its habit of frequenting open fields where grasshoppers (*Acrididæ*), abound upon which it feeds.

Hairy-wicket, Harry-wicket. New England. Corruption of the love or scythe-whetting notes.

Hammer-Head. Western part of Hampshire county, Massachusetts. This name is equally applicable to any other woodpecker.—W. W. Colburn. A homonym. "Name given in the Cape Colony, Africa, to *Scopus umbretta*, which is allied to the Herons."—Newton's Dictionary of Birds.

Hick-wall. Connecticut. Obsolescent. A relic of the old world, of which Hewel and Hew-hole are said to be corruptions. The older form of which, "Hick-waw" (Holly hand) and Hickway and Highawe (Cotgrave) can hardly have come from anything but the Anglo-Saxon "Higera" or "Higere" (T. Wright), meaning laughter, and doubtless referring to the cry of the Green Woodpecker (*Gecinus viridis*).—Newton's Dictionary of Birds.

High-hole, High-holer, High-hold, High-holder. Northern United States and Canada. "From the usual position of its nest."—Earnest Ingersoll. Further modifications of "Hewel," "Hewhole," "Heigh-hawe," or "High-hawe."—Newton's Dictionary. The terms may have originated in accordance with Newton's statement, but are now used only in the sense defined by Ingersoll.

High-ho Woodpecker. Wisconsin. A contraction of High-hole.

Hittock, Hittocks, Hittuck. Canada. New Jersey. "Said to have been handed down from the Delaware Indians, being the Leni-Lenape word for tree."—Heckwelder. "Probably originated from a fancied resemblance of its notes to the sound of the words."—Alexander Wilson. "So called by the Swedes on account of its notes."—Kalm.

Hivel. New York; Ohio. Origin in doubt. Possibly a corruption of the old English word Hewel, for which see High-hole and Hick-wall; or a contraction of hive-hole, from the buzzing bee-like sounds emitted by the small young in the nest.

Hybrid Flicker. Name given the mixed birds of the West by Baird.

Jaune, Joune. Louisiana. French. Meaning yellow. The second a corruption of the first.

Le pic aux ailes dorees. Name given by Buffon. French, Golden-winged Woodpecker.

Little Woodchuck. Caloosahatchie River Region, Florida. The adjective is used to distinguish the smaller from the "Big Woodchuck" (Ivory-billed Woodpecker).—D. D. Stone.

Meadow Partridge. Wisconsin. Misnomer. From its hurried, Partridge-like manner of flushing from the grass-fields when startled.

Missouri Red-moustached Woodpecker. Audubon's name for the hybrid (*C. ayresii*).

Mo-ning-qua-na. White Earth Reservation. Chippewa Indians. "Bird with dirty-colored wings."—W. W. Cooke.

Northern Flicker. Prefix given by Outram Bangs to that portion breeding from North Carolina northward.

Ome-tuc. Maine. Probably of Indian and onomatopoetic origin.

On-thee-quan-nor-ow. Hudson Bay Region. British America. Natives. "From the golden color of its shafts and lower sides of wings."—Alexander Wilson.

O-zaw-wan-day Paw-Paw-say. Lower peninsula of Michigan. Pottawatomie Indians. Yellow or Golden-colored Woodpecker.

Partridge Woodpecker. Wisconsin; Massachusetts. See Meadow Partridge.

Paw-Paw-say, plural **Paw-Paw-say-og.** Lower peninsula of Michigan. Pottawattomie Indians. "Paw-big (flea) hence the word, jumping about quickly in any direction. Our people did not go into varieties nor define birds and mammals as Europeans do. For instance: should we want to describe more particularly the Red-headed Woodpecker, we would say Mis-qud (red)-o-dib (head), Paw-Paw-say (Woodpecker); or

O-zaw-wan-day Paw-Paw-say, (Yellow or Golden-colored Woodpecker).—Simon, Chief of Pokagons.

Peckwood, Peckerwood. Florida, Georgia, Michigan. Transposition of Woodpeck and Woodpecker.

Peerit, Pee-ut. New England. **Pe-up.** Massachusetts. From its shrill call notes.

Pie-bis, Pie-bris. Louisiana. French. Brown Pie or Magpie. A Misnomer.

Pigeon Woodpecker. New England; New York; Minnesota. "Arising from the peculiar pigeon-like attitude when perched across the branch instead of lengthwise along it as do other more genuine woodpeckers."—Ernest Ingersoll.

Pink-throat. Mackinac Island, Michigan. In certain lights the pinkish-cinnemon of the neck appears to advantage.

Picque-bois-jaune. Louisiana. French. Yellow Woodpecker.

Piut, Pi-ute. New England. Same as *Peerit.*

Sapsuck, Sapsucker. Southern States. From the belief that it extracts sap from the trees in which it bores. Misnomer.

Shad-spirit. New England Coast. "A half superstitious idea of the fishermen of former days—and it may be yet—that this bird came up from the south and ascended the rivers just ahead of vernal migration of shad, in order to inform them of the approach of the fish; in other words, a noting of a coincidence."—Ernest Ingersoll. Its spring cry is heard at about the time the first shad are caught in the Merrimac river.—Walter Hoxie. A parallel case in the Old World is that of *Mackerel-bird*, on Guernsey Island, for the Wry-neck, referring to its appearance coincident to that of the Mackerel.

Sharp-billed Flicker. Eastern Pennsylvania.

Silver Dollar Bird. Pennsylvania. "From its white rump mark which it shows so conspicuously when rising from the ground."—W. W. Colburn. According to Gould "Handbook of the Birds of Australia," the Australian name for *Eurystomus pacificus* is Dollar Bird, from the silvery-white spot in the middle of the wing, which is distinctly shown when in flight.

Spotted Woodpecker. Name given by Maynard to the whole genus.

Sucker. Florida. See *Sapsucker.*

Specht, Speckt, Speight, Spright. Pennsylvania. German. (Woodpecker). A corruption—*Woodspite*—is locally in use in England to designate the Green Woodpecker, according to Rev. J. G. Wood.—"Popular Natural History."

Talpa-na-ni. Southern Florida. Seminole Indians. It has no equivalent in English. The first part seems to be a generic prefix, and the last two syllables are an imitation of a cry of the kind.—Walter Hoxie.

Taping-bird. Massachusetts. This epithet was applied because it flies as if "measured off tape." In the "Audubon Magazine" an error was made in copying from the "Forest and Stream," making it "Tapping-bird," which would of course make it have a very different meaning.—W. W. Colburn.

Tree-pecker. Lower Delaware Valley. (Obsolete). So called by the early Swedish settlers, according to Heckwelder.

Wa-cup. New London and Windham counties, Connecticut. "So called by every one save a few closet bird men."—C. L. Rawson. Imitation of its song or greeting notes.

Wah-cup. Massachusetts; Long Island. Same as *Wa-cup.*

Wake-up. New England; New York; Minnesota. Corruption of *Wa-cup.*

Wa-wup. New York; Pennsylvania. Same as *Wa-cup.*

Weather-hen. Vermont. Doubtless so called because it becomes, in common with many other species of birds, particularly vociferous just before or after a storm.

Wheeler. Somerset county, Maryland. Probably of onomatopoetic origin.

Wild Hen. Maine. "Its practice of laying additional eggs when the first set is removed gives the bird this name."—Ernest Ingersoll. Its cackling notes are somewhat similar to the common domestic fowl's.

Will Crisson. Dismal Swamp Region, North Carolina. Given me by a gentleman who visited and hunted in that section and heard it applied. I know nothing of its origin or meaning.—W. W. Colburn. Probably another sound-word, corrupted until all trace of the cry represented has been lost.

Woodchuck. Berkshire Hills, Massachusetts; Kansas; North Carolina; Florida. Possibly the suffix is derived from

chuck, the original name for hog ; hence literally *Woodhog*, from its habit of burrowing in the wood in comparison to the rooting of the hog in the earth ; or *chuck*, used in the sense "to strike," would still be consistent ; and again, the latter word with other meanings. "To call as a hen to her chickens, to jeer or laugh," would seem equally relevant and appropriate.

Woodcock. New England; Pennsylvania; Iowa. A homonym rather than a misnomer.

Wood-lark. Locality unknown. Misnomer.

Woodpeck, Woodpecker, Woodpicker. Illinois; North Carolina, Michigan.

Woodpecker Lark. Georgia; South Carolina. "From the black crescent of the breast."—Ernest Ingersoll. Owing to a resemblance in upper plumage as well as the-at-times-similarity of feeding habits and association while on the ground with the Meadow-lark.

Wood Pigeon. New England. Misnomer.

Wood-quoi. Connecticut. A mongrel term, possibly from *Wood-pie*, for which see *French Woodpecker*.

Wood-wall. New England. Clearly an early importation from England, originating from its nesting habits. Said to have been the ancient name for the Green Woodpecker, and occurring in the writings of the old English poets. Still in use in some parts, particularly in the New Forest, Hampshire, according to Cassell.

Xebec. (Pronounced ze-bec). New Hampshire. This is the name under which I received a set of Flicker's eggs some fifteen years ago. The collector knew the species by no other name.—F. H. Lattin. The original of the name is a small sea-going vessel carrying much canvas ; hence the nickname was doubtless suggested by the most conspicuous identity mark of the kind at a distance—the white rump.

Yacker, Yecker, Yucker. New York; Massachusetts. Doubtless of onomatopoetic origin.

Yaffle. Connecticut. Another importation. "The people of Surry and Sussex, England, call the Green Woodpecker 'yaffle' or 'yaffel,' from its repeated notes which are compared to the sound of a laugh."—Cassell.

Yarup, Yar-rup, Yaw-up. Middle States. From its ordinary call note.

Yellow Flicker. West. To distinguish it from the Red-shafted Flicker, whose range it overlaps.

Yellowhammer, Yellerhammer, Yallerhammer, Yellow-'ammer. In general use, ranking next to the Flicker in popularity, more frequently heard in the older States, but not uncommon in the Mississippi Valley, and even cropping out in the far West, thus indicating *C. cafer.* "Yellowhammer is an old Teutonic word, common in Great Britain as the provincial name of the Yellow Bunting (*Emberiza citrinella*). Hammer or 'ammer—it ought to be the latter—means, radically, the chirper, *i. e.*, a small chirping bird, so that Yellow-'ammer=Yellow Songbird. Its application to our Flicker is the result of ignorance long ago."—Ernest Ingersoll. Doubtless the very first settlers, eager to discover something in the wilderness that would remind them of the land they had left, so named the strange bird upon the first flash of yellow, irrespective of the difference in size, structure and habits; and the title continued through a sense of its accidental fitness.

Yellow Jay. New Hampshire, Wisconsin. A misnomer, but not altogether inappropriate, as it possesses a call note almost in common with one of the Blue Jay's.

Yellow-shafted Flicker, Yellow-winged Woodpecker. See Golden-shafted Flicker.

Yellow Wing. Cape Ann, Massachusetts.

Yellow-winged Sapsucker. Pennsylvania. Misnomer.

Yellow-winged Woodcock. Iowa. Misnomer.

Zebec. (*Young Oologist*, '84, p. 22). See Xebec.

GEOGRAPHICAL DISTRIBUTION.

Geographical Range. "Eastern North America; from Florida and the Gulf coast north through the maritime provinces of Canada to Newfoundland and southern Labrador, and the shores of Hudson Bay to about latitude 58°; thence in a northwesterly direction to Alaska, to about latitude 68°; west through about the eastern half of Texas, the greater part of Indian Territory, Kansas, eastern half of Nebraska, South and North Dakota, and the province of Assiniboia and Saskatchewan, Dominion of Canada, to northern British Columbia; accidental in Greenland and Europe."—Bendire's Life Histories of North American Birds. Ranging from the sub-tropical climate of southern Florida and the Gulf coast to the tree limits of the boreal zone, it would appear not only pushing out further to the west into the territory of *cafer*, but a foothold which promises to become permanent has been gained in California. While frequently mixed birds, a number of apparently pure *auratus* have been found; the first record being from San Bernardo, taken early in January, 1885."—Auk, Vol. II, p. 383. Mr. R. P. Sharples, during several years' residence in Oakland, Alameda county, has found it and believes it to breed there. He also examined one skin in a small collection in Marin county, and its owner informed him that he had taken it nearby. This is the most direct route for migrants going to or from the northwestern breeding grounds, yet a little over a quarter of a century ago birds exhibiting even traces of the Yellow-shafted were practically unknown in all that region. There is one record for Colorado. A straggler taken in England in the autumn of 1836 is the only record I have been able to find, though doubtless it has been taken on the Continent also, and a few may and probably do wander into northeastern Siberia.

Winter Range. "It is much more abundant in Winter than in Summer south of latitude 36°, usually inhabiting the

woods and swamps, where it is reported as very wild, keeping well out of the reach of the gun. While it is said to be usually a resident as far north as the 38° parallel, further north it becomes less common, and above the 40° parallel is rather scarce as a resident, although a few are reported at almost every station on the Atlantic slope. "At Cape Cod it is very mischievous during this season, boring holes through the weather boarding of vacant summer residences for no apparent reason except for shelter. Drumming on tin roofs also seems to afford it pleasure."—J. H. Bowles. "At Taunton, Mass., the few that remain find shelter in the deep evergreen swamps or in old ice houses, in which it excavates its winter quarters."—A. C. Bent. "West of the Alleghenies it is found in small flocks on Big Island, Burlington county, Iowa; and is not uncommon at Oberlin, Ohio, Port Sanilac and Plymouth, Mich.; and at Mexico, Mo., extending well out on the prairies, seemingly loss migratory yearly, as it was found throughout the cold winter of '93-'94. "At Wady Petra, Ill., for three winters—'93 to '96—an old male was present almost every day, though during the coldest weather he disappeared for as long as a week at a time; during the morning he usually sat on the east side of the roof of the house."—Virginius H. Chase. "At Oberlin College for two winters—'95 to '97—a solitary bird roosted between the vertical water pipe and wall of Spear Library, and during the winter of '97-'98 one bird made its headquarters in the cupola of the Theological Seminary building."—Lynds Jones. Two records are given for Perry, Iowa—Nov. 18, '93, and Dec. 22, '94. Regardless of the Winter weather from one to three have been noticed every few days throughout December, '99, and January, '00, at Hillsboro, Iowa, which is within ten miles of the Missouri border; and at Waseca, Minn., one was seen on Dec. 11 and 12, '86. At Plymouth, Mich., the cold winters and the scarcity or abundance of beech nuts does not seem to effect the rarity or abundance of the Flicker as it does the Red-headed Woodpecker. It does not winter at Glen Ellyn, Ill.; Iowa City, Iowa, or at any station in Wisconsin or Minnesota. While stragglers have wintered even north of the United States in mild seasons, I believe nearly if not quite all birds found above latitude 40° to be Winter visitants from further north,

mainly hardy old males. In this locality it has decreased as a Winter resident during the last fifty years from common to casual.

Breeding Range. Nesting from Newfoundland to the Dakotas and from the Florida peninsula to Alaska, its range is more extensive than that of any other American Woodpecker. It is said to be nearly co-extensive with its geographical range, being found generally below altitudes of 4000 feet. It is in greater abundance and more generally distributed between the 36° and 46° parallels than anywhere else, and in actual numbers probably falls but little short of equalling all other members of the family combined in the same area. It has been found breeding at Fort Churchill, the most northerly outpost of civilized man's residence on the west coast of Hudson Bay. Unfortunately but little data is available from the great northwest, which is doubtless in part owing to its greater abundance in the States. "At St. Vincent, Minn., it is at no time abundant, nor is there an appreciable increase during the autumnal migrations."---Rev. P. B. Peabody. G. G. Cantwell found it breeding in numbers along the Sixty Mile river, N. W. S., on July 8, '97. — Osprey, Vol. II, p. 25. The table given below is compiled from a large amount of published and unpublished data, showing the average period of Summer residence in various sections of the country. It is believed to be approximately correct. The average date of the arrival of the bulk in Maine, while much later than that given for Wisconsin and Minnesota, is taken from thirty-four records; probably a larger number of dates would make it earlier, and consequently show a longer period of summer residence in that section:

Locality.	Av. Date When First Seen.	Av. Date When Common.	Av. Date When Bulk Depart	Av. Date When Last Seen.	Av. Period of Summer Residence.
S. E. Penn'a.....	March 21	April 8	Oct. 9	Oct. 27	189 days.
New York	April 7	" 12	" 3	" 6	174 "
Maine	" 17	" 27	Sept. 26	" 2	152 "
S.W. Penn'a, Ohio, Indiana, Illinois.	March 15	" 3	Oct. 13	" 26	193 "
Iowa.	" 22	" 3	" 2	" 25	185 "
Wis. and Minn....	April 5	" 8	" 2	" 9	177 "

MIGRATION.

Exclusive of the work of the United States Biological Survey but little effort has been made in this country toward detailed co-operative investigations on a large scale of this phenomenon; therefore the finished systematized report produced from the vast mass of accumulated data should be the most important publication ever issued by that branch. We know very little of the migratory habits of the Flicker beyond that it occurs in large loose flocks by night, published data being meagre; under the circumstances no excuse need be offered for the tabulated forms, incomplete as they are, owing to the varied terms of years, 1875 to 1899, and fragmentary nature of the reports. In spite of all that has been said to the contrary, the homing instinct must have much to do with the annual northward movement and the alleged failure of the food supply has less to do with the retrograde movement than the approach of cold and stormy weather and consequent disappearance of sheltering foliage. In common with a large number of our birds, the Flicker is peculiarly sensitive to meteorological changes which govern its movements to a large extent. The discussion of the probable causes of the semi-annual restlessness and irresistible impulse to move to more favorable climes lies beyond the scope of this paper. If migration consisted of a uniform dispersion and progression throughout the country instead of lines of flight along the coast, rivers and valleys and in irregular waves, the significance of the dates would be more apparent; as it is, a record may be that of the arrival of a Summer resident or transient, according to the remoteness or proximity to the line of flight. W. W. Cooke in "Bird Migration in the Mississippi Valley," states that the Flicker travels faster on the east than the west side of the Mississippi river. He estimates its average daily speed at about 12 miles. My calculations place the relative speed at about the same figure, but varying according to season

and weather conditions from 7 to 48 miles per night. It is absolutely certain that it does not move steadily night after night, but only as the weather permits or necessitates and its physical condition allows; the actual distance covered in a night's journey is therefore much greater than at first apparent.

Vernal. During January and February it is found in flocks of fifty or more individuals in Charleston, S. C. (Wayne), and the forward movement takes place in the first mild weather; the forerunner appearing at Berwyn as early as Feb. 2 or as late as April 6, according to the promises of the season, correlating in a measure with the date at which the first frog is heard peeping. The first arrivals are often solitary birds, frequently hardy old males, that have wintered nearby, accounting for the irregularlty of first appearance.

Locality.	1892	1893	1894	1895	1896	Aver.	No. Yrs.	Earliest	Latest
Berwyn, Pa.....	Feb. 25	.....	Mar.20	Apr. 2	Mar.30	Mar 13	10	Feb. 2	Apr. 6
Germantown,Pa	.....	.....	.....	.....	.....	.....	.....	Mar. 13	Mar. 25
Croton Falls,NY	Apr. 4	Apr. 6	Mar.22	Apr. 6	Apr. 12	Apr. 6	7	Mar. 22	Apr. 14
Cincinnatus,NY	.....	Apr 5	.....	Apr. 9	Apr. 14	Apr. 13	6	Apr. 5	Apr. 20
Penn Yan, N. Y.	Apr. 3	Apr. 3	.....	.....	.....	Apr. 8	10	Mar. 21	Apr. 18
Toronto, Ont...	Apr. 21	.....	.....	.....	Apr. 26	.....	.....	.....	.....
Westbrook, Me.	Apr. 6	Apr. 8	.....	Apr. 20	.....	Apr. 12	7	Apr. 4	Apr. 20
Cornish, Me....	Apr. 9	.....	Scarce	Apr. 22	Apr. 15	Apr. 15	5	Apr. 9	Apr. 27
N. Brighton, Me.	.....	.....	.....	Apr. 26	Apr. 20	Apr. 21	10	Apr. 12	Apr. 28
Pittsfield, Me..	Apr. 6	Apr. 22	Apr 18.	Apr. 21	Apr. 15	Apr. 18	7	Apr. 6	Apr. 23
Bangor, Me.....	Apr. 6	.....	.....	Apr 20	Apr. 22	.....	.....	.....	.....
Waynesburg, Pa	Mar. 27	Mar. 25	Mar. 19	Jan. 21	.....	Mar. 2	6	Jan. 21	Mar. 27
Oberlin, O.....	.....	.....	Mar. 5	Feb. 26	.....	.....	.....	.....	.....
Wady Petra, Ill.	.....	.....	Mar. 8	Feb. 28	Feb. 24	Mar. 2	3	Feb. 24	Mar. 8
Glen Ellyn, Ill..	.....	Mar. 26	Mar. 25	Apr. 1	Apr. 5	Mar. 29	4	Mar. 25	Apr. 5
Delavan, Wis...	Apr. 2	.....	Mar. 18	Apr. 2	Mar. 31	Mar. 29	4	Mar. 31	Apr. 2
Mt. Sterling, Wis	.....	.....	Mar. 22	Mar. 31	.....	.....	.....	.....	.....
Meridian, Wis	.....	Apr. 3	Apr. 2	Mar. 24	Mar. 20	Apr. 3	6	Mar. 24	Apr. 13
Beatrice, Neb	.....	.....	Feb. 17	Feb. 27	.....	.....	.....	.....	.....
Odell, Neb.....	.....	.....	Apr. 4	Apr. 20	.....	.....	.....	.....	.....
Iowa City, Iowa	.....	.....	Mar. 10	Mar. 4	Mar. 5	Mar. 6	3	.....	.....
Grinnell, Iowa..	.....	.....	.....	.....	.....	Mar. 30	6	Feb. 18	Apr. 3
Perry, Iowa....	.....	.....	Mar. 19	Apr. 2	.....	.....	.....	.....	.....
Waseca, Minn ..	Apr. 3	Mar. 28	.....	.....	.....	Apr. 2	12	Mar. 21	Apr. 9

Narbeth, Pa., March 20–25; Vincennes, Ind., about March 9; Forest City, Ia., Feb. 14 ('91); Dawson, Y. T., May 22 ('99).

The condition of the weather has much to do with the irregularity, as it has been observed that of the earlier records those of January and February especially were made in mild open weather, while the latter dates with one exception were made after a season of irregular weather; March '93, however, was generally open and mild, yet it did not put in appearance until the 25th; the next day more arrived, and in a

few days it became common. It returns each succeeding year to the same locality (Jacobs). It often makes its first appearance at Iowa City, Iowa, in small flocks; at Delavan, Wis., in pairs or small bunches, and at Meridian, Wis., often in quite large flocks, at other times in pairs or families.

The bulk ordinarily arrives between two and three weeks later, in Pennsylvania and Illinois, but the number of days intervening gradually diminishes as it moves northward, and the van leads by scarcely a week in the northern tier of states. As far as I have observed, the males appear before the females, and the migrations are conducted in small companies, these forming the bulk of transients; while like most all species migrating, there are forerunners and stragglers (Miller). At Berwyn, Pa., it becomes common soon after the hardy willow has unfolded its leaves, and about the time the fragrant spicewood blossoms, when the ants, spiders and beetles become active once more, and just in the height of the arbutus season. It appears to average earlier in the West than in the same latitude in the East.

Locality.	1892	1893	1894	1895	1896	Aver.	No. Yrs.	Earliest	Latest
Columbia, Pa.	....	....	.....	.....	.....	.....	.....	Apr. 1	Apr. 10
Berwyn, Pa.	.....	.....	Apr. 1	Apr. 20	Apr. 12	Apr. 1	11	Feb. 27	Apr. 23
Penn Yan, N. Y.	.....	.....	.....	.....	.....	Apr. 18	3	Apr. 17	Apr. 19
Cincinnatus, NY	.....	Apr. 9	....	Apr. 20	.....	.....	.....	.....	.....
Buffalo, N. Y.	....	.....	.....	.....	.....	.....	.....	Apr. 10	Apr. 20
Westbrook, Me.	Apr. 21	Apr. 24	Apr. 22	.....	Apr. 18	Apr. 20	7	Apr. 18	Apr. 24
Cornish, Me.	.....	.....	Rare	Rare	Apr. 19	.....	.....	.....	.....
N. Brighton, Me.	.....	.....	.....	Apr. 22	Apr. 20	Apr. 21	10	Apr. 12	Apr. 28
Pittsfield, Me.	May 1	May 1	Apr. 28	May 1	Apr. 29	Apr. 29	7	Apr. 23	May 1
Waynesburg, Pa	Apr. 1	.....	.....	.....	.....	Mar. 18	3	Mar. 12	Apr. 10
Oberlin, O.	.....	.....	Mar. 9	Apr. 5	Apr. 11	Mar. 21	6	Mar. 9	Apr. 11
Wady Petra, Ill.	.....	.....	Apr. 6	Apr. 3	.....	.....	.....	.....	.....
Glen Ellyn, Ill.	.....	Apr. 2	Mar. 25	Apr. 14	Apr. 12	Apr. 9	7	Mar. 25	Apr. 19
Delavan, Wis.	.....	.....	Mar. 21	Apr. 5	Apr. 2	Mar. 30	3	Mar. 21	Apr. 5
Mt. Sterling, Wis	.....	.....	.....	Apr. 13	Apr. 2	.....	.....	.....	.....
Beatrice, Neb.	.....	.. ....	Apr. 13	Mar. 20	.....	.....	.....	Mar. 20	Apr. 13
Grinnell, Iowa.	.....	.....	.....	.....	.....	Mar. 28	5	Mar. 19	Apr. 3
Perry, Iowa.	.....	.....	.....	Mar. 30	.....	.....	.....	.....	.....
Waseca, Minn.	.....	Apr. 15	May 1	.....	.....	Apr. 11	6	Mar. 26	May 1

Boothby Harbor, Me., April 10 ('98); Vincennes, Ind., about the middle of March; Red Wing, Minn., last of March or first of April; Ramsey, Hennepin, Dakota and Washington counties, Minn., last of March to April 10. It is found sparingly during the Winter at Hillsboro, Ia. Feb. 24, '99, it began to increase, March 15th the great wave appeared, April 2, all gone except the goodly number that remain to breed. April 17, '98, when some twelve or fifteen miles off Cape Ann, at sea, a Flicker came aboard, perching for a few minutes on

the top sail before continuing its northerly course (Morrell). As numerous as and even more noisy than the Robins, during migrations, calling uneasily, flying from tree to tree, often in considerable companies. It is not confined to the woods, but is everywhere. This vast multitude passes northward within a week after arrival, leaving only the local breeders (Jones). Some notes taken in the Spring of '96 at Delavan, Wis., by Mr. Ned Hollister are interesting on account of the waves recorded; March 31, first heard at daybreak, calling loudly from the heavily wooded island in Delavan lake; five seen during the day in a walk over this island, all low down near underbrush between wood and marsh; April 1, about the same number in same place; April 2, common about lake; April 4, common everywhere around the shores, having steadily increased since first arrivals; in the morning, soon after the first signs of daybreak, it was heard calling from all sides. On moving into town none were observed until the 12th, when it became very abundant all at once, a perfect wave taking the place of a very large wave of Yellow-bellied Sapsuckers that had taken the town by storm the two previous days. The Flickers were everywhere, especially in the marshes, orchards and woodland; burnt marshes seem to be a favorite place, feeding on the ground in dozens and large flocks, far from water. April 19, 20 and 25, abundant; April 28, 29, common; April 30, abundant; after this date common until Fall.

During the season of 1895 there was a marked decrease in numbers in some localities: for instance, at Columbia and Berwyn, Pa., it became rather uncommon, and at Cornish, Me., from abundant to quite rare, none remaining to breed. At only one point was it particularly noticeable in the West, about Meridian, Wis., where the decrease was placed at 50 per cent at least. It seems almost incredible that so hardy and resourceful a bird should have suffered so severely from that long-to-be-remembered blizzard.

While the retrograde movements are conducted in larger numbers, being recruited by great numbers of birds of the year, it is scarcely as noticeable, lacking the noise and bustle of Spring arrivals. Like the Robin, its whole nature seems to have undergone a change. It no longer solicits notice by song or display of plumage, but becomes shy and suspicious,

and while gregarious to a great extent, in flight every one is capable of looking out for itself. The mature birds are the most wary, and by example prepare the young for the dangers of migration and Winter residence in the South, where it is constantly menaced by hunters. Acknowledging the difficulties in the way, it seems to me that the departure of the bulk has been sadly neglected nevertheless. In this species at least its value over dates of last seen is apparent.

Locality.	1893	1894	1895	1896	Average	No. Yr's	Earliest	Latest
Berwyn, Pa.....	Oct. 19	Oct. 19	Oct. 5	Sept. 6	Oct. 9	7	Sept. 13	Oct. 19
Oberlin, O	.....	.....	.....	Nov. 10	Nov. 14	4	Nov. 1	Dec. 6
Glen Ellyn, Ill..	Sept. 20	Sept. 25	Sept. 26	Sept. 20	Sept. 25	7	Sept. 20	Sept. 28
Delavan, Wis...	" 12	Oct. 7	.....	.....	Oct. 1	3	" 12	Oct. 12

At Buffalo, N. Y., the bulk retires in October; Dunrak, Pa., first week in October; Meridian, Wis., by Oct. 10; and the same date is given for Hillsboro, Ia. The departure of the bulk is always dependent upon weather and foliage. In '98 the foliage was unusually late in falling, but in '99 rather unusually early with some chilly weather in October (Jones). During the cold windy days in October at Taunton, Mass., it may be found in large numbers huddled together in hollows and sheltered localities, where it may be easily approached (Bent). The last seen are represented by a number of irregular dates.

Locality.	1892	1893	1894	1895	1896	Aver.	No. Yrs.	Earliest	Latest
Bangor, Me.....	.....	.....	.....	Sept. 28	.....	.....	.....	.....	Oct. 21
Pittsfield, Me...	.....	Sept. 30	.....	Sept. 29	Sept. 9	Sept. 27	5	Sept. 9	Oct. 6
Westbrook, Me.	Sept. 19	.....	.....	.....	.....	Oct. 11	4	Sept. 14	Nov. 28
Toronto, Ont...	Oct. 4	Oct. 11	none	.....	Oct. 1	Oct. 2	5	Sept. 25	Oct. 11
Cincinnatus, NY	Oct. 6	.....	.....	.....	.....	.....	.....	.....	.....
Penn Yan, N. Y.	.....	.....	.....	.....	.....	.....	.....	.....	Dec. 29
Croton Falls, NY	Oct. 4	Oct. 11	not seen	.....	.....	Nov. 4	3	Sept. 26	Oct. 11
Berwyn, Pa.....	.....	Oct. 19	Oct. 19	.....	Nov. 12	Nov. 12	6	Oct. 19	Dec. 8
Waynesburg, Pa	.....	.....	.....	.....	.....	.....	.....	Nov. 10	Dec. 10
Delavan, Wis...	Sept. 27	Sept. 19	Oct. 19	Oct. 18	.....	.....	4	Sept. 19	Oct. 18
Wady Petra, Ill.	.....	.....	Oct. 15	Oct. 21	.....	.....	.....	.....	.....
Perry, Iowa.....	.....	Nov. 18	Dec. 22	Sept. 4	.....	.....	.....	.....	.....
Grinnell, Iowa .	.....	.....	.....	.....	.....	Oct. 22	5	Oct. 5	Nov. 21

At Croton Falls, N. Y., not present during the fall of '91 and '94; Dunrak, Pa., last by October 15; Germantown and Narberth, Pa., by last of Octobor; St. Paul, Minn., late in October, one lingering until November 7, '95; Iowa City, Iowa, and Glen Ellyn, Ill., last week in October; Hillsboro, Iowa, November 6, '99, all but the few that winter.

FLIGHT.

Its usual flight is undulating, so characteristic of the Woodpecker family as well as the Crossbills, many of our Finches and some other species. While gaining headway its wings beat the air rapidly, producing a whistling sound which, upon gaining sufficient altitude and velocity, apparently ceases altogether, recurring only when about to alight. Perhaps this noise is only an audible manifestation of its almost perpetual bustle and restlessness, as I have known it upon rare occasions to take flight or alight within a few feet of me with the stealth and noiselessness of an Owl. When flying in flocks, which by the way are never compact, it does not act with the unity of action of the majority of our birds; still there is considerable regularity of length and inflection of the waves produced by the alternate opening and closing of the wings. During '96 I took the following notes: June 25, one flushed at road-side, rose twenty feet at a distance of seventy-five feet —just clearing the comb of a small barn—making five dips of about three feet or one dip every fifteen feet on an average. One flushed from creek bank and flew to ground again. Ten feet rise in forty feet, making two dips of less than one-half foot. August 1, several flushed from ground. Ten feet rise in forty feet, two dips of about three feet or one dip every twenty feet. It is capable of greatly increasing its usual speed and sustaining itself with little or no undulation but seldom rising to any great height above the tree tops except when migrating. Alighting is best accomplished by a slightly upward movement, and when at right angles to its perch the tail plays an important part in the rather awkward feat of balancing, suggesting a comparatively recent aquirement and one not attained by the true Woodpeckers.

ROOSTING.

I do not know how much proof can be offered in support of the popular belief that it habitually roosts in the tree cavities. While it is to be inferred that it frequently does so in cold or stormy weather whenever suitable chambers are available, yet I very much doubt whether accommodations could be found within reasonable distances for more than five per cent. of the number flocking previous to the autumnal migrations as well as the winter season in the south. During the warm summer months it is reasonable to suppose that it would prefer the open air to the hot and stuffy chamber of wood, except of course the short period necessary to hatch and protect callow young.

Alexander Wilson relates how a captive slept in a perpendicular position with its head under its wing. An interesting observation comes from Mexico, Missouri: On a cold blustry evening of the spring of '94, a Flicker was observed roosting on the south-west side of the bare trunk of an elm close to the house. The year following, on the warm and balmy evening of April 9th, another bird flew into the same elm and with a little scrambling and investigation it disappeared behind the trunk to a nich a little below the crotch of two upright limbs, with its whole body in contact with the bark of the tree and its neck shortened back into its body—it was evidently in a roosting position. Now as it was not known whether the previous visitor had staid all night, this one was carefully and perhaps too closely watched, as it left at the call of a passing mate. The next night was cooler with a north-east wind and a lowering misty vapor in the west, but not very threatening. At 6:30 the same or another female alighted and quietly shuffled around on the south side to the identical spot occupied for a time the previous evening, but at 7 o'clack it too had vanished.—J. Newton Baskett. Bendire quotes a Maine correspondent who once found a Flicker asleep on the outside of

a tree one moon-light night ; as there was no bird on the nest, it roosted in that position from choice. At Oberlin College a single bird roosted between the vertical water pipe and wall of Spear Library for two successive winters, and another occupied the cupola of the Theological Seminary the succeeding winter. —Prof. Lynds Jones. A correspandent makes note of it cutting its way through weather boarding of vacant summer residences at Cape Cod for no apparent reason except for shelter, and at Taunton seeking shelter in the deep evergreen swamps or excavating winter quarters in the sawdust lining of ice houses. It has also been known to roost in hollow trees, outbuildings about farm houses and unused chimneys during the coldest seasons.

DRUM CALLS.

This form of instrumental music is a by no means insignificant addition to the Flicker's repertoire. It is a musical long roll of vibrant, far reaching effect, sometimes evidently demanding an answer as the bird will assume a listening attitude, and at other times preceeding or succeeding a vocal call or song. In the spring time it is a very popular means of attracting the attention of a mate or sounding an assembly. It is seldom heard after the nesting season has well progressed and ends before the young have hatched. J. N. Baskett states that in drumming the beak is struck directly end-on against the resonant body as shown by an examination of a soft pine box which was frequently used. The box was nailed to a tree and by slipping up and throwing a hat over the bird while it was clattering away, it was finally caught. Either it or another one was drumming again the next day. Chief Simon Pokagon relates a little incident which must not be lost. In his own words: "I asked a class of Indian boys what kind of music they liked best. One said '*Pe-nay-shen*' (Bird) music. I then asked each one what kind they liked best of all the birds. One replied '*Au-pe-tahe*' (Robin), another '*Tehin-dees*' (Blue Jay), another '*Au-nawk*' (Thrasher), another '*We-bin-gwan-Pe-ney-shen*' (Bluebird), and to the smallest in the class I said '*Que-we-zaynes*' (My boy) 'what one pleases you the best?' He quickly replied '*O-zaw-wan-day Paw-Paw-say*' (Golden-winged Woodpecker). I said 'Why so my little boy?' He quickly answered 'Oh him am such a *me-no* (good) *Tom-mer Tom-mer* (drummer.)' Accent almost invariably on last syllable."

VOICE.

The Flicker has a much greater vocabulary and more modes of expression than any other of our North American Woodpeckers, and while the contrast between its so-called song and the inspiring melody of our tree songsters is ever so great, its voice blends harmoniously with the many other voices and sounds of nature without which the hill, meadow and grove would lose much of their charms. Individuality now and then cropping out during and immediately after mating and the earlier part of the breeding season, appearing to be constantly varying and improving, seeking to give expression to its feelings.

Perhaps it is unwise to devote much space to this subject however enticing it may be, for but few have given enough time and thought to it to be classed as competent reporters; then the variability of the notes according to locality adds another difficulty. However, as its notoriety has been largely gained through its versatile voice, it would not do to pass over this fascinating study without an attempt to condense and render intelligible the notes in my possession. For brevity and convenience I have separated them under Calls, Conversational Notes, Common, Scythe-whetting, Flicker and Wake-up Songs.

Calls. The vocal call is usually high pitched and penetrating. It is a note characteristic of no particular season and when uttered in a startling shriek which may be heard at a distance of almost half a mile or subdued to a soft but impatient inquiry unnoticed a hundred yards away, it serves as a call or answer to comrade, mate or young, challenge to rival, or precedes the song as an imperative demand for attention. Ordinarily a *chu*, *ka*, *che-u che-ah*, or *chu-ah* in New York and Pennsylvania, and in the northern part of the first state often sounding like *clape* and *kee-yer*. In New England—*pea-up*, *ye-up*, *ye-a-up*, *yar-r-r-up*, *pee-up*, *kru* and *que-ah*. In Georgia

—*wake-up*. Missouri—*cheer*. Illinois—*flicker*. Iowa—*kee'-yer*. There are evidently answers to all calls and it is a question whether one sex has a note not possessed by the other.—J. Newton Baskett. During a calm day it may be heard calling *clape* nearly a mile to windward.—H. E. Miller.

Conversational or Soliloquizing Notes. These are neither calls nor songs and are evidently not intended for the ears of the public, commonly a scanny, gurgling, almost involuntary *chur-r-r-r* as danger seems to threaten it when on the wing, or when flushed from the ground or just before a-lighting, which may be interpreted as a note of warning or announcement of arrival according to the circumstances. I have heard a low guttural *who-del* as it endeavored to balance itself on a slender branch immediately after arrival. At Wady Petra, Illinois, an old male who spent three successive winters close at hand, usually sat on the house roof for a time in the early morning. On December 1st, '94, he uttered an odd gutteral call of *huck-a-woo'-ah* or again only *woo woo* evidently for his own edification.—Virginius H. Chase. At Croton Falls, New York, a low and soft *a-claupee* belongs exclusively to the nesting season.—H. E. Miller. From Ponkapog, Mass., we have another note: On September 12, '94, an adult and four young flew on a tree overhead, uttering a soft measured *sic-err* several times. While making these notes they seemed to be in a sort of ecstacy, holding the limb firmly, spreading their tails, drooping their wings, stretching their necks, pointing their beaks upward and throwing their heads this way and that in a quick, graceful manner, keeping perfect time to the notes.—J. H. Bowles.

Common or Cackling Song. This undergoes but few modifications, being a simple *ka* or *cuh* repeated more or less rapidly from six to thirty-five or more times in a loud full voice, rising and falling regularly as the notes are inhaled or exhaled. To correspondents in Massachusetts and Michigan its song sounds like *wet-wet-wet*, while to others in the former state it is *yip-a-yip* or *woit-a-woit*, and in Iowa *hee-chu*, repeated over and over again. Its song reminds me of that occasionally emitted from the throat of our common domestic hen, although the latter is a tame and feeble imitation in comparison. It begins in Southern Pennsylvania on the first

mild day in March and increasing in length, frequency and rapidity as the season progresses, with intervals of depression during cold or stormy weather, until about April 10th when it becomes monotonous, the notes often being uttered at the rate of four or five to the second; this continues until about the 20th, after which it becomes infrequent, much shorter and rather subdued in tone, until nest building, incubation and care of young claim its undivided attention and the song is restricted as much from caution as from any thing else, it is only semi-occasional until late in June when the young are well along; it revives once more for a few days in a brief early morning—5:30 to 7:15—or before or after shower song. As a cooler day appears in August or September it becomes more frequent and even lively, especially after a refreshing shower, but by the first week in October is heard no more. A careful observer at Perry and Madison, Wisconsin, has arrived at about the same conclusion, i. e., it begins the cackling song in the country previous to the towns, is more clamorous in the morning and evening, almost ceasing after it becomes well mated, and cropping out again in the months of August and September.—J. Eugene Law.

Love or Breeding Songs. The last three songs are essentially of this character. I am aware that some are mating notes only while the active breeding season claims others exclusively, yet I am unable to make such separation. The **Scythe-whetting or Rollicking Song** is probably a form of greeting as well as love, as it is uttered when two or more meet. It has been likened to the sound produced by the sharpening of a scythe, and is a sharp metallic *wich-er*, *wich-ah*, *wick-ah*, *wee-chee*, *ka-wick*, or *co-flick* of the New England and Middle States; *quit-to* and *quit-tu*, of Ohio; *hurrick-ah*, of Minnesota; *tse-wet* and *chuck-a-chuck*, of Iowa, repeated from two to twelve times. The **Flicker Song** is so hopelessly entangled and interwoven with the **Scythe-whetting Song** as hardly worth recognizing as separate when all the localities are taken into consideration. The **Wake-up Song** is less frequently uttered, and is the same throughout the north, from Maine to Iowa, as an oft-repeated *wake-up*, *wa-cup*, *we-cup*, *we-cough*, *wick-up*, *wick-ah*, or *hick-up*, and in Georgia *chuck-up*; great emphasis being laid on one or the other syllables, usually the first. I regard

I APPEND TABLES IN ORDER THAT THE READER MAY OBSERVE THE PROGRESS AND DURATION OF THE SONG PERIOD AS WELL AS CORRELATIVE DATA FOR NEARLY TWO SEASONS AT BERWYN, CHESTER COUNTY, PENNSYLVANIA.

DATE.	NO. OF BIRDS.	WEATHER CONDITIONS.	COMMON SONG.	OTHER SONGS, CALLS, ETC.
1897				
March 22-3	3-5	Warm and cloudy	Occasional, 6 to 10 notes duration	Several drum calls
" 26	2	Cold N. W. wind		Call at 2 P. M. Drum call at 6 P. M
" 30	6	Very warm. Fair	Throughout day. Not more than 6 notes	
" 31	6	Warm, fair, brisk N. E. winds	Frequent 6 to 10 notes duration	Several drum calls
April 2	2	Warm, fair, wind N. shifting E	A trifle longer during day	" " "
" 3	4	Warm, fair, wind East	8 12 notes repeated slowly	" " "
" 4	8	Cloudy, mild, rain at 4 P. M	Loud, long, rapid and frequent. 12-35 notes	*Wicker* twice in succession. One or two calls.
" 5	8	Rain until 10 A. M. Fair until 6 P. M.	Loud, long, rapid and frequent. 25-35 notes	Two calls. Frequent drum calls
" 6-7	2-2	Cloudy, some rain, cooler	Short and infrequent	
" 8	4	Cloudy, rain from 1 P. M. to night	Longer and faster. 12-20 notes	
" 9-11	3	Rain and fog or fair and cool	Short	
" 12	2	Cloudy A. M. Fair P. M.	Louder and longer (P. M.)	
" 15	2	Rain, cloudy	Much longer	*Wick-up* frequent at 3 P. M
" 16	18	Fair, mild	Frequent. Monotonous	*Waeup, wick-up* and *wicker* common
" 18	9	Fair, warm	Frequent. Very long	*Wick-up* frequent. Calls common
" 20	7	Freezing A. M. Very warm P. M.	Once in A. M. Frequent in P. M	*Wick-up* several times
" 21-26			Shorter and fainter	Probably excavating nests
" 29	5	Fair and mild	Renewed, long and lively	
May 1-10			Occasional, neither loud nor long	Probably incubating
" 11			Increasing in force and length	
" 12-26			Occasional early A. M. or before or after rain	
" 27-31			An increase	Probably young well along
June 10	8	Fair. North breeze	Frequent	*Wick-up* once. Several calls
" 12-25			Infrequent	
July 4-9			Infrequent. Short duration	
" 11-17			Short and broken, before 8 A. M. after 5:30 P. M.	
" 19-20			One short song	
August 1, 3, 16				Short *wicker* song

DATE.	NO. OF BIRDS.	WEATHER CONDITIONS.	COMMON SONGS.	OTHER SONGS, CALLS, ETC.
1898				
February 10, 13	1–1	Fair, mild		Calls
March 16	1	Cloudy, mild	At 7 A. M. 6 8 notes duration	
" 21	2	Rain, cooler	At 10 to 11 A. M. 6 10 notes after rain	
" 21	3	Threatening, warm	4 to 8 notes duration	Calls
" 27	10	Cloudy, warm	All day. 6 12 notes, once 28 notes	*Ka-wick* and *hick-up* songs, calls and drums
" 30	4	Cloudy, mild	8 to 12 notes duration	Calls and drums
April 3	2	Cloudy, cold	Short and few	Short *Ker-wick* 4 P. M. Calls
" 8	1	Cold and blustry	" " "	Few calls
" 9	3	Fair, mild	More frequent. 8 20 notes	
" 10	1	Mild, showery	More frequent. 12 22 notes	
" 11	4	Mild, cloudy	Frequent. 12–24 notes	
" 12 13	2	Fair, warm	Frequent. 16 24 notes	*Wé-cup* song
" 14	2	Mild, raining at 4 P. M	Short duration	
" 15	1	Cold and windy		Calls
" 17	6	Fair, windy	Frequent. 12 20 notes	Much drumming between mates
" 18	9	" "	Frequent. 10 24 notes	Much drumming. Nearly all appear mated
" 19	2	Cold, showery	Infrequent	Drum calls
" 20	12	Cold, windy	Common at any time. 16–32 notes	*Wicker* and *wick-cough* notes. Long drums
" 21	11	Showers and squalls	Less frequent	Several *wickup* songs. Drum calls
" 22	10	Mild, cloudy	Common. 20 30 notes.	Frequent *wickup* songs. Much drumming
" 26	5		Frequent	*Ka-wick* and *wick-ka* song at 6 a. m.
May 1 14			Short or silent	Silent except occasional call
" 18, 23, 27			Frequent	
" 28 31			Not frequent	
June 1 8, 17, 28			Occasional, short duration	

this song as by far the most musical of any of its attempts in this line. On May 16, '96, I heard an apparently rare variation, a metallic *ka-wick-wick-wick-wick-wick-wick-wick-wick-wick-wick-ka* by the male while close to the nest.

Quite a number of birds have certain cries which might easily be mistaken for the Flicker's notes. Bendire and others mention the following: Groove-billed Ani, *Crotophaga ani*, Yellow-billed Cuckoo, *Coccyzus americanus*, Pileated Woodpecker, *Ceophlæus pileatus*, Blue Jay, *Cyanocitta cristata*, Long-crested Jay, *C. stelleri macrolopha*, and Oberholser in **"Birds of Wayne County, Ohio,"** states that the imitation by the Cardinal, *Cardinalis cardinalis*, was so perfect as to almost induce an erroneous note book entry.

MATING.

Immediately after the arrival of a sufficient number of local birds, (the females appearing last), and the advent of milder days, courtship commences and continues with increasing vigor for two or three weeks. It is elaborate and ceremonious, often bordering the amusing and ridiculous. The male alights close to the female, often choosing a rather slender and leafless horizontal branch as best suited to an unobstructed view of his graceful form and gay plumage. The female assumes indifference or the silence, dignity and alertness of a critic, while the male bowing, hopping, prancing, dancing, strutting, flirting his wings, pleads and urges his suit with flickering, wacuping and hickcuping notes; finally he sidles up to her, she coyly sidles away, and perhaps takes wing, followed by the one or more suiters to another tree, where the whole performance is repeated. There are sometimes from two to five males, between whom sharp but apparently harmless encounters occasionally take place while in the air, determining, as one correspondent suggests, which one shall next offer his attentions. In due time the female shows her preference, and not infrequently joins in with the bowing and singing of her accepted lover, and if the rejected suitors have not already left in pursuit of some other unmated female, the pair unite in driving them from the premises. As Audubon has stated that the Flicker never fights, it is befitting that we insert some of the testimony at hand: I have not observed the males fighting among themselves for possession of the females, but they display a good deal of friendly rivalry in their efforts to display their good points and in paying attention to the desired females.—Angus Gaines. It is only when approaching the female that the male gives utterance to the familiar and highly sentimental *chuck-a-chuck-a-chuck*, etc., all the while sidling up to her as she sidles away. I have seen the pair make the circuit of a tree several times. It is rare that a rival male molests the actor until the

female takes flight, and then he at once pounces upon him.—Lynds Jones. That the males do not always conduct the courtship is proven by Mr. Benj. T. Gault's experience while collecting in the sunken lands of Arkansas and Missouri—the St. Francis river region. He says: On March 3rd, '94, while visiting Griffin island, on the Arkansas side of the river, my attention was drawn to a small troop of these birds, four in number, clustered together near the top of a dead snag. As other birds were interesting me at the time, slight attention was given to them, but on returning to the same spot an hour or so afterwards, and finding them still there, my glasses were turned upon them; somewhat to my surprise the lot, consisted of three females and one male, the latter holding the most exalted position on the snag, the evident pride of the gentler sex, who were indulging in quite an animated discussion, idolizing his lordship—so to speak—but in tones so low they were scarcely audible from where I stood. I more than judged their earnest intentions by the peculiar swaying motions of their heads, which were very amusing to witness. Never having seen the female do the waiting upon before or since that time, I think their actions were a little out of the ordinary. J. N. Baskett describes a similar scene of two females courting a male, in the *Osprey*. These are the only instances on record, I believe.

When mated the birds become very affectionate and inseparable, few of our native birds excelling them in this respect. It is constantly calling or answering, the male drumming a long rolling call and singing the common song at the top of his voice to equal or excell that of his nearest neighbor; when suddenly missing the female, his calls amount to a perfect shriek, and an answer results in a swift galloping flight as he gurgles a scanny exclamation; alighting beside her he indulges in a series of bows and *we-cup* notes, in which she joins for a time. As the more serious side of life begins, the selection and construction of a nesting place, he becomes less and less noisy, and finally almost silent altogether, except the early morning and before or after shower song, although fully as attentive and helpful to his mate as ever.

NIDIFICATION.

Situation of Nest.—I fail to discover any great uniformity in the choice of nesting places throughout its breeding range, which is not surprising, considering the well known capabilities of the bird for adapting itself to existing conditions, and which indeed is absolutely essential in a species so abundant numerically and ranging over so wide and diversified a territory. On Avery's Island, La., it seems to prefer trees near the edge of the woods, occasionally close to water or in yards or pastures. In the South Atlantic States the lowland pine forests, usually a dead pine, now and then an oak, apple, maple, chinaberry, ash, beech, willow, palmetto, or an unrecognizable stub. Mr. W. L. Foxhall calls to mind one dead pine, perforated with 25 or 30 holes, most of which were in use at one time or another. In the Middle and Eastern States: apple, sycamore, oak, butternut, cherry, elm, chestnut, maple, poplar, beech, ash, pine, hickory, etc. In Southwestern Pennsylvania Mr. J. Warren Jacobs has found the choice to be about as follows: 1st, along streams and in orchards; 2nd, pasture fields on hillsides; 3rd, in woods. He has also found the sycamore to be the favorite, with the apple and maple second, the beech and locust third, oak and cherry fourth, and all other varieties fifth. At Croton Falls, N. Y., it appears to have no marked preference, as it is found in the low wet meadows and again in the highest and dryest woodland, the fruit trees in orchards and the willows bordering the water appear favorites; while about Cincinnatus and Buffalo the edge of woods, groves, orchards or isolated trees, always in dead wood, have their claims. Mr. C. L. Rawson used to fancy that it preferred apple trees at Norwich, Conn., but old orchards disappear and no particular tree now seems to be the favorite. At Fitchville a row of old elms are now the homes of half a dozen Wacups. At Taunton, Mass., it selects perfectly sound apple trees, occasionally an ash, oak or walnut in an open field;

while about Ponkapog it breeds in orchards, swamps, thinly or densely wooded ground, with only one instance of a living evergreen, but any other tree living or dead. At Cornish Me., all found in trees standing away from the thick woods, mostly apple orchards; and about Pittsfield, almost any locality, except perhaps the deeper woods, along the shores of the ponds, especially in overflowed ash swamps it is found. From Ohio westward the apple orchard is a favorite with the poplar, willow, maple, oak, elm, walnut, cottonwood, etc., more or less resorted to, according to availability. Mr. R. M. Strong states that, like many other species, it is rapidly adapting itself to civilization, and gives an instance of a bird excavating a nest about five feet up in the trunk of a shade tree standing on one of the most traveled streets of Oberlin, Ohio. At Glen Ellyn, Ill., Mr. Benj. T. Gault has found that in addition to old and neglected orchard trees, old and partly decayed white oaks, black jacks, and both dead and living elms and poplar are usually selected. At Iowa City, Ia., Mr. Paul Bartsch says that while orchards are the favorite, at times it seeks a more lofty location, such as is afforded by the bare approaches of that giant of the forest, the sycamore; and at Grinnell the favorite trees are the box elder, linden, soft maple, cottonwood, white willow, poplar, in the order named, and in fact almost any tree if it is sufficiently decayed to be easily worked. Summing up the evidence, it is found to be an inhabitant of the open country rather than the deep woods in the north and west.

The preceding may be called the natural nesting sites, but at the same time does not complete the list of available situations for this remarkable bird. Gate posts, fence posts, telegraph, telephone and electric light posts are frequently utilized on the treeless islands and beaches of the east as well as the prairies of the west. Mr. J. H. Bowles writes that on Cape Cod large numbers of poles are literally honeycombed with holes, some of which are used for nesting purposes. It has been found breeding far out on the prairie in an old wagon hub, surrounded by weeds; also in barrels, and one instance of an excavation of the regulation size in a hay stack is on record; another nested in a crevice of an unused chimney for several years; and stranger yet it has been found more than

once occupying Kingfisher's and enlarged Bank Swallow's burrows. It often cuts through the weather boarding of ice-houses, and burrowing in the sawdust lining, lays it eggs, as well as utilizing for the same purpose enclosed cornices, gables, hollow columns, etc., of dwellings and other buildings; not uncommonly in the east and quite frequently in the west. Mr. G. F. Breninger gave an account of the Flicker cutting holes in a 65-foot church tower at Beattie, Kans., and building on the timbers within, six pairs bringing forth young. In response to an inquiry he has given me fuller particulars. The holes were cut through the shingles near the top of the tower and the eggs deposited on the timbers within. The orifice being so small as not to admit of even a small boy getting at them, it was impossible to ascertain whether any cavity was dug into the timber or any material used for nests. He has observed the same trait carried into effect by the California Woodpecker in a church tower at Oreville, Cal. Rev. P. B. Peabody gives some interesting data, showing how it modifies its habits when resorting to localities where the usual nesting conditions are well nigh impossible. In Southwestern Minnesota, where there is very little timber in which it could nest, it has been found resorting quite commonly to the telegraph poles and the railway semaphores. One semaphore contained five holes, one of which was inhabited by a pair of Flickers, and another, just above it, by a pair of Tree Swallows at the time of observation. The holes in the telegraph poles appear very shallow, and generally at a height of not less than two or more than ten feet. Up in northern Minnesota the occupancy of the telegraph poles is quite common and the occupancy of buildings even commoner. For instance, the Church of St. Vincent has Flicker holes in the cornice of both gables. Last year it made a new excavation in the north gable while the Tree Swallows took possession of the south gable. The ice-houses of the Great Northern railroad are perforated with holes, as many as eight in the south end, which is very small. From Ottawa, Kans., comes the particulars of an almost unique nesting site. Mr. Burke H. Sinclair found a nest containing eggs in the garret of the town high school. The birds obtained entrance to this large three-story brick building by means of a displaced brick. As in all infloored lofts it consists

of nothing but the parallel rafters, with attached lath and plaster, which forms the ceiling of the room below. This frail floor is about ten inches below the entrance hole, and the nest was situated about one foot from and directly in front of the entrance. The place had evidently been used for several years, there being at least a peck of wood chippings, some fresh, but a large quantity old and discolored with age. The nest was placed between two of the parallel rafters and composed of these chippings, being about six inches thick by eighteen inches in diameter. This material had been all cut from the rafters on the floor and the roof overhead. There had been an infinite amount of labor, as large as 2×6 rafters, besides a large number of smaller studding, were chipped over half, and others entirely cut through. The birds seem to have been cutting at the rafters for amusement, as well as material, as everything in the immediate vicinity of the nest was strewn with chips. The male spent much of his time sitting in the entrance or demolishing the rafters; the pecking became so vigorous as to disturb classes in session below.

I regard this last instance as a much greater departure from the normal habits than any other known to me, as in all previously related instances it was compelled to cut through an outer shell after the manner natural to it, except in the occupancy of wagon hub, barrels, chimney crevice and the bank burrows, which differ in no material way in interior arrangement from hollows and burrows in trees. At this rate it appears within the range of possibility for it to breed in properly constructed bird boxes if protected and encouraged to do so.

POSITION.

Prof. Lynds Jones voices the general verdict when he affirms that the trunk of the tree is much preferred, but the main limbs are sometimes used. It seldom if ever carves out for itself a home in a perfectly sound hardwood tree. Soft punky stubs and trees that are entirely dead or have decayed portions are almost invariably selected. If the tree chosen is a large one, the excavation is confined to that side of the trunk in which the entrance is made. It excavates with the grain of the wood, so that if the trunk of the tree is slanting

the excavation will have the same slant. When the tree is leaning the entrance will be made on the under side, otherwise the rain would enter and fill the excavation. Once he found a nest in the horizontal branch of a tree not more than two feet from the main stem. The hole was bored in the side of the branch and carried at right angles toward the tree bole. The next year the same entrance was used, but the burrow dug out of the opposite side, the old cavity not being used at all. Natural cavities are sometimes chosen and the entrance enlarged. Once such a nest came to grief during a heavy rain, when it filled with water, ruining the eggs. As to distance from ground, he says it would be impossible to state any usual or preferred height, for there are none. Mr. Chase once found a nest in a willow post with entrance but twenty-two inches above the ground, and extending down until level with the surface. The height probably varies almost if not quite as much in one section as the other, but apparently averaging higher in the North and South Atlantic than in the Central Western States from data at hand:

South Atlantic States—Maximum,	100	feet.	Minimum,	12	feet.
Middle & Eastern " — "	60	"	"	2	"
Central Western " — "	90	"	"	0	"

EXCAVATION.

House hunting begins shortly after the female has chosen her mate. The female leads, assiduously seconded by her partner, in a tour of inspection of all available sites, which often furnishes occupation for days. The following jottings from my note book for '96 are pertinent: April 15th, 9 A. M.—A female flew to old swamp willow, close to creek, and ran up main stem, examining some old cavities on the way; male arrived a minute later and went through the same performance, the female retiring meanwhile; both silent. At 9:30 the female flew directly to the top of the hollow stub, male followed directly after, uttering his love or scythe-whetting song upon alighting, in which the female occasionally joined, but soon left. At 10 o'clock the pair returned, singing common song on the top, apparently decided upon exact spot. Another pair went through the same ceremony on a tree further up the creek at 1:30 P. M. April 21st, three individuals

busy excavating nest cavities, very quiet; until May 16th constructing nests and depositing eggs, rather silent. When business of so much importance is under way there are no more loud rappings, cries or songs, but silence usually prevails in the immediate vicinity of its labors. If love notes are indulged in they are subdued in tone, and the bird stealthily chiseling at its dwelling will quietly creep around to the opposite side of the tree upon the approach of an intruder. Rarely a pair will appear bold and indifferent to observation. With its feet close together, holding on by its claws, and its body well braced by means of the stiff tail feathers, it swings backward and forward, showering yeomanlike blows on the spot selected. The circular hole, just large enough to admit the bird, but scarcely as neat and true as the best work of many others of the tribe, is tunneled in straight for about six inches, then turned down at right angles, and enlarged rapidly to the maximum diameter, which is, as Prof. Jones says, about twice the diameter of the entrance. Often it will chip out several inches above the entrance hole, for what purpose I am unable to more than conjecture. Maurice Thompson is authority for the statement that all of our Woodpeckers construct their nests in the form of a gradually widening pocket or gourd shape, except the Ivory-billed, which drills a jug-shaped cavity. Mr. Robert Windsor Smith describes a bird building her nest thirty feet up in an old post oak on June 10th, '93. The location was close to a public road and the Georgia railroad, near Duckwood, Georgia. In the formation of this nest the female did all the work ; in fact the male did not make his appearance. At the time of the discovery she had already made an excavation almost large enough to conceal her entire body. Often during the operations she would sink into the hole leaving about half her form exposed, remaining in that position but a moment when she would back out and resume her work as before. When a neighboring tree was rapped with a stick, she would creep around to the opposite side remaining there several minutes and peering around as if to learn the cause ; if no other effort was made to disturb her she would again resume her place and continue the work unmindful of prying eyes as long as no demonstration was made against her. Wagons and other vehicles passed beneath her and several

freight trains went lumbering along, but she seemed unmindful of what was going on around her. Mr. Smith watched this bird for two days, when he was unavoidably called away for some ten or twelve days and on his return found that the tree had been cut down and carted away. Nearly all agree that both sexes assist in the work. Mr. Angus Gaines mentions a pair in particular, near neighbors and good friends of his, selecting a well seasoned snag, hard and tough, both birds working with a will, turns about, in constructing the nest hole, and returning to the same upon succeeding years. Mr. Francis R. Cope, Jr., says that in one nest he watched construction during the spring of '92, all the chips were carefully carried away some distance into a neighboring meadow; but in all other cases this precaution was not taken, the ground immediately around the foot of the tree being plentifully besprinkled with chips. In the first instance the male would work at the hole for about five minutes and then after carrying away all the chips, his place would be taken by the female, who in turn would labor diligently for another five minutes or so, always carefully carrying away every chip she made. In Iowa, Mr. Jones finds that it does not carry the chips from the excavation any distance from the nest, the chips being scattered broadcast, some falling at the foot of the tree. Mr. J. H. Bowles states that it will sometimes desert its nest when half finished and begin a new one, a trait so common with many of our Woodpeckers. Mr. Stephen J. Adams has found that it requires from one week to twenty days to complete this work and it is often carried on after the eggs are laid, enlarging and smoothing up the cavity, which accounts for the eggs found buried in "saw dust" now and then. Mr. James B. Purdy's experience has been that it takes about two weeks to complete the nest. On April 22nd a Nebraska bird was scared from her nest in a box alder when the cavity was ten inches deep, and on May 4th seven fresh eggs were collected from the hole, now twenty-two inches deep. Allowing a week for deposition, the additional twelve inches must have been hewn out in five days or less — something over two inches daily. When a pair has been robbed, Mr. J. Warren Jacobs finds that in most cases the hole is dug an inch or so deeper before another set of eggs is deposited; and Mr. C. H. Morrel reports

the depth of a cavity in an ash tree as but ten inches in '95, and deepened to twenty inches in '97, in both cases containing eggs.

An old nest is frequently used, thereby escaping days of hard labor, it being not uncommon for a pair to return year after year to the same cavity. Some years ago the late Dr. Willard L. Maris found it nesting in a hole in a tree situated in an open field near Melford, Penna., where for three or four years it successfully reared its broods, and after an interval of some three or four years he again examinad the nest — May 10, '94 — and was not disappointed in finding it occupied, but whether by the same pair it is of course impossible to say. This is but one of many instances of the kind. Messrs. James B. Purdy, J. N. Clark, James Savage and others have also made note of it.

Many of our birds owe to the Flicker their cozy homes in its deserted and oft times partly demolished breeding chambers. It occasionally furnishes nesting sites to at least one species of Ducks — Bufflehead (*Charitonetta albeola*); all of our smaller cavity nesting Hawks and Owls—Pigeon (*Falco columbarius*) and Sparrow Hawk (*F. sparverius*) and sub-species, Saw-whet (*Nyctala acadica*) and Screech Owl (*Megascops asio*) and sub-species; several Woodpeckers—Downy (*Dryobates pubescens*) and Red-head (*Melanerpes erythrocephalus*); one Flycatcher—Crested (*Myiarchus crinitus*); one Sparrow—European House (*Passer domesticus*); at least two Swallows—Tree (*Tachycineta bicolor*) and Purple Martin (*Progne subis*); our only cavity nesting Warbler — Prothonotary (*Protonotaria citrea*); many of our Wrens—Baird's (*Thryothorus bewickii bairdi*), House (*Troglodytes aedon*) and sub-species; Nuthatches — White-breasted (*Sitta carolinensis*), Red-breasted (*S. canadensis*) and Brown-headed (*S. pusilla*); Titmouse—Tufted (*Parus bicolor*), Black-capped (*P. atricapillus*) and Carolina (*P. carolinensis*); and Bluebird (*Sialia sialis*).

Composition. The lining or bed upon which the eggs are placed has been found to consist invariably of fine chips, probably the last made in smoothing up the chamber. If the wood is extra soft and punky, few if any fragments may be present, at other times some of the eggs will be almost buried

in the saw-dust-like chippings. No extraneous material is ever employed.

Dimensions. The data at hand is so incomplete as to admit of no constant comparison between different parts of the country, or living and dead trees, and hard and soft grained woods; but the depth of excavation appears to be least in the Southern states (6 to 14 inches), and greatest in New York and New England (10 to 36 inches), Illinois (14 to 24 inches), Pennsylvania (10 to 18 inches), and Minnesota (9 to 18 inches). The averages in general, together with the maximum and minimum measurements for the United States, are given in inches and hundredths. The difference in the methods of measuring are so great that much data other than the entrance diameter could scarcely be relied upon, but undoubtedly the depth of cavity depends in no small degree upon the quality of the wood.

	MIN.	MAX.	AVER.
Diameter of Entrance	2.20	5.00	3.28
Diameter of Cavity near Bottom	4.50	10.00	7.67
Depth of Cavity from Entrance	6.00	36.00	15.79
Total Length of Cavity	9.00	40.00	18.50

EGGS.

Deposition. Almost invariably an egg is laid daily until the clutch is complete. Indeed, such is the great fecundity of the species that it will often continue under exceptional circumstances to deposit an egg daily, with or without an occasional day of recoupment, until it multiplies the number in a typical set several times over, and that without a radical diminution of the properties of the egg. Records of even the most prolific of our wild birds laying more than a single egg daily are so few that an instance given by Mr. C. H. Morrell, Pittsfield, Maine, is of more than usual interest: On May 21st, '97, at about sunset a cavity in an ash slab was sawed into and the three eggs taken out, examined and returned; on the 26th it contained nine eggs, which were collected. It looks very much as if two eggs had been deposited in one day and from appearances all must have belonged to the same bird. Certainly no egg was overlooked upon the first visit.

Arrangement. The eggs usually remain in the position of deposition, becoming adjusted to the body during the frequent turning to which they are involuntarily subjected. When the cavity is small and the clutch large they are sometimes placed in two layers, the fine chips protecting them from injury. The arrangement of a heavily incubated set containing the unusual number of thirteen eggs taken by Mr. H. J. Flanagan in Providence Co., R. I., on May 30th, '98, was peculiar, if not unique. The entrance, eighteen inches above the nest, was about three and one-half feet above the ground, in an apple tree, and had been previously broken into so that the eggs were in plain sight. The trunk had been hollowed out to a diameter of ten inches or so, and the eggs laid in one row of five and two rows of four each. Two eggs which contained dead embryos appeared of a dark brown color. One was situated almost in the middle of the central row, and the other in the center of one of the outer rows, about one egg separating them.

Clutch. As a rule the minimum number of eggs in a set is found in the south, where the usual clutch appears to consist of but 5 or 6 eggs, a larger number being rather unusual. The whole north appears to be more favorable for the maintenance and development of much larger broods; most commonly 6 to 9 eggs are laid; sets of 10 not uncommonly, while 12, 13, and even 14 eggs are not wanting; larger sets are unknown, with one possible exception, published in the *Forest and Stream*, Vol. XXV., p. 427—a brood of 19 young, all alive and in good condition.

LOCALITIES.	NO. OF EGGS IN SET.										
	4	5	6	7	8	9	10	12	13	14	Total
N. C., S. C., Ga., Fla., Ala., La..	3	11	6	.....	2	.....	.....	.....	.....	.....	22
Del., Pa., N.J., N.Y., Ont.(Toronto)	3	9	21	17	10	11	1	3	.....	1	76
New England.....	2	4	5	2	20	3	6	.....	1	.....	43
O., Ind., Ill., So. Mich., Ky.....	2	1	3	4	1	2	1	.....	.....	.....	14
Wis., Minn., Ia., Neb., Kas.....	4	2	6	11	7	1	5	.....	.....	.....	36
Total.....	14	27	41	34	40	17	13	3	1	1	191

The southern bird makes up for the smallness of her set by producing a second brood in many instances. Mr. Arthur T. Wayne, Mt. Pleasant, S. C., says that two, and sometimes three broods, are reared in a season, a fact which has been noted by Bendire also.

Season's Aggregate. The Flicker has the reputation of laying more eggs under exceptional circumstances than any other species. Nearly every observer has something to say regarding this peculiarity and the persistence with which it is carried out. Mr. J. Warren Jacobs has found that on several occasions, when the eggs were taken before the set was completed, he has been rewarded with another egg on his return the next morning; and after laying 6 or 8 eggs, the bird rested a few days before beginning a new set. Mr. Paul Bartsch finds it to be a very patient and persistent layer; if one removes all the eggs except one from an incomplete set, and keeps this up day after day, the Flicker will try to complete the set, depositing egg after egg until her supply or patience is exhausted. He has in this way taken 17 eggs from one nest. Mr. J. H. Bowles stated that a friend once collected 25 eggs from one nest before the poor bird finally gave it up. Mr. J. B. Purdy

once found a nest in a cavity of an apple tree, and as soon as the first egg was deposited it was removed, and as fast as all subsequent eggs were laid they were removed; the bird continued to lay day after day until she had deposited 27 eggs. Mr. F. A. Colby has known it to lay as many as 28 eggs in a continuous stretch; a day perhaps was skipped after the boys robbed her, but she did not stop laying more than two days at a time when relieved of four to six eggs in a bunch. Rev. P. B. Peabody discovered a nest among a dense growth of black oaks, averaging about six inches in diameter. It was placed eighteen inches from the ground in a cavity, which, according to his remembrance, was partly natural and partly excavated by the birds, the depth being very slight. One or two eggs only were taken at the time at first, whereupon the mother Flicker, like so many others on record, began to spin out her "set" to the number of 30 or over before giving up in despair. Mr. J. H. Armfield reports the taking of a large number of eggs from a cavity in a maple tree near a spring, seven miles S. W. of Greensboro, N. C., in '98. Five eggs were collected on May 6th, and every two or three days thereafter all eggs found were gathered; the female continuing to lay, not every day, however, until July 5th, when she had deposited 48 eggs. This is the next to the largest on record. In relation to that historic and extraordinarily prolific bird of Taunton, Mass., little can be added to the meagre notes recorded by the collector at the time. The eggs were taken one at a time from a cavity in a willow, beginning May 6th, '86, leaving a nest egg, until 71 had been deposited. Mr. Chas. L. Phillips informs me that some of the eggs were accidentally broken and the remainder disposed of to Mr. F. B. Webster, the well known dealer, who in turn writes me that he has entirely lost sight of the Phillips collection, and has no means of tracing it, as it may have been broken up for decorative purposes. No measurements were taken, and while the collector is inclined to think they were all the product of one female, it is not impossible that a second bird whose own nest had been demolished, may have "jumped the claim" in preference to chiseling out a fresh nest so late in the season, and after one day's interval contributed her share to the grand total. Still, as Mr. Phillips argues, it is unlikely. It is unfortunate that this series of eggs was not better appre-

ciated for its scientific value. While this method of collecting eggs is hardly scientific and only justifiable in rare cases, permit me to advise the collector occasionally practicing it, to fix the identity of the female by means of some peculiarity of voice, habit, or plumage, if possible; and to carefully number and measure the eggs in the order of deposition, time on nest, etc. Collected from all sources we have the following:

Massachusetts.....15 eggs, taken in sets, no nest egg
Connecticut..... ...17 eggs, taken in sets, no nest egg
Pennsylvania.....17 eggs, taken in sets, no nest egg
Iowa.....17 eggs, taken singly, nest egg
New York.....20 eggs in 27 days, in sets, pigeon's nest egg
Connecticut.....21 eggs daily, nest egg
Massachusetts.....25 eggs daily
Michigan.....27 eggs daily, no nest egg
Massachusetts..... 27 eggs, in sets
Vermont.....27 eggs, in sets
Nebraska.....28 eggs, in sets, no nest egg
Illinois.....28 eggs, singles and sets, nest egg
Pennsylvania.....30 eggs in 40 days, in sets, no nest egg
Minnesota..... 30 eggs daily
Indiana.....37 eggs in 49 days, in sets, no nest egg
Texas.....40 eggs in 40 days, no nest egg
North Carolina.....48 eggs in 65 days, no nest egg
Massachusetts.....71 eggs in 73 days, nest egg

Mr. C. L. Rawson, the veteran oologist, who is perhaps better known as "J. M. W.", of Norwich, Conn., has looked over some oological data, taken from field experiments made by himself and his climber since '76, and has come to the conclusion that the Flicker lays no more eggs in proportion to the usual number in a set when stimulated in some way, than many other species of various genera. Twice by the nest egg and at times by the substitution process he could take but 21 eggs from the Wacup, but in the same manner his notes say he has taken

11 eggs from the Common Term (only one pair nesting on islet)..... .....Equal to 3 sets
20 eggs from the Sora Rail (only one pair in bog).....Equal to 2 sets

32 eggs from the Bob-white (identification of same bird sure).....Equal to 3 sets
16 eggs from the Marsh Hawk.....Equal to 4 sets
17 eggs from the Sharp-shinned Hawk.....Equal to 5 sets
13 eggs from the Cooper's Hawk.....Equal to 3 sets
9 eggs from the Red-shouldered Hawk.....Equal to 3 sets
9 eggs from the Barred Owl.....Equal to 3 sets
21 eggs from the Flicker.....Equal to 3 sets
13 eggs from the Meadowlark.....Equal to 3 sets
11 eggs from the Purple Finch (besides 4 eggs of Cowbird).....Equal to 2 sets
12 eggs from the Vesper Sparrow.....Equal to 3 sets
16 eggs from the Parula Warbler.....Equal to 4 sets
20 eggs from the Long-billed Marsh Wren.....Equal to 3 sets

Numerous instances in which that pest, the European House Sparrow, has equaled or even exceeded the best ratio given by Mr. Rawson in the above interesting list, might be given.

Dates. The nesting period averages much later than is generally thought by writers. The time for fresh and complete sets varies of course, according to the season, but the following averages compiled from a large amount of data will be found in most instances to be approximately correct in average seasons:

Localities.	Average.	Variations.
N. C., S. C., Ga., Fla	May 4	April 10 to June 7
Penna., N. J.	" 15	" 28 " 26
N. Y., New Eng. (except Maine)	" 22	" 14 " 6
Maine, Ont., N. S.	" 30	May 14 " 18
Louisiana	" 7	" 5 to May 10
Ohio, Ind., Ill., So. Mich	" 22?	" 2 to June 30
Iowa, Neb., Kans	" 10	April 24 to May 28
Minn., Wis.	" 18	May 10 to June 1
Alaska and N. W. Ter.	June 10	

Mr. Arthur T. Wayne finds the average date in South Carolina to be April 21st, except in '95 (a late season) when it was May 9th.

Shape. The contour is subject to little variation, the typical egg being ovate; now and then an oval specimen is found,

and more often sets in which the eggs are irregularly elliptical ovate, sometimes sharply pointed.

Color. Fresh eggs are a beautiful translucent white, the yolk showing through and suffusing the whole shell with a mellow delicate pink. When blown this pale wild rose bloom disappears, the shell retains the translucency in decreasing amount until it is dry when it is simply a pearly glittering white.—Lynds Jones. All colorless fine textured eggs, especially when fresh, seem to emit a faint glow and in this state are admired by field oologists more than the clear porcelain white specimens in the cabinet. Not rarely a set of prepared eggs show a creamy suffusion, which, if the cause was unknown, would deceive one into believing it to be naturally produced. If the eggs are left standing unblown for a number of days, the yolks will settle and the lining absorb enough coloring matter to stain it a uniform creamy-buff, which, showing through the semi-transparent shells, gives them the same appearance. With every reason for the belief that the prehistoric bird had a reptilian ancestry and that plain white eggs would most naturally be produced by the descendants of such progenitors for a time at least, uncolored eggs must be regarded as the least modified as far as external appearance goes. Some species advanced along the line of involuntary protective coloration of their eggs, while others habitually nesting in dark cavities, in large colonies or practically safe places, as the Petrels, Pelicans, Pigeons, Owls, Kingfishers, Woodpeckers, Swifts, Hummingbirds, etc., have undergone slight changes apparently. According to Dr. Brewer, "Any egg, always excepting a Woodpecker's, is liable to be marked (stained) by minute infusions of colored lymph of the parent in exlcusion." On what grounds he excludes the Woodpeckers is purely conjectural, but if it is on account of the fine texture and polish, the Kingfishers should also have been made an exception. It would appear, moreover, that Woodpeckers' eggs are accasionally spotted. It is reported that Audubon once found a set of spotted eggs of the Three-toed Woodpecker. Angus Gaines, Viscennes, Ind., noted a set of eggs of the Red-headed Woodpecker with reddish spots at the larger ends (see *Oologist*, Vol. XII, p. 118) and in Vol. VIII, p. 96 of the same paper a set of four eggs of the Flicker, spotted with dull red, is recorded

from Fairbank, Minn.; and J. H. Bowles, Ponkapog, Mass., describes the latter species as sometimes laying eggs minutely spotted with dots of red or black, for the most part easily washed off.

Texture. The shell has a fine smooth surface with a porcelain-like gloss normally. A set of five in my cabinet collected at Avery's Island, La., is quite unusual in having no gloss whatever. Granulations appear upon the larger ends not infrequently, being much more noticeable on a white and polished surface than upon a colored or lusterless specimen. Mr. Jacobs, in describing the abnormally large egg in the Ottawa, Kansas, set, notes a number of dead white granulations scattered over the shell at random, and at one side a decided hump; a large circular patch on the larger end is also dead white, indicating a thin spot in the shell.

Measurements. The average of over 500 eggs, nearly all of which were taken in the United States, is 1.09×.85. 173 eggs taken in New York and Pennsylvania are but a very small fraction above the general average. When amassing data, the extraordinary amount of variation to which it proves subject was not taken into account and what was at first considered a fair number of measurements proves insufficient material for a series of locality averages. The South, Northeast, and Northwest show surprisingly little difference in general averages. Leaving out the series of 48 eggs taken from a single bird inhabiting the mountains of Western North Carolina, reduces the Southern average to 1.06×.84, and a further reduction to 1.02×.83 is made by not including the Louisiana (Avery's Island) series which are large eggs also. On the other hand many eggs from Maine, Iowa, Minnesota and Nebraska are unusually small, thus lowering the averages of their respective localities.

LOCALITY.	NO. EGGS	AVER.	MAX.	MIN.
South (N. C., S. C., Ga., Fla., La.)..	133	1.098 x .849	1.24 x .92	.90 x .75
Northeast (New England, New York, Ontario—Toronto—, Pennsylvania). .	233	1.090 x .855	1.15 x .91 1.22 x .86 1.21 x .88	1.00 x .75 .96 x .80 .97 x .73
Northwest (O., Ky., Wis., Kas., Neb., Iowa., Minn.)	126	1.088 x .855	1.41 x .93	.93 x .65

The major axis is subject to much greater variation than

the minor axis, which is I believe, the case with all kinds of eggs.

A set collected at Mt. Pleasant, S. C., April 21st, and now in the collection of Mr. R. P. Sharples, measure 1.17×.89, 1.24×.92, 1.19×.90, 1.10×.84, and the collector—Mr. Arthur T. Wayne—says they might easily be mistaken for the eggs of the Pileated Woodpecker. It remains for the Ottawa, Kansas, bird, already referred to as building in a school house loft, to break the record in the dimensions of one egg. The set is now in the collection of Mr. J. Warren Jacobs and measures 1.16×.94, 1.15×.91, 1.15×.88, 1.17×.94, 1.21×.92, 1.19×.91, 1.41×.93. Equally remarkable is a set of small eggs collected by Prof. Ora W. Knight, Bangor, Maine, June 14, '93—.85×.75, .99×.79, .98×.77, .87×.79, .77×.72—and is probably a second or third set. The average of 16 eggs known to be of the second laying is slightly less than the general average —1.07×.84. Mr. Chas. L. Phillips, who took 74 eggs from one hole in 73 days, states that they appeared of the usual dimensions with very little variation; a fact also noted by J. Parker Norris in the *Ornithologist and Oologist* after he had collected 30 eggs from one pair and found the last egg as large as the first. The measurements of the 48 eggs taken from one bird near Greensboro, N. C., as already briefly mentioned under the head of *Season's Aggregate*, are before me, although unfortunately not in exact order of deposition, and exhibit a great difference in size—from 1.08×.80 to 1.17×.87—much larger than the general average. Runt eggs are by no means scarce, in fact I consider them more often occuring in this species than in any other of the family. Mr. Otto Grady, Ludlow, Ky., found a nest June 24, '95, containing six young ready to leave, piled pellmell on top of one another, and three runt eggs; one being as thick as an ordinary Robin's egg and much longer than the average Flicker's egg, the second the size of a Red-headed Woodpecker's egg, and the third almost globular. An Orleans County (N. Y.) collector took 20 eggs from a pair in 27 days, the 8th and 9th being runts. Another is incidently mentioned by another New York oologist, but no particulars given. There is a distinction between the small fertile eggs such as are given in the locality table, and the

runts which are excluded from all averages; such as I have measurements of appear below:

Toronto, Canada.....June 7, '95, in set of 8 eggs, .70 x .56
Grinnell, Iowa..... .67 x .58
Avery's Island, La.....May 14, '95, in set of 6 eggs, .79 x .62
Port Hope, Ontario, Canada.....June 10, ,98, in set of 4 eggs, .79 x .65
Philo, Illinois.....May 11, '98, in set of 9 eggs, .83 x .67

In Other Birds' Nests. When the exact circumstance of deposition is unknown, the owner of a nest in an old Woodpecker cavity is the bird placing the lining therein, the chamber being vacant. It is hardly probable that the Flicker would intrude unless its own nest had been destroyed before the completion of its quota. On June 6th, '89, while collecting near Lake Assawamsett in Plymouth County, Mass., Mr. A. C. Bent explored an old orchard. One tree contained a Bluebird's nest with five eggs of the owner and one of the Flicker's, and in a neighboring cavity a deserted nest of a Tree Swallow with the same number of eggs. A not much frequented place and while possibly the work of some boys, it is hardly probable. A similar instance is recorded by E. G. Elliot, Bradford, Mass., May 16th, '84, of a set of five eggs of Bluebird and one of Flicker, nest of grass and feathers. Records of European House Sparrow and Red-headed Woodpecker eggs in freshly excavated quarters with one or more eggs of the Flicker are not uncommon, and upon investigation the latter proved to be the aggrieved party in every instance. In the *Oologist*, Vol. XII, p. 76, Walter Draper, Barahoo, Wis., gives an interesting account of an "Eccentric Flicker." He observed a Mourning Dove's nest in process of construction on a limb of an oak tree near a path, and a few mornings later was surprised to see a female Flicker on the nest. She was not disturbed at that time, but returning at noon to investigate, the Dove was flushed from her own two eggs and a cracked egg of the intrudor found near the edge where it had probably been shoved by the proprietor.

INCUBATION.

Few birds so timid and defenceless as the Flicker, sit so closely and presistently. While occasionally it may be seen to fly from its nest at a near approach, it is usually very hard to drive out; shouting and pounding upon the base of the tree having little effect, and often it is necessary to prod the bird with a stick or reach in and pull her out by the beak. She is gentle and harmless, never offering to claw, bite or strike, although capable of inflicting a painful wound if disposed to use her strong beak. When caught she will struggle violently for a moment or utter a long wailing, despairing shriek which will be answered by the mate if within hearing distance. In one instance described by Mr. Jacobs the female returned and entered the partly destroyed cavity, emerging only to re-enter and re-examine her home the second and third time; and at another time when the female was flushed and set collected after dark, she came quite near and alighted on his back acting as if very much dazed or blinded. Prof. Jones has found it occasionally making fierce dashes at the intruder and also relates an incident of his first experience with it as a close sitter, taking it for an Owl and dropping three large stones upon it in the vain hope of causing it to vacate. When the nest was opened she was found pinned down by the stones but so carefully protecting the eggs that not one was broken, and happily she seemed unharmed also. For a bird habitually nesting in dark situations, it seems strange that it exhibits such a dislike and inaptitude for movement after the sun has set, acting stupidly and deserting the nest for good if disturbed at such a time. Incubation may commence soon after the first egg is deposited, or in accordance with the great majority of birds, after the set is completed. More than 90 per cent. of the sets of which I have data show the latter condition, and curiously enough, all but two instances (Louisiana and Kentucky) of irregularly incubated eggs occur in the New England and

Middle States; from which we may infer that this species, as well as the Cuckoos and Kingfishers, are more addicted to this sort of thing, for which I believe no cause has yet been assigned, in the east than in the west. Most birds incubate by squatting upon their eggs in an upright position. One observer suggests that the Flicker may assume the posture of a Screech Owl while upon the nest, as in every case where he has opened the chamber it has been found lying upon the eggs; but it is more than possible that the parent lay close but momentarily to avoid the falling *debris*, protect the young or eggs, or in the vain hope of escaping notice. Mr. Sinclair has had exceptional opportunities of observing the bird on her nest without disturbing her in the least, in the garret of the school building alluded to under the head of *Position;* the loft being pitch dark excepting the light entering the rough entrance, in front of which the female sat upright like any ordinary bird. I have ample proof that it is doubly monogamous, though the observers with few exceptions have not found the male taking his turn at covering the eggs. It may be a more common trait in the east, where the bird is frequently lifted from a set of eggs well along in incubation. Sometimes near the middle of the day the male appears and utters a few love notes, when he is at once joined by his brooding mate, who soon hurries off in search of food, while the devoted male takes her place on the eggs. On June 12, '97, I was in the vicinity of a nest placed 35 feet up in the dead top of a chestnut tree in the woods, while the change was being effected. Time, 1:45 P. M.; birds on tree; short duet of *wick-a-wick* or breeding song; both flew away, male returning in five minutes, alighting 12 feet below entrance, and after a thorough reconnoitre in which he undoubtedly observed me, ascended almost imperceptibly, halting four times to look about. Silent and very cautious, taking 25 minutes to get within a foot of entrance. Still suspicious and will not enter, but noiselessly flying to a bare limb and dropping from it to a lower and yet lower branch and back to main stem. As I stole softly away from the foot of the tree, unable to remain longer, he peeped shyly around the trunk at me. On May 28, '98, at 12:30 P. M., I took a male from a nest containing 7 eggs, in which incubation varied from commenced to small embryos, the absence of abdominal feathering proving

that it was a regular task. The female was feeding at the opposite side of the grove. Prof. Lynds Jones has one record of the duration of incubation, which was 14 days. Major Bendine gives it as about 15 days in his *Life Histories of North American Birds*. It doubtless varies to some extent, according to locality and season.

YOUNG.

It is hatched both blind and naked, remaining in this helpless and callow condition for over a week. It is not known when the white membranous process which extends from either side of the base of the lower mandible disappears, but it probably goes at a very early age. This formation is apparently peculiar to all young Woodpeckers, as suggested by Frank A. Bates in the *Ornithologist and Oologist*, Vol. XVI., p. 35, but its use is unknown. The young are often piled on top of one another, but soon learn to cling to the side of the cavity and avoid too much crowding. On cold or stormy days one of the old birds covers them at intervals, as well as at night, when extremely young. Nearly every one is familiar with the sounds uttered by the unfledged brood, which has been compared to the hissing of a nest full of snakes; as they grow larger, to the winding of a clock; and finally to the click and clatter of a mowing machine. If the tree or stub in which they are situated is pounded, their combined voices increase to a perfect storm of vociferation. Both sexes feed the young with equal assiduity, and up to the time they leave the nest, by the process of regurgitation only. Nuttall appears to have been the first to discover this peculiarity, but when it was more fully commented upon a few years since by Olive Thorn Miller in *Nesting Time*, William Brewster in *Auk*, Vol. X., p. 231, and J. N. Baskett in *Nidologist*, Vol. II., p. 110, it appeared something in the nature of a revelation. Mr. Baskett kindly furnished me with some data relating to the same nest full of young, from which he took the notes for his article in the above magazine, and is substantially the same. The parents appeared to have different places from which to procure food, and were gone at irregular intervals, rarely both present at once. Nothing was ever visible in their mouths, and the regurgitation, while labored, never seemed to indicate that any large portion was being thrown up. The parent drove its

beak down the gaping and screaming throat of the nestling and began a jerking and riggling motion which seemed to tax the efforts of the youngster to hold on, the process lasting for some seconds and seldom repeated at the same visit. As the adults do not remove the excrement, the bottom of the basket-like nest soon becomes foul, but the young manage to keep clean holding tight to the walls by means of their sharp claws, soon creeping to the entrance to peep out on the great world without or to look and listen for the parents, there to receive the food. Thus a period of from two to over three weeks is passed, after which they emerge to spend the day on the tree trunk or large branches, blinking and sunning themselves in the bright light, returning to the security of the chamber on the approach of a storm, threatened danger or return of night; for after all it is their home nest, snug and safe, and by no means the "black hole of Calcutta" imagined. In a few more days the adults, by means of much beseeching, encouraging and threatening language, persuade one after another to try its wings, and short flights are made from limb to limb and tree to tree amid much excitement and flurry. Prof. Jones says that the ability to fly seems to be an individual characteristic, some being able to do so much earlier than others of the same brood. They depend on the food, small fruit and ants mainly, brought them by the old birds for some time after departing from the home-tree, and are supplied with a small quantity of gravel (grinders) before leaving the nest. Apparently the juvenile makes its first essay to supply its own wants while on the ground, as nearly all June and July specimens were shot from that position. The tongue of the nestling is harmless; just when the barb appears I am unable to say. One bird over a week out of its nest had not developed it. Mr. Baskett says that in the fall the young of a family keep well together.

MOLT AND RENEWAL.

The single annual molt, which is complete, occurs directly after the breeding season in the manner described by Prof. Lynds Jones for this paper: The molt of our common Flicker, as illustrated by four specimens, follows the general law of our smaller land birds, with the differences peculiar to the Pici. In these four specimens there are exhibited some individual peculiarities of no importance except as illustrating the principle stated by Witmer Stone, in his admirable paper on the molting of birds, that there are likely to be individual peculiarities of molt within the species. It is well known that among the Woodpeckers, whose tail is used as a support in clinging to perpendicular surfaces, that the middle pair of tail feathers are the last to be lost, and that they are retained until the next pair has grown to a functional length. Apparently the middle feathers, rather than the outer ones, are retained because they are the strongest and are therefore the best able to sustain the weight of the body unaided by the others. Of the four specimens, two are males and two females. I am unable to decide whether they are birds of the year or old ones. There is no apparent difference in the process of molting of the sexes. In common with most other small land birds, the Flicker first molts the middle row of the abdominal tracts, followed almost immediately by the innermost—the 10th—primary and the outermost greater wing-covert. The 9th primary is next shed, and with it the middle row of the pectoral tracts, the two rows next the middle row of the dorsal tract, the middle of the humeral tract and the lower row of the femoral tract. Next the 8th primary, throat, sides of crown and scattering feathers on the thighs. At this stage the regions of first molt are beginning to show new feathers and the molt of the contour feathers has spread somewhat in all directions. With the 7th primary the next to the middle pair of tail feathers, the whole head except the middle of the crown.

Enough old feathers remain in the crown to form a covering. With the 6th primary the next pair of tail feathers, the outer rows of ventral tracts, middle wing-coverts. With the 5th primary the next to the outer pair of tail feathers, next to the inner secondary, middle of crown. With the 4th primary the outer tail feathers, inner secondary, lower row of lesser wing-coverts, two outer pairs of upper and under tail-coverts. With the 3rd primary the remaining upper and under tail-coverts, outer rows of dorsal tracts. At this point the plumage assumes a smooth, clean appearance, the new feathers almost completely hiding the old ones. With the 2nd primary the middle tail feathers, outer secondary, and inner tertiary drop. With the 1st primary the remaining inner rows of the abdominal tracts and humeral tracts, the remaining lesser wing-coverts, with any other unmolted feathers, are lost, completing the molt. With their renewal the plumage is again complete. The last three primaries—1st, 2nd and 3rd—are molted in rapid succession, the third one being but half grown when the first one breaks its sheath. The slow molt of the tail is characteristic of this order, and is a necessity, as hinted above. As a rule among the small birds the tail feathers are molted practically simultaneously. Almost everywhere over the body some old feathers remain unmolted until the new ones are nearly or quite grown. The old plumage presents a much faded appearance, lacking the marked contrast of the new, and appearing much harsher and coarser, due to the worn tips and edges. At no stage of the molt is there any part of the body entirely bare, nor are the flight feathers molted rapidly enough to hinder flight. During the molt the birds seem to feed largely upon such insects as can be easily caught upon the ground or in the grass, indicating a relatively low state of vital force. As to the time of molt: One of the specimens before me which has the molt fully half complete, was taken on July 5th. Another with the molt complete but with the first primary about two thirds grown, was taken on October 17th. This specimen does not seem to be a bird of the year, the other may be. It is hardly possible that one bird requires all the time from the last week in June to the third week in October to complete the molt and renewal. Probably half that time is amply sufficient.

My series of adult birds relates more to the renewal than to the earlier stages of the molt, and in nearly every particular attest to the correctness of the sequence revealed by Prof. Jones' minute examination. The middle rectrices grow more slowly than the first, second and third primaries, which are shed almost simultaneously and grow rapidly. Three specimens taken on September 26th, two on October 3rd and one October 10th—all at Berwyn, Penna.—show the middle feathers from half grown to almost equal to next pair, while the primaries are complete, although the last sheath has not always disappeared. Of two Georgia specimens taken September 10th, the first shows the 3rd primary three-quarters, the 2nd two-thirds grown and the 1st not shed, central tail-feathers dropped and pin feathers on chin and throat; the other shows the 3rd primary four-fifths, the 2nd and 1st one-half grown, middle pair tail feathers one-half grown, also pin feathers in malar and chin. A June 10th specimen from the same locality, varies in having the outer rectrices one-fourth and four-fifths grown, otherwise apparently complete renewal. This bird must surely have remained unmated or lost its mate early in the season, otherwise it could scarcely have been in so fine a dress at that date. Another peculiar state is represented by a hybrid from Santa Cruz, California, September 3rd, with the 3rd primary one-half, outer secondary three-fourths grown at the same time, next to middle pair of tail feathers molted, malar and forehead just renewed. Apparently the feathers about the head and throat begin to drop early but new feathers develop slowly. The central rectrices are the last important feathers to attain their growth.

The juvenile Flicker molts and renews its entire plumage the first year in common with all Woodpeckers, which are numbered with the few groups among the *Altrices* doing so. It varies little if at all from the adult. Seven Georgia birds but a few weeks at most out of nests, taken between June 28th and July 18th, are in various stages of molt and renewal; the red cap often confined to the forehead. A bird taken July 10th had commenced to molt on nape, malar, breast and rump, the 6th primary almost complete, top of head renewed except forehead, a pair of new feathers of the autumnal dress had appeared on either side of the breast, and all signs of the red

cap had vanished. This bird is in a very ragged condition. I am inclined to ascribe the early disappearance of the red cap to growth and abrasion in a similar manner to the small patches of natal down in which many of the *Alltrices* appear, i. e. : the gray feathers growing beneath on the same stem push the red tips upward where they become dead and brittle, rapidly crumbling away. The forehead does not always show signs of molt and possibly may occasionally remain until the following fall.

In Pennsylvania the renewal is complete by the first of October usually, often a week or so earlier.

FOOD.

From an economic standpoint the supreme test as to the beneficial or injurious nature of a very large number of our birds is adjudged from a knowledge of their food habits, more especially if their value as an article of food or for manufacturing purposes is important. To be wholly beneficial a species must feed upon that which is directly or indirectly injurious and in a manner entailing the least possible damage to that which may be utilized by man. Few birds will be found to meet all of the requirements of so exacting a standard, and if the good overbalance the bad qualities, or even if their habits are of a neutral or doubtful character, they should be protected as far as it is possible to do so. Recent investigations conducted by the United States Agricultural Department warranted the statement that "Judged by the results of stomach examinations of the Downy and Hairy Woodpecker and Flicker, it would be hard to find three other species of our common birds with fewer harmful qualities." The Flicker differs from all other Woodpeckers in being more terrestial. Being equally adept in foraging above or upon the ground, it has a much greater variety of food to select from, consequently waxes fat, is more numerous and covers a greater area than any other member of the family in North America. There is little difference in the nature of its food and feeding habits, north, east, south or west; though of course being somewhat more insectivorous in the warmer climes during the colder months. It is almost completely insectivorous from the latter part of March until well into June. Ants form the staple food however. Professor Beal of the United States Nation Museum, places it at about 75 per cent. of the insect food or 45 per cent. of the whole matter for the year. It is often discovered standing over a colony, catching the ants as they emerge or digging vigorously into the soil with its sharp pickax to unearth them, its bill being almost constantly coated with earth from this

habit. In Michigan it seems to have a preference for the mound-building ants (Purdy). In Georgia there are myriads of small red ants which infest every path and byway in summer and one cannot help noticing their funnel-shaped abodes; upon these ants it wages eternal warfare so that its flesh becomes so thoroughly impregnated with the pungent odor so peculiar to these little insects as to be clearly preceptible when removing the skin. It also preys upon a black ant found under the bark of dead trees, but as they are not so plentiful as the former, they do not predominate as an article of food (Smith). I have the result of an examination of twenty-five stomachs, including seven taken from juveniles, collected in DeKalb County, Georgia, by Mr. Robert Windsor Smith. Every month in the year is represented with the exception of May, August and November. In all but two, quantities of either red or black ants were found, with a fair amount of undetermined fragments of *Coleoptera* in ten, one contained a mole cricket in addition to the ants, another three grubs and a large black ground beetle, while the October bird had eaten its fill of gumberries, the same fruit being found with an assortment of insects in the two September birds. Somewhat to my surprise the January bird had eaten the largest number of insects, its stomach being distended with the 841 ants, fragments of 2 ground beetles and 8 pieces of white gravel (299 small red ants, 492 small winged ants, 40 pupa, 3 mound-building ants, 7 ants — species undetermined). The seven young birds had left the nest, though occasionally fed by adults, and were taken between June 28th and July 18th—five in '98 and two in '99. All contained red ants with the addition of wild cherries in them, and beetles in a fourth. A small quantity of white gravel found in all or nearly all young. The stomach of one taken on July 12th contained several pieces of red gravel, in addition to quite a quantity of the usual white flint, and another that two days later had swallowed a splinter of weather-beaten wood, probably their first attempts to feed themselves. In Iowa it is often seen darting after insects in the manner of Flycatchers. Stomachs examined have invariably contained remains of Carabid and Scarabid beetles, with the skins of Lepidopterus larvæ and numerous ants (Jones).

In Pennsylvania I have found as much as 157 large black

ants, 7 May beetles, and a large green larva in a single stomach. Large grubs, crickets and red ants are commonly found. I think there should be no question regarding the inestimable services rendered in keeping within reasonable limits the numerous varieties of ants. In Indiana it not only devours large quantities of mature insects, but their eggs, larvæ and chrysalides (Gaines). Wilson says it also feeds upon woodlice. Grasshoppers when in season form no inconsiderable portion of its food. In early spring and early fall its manner of feeding on the ground is to collect in small, loose flocks, travelling back and forth along the edges of a wood, around a hillside or in a meadow; silently clearing the group of its insect pests, only flying up when disturbed or satisfied; in this manner often mixing in with the Meadowlarks, and in the West extending well out on the prairies at a considerable distance from timber or trees of any kind.

As a correspondent suggests, birds, like other bipeds, only "scratch for a living" when necessity makes it compulsory. Whether its system demands a change of diet or to put its young in the way of feeding themselves or from sheer laziness, it becomes largely frugivorous from late July to November or until its departure, feeding upon the fruit, as it ripens, of the wild strawberry, raspberry, serviceberry, mulberry, red cherry, dewberry, blackberry, huckleberry, elderberry, pokeberry, black cherry, grape, dogwood, black alder, wild plum, hawberry, gum and hackberry; a perfect profusion and succession of wild fruit; often to the almost entire exclusion of insect life, growing fat upon the pulp diet. It is noted by Mr. Robert Windsor Smith that when the bird is gorged with berries but little gravel is found in its stomach; this also applies to many others of our so-called insectivorous birds. I have known it to eat so largely and continuously of certain small fruits that the stain of the highly colored juices would penetrate and saturate the intestines, abdomen, and even dye the bases of the feathers a rich red or purple; particularly so when pokeberries are indulged in. It is extremely fond of the fruit of this plant, and in this connection I wish to state that Dr. W. E. Rotzell has given some attention to the effects of pokeberries upon birds (*Hahnemannian Monthly*, '91, p. 790). An extract of this fruit has been prescribed for obesity under

the generally accepted theory that it acts as an anti-fat agent, but the result of his examination tends to prove that wild birds which were gorged with the berries were always in good condition and frequently quite fat.

When the gumberries ripen in September and October, the sour gumtree (*Nyssa Sylvatica*) is the centre of attraction, and its fruit the staple food. If the Flicker is fond of other fruits it loves the gumberry. At this period of its existence it is in the very best of condition, and hundreds are annually shot for food and sport, being, as a southern observer says, fully as good eating as Doves. Many a country boy's first game has been this large, handsome and palatable bird while it was gluttonously feeding upon gumberries. Picture if you can a calm, hazy, autumnal sky, a cool, green, swampy meadow in which grows an old gum tree with its deep-green wax-like leaves already turning to scarlet; the boy creeping Indian fashion from bush to bush or along the old worm fence; the slight degree of uncertainty highly magnified makes it all the more fascinating to him. The murderous report of the old musket loaded with a generous and well-rammed charge of coarse black powder and large shot, the whirl of many wings followed immediately by the scream of the wounded, appeals but momentarily to his better nature. Stimulated by excitement he hurriedly gathers the dead, wrings the necks of the wounded, and retires within easy gunshot. In a few minutes the Warblers, Cedarbirds and Thrushes appear, shortly followed by the Robins; the Flickers scattered to the four winds, call from tree to tree, and finally a young male, totally lacking in experience, flies straight for the tree on galloping wings. He sees nothing suspicious, and after a lusty, long-drawn call, which apparently means "all's well," plunges deep into the foliage to greedily partake of the tempting banquet. The bulk now come trooping in, racing with the Blue Jays, and the clatter becomes deafening when "bang" goes the gun, down come several more victims, and again the survivors go scurrying away, only to return as before and repeat the experience, gradually becoming more and more wary, until those that are left become so wild and alert as to defy the gunshot range. Unfortunately this slaughter does not end with the boys, but is often carried on more or less systematically by

the so-called sportsman, but I am happy to say not nearly as frequently as formerly, in this section at least.

Of course the Flicker occasionally tastes of the cultivated fruits and grains, such as the blackberry, cherry and mulberry, and corn in the milk; but so seldom as to call forth no complaint. In Illinois he is far less destructive in this respect than his red-headed relative (Gault). The only serious damage reported comes from Farboro, N. C., where he is quite destructive to the peanut crop while the nut is maturing, congregating in great numbers in the fields and playing havoc, often making half a dozen holes near a vine probing for the soft kernel. During the month of August, however, it resorts in great numbers to corn fields in quest of corn worms (Foxhall). Maynard says it is very fond of over-ripe pears and apples. In the North, as the season wanes, the trees, shrubs, bushes and vines become stripped of their fruit, for the Flicker is not the only bird foraging, and the bulk retire southward, leaving the hardy winter resident, usually an old male, to adapt itself to the existing conditions, be what they may, and becomes everything but carnivorous (Bowles). Almost omnivorous, its maw receives the dried or frozen remnants of the wild fruits already named; also the berries of the red cedar, hawthorn, mountain ash and woodbine; the seeds of the sumac, poison ivory, clover, grass, and various weeds; as well as acorns, beechnuts, corn from shocks, and oats, wheat and rye from stacks; while ants, beetles and larvæ are sought from bark and wood of decayed trees and stumps or gleaned from the bare ground or creek banks. During the winter of '87–'88 a single male took up his quarters in a corn crib near Grinnell, Iowa, and waxed fat on the corn and oats in the bins, but succumbed to a temperature of 20° below zero on the 14th of January (Jones). In Michigan its winter food seems to consist mostly of corn, for where there is a field of corn standing only there the Flicker is found. It also resorts to corn cribs, and probably a few beechnuts and acorns, as well as such insects as can be had are eaten (Purdy). Apparently the Flicker performs the same service in Michigan as the Crow does in eastern Pennsylvania for the slothful farmer, but doubtless less thoroughly. Further south it fares better during the colder season. Near Raleigh, N. C., it feeds upon the waste peanuts

on the ground after the crop has been gathered; also on the berries of holly and cedar (Brimley). According to Baker, specimens from Florida often contain the berries of the cabbage palmetto. The large amount of insect food secured by a Georgia bird in January has been already commented upon.

It is presumed that where a large number of telegraph poles are perforated or honey-combed, it is not always with the intention to nest, but that the motive is most often suggested by the humming of the wires which it probably mistakes for the boring of insects. It must be admitted, however, that this occurs almost wholly in treeless localities like Cape Cod and Nantucket, Mass., and the great plains of the West. It performs a good service in scattering the seeds of many useful plants and trees, not among the least of which is the pokeberry, whose young and tender shoots are so highly esteemed in the culinary art. It doubtless assists in the spread of the poison ivy (*Rhus radicans*) and poison shumac or poison dogwood (*R. vernix*), since it eats the berries in the fall and winter seasons.

ENEMIES.

Its natural enemies are few and rather unimportant in the extent of their depredations, as far as the adults are concerned, confined almost exclusively to the Hawks and Owls. Mr. J. H. Bowles observes that the swift little *Accipiter velox* considers it a great delicacy. I witnessed one instance of its unsuccess, however, while watching a number of Flickers feeding in a meadow. Suddenly a commotion occurred half way up the hillside, exciting the whole community; a young male Sharp-shin had darted to where a pair were feeding. Tumbling over in their haste and terror, they dodged and ran with half-spread wings, uttering despairing shrieks, finally taking flight, hotly pursued by the now confident Sharp-shin until directly overhead, when I gave him the contents of my little 68-caliber collecting gun; he instantly wheeled to the right and made for the woods, but dropped dead before going fifty yards. Mr. J. N. Baskett once found a Sparrow Hawk (*Falco sparverius*) and a Flicker on the ground clutched in a life and death struggle, while dozens of the latter species sat on near-by trees, simply sneezing an alarm or threnody. I am inclined to think they are much less successful when attacking it about the tree trunks on account of its skill in dodging.

Mr. Bowles offers circumstantial evidence in the form of numerous feathers discovered in nesting cavities, of nocturnal visits of the Sreech Owl (*Megascops asio*) which he places among its most dreaded foes. An unique instance of these two birds dwelling together in peace and harmony is furnished by Mr. John Meisky, Columbia, Pa. One day in May—about the 16th—he found a nest of the Flicker in a limb of a chestnut tree, and in the same hole was a Screech Owl. Visiting the place twice subsequently he found both birds present, seemingly contented. Although occupying the same cavity the Owl was not on the eggs.

The eggs and callow young are sometimes destroyed by

Red Squirrels (*Sciurus hudsonicus*) and subspecies, Flying Squirrel (*Pteromys volucella*), Weasel (*Mustela vulgaris*), Mice of various species, Red-headed Woodpecker (*Melanerpes erythrocephalus*), Crows (*Corvus americanus*), (*C. ossifragus*), Jays, (*Cyanocitta cristata*); and probably a few others. Mr. C. L. Rawson, who has had a wide experience in collecting, says that he has never seen snakes in holes in trees, *a la* school books, but mice, Red and Flying Squirrels often.

Mr. A. O. Garrett, Fort Scott, Kans., writes that the Flicker appears to be subject to internal parasites to an unusual degree. In skinning a number he found wire worms in the stomachs of fifteen or twenty; also parasites where noticed on the occipital bone in several cases.

Undoubtedly quite a number succumb to extremely cold weather. Prof. Jones records an instance observed in Iowa. Mr. J. H. Armfield notes it among the birds that suffered during the extremely cold winter. One found dead in a post oak cavity, Feb. 22, '99, at Greensboro, N. C. Harry Gordon White made note of one found dead with its feet frozen to a sheet of ice on the floor of a cavity, many years ago.

Man is its greatest enemy. Protection is needed particularly in the South, where most of the surviving adults, plus their progeny, reside for at least one-third of the year. Dr. M. T. Cleckley, writing from Augusta, Ga., states it is being gradually exterminated by the hunters. Mr. Gustave Kohn says that it is shot during the winter season by most hunters, as it is considered as good eating as Doves. He has seen them in bunches for sale on the streets and in the markets of New Orleans, La. This practice, although common enough in the times of Wilson and Audubon, has long ago ceased in the older Northern States. Mr. Fritz V. Raymond, referring to the town of Ludlow, Ky., writes that it is difficult to study birds whose nests are easily found, as a class of destructive boys scour the country for miles around and kill and plunder for the very love of it, stringing eggs like beads and taking the young birds. Plainly the most intelligent people of America are often too thoughtless and indifferent to instruct their children by precept and example in the common laws and economy of nature. As to the ignorant, next to enlightenment—with which I do not qualify my remarks when

including the vicious—a deep-rooted superstition tending to the protection and preservation of our birds is wanted. For examample, the absurd saying, "The sting of a humming bird results in death," has stayed many a hand itching to examine this living gem. Again, the number of Catbirds slain on the altar of a deep-rooted prejudice cannot be estimated.

Mr. Walter G Savage, Hillsboro, Iowa, says he can note no increase or decrease in the past five years, but there has been a decrease of about 20 per cent. in the last twenty years.

MEASUREMENTS.

Doubtless a very large series of skins would show a gradual increase in size from south-northward in all measurements except perhaps the bill and feet. In a small series this can be emphasized only when the mean is obtained from remote localities. The table showing the sexual, individual and geographical variation requires no further comment than that the measurements are in inches and hundredths, and were taken by the writer from the dry skins of adult birds, secured on their breeding grounds. Late fall, winter and early spring specimens are not included. The measurements of young birds but a short time out of their nests follows. It would be well to state here that the first primary which is spurious or rudimentary, measures but a little over two inches in the juvenile, and less than two, usually about one and a half inches in the adult.

			Wing	Tail	Tarsus	Bill		
						Nostril to Tip	Depth at Nostril	Width
Northern United States (Between 40° and 43° parallels lat.)	17 males	Aver.	6.04	4.15	1.07	1.09	.33	.35
		Max.	6.30	4.46	1.14	1.14	.36	.40
		Min.	5.90	4.00	1.01	1.01	.29	.32
	13 females	Aver.	6.06	4.14	1.06	1 11	.31	.34
		Max.	6.27	4 55	1.10	1.23	.35	.37
		Min.	5.75	3.80	1.00	1.02	.28	.31
Southern United States (Between 33° and 36° parallel lat.)	9 males	Aver.	6.00	4.07	1.07	1.07	.32	.35
		Max.	6.25	4.62	1.10	1.15	.39	.39
		Min.	5.75	3.87	1.03	1.02	.29	.33
	14 females	Aver.	6 00	4.01	1.09	1 06	.34	.35
		Max.	6.23	4.62	1.12	1.13	.41	.39
		Min.	5.75	3.69	1.05	.98	.29	.32
9 Juveniles		Aver.	5.75	3 66	.95	1.07	.31	.34
		Max.	6.00	4.05	1.08	1.11	.40	.36
		Min.	5.55	3.10	.80	1.01	.22	.31

PLUMAGE.

Individual Variation. I will first attempt the description of a typical spring specimen, collected April 20th, '98, in Chester county, Penn'a. Interscapular region, sepia ; Scapulars, wing coverts and exposed parts of secondaries, hair brown ; and the whole barred with deep brown, almost black. Rump white, upper tail coverts white, marked with black. Tail feathers glossy black above, the basal portion of all but the central shafts, chrome yellow ; under surface wax yellow, tipped with black. Primaries and secondaries above, dark-brown ; under surface with chrome yellow shafts and wax yellow vanes—with the following exceptions : beginning on a line near the base of the first primary and running diagonally to the tip of the first secondary, a deep edging of light chrome yellow extends to the body, and from the same line out to tip of wing an edging of dark-brown, heaviest at the tips, encircles the primaries. Bend of wing pale-yellow, spotted with black. Top of head, sides and back of neck, ashy-gray. Scarlet-vermillion crescent on back of head, and a broad black crescent across the breast. Sides of the head, chin, throat and forebreast, fawn color. Remainder of under parts dull white, with circular spots of black on each feather, becoming cordite on flanks and anal region. Sides and flanks washed with a pale fawn-cinnamon. Bill dead brown-black. Toes and tarsi plumbeous. Iris brownish. Individual variation is very great, particularly in the upper plumage. The back or interscapular region, runs through bistre, sepia, olive and hair brown to drab-grey in different specimens, sepia being the most common ; my only example of drab-gray coming from Georgia, where we are led to expect only the darkest birds. The scapulars, wing-coverts and exposed secondaries are usually a shade lighter, often as light as broccoli-brown ; the bars vary only in width. The top of the head is occasionally washed with umber or tawny, and the nuchal

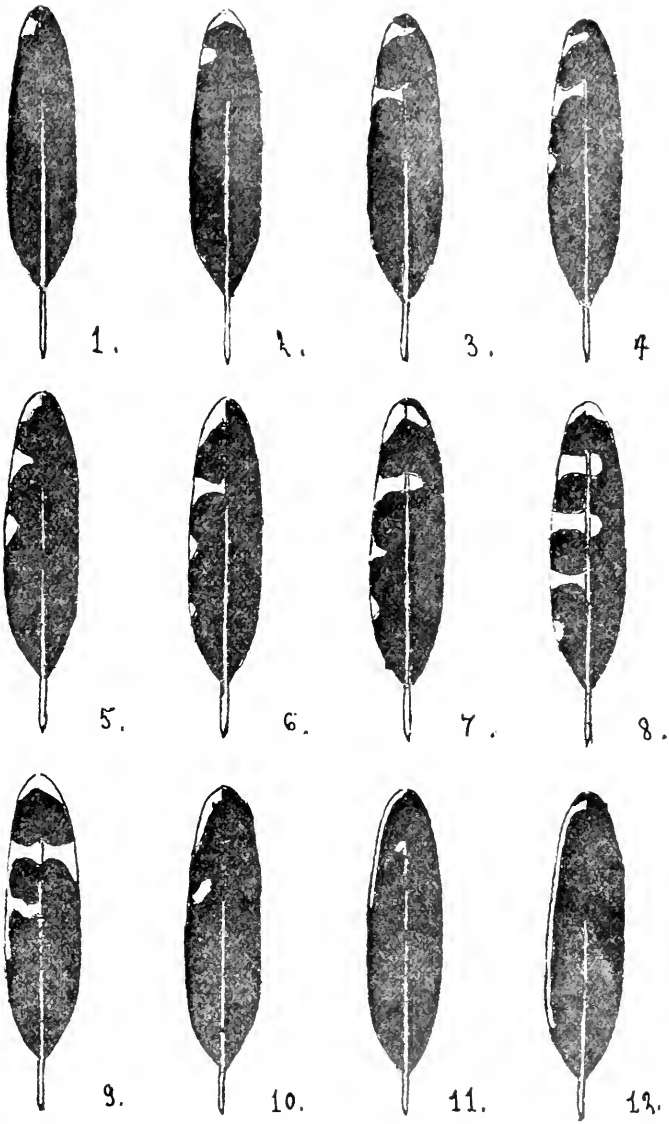
crescent varies greatly in extent and in color from scarlet to vermilion. The sides of head, chin, throat and forebreast from drab through fawn, ecru-drab to vinaceous-cinnamon. The black breast-patch being a generic character remains fairly constant. The under parts vary in the extent and depth of tone of the pale fawn-cinnamon wash, and the size and shape of the black spots. In four specimens the bend of the wing is apparently immaculate, but the small black spots are discovered beneath the surface. The absence or presence, number and extent of the light edgings on the tips and outer vanes of the primaries, and the tips, edgings and barrings of the rectrices offer a more complicated study, as variation occurs more frequently in these parts, and can be successfully investigated only with unstinted material.

Aside from the black malar stripes or "moustaches" which vary in length and breadth, a usually greater width of nuchal crescent, and an apparently less frequently spotted condition of the tips and outer vanes of the primaries of the male, I can detect no constant differentation of sexes. The pattern of coloration of the fully fledged young is very near the same as the adults, but the spots and bars are usually much broader, giving a coarser and darker effect. The immature female as well as the male resembles the mature male in having black malar stripes, and the female in having a narrower nuchal band and in the extent of primary markings. The wings and tail are of a duller yellow and the feathers of the forehead and crown are usually tipped or mottled with scarlet vermilion, dragon's blood or brick-red, posteriorly fading to a rusty brown or burnt umber over the ashy-grey, which extends almost around the eye in some specimens. The lores are frequently blackish, and one specimen has a dusky superciliary stripe. The throat is often tinged with ashy, pronounced in one specimen, and occasionally a dull vinaceous-buff. The black breast tract is shaped more like a semi-circle than the crescent of the adult, and the whole body has a fluffy, lustreless appearance.

The color pattern of the tail coverts is subject to much variation at any period of the bird's life, but ordinarily follows a definite line of progression. Chapman, in *Bulletin American Museum Natural History*, Vol. III., p. 314, illustrates the development of the long upper tail coverts in fifteen figures,

beginning with the barred, running through the intermediates to the concentric or longitudinally striated, and terminating with the white-edged black feather. He says: "If we assume that the phases just observed epitomize a transition which is occurring in *auratus*, and if we furthur assume that *auratus* is the most recent offshoot of the Neotropical genus *Colaptes*, we should expect the more southern and older species to exhibit only the earlier stages of a color-pattern which in *auratus* has reached its highest degree of development. Unfortunately very large series of the extra-limital species are wanting; so far as my specimens go, however, they seem to support the theory advanced." The posterior upper tail-coverts of two Georgia specimens in juvenile plumage, now in my collection, are black with minute white spot at tip; a distinct and more primitive pattern than any described above, from which I infer it to be a stage almost outgrown and as seldom met with as the white-edged black feather—its present highest stage of color-pattern development. In the variation or transition of the color-pattern of the spurious rectrices, we have a similar condition due mainly to age. This rudimentary tail feather, present in all the Woodpeckers, lies concealed between the present outer and next to outer tail feathers. I consider it of sufficient importance to illustrate in twelve natural sized figures, showing the progression from the primitive dot to spots, cross-bars, and lastly the white-edged black feather, as something seldom occurring. My series of skins is not large enough to contain all stages; hence the sequence may be faulty and is undoubtedly incomplete. Correlative data is incorporated with the explanations on next page.

Seasonal Variation. There are two distinct phases of coloration, autumnal and vernal, although but a single annual molt. The post-breeding molt and renewal results in a somewhat deeper coloring of the upper plumage from nape to rump, and a pronounced primrose suffusion of the under parts, and occasionally the rump. After a few months of wear there is a gradual fading of the upper plumage and a more pronounced change in the lower parts, the primrose or straw-yellow first disappearing from the flanks and anal region, the middle of the abdomen only occasionally retaining a faint yellowish tint. The breeding season is particularly hard on the feathers of



EXPLANATION.—Nos. 1, 2 and 3, Juvenile, 9 examples. Upper tail coverts—black with white dot, incipient bars, or complete transverse bars. Nos. 4, 5 and 6, first renewal, 31 examples. Upper tail coverts—14 barred, 5 concentric, 12 intermediate. Nos 7, 8 and 9, second renewal, or third stage, 9 examples. Upper tail coverts—6 intermediate, 3 concentric. Nos. 10, 11 and 12, most advanced stage, 10 examples. Upper tail coverts—2 intermediate, 8 concentric.

this bird. Its cavity-haunting habits gradually wear away the light-colored tips which have more or less obscured the bars and spots until all of the darker markings are fully exposed, resulting in a much heavier and darker appearance.

Geographical Variation. Dr. Allen, in the *Bulletin American Museum Natural History*, Vol. IV., p. 36, says: "It has been suggested that the resident form of South Florida would prove separable as a sub-species from the birds at large further north on the basis of its smaller size and darker colors. The average difference, however, as shown by a large amount of material, proves too slight and too inconstant, in either size or color, to make a separation practicable, as is readily shown by comparison of a considerable number of breeding birds from South Florida with a corresponding series from the Middle States or New England. Specimens nearly as dark occur, however, in New Jersey and Massachusetts, so that the average difference in color between Florida and northern birds is not appreciable. There is a lightening of colors as we approach the Plains. This is very noticeable, even in Minnesota specimens, and still more so in specimens from the Dakotas, Nebraska and Kansas.". Since the above was written the separation has been made and the southern form given as resident in the South Atlantic and Gulf Coast region. Comparing my series of skins—twenty-three specimens—collected in DeKalb county, Georgia, with those collected in Chester and Montgomery counties, Pennsylvania, Lorain county, Ohio, and Walworth county, Wisconsin, I fail to find any constant difference in coloration, and defy any one to select the so-called *C. a luteus* from the mixed lot with any degree of certainty, except by means of the labels.

A small spring specimen taken in Bradford county, Florida, has a dull, faded appearance, slightly exceeding in size a breeding male, taken in Cleburne county, Arkansas. Both of these birds should belong to the southern form. It strikes me, however, that the stability of a sub-species must be very uncertain when it requires a painful scrutiny in the best light to determine the best shade effects of the upper plumage or a careful and laborious measurement of width of crossbars, combined with the slight and consistent geographical gradations in size, observable in all species having a wide range.

Abnormal Coloration. Albinism is said to be very rare among the *Picidæ*. Ruthven Deane described the only example that had come under his notice—*B. N. O. C.*, Vol. V., p. 26—a beautiful specimen, taken near Providence, R. I., in '79, the red nuchal crescent and gold-shafts of the wings and tail being the only normal colors remaining, the rest of the plumage creamy-white. Chas. K. Worthen describes a similar example in the *Osprey*, Vol. I., p. 24, said to have been taken in Lee county, Iowa. It is also cream-white, with the exception of a pink nuchal crescent, and the under parts of the wings a rich yellow. A specimen in the young of the year plumage, taken in New Jersey and now in the Philadelphia Academy of Natural Sciences, closely approaches the albinistic phase, having a general washed-out appearance. One of my Georgia skins, an old male in rich autumnal dress, has a single white feather near the center of the occiput.

Melanism, a yet rarer condition of plumage, is represented by a single case cited by Mr. Deane in the above periodical. Records of the last are extremely unreliable unless the specimens are in hand. In proof of this, witness Mr. J. N. Baskett's experience: His little boy called his attention to a bird on the lawn; it seemed to the eye to be perfectly black, but under the opera glass faint markings characteristic of the Flicker, appeared; the bird's pose, shape and movements already established its identity. As it was Sunday and in town, this apparently remarkable melanistic form could not be shot, and the next day it could not be found. A small boy, however, appeared on the following day with the identical bird, it having been shot by his father while it was engaged in digging holes in the corner of his house. On closer examination its plumage proved grimy and greasy with soot with which it had doubtless came in contact while occupying a used chimney as a resting place. This specimen came from the hands of the taxidermist but slightly darker than normal, he having exceeded his instructions and given it a thorough cleansing.

HYBRIDISM.

In order to introduce the subject a brief synopsis must be given of the suppositions advanced by some of our most eminent ornithologists to account for this interesting condition: Although Baird had apparently solved the question satisfactorily away back in '58, other causes were suggested or assigned from time to time, almost up to the present date. Although suggesting that it might be due to environment or climatic influences, Maynard seemed convinced that it was but the insensible gradation of one to the other, *C. cafer* being but a more highly colored race; Ridgway appeared to have considered it the remnant of a generalized form from which the eastern and western representatives had sprung; an opinion shared by Newton at the present time. Coues was undecided as to whether it was a hybrid or transitional form. Hargitt, though leaning toward the theory of hybridization, suggests that it might be a sign of reversion to a remote ancestral plumage.

While hybridism has appeared the only solution to American ornithologists in recent years, it was not until '92 that seemingly overwhelming proof of the fact was presented by Dr. Allen in a paper entitled *The North American Species of the Genus Colaptes with Special Reference to the Relationship of C. auratus and C. cafer.* He finds a complete blending "along the line of juncture of the two species from Southeastern Texas northward along the western edge of the Plains into British America, and then westward in British America to the Pacific Coast in Southern Alaska." Mixed blood is of quite recent introduction in California, apparently, probably within the last thirty years. It is now quite common, particularly in the central and northern Pacific slope counties. While many are migrants from the north a number are residents or breeders. I have examined males taken in San Bernardino and Santa Cruz—April 27, '83, and Sept. 3, '95—which undoubtedly

belong to the latter class. A beautiful specimen, taken at Palo Alto, Nov. 26, '96, resembles Audubon's *C. ayresi*, with a half concealed red crescent, tipped with grey, and the orange-ochraceous wings and tail of *auratus;* head, throat, fore breast and malar stripes of *cafer;* and intermediate back. Cross-breeding is not confined strictly to the Red-shafted ; the Northwestern form *C. c. saturatior* also blends with the Yellow-shafted, as exhibited in a pair collected at Puyallup, Washington. The male taken April 3, '96, has a small patch of red on either side of the occiput, strongly suggesting an incipient nuchal crescent, several creamy-white feathers contrasting with the vinaceous of the rest of the breast, and the fourth rectrices are yellowish. This is probably a young bird, hatched the previous summer, as quite a few of the feathers in its forehead are red. It is only recently that *auratus* has come in contact with the Gilded Flicker, *C. chrysoides*, if at all. A supposed hybrid is described in the *Osprey*, Vol. III., p. 13, a bird taken in Arizona, showing red on the nape. No instance of the actual pairing and interbreeding of the pure Yellow-shafted with the Red-shafted Flicker has ever been published, but a writer in the *Auk*—Vol. II., p. 284—mentions having witnessed the courting of a true *auratus* and a hybrid in Southeastern Dakota; and Chas. T. Morrison—*O. and O.*, Vol. XIV., p. 146—found the hybrid mated with the *cafer* in the Big Horn range, and secured the eggs and parent birds. Rev. William Osburn writes me that he has been informed that the hybrid mates with *cafer*, nesting and producing young. Comparing and contrasting the plumage of the two species, the pattern of coloration is the same, with the exception of the nape, yet excluding the crescentric breast patch of black, there is a complete dissimilitude in coloration. The prevailing color is yellow on one and red on the other, even to the tint on the rump ; and the grey head and brownish throat of one are transposed on the other. Hybrids and mongrels present a bewildering number of regular and irregular combinations. Red in the malar or nape is the first to appear as well as the last to disappear. This color about the head being characteristic of the Woodpecker family, is in line with the Darwinian principle of hybrids, showing a tendency to revert to the ancestral stock.

In the event of the western representatives becoming

absorbed, which, strange as it may seem, is a not impossible happening, it appears to me that it would not be replaced by a richer colored bird, such as the Palo Alto specimen for instance, combined with the more advantageous hardiness and aggressiveness of the eastern and northern bird, as suggested by a recent writer (Rhoads in *Science*, Vol. XX., p. 325), but rather, conforming to the general rule that complete hybrids are seldom fertile, a constant infusion of pure *auratus* blood would cause the *cafer* characteristics to become less and less evident until obliterated entirely. The very close affinity of the North American types in which the divergence in colors is the greatest, tempts me to propound the following question: Is it less than improbable that the original *Colaptes* stock has been dichromatic, the yellow phase evolutionizing into one group of which *auratus* is an example, and the red phase into another group of which *cafer* is a representative and *chrysoides* standing for the intermediate? The Red-shafted is less prone to wander; a few specimens have been taken in Iowa, Nebraska and Kansas. A hitherto unpublished record from Forest City, Winnebago county, Iowa, by J. Eugene Law is the eastermost perfectly authentic record I have seen. Mr. Law assures me that it is an unquestionably pure *cafer*, shot and brought to him by some of his scholars on Sept. 19, '90. The specimens taken in Van Buren county, Iowa, in March, '78, by William Savage, proves to be a well-defined hybrid.

ATAVISM.

It need not necessarily imply that all birds varying slightly from the normal are the result of mixed union, because undoubted mongrels along the line of contact sometimes possess similar characteristics, since Darwin says: "In a breed which has not been crossed, but in which both parents have lost some character which their progenitor possessed, the tendency, whether strong or weak, to produce the lost characters might, for all that we can see to the contrary, be transmitted for any number of generations. When a character which has been lost reappears, the most probable hypothesis is that the character in question has been lying latent, and at last under unknown favorable conditions, is developed." As previously mentioned, there is an occasional specimen, more noticeable in the juvenile, having the crown more or less tipped or washed with brownish or with scarcely more than a suspicion of ash on the throat, colors belonging to the western species, just as truly as the scarlet malar stripe or ruby colored shafts, although not as conspicuous. An anomalous specimen, secured in New York markets and described by Gerrit S. Miller, Jr., in the *Auk*, Vol. XIV., p. 275, is an almost perfect intermediate between *auratus* and the Cuban Flicker *C. chrysocaulcus*, and would doubtless be considered a hybrid but for the fact that the breeding ranges of the two species do not overlap. To the best of my knowledge this is the only specimen with spotted rump taken on the North American continent. Possibly the abnormal Gilded Flicker noted under the head of *Hybridism* belongs properly to this section. An old male showing the effects of previous gunshot wounds in wing and mandible, taken in DeKalb county, Georgia, Jan. 27, '99, has a single red feather over the right eye. I shot an adult male near Berwyn, Chester county, Penn'a, Oct. 3, '94, which has a narrow border of scarlet on the upper margin and end of the black moustache; a not at all remarkable condition, occurring

repeatedly in almost every State in which the Flicker is found, and quite as frequently along the Atlantic coast as anywhere. With the exception of the apparent hybrids taken near Toronto, Philadelphia and New Orleans, scarcely a well marked mongrel has been captured east of the Mississippi. The so-called hybrids varying but little from the normal, are often separated by a thousand or more miles from known points of interbreeding, and are surrounded by hundreds of pure birds as far as can be told by the plumage. In view of these facts we may ponder on the probable source of the alien blood. If it is the fading vestiges of an earlier infusion, it should have been much more noticeable twenty years ago, since a hybrid crossed regularly with pure stock would soon have a very small proportion of foreign blood, 1 in 16,384 in fifteen generations for example. Mr. James Newton Baskett is very much inclined to attribute such instances, especially when found on the Atlantic slope, as pure variation, either rudimentary or vestigial, perhaps the latter, since the genus is quite probably of southern origin, and most all southern and southwestern species and races incline to red moustaches; *C. auratus* being a late northward-tending species, showing occasional tendencies to revert. A hypothesis in part or in whole shared by not a few. Dr. W. E. Rotzell also questions the occurrence of hybrids in the East, *C. cafer* not being present; and inclines to the opinion that we must of necessity seek a better understanding; the so-called hybrids may be explained by the fact that there is a strong atavistic tendency in *C. auratus*, the form reverting so frequently in some particulars to the ancestral type, exemplified so frequently in the head of the young.

CONCLUSION.

It is not my purpose to generalize or make further deductions from the evidence collected, but there are some facts and thoughts which appear to me to have not an unimportant bearing on the subject in general. Few species offer greater possibilities and at the same time more difficulties in the way of a close study, than this bird. To deduct the general facts or principles underlying the migration, reproduction, moulting, mode, variation, hybridization, etc., of this one species would in all probability go far toward solving the many vexed problems so important to science and yet so imperfectly understood. The Flicker is both progressive and energetic—a typical American. It may be said to be perfectly fitted or designed to meet the conditions of its environment, but the surroundings are changing, and its habits, food or plumage may alter perceptibly in the not remote future. It doubtless represents a comparatively recent off-shoot of the genus, and is yet undergoing certain modifications of an evolutionary nature. Undoubtedly its comparatively weak curved beak, so like a pick and so unlike the drill-shaped bill of the Woodpecker, would become so less able to withstand the strain of hardwood cutting the less it is used for that purpose, and burrowing in the earth, soft wood and bark become the extent of its capabilities in that line; but it by no means follows that its chiseling power is suffering marked diminution within recent years or the immediate prospect of its curtailment as long as timber is so plentiful. Favorable to the preservation and increase of the species, I may mention an almost perfect protection during the critical breeding time from the inclemency of the weather, and carnivorously inclined beasts, birds and reptiles; great powers of reproduction; abundance of suitable food; hardiness; absence of harmful traits; ease of adaptation to conditions of surroundings; and the possession of the great advantage over nearly all of our Woodpeckers in having a much less con-

spicuous if not mimetic plumage. Its very natural advantages over all other members of the tribe inhabiting the same regions would tend to its preservation, increase and comfort when the less versatile or adaptive species decreased or became extinct under changed conditions; exceptions being made to the Downy (*Dryobates pubescens*), for which there appears a distinctive place, and whose dwarfishness exempts it from persecution by man—Nature's worst enemy.

KIRTLAND'S WARBLER (*Dendroica kirtlandi*) AT OBERLIN, OHIO.

It has been my rare good fortune to meet face to face three Kirtland's Warblers during the season of migration just past. On May 7 it was seen and heard singing in an orchard of some three acres just outside the limits of Oberlin. The early hour —4:15 A. M.—an overcast sky with fine rain and searching north wind made a satisfactory scrutiny of the bird impossible. Consequently its identity was not fixed. One could not see the markings clearly in the feeble light. May 9th, at 5:00 A. M., in company with a considerable number of students, one was heard singing in the "South Woods" about a mile south of Oberlin. Here, again, circumstances made it impossible to obtain a satisfactory scrutiny of the singer, but the song was carefully studied and written out. On our return from the woods at 6:30, past the orchard mentioned above, the song was heard again and the bird clearly seen and studied for some time. Half an hour later the bird was in my hand for positive identification. It seemed a great pity to sacrifice so sweet a singer for a museum specimen.

One may ask why I speak so confidently of three individuals when but one of them was positively identified. In the first instance it was both seen and heard, and in the second clearly heard, and there is no Warbler song like it. Even the students remarked upon the unusual quality of the song and its striking character. It was given from three to six times in succession at intervals of about fifteen seconds, then with a prolonged pause sometimes lengthening into ten minutes, but often not over two minutes. It is likely, however, that the longer pause was occasioned by the bird flying from one tree to another because of my inquisitiveness. One does not meet so rare a Warbler every day, and so may be excused for a degree of over inquisitiveness. The song was loud and full, given with all the vigor of a Wren or Kinglet; the body being straightened to almost a perpendicular direction, and the beak

pointing straight up. It was no by-talk nor incidental song, but manifestly an earnest and purposeful call song. The song is a double phrased one, the first part slightly longer and a little less rapidly uttered, the second part quickly and more vigorously uttered. I have written it thus: *ter ter ter tee; tswee te chu.* The first three syllables have the *r* trilled slightly and the syllables on the same key, the fourth one about a sixth higher pitched; the first syllable of the second phrase is a third higher than the first three, the second syllable of the second phrase a note above the preceding one and much shorter, while the last syllable is on the same pitch as the first three, slilding a third or more below; it is therefore somewhat prolonged. – __. It is difficult to represent the song by characters – – – – but the scheme given may prove suggestive to some.

There are two distinct field characters which appear to me most strongly, which I venture to give. First, because first seen usually, the yellow underparts, from the chin to the tail, without any markings on them except along the sides at the edge of the wings; second, the middle of the bluish gray back with distinct black streaks—four in this specimen. This back pattern is so unusual that to me it was the most striking character. The bird was not at all wary or timid, but allowed an approach within ten feet on both mornings, but in rather heavy foliage.

I claim two records for this rare Warbler, with a probable third. But since the bird captured was in the same orchard as the first one seen, and but two days later, the first and the third may be the same individual. Clearly the one heard singing in the woods could not have gone to the orchard while we were returning, more especially since the natural route of the woods bird would have been at right angles to the direction of this orchard.

LYNDS JONES, *Oberlin, Ohio.*

A DAY IN RUBIO CANYON, CALIFORNIA.

The day dawned brightly as California days are wont to. I had dreamed the night before of "takes" and "finds," and

that day in "Rubio" was a realization. And now as I look back at it in the dizzy retrospect of years it seems like a beautiful dream. Starting from home "Lomita," in the Calmenga Valley near Los Angeles, I met my friend, a true old nobleman of Nature, clad in his rustic garb and carrying a time-worn market basket. But beneath his rough clothes, donned purposely for the trip, there was one of the keenest and best ornithologists of the west. We took the train, and as we passed the country lying from Los Angeles to Pasadena, the scenery was grand. Lemon orchards, palms, little farms here and there as neatly kept as a front yard of a city dwelling, came and went away before the eyes as we peered out of the car windows.

The City of Los Angeles is truly a city of angels to me. And I believe if an angel would drop down from heaven and view around, he would soon soar to that dainty little city cutely ensconced amid a range of the Sierra Madre in southern California, and say, throwing down his mantle and lowering his wings, "I'm back in heaven. I am back in the City of Angels."

We soon reached our getting-off-place and soon started over the rough country of the foothills. Bevies of Valley Quail greeted us along the pathway. A flock of downy young come skampering down the path but a glimpse of us was enough and sent them scurrying away in the high grass nearby. Anna's and Black-chinned Hummers were common, and as we proceeded up the canon, along a little stream, we found many of their nests with eggs. Phainopeplas and Black-tailed Gnatcatchers were common now, and as I passed a little stream I saw for the first time in life a Pileolated Warbler drop down from its green bower, and pausing, drink from the pebbly shallows of the little stream. We found a Black-tailed Gnatcatcher's nest and one of the Western Flycatcher. The former was in a live up-right, far up; the latter amid ferns and other growth beneath the overhanging face of a bank near the stream. Louisiana Tanagers, Black-headed Grosbeaks, Black Phœbes, several kinds of Warblers and California Thrashers were common. I found a beautiful set of the Desert Sparrow Hawk in a cavity of a live oak. It comprised five eggs, the most beautiful I ever saw for this species; I got nearly eaten up by ants

while up after this set. Mosquitoes are not in it when ants are in comparison.

While we were eating lunch a California Condor soared high up above the canon and gave me my first sight of this bird in life. I don't know, in view of circumstances which seem to condemn it to extinction, that I shall ever see it again.

We ascended the canon to its end and spent one of the happiest days of my life in Rubio. The gentle climate and new surroundings were exhilarating and it causes me a refreshing thought whenever I recall that day with M. in Rubio.

JOHN W. DANIEL, JR., *Lynchburg, Va.*

FIVE ACRES OF BIRDLAND.

We had scarcely set foot within the five acre enclosure of the Ahtanum parsonage before I recognized its possibilities as a haunt for birds and determined to register them in the order of their appearance. The parsonage demesne is pleasantly diversified by the presence of a winding stream and plentiful shade. In fact, this five acre plot contains a little bit of every thing. In it are to be found a wheat field, a lowland meadow of wild grass, two alfalfa meadows, an upland pasture with salt grass, rye grass, and sage, a tule' swamp, a rose brush thicket, abundant willows skirting the stream, a fine lawn sprinkled with box elders, maples and young elms, an orchard of thirty trees or so, and a garden. Besides these there are weedy tangles and brush heaps, such as birds delight in ; overgrown fence corners galore ; and best of all, "The Island," a low lying coppice which the creek almost surrounds and above which towers a numerous company of young balm trees.

On the first of June I set out to see how many birds would visit the enclosure within the year, or a given time. In pursuance of this plan the following rulings were established : On my fence is in my yard, and, Over my yard is in my yard. If the desideratum were very near and apparently in need of encouragement I did not scruple to assist nature by making a retreat into the parsonage lot seem more desirable than my approaching presence ; but further than that I did not pass the

bounds: even thus, birds that I thought I had a good right to escaped me. A certain Lark Sparrow would sing his heart out from one of the trees in an adjoining yard but he avoided me as if I were a kodak fiend. An ill favored Turkey Vulture passing up the valley on his daily round of inspection was always careful to give us a considerable berth. Of course we readily excused the omission on sanitary grounds. Many a time did I endeavor to "shoo" a Dusky Horned Lark, nesting in an adjoining back lot, within bounds, but all to no pursose. Finally, at the expiration of four months the bird came of its own accord, and came often, by way of asserting its independence.

Of course we had rare visitors. June 5th was a gala day at the parsonage, for although I mistook the name on the cards, at first, I soon made out *Townsend's Warblers*. The trouble was due to their high plumage. It was brighter, that is "higher," than Coues' description of it. Thus: In the adult male the crown was pure black, not jet black indeed, but still dead black, unstreaked, and most intense on the forehead. Instead of merely "jugulum black" most birds were black *clear up to the bill*, altho—and this is important—some birds were not. This extension of the black throat led me, carelessly enough, to assume *D. occidentalis;* but the other markings are positive and determinative. The bird is an exquisite and no mistake. Not less than a dozen spent the day with us in orchard and shade trees. The birds sang freely. The song was very much like that of *D. virens* in general character, only somewhat lighter and more varied. A returning bird was noted on August 23rd and he was still in song.

Other notables worthy of special mention are: Lutescent Warbler, Black-headed Grosbeak, Least Sandpipers, MacFarlane's Screech Owl and Black-headed Jay. The latter was slipping through the country very quietly, knowing that he was about twenty miles off his beat.

The time covered by the following "yard list" is nine months; for owing to removal from the parsonage in February it is not thought worth while to add those accidentally noted since March 1, 1900. The sixty-three species are recorded in the order of their occurrence.

June 1–4.
1. Rusty Song Sparrow.
2. Western Chipping Sparrow.
3. Yellow Warbler.
4. Pileolated Warbler.
5. Western Yellow-throat.
6. Russet-backed Thrush.
7. Louisiana Tanager.
8. Mourning Dove.
9. Western Robin.
10. Western Meadowlark.
11. Barn Swallow.
12. Western Wood Pewee.
13. Goldfinch.
14. Lazuli Bunting.
15. Brewer's Blackbird.
16. Spotted Sandpiper.
17. Pine Siskin.
18. Wilson's Snipe.
19. Warbling Vireo.
20. Cowbird.
21. Cliff Swallow.
22. Kingfisher.
23. Cassin's Vireo.
24. Kingbird.
25. Western Kingbird.
26. Bullock's Oriole.

June 5.
27. Townsend's Warbler.
28. Lutescent Warbler.
29. Western Vesper Sparrow.

June 7.
30. Burrowing Owl.
31. Killdeer.
32. Red-winged Blackbird.
33. Tree Swallow.

June 8.
34. Cedarbird.
35. Say's Pewee.

June 9.
36. Brewer's Sparrow.

June 10.
37. Western Nighthawk.
38. Crow.

June 14.
39. Hammond's Flycatcher.

June 16.
40. American Magpie.

June 17.
41. Gairdner'sWoodpecker.

June 22.
42. Black-headed Grosbeak.

June 26.
43. Red-shafted Flicker.

July 5.
44. Spurred Towhee.

July 8.
45. Oregon Chickadee.

July 24.
46. Bank Swallow.

August 12.
47. Calliope (?) Hummer.

August 22.
48. Red-breasted Nuthatch.

August 26.
49. Least Sandpiper.

August 29.
50. Desert Sparrow Hawk.

September 10.
51. American Pipit.

September 11.
52. Audubon's Warbler.

September 15.
53. Oregon Junco.
54. Inter. Crowned Sparrow.

September 18.
55. Pigeon Hawk.

September 21.
56. Dusky Horned Lark.
September 24.
57. MacFarlane's Screech Owl.
October 1.
58. Ruby-crowned Kinglet.
October 4.
59. Black-headed Jay.
October 15.
60. Western Golden-crowned Kinglet.
November 18.
61. Northern Shrike.
November 24.
62. Redpoll.
February 16, 1900.
63. Green-winged Teal.

REV. W. L. DAWSON, *Ahtanum, Wash.*

MOLTING OF TROCHILUS COLUBRIS.

The molt as evidenced in a series of females of *colubris* offers quite a field for investigation. I have before me twenty examples of *Trochilus colubris*. It has been claimed that no molt is to be observed while the birds are here on their brief summer sojourn with us, but this is only correct in a measure, for certain it is that certain specimens taken in early spring differ widely from those taken later on and into the fall. The change is easily accounted for to an extent, when we remember that these birds perhaps reared their offspring, and in sitting upon their frail structures, protecting their young and their frail homes from the summer storms, very naturally, they more than ordinarily exposed their delicate plumage to wear. But however this may be viewed and giving it its full weight, there is something more than a change, due to these conditions, noticeable in some of the lingering specimens that are taken in the late fall, and attention of working ornithologists should be drawn to it. In this I hope that we may soon have some happy results. The study of the plumage of the juveniles is also interesting, the various stages of it, from the young fellow who is just discovering what his wings are intended for to the final stage of the ruby-throated gallant who flirts around in the sunshine amid the flowers, twittering and whirring his tiny pinions in the balmy air. The extremely young nestlings are no less interesting.

There is not much investigation done along these lines and only a certain class of scientific ornithologists take enough

interest to investigate. But to know a bird well it is necessary to know all about it and the study cannot commence too early in its life history.

The formation of the rubythroat patch commences first in a grayish patch of black or brownish spotted feathers ; these are margined with grayish, which gives the "grayish" aspect or cast to the patch. Then a brilliant patch of ruby will break out on this other patch and finally devour it, as it were, in a brilliant gorget of iridescent fire. The young male does not look unlike the adult female when seen at a short distance. The throat-patch of the male is dead black, when the bird is placed upon its back and a direct downward view taken, while if the bird be laid upon its side, the beauty of the layers of loveliness and sunshine are seen in the bright rufous red or garnet of the throat when the sun strikes it transversely.

Another interesting item is the great variation to be noted in the size of the bills. In the series I am examining there is a very noticeable variation. But to turn back to the question of molt. There is a field for close study, not only in the matter of *colubris* but in all birds, and the tenor of this article is to call attention to rather than point out the importance and the value of such an investigation ; also to seek aid and to request others to help me advance this line of bird study, by contributing notes upon it to our BULLETIN.

JOHN W. DANIELS. JR., *Lynchburg, Va.*,

ANOTHER NEW BIRD FOR LORAIN COUNTY, OHIO.

It gives me pleasure to record two occurrences of the Short-billed Marsh Wren in Lorain County, Ohio. The first was seen by Mr. R. L. Baird in a low place just outside of Oberlin south, the other by the writer one mile west of North Amherst, on the north side of the south lake ridge. Both were singing lustily and were closely approached, but were not captured, our familiarity with the species in other places making that unnecessary. Mr. Baird's record is May 12 and mine May 19.

It is interesting to note, in this connection, that Carolina Wren, which was first seen in the county on September 6,

1899, at Chance Creek, spent two weeks or more in Oberlin village during the latter part of April. Its song was one of the conspicuous ones in the morning chorus during its stay. None have yet been heard at Chance Creek, but I have no doubt that they are nesting there.

LYNDS JONES, *Oberlin, Ohio.*

A CORRECTION.

I learn that it will be necessary to name a substitute for the Alder Flycatcher of the horizon lists of Milton Township, DuPage County, Illinois, published in No. 28 of this BULLETIN.

Instead of the Alder Flycatcher (*Empidonax traillii alnorum*), it should be Traill's Flycatcher (*Empidonax traillii*).

The nest and four eggs mentioned in the remarks of June 29th were afterwards taken, together with one of the birds, the male, by the writer. The skin was forwarded later to Mr. Walter Deane of Cambridge, Mass., by whose courtesy it was placed in the hands of Mr. William Brewster for comparison. Concerning this Flycatcher, Mr. Deane has written me under date of April 9th, as follows: "Your bird is *E. traillii*. The characters that separate *alnorum* from *traillii*, 'upper parts richer and more olivaceous, the wing bands yellower and bill decidedly smaller', are not borne out in your specimen. Typical *traillii* from further west has a larger bill than your bird, while the bill of your bird is decidedly larger than *alnorum*." Ever since the original naming of *alnorum* by Mr. Brewster, the writer has entertained the idea, erroneous as it seems, that the birds found here during the nesting season were of this eastern form, and it is with pleasure that the present opportunity is now offered for setting matters right.

The foregoing facts also are of interest in showing that this section of Illinois comes some where upon the dividing ridge, or over lapping line, between several eastern and western forms. Interesting examples of these are our House Wrens and Water Thrushes, which prove at times quite puzzling in their proper disposition.

BENJ. T. GAULT, *Glen Ellyn, Illinois.*

ALL DAY WITH THE BIRDS.

The first attempt to determine how many species of birds could be found in a single day in Lorain County, Ohio, was made on May 17, 1898, by Mr. W. L. Dawson and the writer, which resulted in a record of 102 species. May 8, 1899, witnessed the experiment repeated, but on that day Mr. Dawson could not continue the work after 8 A. M. The day's record was 112. There have been two days devoted to this object during 1900; the first on May 5, by Mr. R. L. Baird and the writer, the second on May 19, by the writer alone. The May 5 record is 93, the May 19 record is exactly 100. The smallness of these two records is largely accounted for by the state of the weather. May 5 opened with a temperature of 30° and heavy frost, with a brisk north-east wind blowing; consequently there was not much movement among the birds. The 19th opened at a temperature of 50° with a strong north-east wind and fine penetrating rain for the whole morning, driving the birds to the dense underbrush where the foliage and the dark morning conspired to effectually hide them from view. The early morning work was disappointing in the extreme. The reader will remember that the 1898 and 1899 records were made under some difficulties, especially in the way of wet roads which made the use of wheels impracticable, but on neither occasion was the temperature low, nor was there any appreciable wind. There is probably little likelihood of being able to take advantage of an ideal day for this work, if indeed there should ever be one. However, if the first half of May could be spent entirely with the birds it is more than likely that a more favorable time would be found than any yet taken advantage of. But that is a dream for which there is no likely fulfilment.

A comparison of the species seen on these four occasions proves not a little interesting, especially so as the range of time covers no less than fourteen days in May. If it were possible to give an accurate summary of the weather for the first two weeks or more of May for these three years, this comparison would throw some light upon the influence of the weather upon the several species of late migrents, but that is

Blackburnian Warbler. *Dendroica blackburniæ.* 662.

We might reasonably expect this rather large Warbler to favor us with a robust song. On the contrary, he seems unable to produce more than a shrill, thin song, which runs up the scale to end in a high *z*. I can recall it by the syllables *tsze tsze tsze, te ze ze z-z*. Mr. Minot detects some difference between the spring and summer songs. The summer song is a repetition of the syllables *wee-see*, with the accent on the second; while the spring song is more ambitious: *wee-see, wee-see, tsee-tsee, tsee, tsee, tsee-tsee, tsee, tsee*, ending shrill and fine. While the song differs in execution from the Yellow Warbler it yet retains somewhat of that character, and should form the beginning of the transition to the Chippy type.

Blackburnian is not a persistent singer, and may sometimes pass northward in almost silence. He has not been heard singing during the return journey.

This promethean presence gleams from the upper foliage of trees, but delights in the shade trees of parks and lawns fully as much as the wood-land, usually shunning the deeper woods. His is a familiar presence on the Oberlin campus during the early days of May.

Eastern North America, west to eastern Kansas and Manitoba, breeding from the northern United States northward to Labrador.

a separate topic. The list of species seen on each of the four occasions is of sufficient interest to be given here:

SPECIES COMMON TO ALL THREE YEARS.

Am. Herring Gull.
Common Tern.
Virginia Rail.
Spotted Sandpiper.
Killdeer.
Bob-white.
Mourning Dove.
Red-shouldered Hawk.
Sparrow Hawk.
Belted Kingfisher.
Hairy Woodpecker.
Downy Woodpecker.
Red-headed Woodpecker.
Flicker.
Chimney Swift.
Kingbird.
Crested Flycatcher.
Phœbe.
Prairie Horned Lark.
Blue Jay.
American Crow.
Bobolink.
Cowbird.
Red-winged Blackbird.
Meadowlark.
Orchard Oriole.
Baltimore Oriole.
Bronzed Grackle.
American Goldfinch.
Vesper Sparrow.
Grasshopper Sparrow.
White-crowned Sparrow.
White-throated Sparrow.
Chipping Sparrow.
Field Sparrow.
Song Sparrow.
Towhee.
Cardinal.
Indigo Bunting.
Scarlet Tanager.
Purple Martin.
Cliff Swallow.
Barn Swallow.
Bank Swallow.
Rough-winged Swallow.
Red-eyed Vireo.
Warbling Vireo.
Blue-winged Warbler.
Nashville Warbler.
Tennessee Warbler.
Yellow Warbler.
Black-throated Blue Warbler.
Magnolia Warbler.
Cerulean Warbler.
Oven-bird.
Water-Thrush.
Louisiana Water-Thrush.
Maryland Yellow-throat.
American Redstart.
Catbird.
Brown Thrasher.
House Wren.
Long-billed Marsh Wren.
White-breasted Nuthatch.
Tufted Titmouse.
Chickadee.
Blue-gray Gnatcatcher.
Wood Thrush.
American Robin.
Bluebird.

70(+21+17).

Besides these 70 species seen on each of the four occasions there is a list of 17 species seen on three of the four, and a further list of 21 species which are sufficiently common to make their being seem practically certain under favorable conditions of weather and work. It is evident, therefore, that the county boasts a list of no less than 108 species which one could confidently expect to see during favorable weather in the early part of May. The possibilities which lie within the Warblers are 8 and all other species 16, not including species which may fairly be called rare or casual, and it does not make any provision for the accidents which make the bird student's work so fascinating. The writer does not intend to be boastful for the region in which he finds himself placed. On the contrary this record of what may be found in Lorain County, Ohio, is given in the hope that others in other places may be encouraged to make a similar study of the birds of their region so that instructive comparisons may be possible. The promise of interest and profit which such a study affords is great, and for an inspiration to him who is looking for new things nothing could surpass it.

LYNDS JONES, *Oberlin, Ohio.*

GENERAL NOTES.

THE OLD SQUAW DUCK.—To the average amateur ornithologist the wild-fowl do not seem to present the interest that the smaller birds possess, and the explanation seems to be that they are hard to study on account of the difficulty of near approach and the nature of their habitat. But to some they are far more interesting, especially so if the student has inherited a love for hunting. The bulk of the migrating wild-fowl pass this section in March and April, but one must watch the open waters in February if he would study that most erratic visitor, the Old Squaw. Wheaton gives the Old Squaw the name of being rare in the interior and it is rather uncommon here except in very severe winters, when it occurs frequently. When the ice locks up their food in Lake Erie they are apt to be found in unusual locations. On the 20th of February, 1899,

I saw a male of this species on a small pond almost in the business part of the city and a few days later one lit in my neighbor's yard seemingly almost exhausted but possessing enough vitality to fly away when alarmed. Most authorities agree that the Old Squaw is unedible when killed on the great lakes, but here they vary their diet with worms and are far better eating than Scaup or Golden-eye. I have found the common angleworm and a large green worm resembling a cut-worm in their throats. The specimens seen here are mostly males. I have one specimen taken the 14th day of April, 1898, in full breeding plumage. The white on the anterior portion changes to black and the scapulars from white to black with brown edgings to the feathers. They are very unsuspicious when approached. I have seen them here as late as May in winter plumage, and this spring succeeded in getting a picture of one flying. Why some should retain winter plumage two weeks later than the time others are in full breeding plumage puzzles me and I would welcome any explanation.

WM. B. HAYNES, *Akron, Ohio.*

MIGRATION NOTES FROM DURHAM, N. H.—The Warblers are now here in great numbers. The mass of them came the 11th inst. On that day Blackburnians, Magnolias, Redstarts, Ovenbirds and Parulas were abundant, yet none of them appeared before the 10th, so far as I know. Palm Warblers are still common as are also Myrtles. A single Wilson's—a bird I have seen but little of—appeared on the 13th, and on the morning of the same day I heard for the first time the song of the White-crowned Sparrow. There were three males about, and between them they kept up a song nearly all the morning. The song was oftenest delivered from a tree, though it came freely from a bird on a wood pile. It reminded me of the White-throated Sparrow in its beginning, and of the Vesper Sparrow in its ending. The first two notes were clear, whistled tones, D sharp and G sharp, delivered precisely like the Chickadee's "*pe-ave*"; these were followed by three quick notes somewhere between the first two, but just where I could not determine, and these by a cadence very like that of the Vesper Sparrow. The order of the two opening notes was sometimes reversed but generally D sharp came

first, then the lower note, G sharp, came after. The volume was light, and the song seemed feeble, considering the size of the singer. During the past winter, I have seen a greater number of winter visitors than ever before. Red Crossbills and Siskins were abundant during the fall, while Redpolls, Pine Grosbeaks and White-winged Crossbills were common during the winter. To these I must add, for this immediate vicinity, a flock of ten Cedarbirds which wintered here and still remain, feeding on juniper berries, which are plentiful.

NED DEARBORN, *Durham, N. H.*

EDITORIAL.

We are pleased to notice that *The Maine Sportsman* is awakening interest in bird protection among its readers by vigorous editorials upon that subject. As a magazine in the interest of Maine sportsmen, or any sportsmen who desire genuine sport, it is invaluable. Its high standard of excellence is constantly maintained.

In another place there is a call for notes on migration which it is very important that every reader of this paper should heed and comply with. The time covered by this call has never been carefully worked over for any considerable space of country, but it is the time above all others which is worthy of careful attention. Address all letters to Oberlin, Ohio, as heretofore.

It has been necessary to cut this issue down to twenty-four pages instead of twenty-eight, as first planned, due largely to the increse in the number of pages of the two preceding numbers—30 and 31. The time which would normally have been given to the solicitation of copy was largely demanded by the increase of work which fell to the editor's lot on account of sickness in the teaching force of his department.

Bird-Lore continues to sustain its high standard, under the editorship of Mr. Frank M. Chapman, as a magazine which not only champions the cause of the birds from a logical and proper view point, but also continues to encourage the use of the camera in the study of the birds by concretely illustrating

what the camera can accomplish. Every effort of the magazine is bent toward educating its readers into a proper appreciation of the birds.

The editor expects to spend July and August in the mountains of central Washington with Rev. W. L. Dawson, in search of rest, recreation and birds. He hopes that many of the mountain birds will condescend to have their pictures taken so that others may share in the pleasures of the outing. During this absence the business of the BULLETIN will be taken care of by Mrs. Editor, from Oberlin as heretofore. All communications will receive prompt attention.

The two preceding "Special" BULLETINS have crowded out the department of Publications Received, causing a considerable accumulation which it has seemed worth while to give fully in this number. Attention is especially called to Mr. Frank M. Chapman's *Bird Studies with a Camera* as a book which should be in the hands of every one who essays to photograph birds. The book is a picture gallery of birds as they are seen in the full enjoyment of life and liberty.

We are in receipt of the speech of Hon. John F. Lacey of Iowa, in the House of Representatives upon the bill to "prohibit the transportation by interstate commerce of game killed in violation of local laws, and for other purposes." The bill applies to all birds as well as to game. This speech is a masterly defence of the birds from the standpoint of a statesman who knows what he is talking about. Surely the signs are multiplying which indicate a widespread and wholesome interest in bird life. Let the good work go on to the saving of our best friends while yet there is time.

The magazine *Birds* which was the first magazine to introduce the process of color photography into nature study publications, later changing its name to *Birds and All Nature* when other subjects than birds were introduced, now changes its name to more appropriately designate its contents to *Nature and Art*. This does not involve a change of plan in the make-up of the magazine, but we notice that the range of subjects is somewhat broadened and the publishers have secured the services of a number of men as contributors who are well

informed upon the subjects of which they write, rather than trusting to scattered contributions from all sources. This magazine fills a distinct want in the popular literature of the times, and is doing a good work in the education of the people to the proper appreciation of "All Nature."

A most encouraging sign of the deep interest that is being manifested in birds by all classes of people is the demand for courses of Ornithology in colleges and universities. There are at hand circulars announcing a summer school of Ornithology at Princeton, New Jersuy, to be conducted by Mr. W. E. D. Scott, Curator of the Department of Ornithology in Princeton University; and "Bird Study at Wood's Holl Marine Biological Laboratory," under the direction of Dr. Thomas H. Montgomery, Jr., assisted by Drs. Whitman and Herrick and Messrs. Stone, Dearborn and Chapman. These courses will not be such as to require the sacrifice of life of any bird but will be directed toward the study of the living bird in its natural environment in the enjoyment of full liberty. We rejoice in the movement for supplying a real want on the part of these great universities.

It has been impossible to fulfil the promise made last November to issue the BULLETINS for 1900 on time. The editor has fretted over this at least as much as anyone, but he has been powerless to avoid it. But he feels a certain satisfaction in at last seeing in print the results of years of earnest work. The compilation of these reports was completed more than a month before they were due to appear, but from their nature the proof was slow in passing thru our hands. In spite of the most careful scrutiny there must be some typographical errors or some omissions which nothing but an errata page can reach. Accompanying this number will be found slips to be inserted in No. 30 on the pages indicated in the index. We confidently expect (that is, as confidently as our broken promises will permit) that the October number will be mailed in October. At this distance it begins to appear that the title of the October number will have to be changed on account of a lack of material out of which to make a report on Migration, but we can promise something worth reading at any rate.

WANTED.

The editor desires migration notes from every reader of this notice, for the first five days of May, for as many years as possible, but particularly for 1900. These notes should cover records of first seen, of the species that become common, of those last seen during the five days. It is not necessary that these notes should cover several years, nor that they should include a large number of species, to be of value, but only that they should reach the editor not later than the first of September. A consciously fragmentary record will be just as welcome as any. Please give this matter your immediate attention.

LYNDS JONES, *Oberlin, Ohio.*

PUBLICATIONS RECEIVED.

In numbers 1200 and 1201 of the Proceedings of the U. S. National Museum, Vol. XXII, Dr. Charles W. Richmond describes the new species *Dendrornis striatigularis*, from Alta Mira, Mexico; and *Æthopyga anomala*, *Criniger sordidus*, *Turdinulus granti*, all from Lower Siam, collected by Dr. W. L. Abbott in the province of Trong.—L. J.

Catalogue of a Collection of Birds from Madagascar. By Harry C. Oberholser. From the Proceedings of the U. S. National Museum, Vol. XXII, pages 235-248. (No. 1197).

The 110 specimens of which this paper treats are referable to fifty-seven species and thirty-two families. The rare species *Lophotibis cristata* and *Ardeola xanthopoda* are most worthy of attention. The annotations are chiefly on plumage and color pattern.

The systematic arrangement of the paper is like that of Notes on Birds Collected by Doctor W. L. Abbott in Central Asia.—L. J.

California Water Birds. No. IV. Vicinity of Monterey in Autumn by Leverett M. Loomis. With one plate.

The first part of this paper is devoted to a daily calendar of the migrations of the water birds from September 18 to

November 14, 1896, thus bridging the gap between the summer and winter observations previously made. Following this calendar the author proceeds to discuss the general subject of migration as illustrated by the movements studied, and to draw a conclusion: "It is held that bird migration is a habit evolved by education and inheritance which owe their origin and perpetuation to winter with its failure of food." The last six of the forty-five pages are devoted to an annotated list of the forty-two species observed during this series of studies. The paper is printed in large clear type on good paper, and the typography is above reproach.—L. J.

Our Common Birds. By C. F. Hodge, Ph. D.

This is number 2, of the Biology Series of Nature Study Leaflets issued from Clark University. It consists of thirty-five pages and thirteen illustrations. The subject matter of this leaflet is another of the earnest pleas for the preservation of our native birds through the medium of education. The suggestions for introducing the subject of bird study into the school room as well as the out door studies, are admirable. The birds are estimated at their true value, while sentimental exaggeration is absent. The pages are plentifully sprinkled with apt quotations of prose and verse, and frequent direct references to careful investigations by experts, and foot notes add value to the paper. It is a leaflet which teaches of Nature Study in schools would find useful. Prof. C. F. Hodge, Worcester, Mass., is prepared to supply copies at five cents each. —L. J.

Notes on Birds Collected by Doctor W. L. Abbott in Central Asia. By Harry C. Oberholser. From the Proceedings of the U. S. National Museum, Vol. XXII, pages 205-228. (No. 1195).

This collection of 142 specimens, representing sixty-two species and twenty-three families, was collected by Dr. Abbott in Cashmere and Ladak in 1895 and 1897. The annotations give the altitude range of most of the species, with some notes on plumage and habits. We notice that the systematic arrangement departs from that adopted by the American Ornithologist's Union committee, following instead the British system, which appears to us the more logical.—L. J.

Notes on Some Birds from Santa Barbara Islands, California. By Harry C. Oberholser. From the Proceedings of the U. S. National Museum, Vol, XXII, pages 229-234. (No. 1196).

This is an annotated list of a collection of birds made by Mr. Clark P. Streator, under the auspices of the Bological Survey of the Department of Agriculture, from April 9 to July 20, 1892. The list comprises twenty-seven species. The annotations have chiefly to do with range and plumage.—L. J.

Birds in Horticulture. By Wm. E. Praeger.

We have seldom seen twelve printed pages so full of sound logic and indisputable fact, and so full of suggestions that can readily be acted upon, as this one. The author clearly shows, first the damage done by insects to crops in the state of Illinois; second, how much of insect food the birds destroy during the year, and finally estimates how much value in grains, fruits and garden vegetables would be saved if the bird population could be increased by one per cent. The latter part of the paper is naturally devoted to answering the question How can we bring about this increase of one per cent. He would encourage the growth of wild fruits upon which the birds are wont to feed, instead of cutting it down as so much rubbish. Mulberry trees are possibilities in every yard, and furnish the birds with a royal banquet just at the time when cherries and blackberries ripen. The encouragement of wild fruits serves a twofold purpose; furnishing the birds with an easily procured food supply and so lessening their appropriations from the orchards and gardens. He does not deny that birds may sometimes do damage, but makes it plain that these few depredations can readily be prevented by the use of scarecrows and other harmless devices. We heartily commend the paper to our readers.—L. J.

Half Hours with the Birds. By Christopher Greaves.

This little twenty-seven page pamphlet treats of "The Cardinal at Home," "The Blue Jay as He Is," "The Shrike or Butcherbird," "A Chat on Birds' Eggs," "A Remedy for the Sparrow Plague," "The Orioles." These topics are treated in a popular chatty manner, with a hint or more about the colors and songs and food habits of the birds, with some touches of life history. It seems to us unfortunate that the

author has confused the Northern Shrike with the smaller summer form. The Northern being the winter bird and the Loggerhead (or Migrant?) the summer form. It is no less unfortunate that he seems to favor the egg collecting mania which attacks every boy; better to discourage such practices. But in his discussion of the Orioles the author has turned to the other extreme by not a little overdrawing the picture for the the average case when the male of a pair has been killed. We turn eagerly to the "Remedy for the Sparrow Plague" in the hope of at last solving the problem of the Sparrow. The author is undoubtedly right in his statement that the only sure remedy is to find some bird which will prey upon the Sparrow, but the difficulty will be to find one that is sufficiently numerous to make any impression. The author thinks that the "Great Northern Shrike" is the bird. The first difficulty with the selection of this bird is that he already has the name of being an indiscriminate butcher. Education may eliminate this difficulty. The second and more serious difficulty is the small numbers of the Shrikes as a group and the fact that they do not, and probably can never be induced to build in cities nor sufficienty near to them to be of any use there. But we can encourage the increase of all small birds of prey and to cease prosecute them in the hope that they will in time become bold enough to prey upon the Sparrows wherever they may be found. The pamphlet is neatly gotten up, printed on good paper and the typography is almost faultless. A half tone of the author as a frontispiece adds to the interest of the paper. —L. J.

*Chapman's Bird Studies With a Camera.**

It is seldom that a book has been so opportunely placed before the public. The study of birds with a camera is the youngest child of Ornithology, but already it gives abundant promise of a development which can accomplish nothing less than a complete revolution of a world-wild attitude toward the birds. The author of this little book has spared neither time

*Bird Studies | With a Camera | with introductory chapters | on the outfit and methods | of the bird photographer | By Frank M. Chapman | Assistant Curator of Vertebrate Zoology in the American Museum of Natural History, and author of Handbook of the Birds of Eastern North America, Bird-Life, etc. | with over one hundred photographs from nature by the author. | New York. | D. Appleton and Company, | 1900. | $1.75.

nor study to the development of this new method of bird studies, and is therefore able to anticipate the needs of bird students who would use the camera if they but knew how to begin.

After an introduction in which bird photography is described as "the use of the camera as an aid in depicting the life histories of birds," some unanswerable arguments upon "the scientific value of bird photography," and "the charm of bird photography" contrasted with the sportsman's apparent pleasure in killing the birds, the author gives a careful and clear statement of what the bird photographer's outfit should consist of and the methods he should employ to attain the greatest degree of success. "The camera—The lens—The shutter—The tripod—Plates—Blinds—Sundries," are all discussed from the standpoint of one who has had large experience not as a professional photographer but as a bird photographer. The discussion of methods covers "Haunts—Seasons—Nests and eggs—Young birds—Adult birds," from large experience with the camera.

After discussing the outfit and methods, the author proceeds to illustrate concretely in ten chapters what can be accomplished in bird studies in all sorts of situations and under all sorts of circumstances. The 110 illustrations, frontispiece, tailpiece and twelve initial illustrations are all the work of the camera and are a picture gallery of more than usual interest not to say an education in phases of bird life.

The table of contents will better illustrate the wideness of the field covered in the text than could be done otherwise. "Bird photography begins at home, The Chickadee—a study in black and white, The Least Bittern and some other reed inhabitants, Two Herons, Where Swallows roost, Two days with the Terns, Perce and Bonaventure, The Magdalens, Bird Rock, Life on Pelican Island, with some speculations on the origin of bird migration." The 214 pages of text are full of information both photographic and ornithologic. The book should be in every library where it is desired to create interest in the birds among the children as well as among older persons. The book is written in Mr. Chapman's clear and pleasing style, the type is large and clear-cut, the paper heavy enamel upon which the illustrations show sharp details, and the typography is

almost perfect. The book is a distinct addition to ornithology and a much needed guide to the art of bird photography.—L. J.

Proceedings of the Nebraska Ornithologists' Union.

In the distribution of this collection of papers the Nebraska Ornithologists' Union has vindicated its right to exist. Its members are not content to stop with a complete list of the birds of their state, but are engaged in the study of habits and characteristics. Their object is to advance our knowledge of birds along all lines.

In the President's Address, "Ornithology in Nebraska," Prof. Lawrence Bruner makes a strong plea for the protection of the birds by the sure method of introducing bird studies into the public schools of the state. There follow four papers which partake of the nature of local lists with annotations. The first, "A Tweny-three Years' Record Kept by Dr. A. L. Child of Plattsmouth, Neb.," by Dr. R. H. Wolcott; "Additional Notes and Observation on the Birds of Northern Nebraska," by Rev. J. M. Bates; "The Bird Fauna of the Salt Basin, Near Lincoln," by Mr. J. S. Hunter; "Some Bird Notes from the Upper Elkhorn," by Mr. Merritt Cary. "Some Notes on the Nesting of the Raptores of Otoe County, Nebraska," by Mr. M. A. Carriker, Jr., treats of the ten species which are known to the author to breed in the state. "How to Popularize Ornithology," by Mr. Wilson Tout, is discussed from the standpoint of a teacher, urging the importance of education as a means of saving the birds from wanton destruction and of bringing before the people the debt we owe to the birds. In making "A Plea for the English Sparrow," Mr. Lawrence Skow, a native of Denmark, endeavors to show that the Sparrow has a distinct right to life and unlimited increase. Not many Americans will agree with Mr. Skow on this point. The last paper, "Suggestions as to an Accurate and Uniform Method of Recording Observations," by R. H. Wolcott, will be read with much interest by all field students of the birds. The author would give absolute values to the terms commonly used—abundant, common, etc.—thus securing absolute uniformity in observations from all field workers. It is a step in the right direction. Such a scheme, however, while a boon to the earnest bird student, would scarcely be

tolerated by the casual observer who wished to get the most enjoyment with the least effort from bird study. But we are not concerned about that class of people. It seems to us that a species cannot well be more than abundant, and that therefore the qualifying adjective "very" might well be omitted. Before any such scheme can be put into practical use it needs to be carefully tested by a series of field studies by two persons working side by side, the one counting the birds and tabulating the results according to this scheme, the other taking notes upon the general impression made by the numbers, but counting the individuals seen to be avoided. That is to say, the scheme should be, as far as possible, shorn of its arbitrariness by making it as natural as possible. The result would probably be that different values would be given to the large birds than to the small ones. Thus, five Bald Eagles to the mile would be abundant, while that number of Vesper Sparrows to the mile would be only common. Dr. Wolcott is to be highly commended for his efforts to bring about uniformity in the field work of ornithologists.—L. J.

American Monthly Microscopical Journal. Vol. XXI, Nos. 2, 4, 5.

Bird-Lore. Vol. II, Nos. 1, 2, 3.

Birds and All Nature. Vol. IV, No. 5; Vol. VII, Nos. 1, 2, 4, 5.

Bittern, The. Vol. I, No. 1.

Book Reviews. Vol. VII, No. 10; Vol. VIII, Nos. 1, 2, 3, 4, 5, 6.

Bulletin 109. Ohio Agricultural Experiment Station.

Bulletin 47–50. Pennsylvania State College Agricultural Experiment Station.

Bulletin of the Wisconsin Natural History Society. Vol. I (new series), Nos. 1, 2.

Condor, The. Vol. II, Nos. 1, 2, 3.

Cornell Nature Study Quarterly. Nos. 2, 3.

Entomological Student, The. Vol. I, No. 1.

Farm Student's Review. Vol. V, No. 1.

Fern Bulletin, The. Vol. VIII, Nos. 1, 2.

Hummer, The. Vol. I, Nos. 8, 9.

Journal of Applied Microscopy. Vol. III, Nos. 1, 2.

Journal of the Elisha Mitchell Scientific Society. 1890. 16th year. Part 2.

Journal of the Maine Ornithological Society, The. Vol. II, Nos. 1, 2.

Legislation for the Protection of Birds other than Game Birds. By T. S. Palmer. Bulletin No. 12, U. S. Department of Agriculture.

Maine Sportsman, The. Vol. VII, Nos. 76–82.

Museum, The. Vol. VI, Nos. 2–5.

Naturalist's Farm and Fancier's Review, The. Vol. II, Nos. 3, 4.

Nature and Art. Vol. VIII, No. 1.

North America Fauna. No. 17. Revision of American Voles of the genus *Microtus.* By Vernon Bailey.

Notes on Rhode Island Ornithology. Vol. I, No. 1.

Plant World, The. Vol. III, No. 5.

Seventeenth Annual Report of the Board of Trustees of the Public Museum of the City of Milwaukee.

Sportsman's Magazine. Vol. IV, Nos. 1–4.

Western Ornithologist, The. Vol. V, No. 1.

WITH THE BIRDS IN FOURTEEN STATES.

"How can I pass the time?" is the all-absorbing question to those who must travel far by rail or water. To such persons it must seem at least peculiar that anybody could deliberately plan a 7000 mile journey for the sole purpose of studying birds, partly, to be sure, on the ground, but partly also aboard train. It may be putting it a little strong to say that the sole purpose of this journey was bird study, but for the writer it came near that.

This Summer's work was largely a partnership work, hence the report of the results will be double-barreled. Rev. William Leon Dawson, the partner in question, makes his report under the caption "Wing Shots and Rests," which report pretty fully covers the partnership part of the work, while the writer supplies the horizons from both note-books for this part, and adds his own work done alone. Little more need be said in introduction further than the restatement that this piece of work is the natural outgrowth of the close intimacy which grew up between these two bird-lovers engaged in study at the same college. It is but fair to say that Mr. Dawson was the prime mover in the scheme, and his personal knowledge of the west from residence in Washington made it feasible.

It is needless to say that this idea of studying birds by rail is not new. Indeed, it is nearly a score of years old. The only new feature introduced is the keeping of horizons for certain places, or certain lengths of time aboard train or steamer, in the effort to more clearly illustrate what one might hope to find in retraversing this region.

In a rapid work of this kind there must be a considerable margin of error, yet we think this has been greatly cut down by eliminating every record about which there may seem to be a doubt. A sharp lookout, a quick eye and discrimination, born of long practice and familiarity with many species, where two are working together, leave little room for misidentifications where the bird is seen well. Yet there are probably errors.

For the sake of continuity it seems best to give space first to the report of Mr. Dawson, followed by the horizons in chronological order, accompanied by a few explanatory notes.

WING SHOTS AND RESTS.

On the evening of June 28, 1900, the editor and the writer boarded the west-bound Santa Fe train at Chicago. Our plan was to spend about ten days en route to Seattle, Wash., via Albuquerque, Pasadena and Portland, and to devote the remainder of the summer to the mountainous region of northern Washington.

In spite of the fact that we had the summer before us we were anxious to get to bed. But the gentleman who presides over the fortunes of the itinerant public couldn't get it thru his Ethiopian skull that we had to get up at five o'clock in the morning to look at the birds. There is nothing which will so pleasantly relieve the tedium of railway travel as the taking of a bird horizon. To be sure your fellow-passengers look askance at you as you suddenly thrust your head out of the window to get the last wing-flash of an unexpected friend or as you dash out of the car door to make the most of a station stop. They will think you odd if you hasten to the edge of a near-by swamp and listen, one ear strained for bird music and the other on the engine bell; but "what's the odds so long's you're 'appy?" You have only to recall that your passage is paid for, and that you are living in a larger world than is allowed to some.

There were no revelations and few notables until we reached the high prairies of eastern Colorado. By the time the Spanish Peaks were sighted the Lark Bunting and the Desert Horned Lark had become familiar. Not until we turned to skirt the Rockies did the distinctly "western" species appear. These in turn had become so familiar that we gave a shout of glad surprise when we heard Dickcissel at Shoemaker, N. M. He was holding forth bravely at this distant outpost of his tribe. One could not help admiring his taste. An encircling rock wall, with a convenient stream-cut exit, in case the sheriff were incontinently to appear at the entrance, shut in a little paradise of meadow, shrubbery and rest. Within Dickcissel held undisputed sway over a railroad water tank, a farm house and the green; while the Rock Wrens, clamorous but cheerful, manned the battlements.

From Las Vegas the chase became exciting. A Zone-

tailed Hawk was harrying a rabbit within forty yards of the passing train. At Ribera the Long-tailed Chats gave us a special matinee. Here was the place we ought to have stopped instead of at Thornton as we had planned. At Rowe, Arkansas Goldfinches were filling the air with their penetrating sweet notes.

THORNTON AND THE RIO GRANDE.

We found Thornton to be a desolate little "dobe" village about two miles from the Rio Grande. The country surrounding was very disappointing, inasmuch as it was almost entirely destitute of vegetation. However, we were in for it, so we packed up our knapsacks and struck out for the distant fringe of green. It, and especially the bleary eye of the river, seemed ever to recede across the barren sands. We came up with it long after sunset and simultaneously with a sandstorm.

Huddling on the sand, behind the clump of osiers on the river bank, we ate a very dusty "snack" and cherished grave misgivings for the night. But never was a serener sky than that which greeted us at the time of the first turn-over in bed.

The Rio Grande is a very insignificant stream at this time of year. We waded its ten rods or so of muddy water repeatedly, having a care for the quicksands and holes. The west bank was well wooded with a dwarf cottonwood, and it was here that we made our principal finds.

The early morning hours were busy ones. Old bird notes were refreshed in my mind and new ones disentangled. Prominent among these latter were those of the Western Blue Grosbeak. In seeing and hearing this bird one gets the impression of an Indigo Bunting on a larger scale. The song is, however, more varied as well as stronger.

The Long-tailed Chat is the great mimic here. Nuthatch, Oriole and Flicker notes were distinctly traced to his door. The imitations were remarkably close. One bird reproduced the "Klyak" note of the Flicker so perfectly as to quite deceive us for a while.

Arkansas Goldfinches were common. This species seems to emphasize the connection between Goldfinch and Siskin. A yellowish-white spot on their wings shows conspicuously in flying, an illumination something after the fashion of Siskin.

In their songs, too, they preserve a note which easily shows generic connection with *Spinus pinus*, "Kezeem," or "Kezum," of peculiar pathos and penetration.

FLAGSTAFF AND THE SAN FRANCISCO MOUNTAINS.

The next stop was made at this trim little town in the Arizona highlands. Of course the ornithologist's first desire upon getting into the average "new" town is to get out. We did so at once. As we set out from Flagstaff we had no intention of climbing San Francisco Peak, reported to be 12,561 ft. high; but as we journeyed toward it along the level pine-clad valley which lies at its feet, the desire grew upon us until it became a determination. A prospector whom we met toiling toward town with a couple of burros, kindly sold us a three-pint canteen, so that the water question was disposed of. Up that carpeted valley we crept, every faculty on the *qui vive* for birds, until we reached a picturesque little canon with solid, perpendicular walls, from the north side of which a tiny stream of water trickled. This empties into a trough which is evidently a great resort for the birds. On the way the Chestnut-backed Bluebird and Long-crested Jay had come to swell the life horizon. Here at the spring birds thronged continually. Cassin's Finches, Arkansas Goldfinches, Lark Sparrows, flycatchers, hummers, blackbirds, warblers—a vitascope, always in motion, ready to the eye, was the scene of this spring.

Time would fail to tell of the ascent, which was accomplished by noon of the next day. The panorama presented from the summit of San Francisco Peak is rather unique for its command of plain and desert and high plateau. Bird-wise, however, this mountain mass is not large enough to attract a great variety of strict mountaineers. Our mountain horizon includes only eight that one might not reasonably expect to find in comparatively level country.

Here we had an experience of Cassin's Kingbird which I shall not soon forget. This bird was really first noted at Thornton, where *verticalis* was also common. The resemblance was so close that *cassini* was suffered to pass as a possible young *verticalis*. Experience on the lower slope of San Francisco Mountains, however, dispelled this illusion. When

I heard the distant "Chebew," which is the distinctive note of this bird, I could not doubt that we had a new species. Investigation proved that a pair of these birds were solicitous for young, presumably well grown. Jones and I shot three times without success, and then squandered the best part of an hour chasing the provoking creatures from branch to stub and from stub to boulder, around in the open woods. Never was the range set at a certain tussock of grass but the bird made off with a mocking wail a pace or two before the goal was reached. Never was a snap shot attempted but the bird dodged behind a tree as the gun was coming up. "Chebew, chebew," and for aught I know those woods are still re-echoing that doleful, aggravating sound.

MELLEN AND THE COLORADO RIVER.

Arizona is certainly well named. Except for the pine section about the San Fra cisco Mountains all we saw was fearfully desolate. There was, however, a genuine fascination to be felt in the clear-cut mountain ranges of the west. For the most part absolutely bare, these intruders pierce the expanse of level plain like the dorsal fins of some titanic sea monster. Nature has not veiled her secrets here. He who runs, even by rail, may read. The ash piles in this her disheveled back yard look precisely as they might have looked when first dumped down. Jagged outlines are the rules rather than the exception in these volcanic ranges; and the culminating point is reached in the "Needles," near the Colorado River. Altho twelve miles distant from the Santa Fe bridge they seem but a step, so simple and so clear cut are they. Nothing but oil can do them justice, for half their charm lies in their marvellous coloring, which both in intensity and delicacy of shading almost surpasses belief.

Our last ornithological stop was made here at Mellen, by the Santa Fe bridge over the Rio Colorado. We found the Colorado a much more formidable stream than the Rio Grande. Its course is very changeable. Just now it is engaged in tearing down the east bank for the mile or so above the station, and the crash of great chunks of alluvium as they fell into the river's jaws was a constant feature of our stay. And

dirty! if anything it is a little dirtier than the Missouri—and that is enough said.

We had barely time to force our way through the dense willows of the lower or alluvium level, and emerge on the acacia flat above, before dark. It was time enough, however, to completely turn our heads with the prospect of birds. After a swim we lay down at the edge of the third, or desert, level; but not, as it proved, to sleep. The moon was too high and the air was too hot and the mosquitoes were too numerous. Finally we retired further into the desert and there, wrapped in the soft mantle of the sky, we slept.

From 4:00 A. M. until 8:00 it was "birds," and from then till 7:00 P. M., when we boarded the tardy west-bound train it was *heat*. The place certainly abounded in birds, but the heat, after eight o'clock, put an effective quietus on man and bird. The day's work was done.

The willow flats were the haunts of such birds as the Yellow Warbler, Bullock's Oriole, Traill's Flycatcher, and the Long-tailed Chat; while the characteristic birds of the acacia level were the Gambel's Partridge and the Verdin. The Partridge is easily the most abundant of all birds in this region. Altho very secretive (we were not able to secure a specimen) they piped from every bush and scurried from every brush heap.

The Verdins are not by nature obtrusive, but some idea of their numbers can be gathered from the fact that nearly every other clump of acacia contained a nest. These nests are balls of twigs clustered, without attempt at concealment, about some lower limb, at a height of from four to eight feet. The structure is quite compact, entered through a hole in the side, and always warmly and softly lined. Altho a dozen or so were examined none were found occupied at this time (July 5th.)

Truth to tell we did not do much bird study here. We shot at sight and identified hastily, and then succumbed to the heat. Never had we seen the like before. After lolling under the willows of the river bottom and voting them insufferably hot, we sought the shelter afforded by the railroad water-tank, and where the temperature was just appreciably mitigated by the dripping waters. The air was literally a blast from a fur-

nace, for a strong wind blew off the Needles, which looked in the offing like glowing coals. This wind, together with the dripping water, produced a curious effect on the rousing consciousness. Several times did I start up from a doze, possessed with the idea that I was in a burning building. The hot air was realistic enough, and the dripping of the water on the pebbles beneath did duty for crackling flames.

In spite of the almost intolerable heat we shall hold Mellen in grateful remembrance as being the place where the "life horizons" grew at the most rapid pace we had ever known. An introduction to thirteen new species inside of six hours is granted only to the tyro, who doesn't know how to count his mercies, or to the traveler in foreign ports. To my mind there is nothing else in ornithological experience quite equal to the joy of making new acquaintances in a new field. The fresh possibilities of note and action possess an irresistible fascination for an "old hand."

After leaving Mellen our editor took a side trip in Southern California, of which a separate account appears in this number; while I proceeded to Blaine, in Washington, where I fitted out for the mountains. Mr. Jones rejoined me at Everett, ten days later, and we headed toward the Chelan country via Wenatchee and the Columbia River route.

If bird-gazing from a railroad train be an absorbing pastime, birding from the deck of a river steamboat is the very embodiment of luxury. A Columbia River steamboat is a thing *sui generis*, a creature of tough sinews and stubborn will. Our attention on the trip up the river was about equally divided between the droves of magpies which swarm on the rugged sides of the canon and the plucky steamer as she steadily fought her way up the rapids.

The trip up Lake Chelan was less exciting as an athletic feat, but the scenery disclosed as you ascend is second to none in America. Birds were for the moment forgotten as we gazed upon those stupendous piles of granite and porphyry amongst which we were to spend a month. Upon landing at the head of the lake we lost no time in putting the Stehekin River between us and the last vestige of civilization, a trim little mountain hotel called "Field's." Then we surrendered to nature and her vocal interpreters.

An incident of the ascent up Pershall Creek toward Wright's Peak was the discovery of a Calaveras Warbler's nest containing three fresh eggs. The nest was a bulky affair, composed of coarse grasses, with a lining of finer grass; and it was placed three feet high in the top of an elkweed or "devil's club," in the brushy tangle of a draw.

Strange voices filled the air as we made the first reaches of the mountain proper. The Western Winter Wren poured forth his tiny cataract of song. Cassin's Finches trilled or hummed tunes softly to themselves. The Mountain Creeper peeped lustily as if to shame my complete oversight on a previous trip; while that rarest sound, the ravishing sweet call of the Dwarf Hermit Thrush, penetrated the woods like an angel voice which haunts the groves of Paradise. If birds of a feather may flock together, count me always among those who babble through the woods or wing at will over the glaciers and awful heights of Wright's Peak.

Our camp was pitched on a heather meadow just bursting into flower. Within a stone's throw I gathered a bouquet of thirty-three species, and I suppose the resources of the season were only half developed. Beside us was the glacier, and only the barren aiguilles rose above. Bird life at that height was fairly abundant. Leucostictes, Pine Siskins, Juncoes, Mountain Bluebirds, Grouse and Ptarmigan were the characteristic species. Of the last named species we found one bird moulting and unable to fly. He had been hiding in the rocks of the main ridge. We came, I suppose, as near as any one has to finding a Leucosticte's nest. We were accomplishing the ascent of the peak proper by a new route, and were within 200 feet of the top when we came upon a bulky nest of grass placed on a ledge of rock, without attempt at concealment. It was on the exposed south slope, and doubtless for a purpose. The nest was in good condition, and the body cavity would tally with the requirements of a Leucosticte. The birds which hovered about did not betray any particular emotion at our inspection of the old nest, but they evidently called that vicinity home.

The panorama this year from Wright's Peak was all that heart could wish. Mounts Stuart, Rainier, and Baker, with Glacier Peak, were in the horizon, while Manchehorner and

the tentative "Mt. Oberlin" invited conquest in the near distance. Our hearts swelled in eager anticipation of the expected triumphs of the next few weeks. Alas! the golden chalice was to be dashed from the hand ere long. Returning the next day from the ascent of Splinter Peak we found the best part of our equipment in ashes. A deep-seated punk log had transmitted our smouldering camp fire and spread it in a devastating circle thru the peaty heather beds. Mr. Jones was the heavy loser. Specimens, photographic plates, notes, blankets, pocket book, return railroad ticket, gone—ugh! We had stood that day on one of nature's pinnacles. A slight misstep on the ridge of Splinter Peak, a pitching forward, would have been—no, *not instant* death. One could have leaped *either way* and not have struck short of 125 feet. But we were down now—way down!

Our losses compelled an instant relinquishment of the cherished plans. Dropping part way down the canon that evening we made the Field's the next day, where we secured supplies enough to enable us to undertake the journey, on foot, from Stehekin, via Cascade pass, to the Skagit River. On the Skagit we could count on finding other conveyance.

The return journey over the mountains was everywhere brightened by our study of the birds and, as may be noted elsewhere, some handsome horizons were taken. The scenic interest, however, so often overshadowed the ornithological that I fear the readers of THE BULLETIN will take me to task and remind me that I am supposed to be talking about birds. Still, if I succeed in dragging a bird or two in, I may perhaps be pardoned for speaking of the view from the divide. Leaving my knapsack beside the iron post which marks the summit of the Stehekin-Hamilton horse trail, I climbed up a neighboring spur, centrally located, for a commanding view. The mountains visible from this spot are certainly grander than anything visible from any American railroad; and I have been on them all so far as mountains are concerned. Eleven well defined glaciers were visible from this point; but they only held the flanks of the mountains; the unfettered, unconquerable peaks rose thousands of feet above. The incessant thunder of the avalanche was only fit praise for the majesty of these untamed monarchs. A mile or so down the trail on

the west side one gets the finest view of a mountain whose aspect and dimensions are simply terrific. A glacier clings midway, whose breaking members must topple over such a precipice as makes one shudder—and adore. One would hardly try, in thought, the awful peak. One is, somehow, content to recognize as part of the eternal fitness of things that *this* mountain should be considered unscalable.

Well, didn't a fussy old Ptarmigan fly up into my face and interrupt all this! Good cause for alarm tho, I was near stepping on some of her chicks. Never did a mother conduct a more gallant retreat than she, as she shrieked her rage from a near-by rock, or dashed at my face in very act to consume me, while her fledglings of every size scuttled off thru the heather. I caught one of the youngest in my hand, whereupon the mother made such a furious onslaught that I was obliged to defend myself with my left. I did not hurt her, but I speedily let the youngest go for fear I should have to. Such spirit I never saw before. What if a hen were as big as a man!

This much is clear: That the female White-tailed Ptarmigan begins incubation as soon as the first egg is laid. I made out ten young and probably missed others. The largest was near a third grown, while the youngest had not broken shell above a day.

Here is a good place to rest. One cannot tell it all, even ornithologically. Of course we saw more birds; and, of course, we got back. Never mind that. Mr. Jones has gone on down the trail. Leave me here on my mountain.

WILLIAM LEON DAWSON.

Columbus, Ohio.

THE HORIZONS.

Our first horizon out of Chicago began at LaPlata, Missouri, at 5 o'clock in the morning and ended at noon, when we pulled into Kansas City. The slight change in topography and vegetation was accompanied by a very slight change in the

birds. Here we recorded Dickcissels, White-rumped Shrike and Western Yellow-throat as new for the year.

LaPlata to Kansas City, Mo., June 29th.

Green Heron.
Mourning Dove.
Turkey Vulture.
Red-shouldered Hawk.
Red-headed Woodpecker.
Flicker.
Yellow-billed Cuckoo.
Belted Kingfisher.
Chimney Swift.
Kingbird.
Blue Jay.
American Crow.
Bobolink.
Cowbird.
Meadowlark
Red-winged Blackbird.
Baltimore Oriole.
Bronzed Grackle.
Cardinal.
Towhee.
Indigo Bunting.
Dickcissel.
White-rumped Shrike.
Cliff Swallow.
Barn Swallow.
Bank Swallow.
Yellow Warbler.
Western Yellow-throat.
Catbird.
Brown Thrasher.
House Wren.
Robin.
Bluebird

Nightfall found us at Stafford, Kansas, with Swainson's Hawk and Western Meadowlark added to the year list and Burrowing Owl the first addition to my life list, marking the beginning of a new era in my bird study.

Kansas City to Stafford, Kan., June 29th.

Killdeer.
Bob-white.
Mourning Dove.
Turkey Vulture.
Swainson's Hawk
Burrowing Owl.
Belted Kingfisher.
Red-headed Woodpecker.
Flicker.
Nighthawk.
Chimney Swift.
Kingbird.
Blue Jay.
American Crow.
Prairie Horned Lark.
Cowbird.
Red-winged Blackbird.
Western Meadowlark.
Bronzed Grackle.
Cardinal.
Indigo Bunting.
Dickcissel.
Cliff Swallow.
Barn Swallow.
Yellow Warbler.
Yellow-breasted Chat.
Wood Thrush.
Robin.
Bluebird.

The second day out proved the banner day, so far as new species were concerned. Of the 38 species seen during the day

22 were new to my life list. Daylight found us in LaJunta, Colorado, and our horizon closed at 6 o'clock, just before the train left us at the miserable little adobe station—Thornton, New Mexico. The large number of new species on this horizon is accounted for by the entirely new topography. The plains have been lost in the distance, and now we are surrounded by the mountains. Of the new acquaintances Lark Bunting was both the most abundant and most interesting. One could not mistake the large white wing patch and the unique bat-like flight. The prairie dogs interested me greatly. Their lookout mounds which occupied railroad property, and many of them beyond the fence, were composed of cinders. Examination of several failed to reveal any hole within several feet of the mound, and the hole was not surmounted by the regulation funnel-shaped mound. Each mound seemed to be owned by a small group of the "Dogs," who would rush to it upon the approach of the train, and scurry away to their holes from fancied danger.

La Junta, Col., to Algodones, N. M., June 30.

Great Blue Heron.
Killdeer.
Mourning Dove.
Turkey Vulture.
Zone-tailed Hawk.
Swainson's Hawk.
Ferruginous Rough-leg.
Prairie Falcon.
Desert Sparrow Hawk.
Burrowing Owl
Lewis's Woodpecker.
Sennett's Nighthawk.
Kingbird
Arkansas Kingbird.
Cassin's Kingbird.
Say's Phoebe.
Desert Horned Lark.
American Magpie.
White-necked Raven
American Crow.
Red-winged Blackbird.
Western Meadowlark.
House Finch.
Arkansas Goldfinch.
Western Lark Sparrow.
Western Chipping Sparrow.
Abert's Towhee.
Dickcissel.
Lark Bunting.
Purple Martin
Cliff Swallow.
Barn Swallow
Violet-green Swallow.
Bank Swallow.
White-rumped Shrike.
Long-tailed Chat.
Rock Wren.
Western Robin.

Nothing more need be said of the Rio Grande horizon than that we stumbled upon the nest of a Long-tailed Chat

while beating our way through the willow tangles of the east bottom. One of the three fresh eggs was a Cowbird's.

Rio Grande River, Thornton, N. M., June 30 to July 1.

Spotted Sandpiper.
Killdeer.
Mourning Dove.
Desert Sparrow Hawk.
Burrowing Owl
California Cuckoo.
Broad-tailed Hummingbird.
Arkansas Kingbird.
Cassin's Kingbird.
Western Wood Pewee.
American Crow.
Desert Horned Lark.
Cowbird.
Red-winged Blackbird.
Western Meadowlark.
Arkansas Goldfinch.
House Finch.
Cassin's Purple Finch.
Western Lark Sparrow.
Black-headed Grosbeak.
Western Blue Grosbeak.
Barn Swallow.
Bank Swallow.
Yellow Warbler.
Long-tailed Chat.
Western Yellow-throat.
Mockingbird
Catbird

July 2nd, on board train.

The only notable species seen during the ride from Thornton to Flagstaff were American Raven and Roadrunner.

A brief comparison of our list of San Francisco Mountain birds with that of Dr. Merriam in North American Fauna, No. 3, pages 87-101, is interesting. It should be borne in mind that Dr. Merriam's work covered all of two months while we were covering the distance from Flagstaff to the summit of the highest peak in one whole day between two half days. We were therefore concerned with resident birds and breeders only. Our bird records were incidental to the mountain scaling. Of the 151 species recorded by Dr. Merriam, a little over 60 were possible for us in this limited time. We recorded but 35 of this number, but found two which do not appear on Dr. Merriam's list, Cowbird and Cassin's Purple Finch. About these two there can be no shade of doubt. Among the 32 unrecorded possibilities there are less than ten probabilities, so that we feel that the cream of the fauna was gathered even in this incidental way. In such vast reaches one needs far more time for study than we could possibly afford.

Flagstaff, Arizona, July 2, 3, 4. San Francisco Mountains.

Mourning Dove.
Turkey Vulture.
Western Red-tail.
Ferruginous Rough-leg.
Golden Eagle.
Desert Sparrow Hawk.
Western Horned Owl.
Burrowing Owl.
Cabanis's Woodpecker.
Red-shafted Flicker.
Western Nighthawk.
White-throated Swift.
Broad-tailed Hummingbird.
Cassin's Kingbird.
Western Wood Pewee.
Wright's Flycatcher.
Long-crested Jay.
White-necked Raven.
Clark's Nutcracker.
Cowbird.
Brewer's Blackbird.
Cassin's Purple Finch.
Arkansas Goldfinch.
Western Lark Sparrow.
Western Chipping Sparrow.
Red-backed Junco.
Louisiana Tanager.
Violet Green Swallow.
Plumbeous Vireo.
Audubon's Warbler.
Rocky Mountain Creeper.
Rock Wren.
Western House Wren.
Mountain Chickadee.
Pygmy Nuthatch.
Western Robin.
Chestnut-backed Bluebird.
Mountain Bluebird.

The Colorado River horizon, at Mellen, Arizona, was the last joint horizon of the outward trip. The chief interest attaching to this place was the tropical character of the fauna and flora—and the weather! We were grateful to a band of Sonoran Red-wings for worrying a Spotted Owl from his hiding place. Bendire's Thrasher spent the morning singing to us. Far in the distance there sounded a voice sympathising with Poor-Will as he lay upon his sand couch amid hungry mosquitoes. But the waning moon brought rest.

Colorado River, Mellen, Ariz., July 5.

Killdeer.
Gambel's Partridge.
Mourning Dove
Turkey Vulture.
Spotted Owl.
California Cuckoo
Texan Woodpecker.
Poor-will.
Western Nighthawk.
Arkansas Kingbird.
Ash-throated Flycatcher.
Traill's Flycatcher.
Cowbird.
Sonoran Red-wing.
Bullock's Oriole.
Yellow-headed Blackbird.
House Finch.
Desert Song Sparrow.
Western Blue Grosbeak.
Arizona Cardinal.
Cliff Swallow.
Rough-winged Swallow.
Cooper's Tanager.
Least Vireo.
Yellow Warbler.
Long-tailed Chat.
Western Gnatcatcher.
Verdin.
Bendire's Thrasher.
Western Robin.

Between Flagstaff and Mellen, on July 4, Pinon Jay and Scorched Horned Lark were added to our lists.

At about 2 o'clock on the morning of July 6th our ways parted for a time. Mine to visit relatives in Pasadena, California, Dawson's to be with his family in Blaine, Washington. It was an unfair advantage which the lone wanderer naturally had over the man of family ties, for Los Angeles county was richer in new species than any other region visited. It was to the writer a veritable bird paradise. But we must not be too hasty.

By morning twilight we were racing down the west side of the Coast Range away from the sun. As we looked out toward the Pacific it seemed to approach us far more rapidly than we were coasting down the mountain side. Yonder loomed Catalina, and over there the other rocky masses seemed to float over the rolling billows. Now I began to appreciate the perfect transparency of the air of this wonderful western region, for I knew that those islands must be many miles away. But — Presto! before I could gather myself together we plunged into a dense fog bank that was rolling up the mountain side. My islands were mountain peaks! There were no birds to be seen in this thick cloud, but as we descended and the cloud rose, the mistiness gave place to a heavy morning air, saturated, but clear below the cloud bank.

As we neared San Bernardino and passed through and beyond it, I was struck by the marked similarity of the appearance of the country to my old home country in central Iowa. I felt almost like a wanderer come home again. Soon, as we sped down and on, the apple orchards (?) gave place to apricots, prunes, lemons, oranges in regular procession. It was garden, desert, garden, desert, garden, the lines sharply drawn between them. My time was poorly divided between the birds and the country and fruit, but there were a few interesting bird records. The Mexican Horned Larks, California Woodpeckers, Turkey Vultures, Magpies and Mockingbirds, seemed to invite attention. A bevy of Valley Partridges scurried away from the flying train. I was wondering how much further away Pasadena might be when a chance glance from the window sent me scurrying for the door with bag and baggage. Eight year's in middle life makes little change in one's friends.

There is no need to sing the praises of Pasadena, for they have been sung already far more enticingly than I could hope to. It is a beautiful place whose growth in all ways can be checked only by the upheaval of another chain of mountains where the ocean bathers now battle with the surf. We do not anticipate such a calamity will befall soon!

While the object of my visit was to renew acquaintance with relatives and friends, which there is no need to dwell upon here, it would have been both ungrateful and impossible to ignore the bird life. The birds are one of the chief charms of this unusually favored city. Some of them thrust themselves upon your notice, while some entice your attention away.

During the eight full days spent in Los Angeles county visits were made to Mount Lowe, elevation 6100 feet, Long Beach and Terminal Island, Los Angeles with its numerous lakes and parks, Baldwin's Ranch and the surrounding mesas and arroyos and the mountain canons. A half day clambering over the tules of a small lake or large pond south of Pasadena, was fruitful in results. Here Coots, Pied-bill Grebes, Florida Gallinule, Black-crowned Night Herons, Bitterns, Tule Wrens and other species found their way into the note-book. The Black Phœbe was in evidence here. It was here also that the Phainopepla was best seen and studied, but many more were seen in the orange groves and about the pepper trees.

On the way to Long Beach a Roadrunner very kindly trotted out into the open, affording an excellent study. This was the only one seen by the writer during the whole trip. At the beach Western Gulls were seen flying about in the offing, but there were no other water birds. However, the surf bathing more than atoned for any lack of birds. I wonder if anywhere on our coast line there is better surf bathing. An hour playing with the huge rollers sped swiftly. I turned longing eyes upon Santa Catalina, but sufficient time could not be given to that trip. There was some consolation in knowing that the time of year was not the most propitious for the bird student over there.

Mount Lowe was by no means the least interesting incident of my short stay. It was here that the Black-throated Gray Warbler danced and sang to me by the half hour. He needed no invitation to perch and sing within three feet of my

nose. Around the summit White-throated Swifts made merry, their long pointed wings cutting the air into bewildering zigzags. But we cannot stop to tell all the secrets which the mountain gave up.

The reader will remember that Pasadena is the home of Mrs. Elizabeth and her son, Joseph Grinnell. The hour spent in that home with Mrs. Grinnell was the most entertaining and profitable of my stay in the city. The lawn and garden are strictly set apart for the birds, and they show their appreciation of this attention by coming in numbers to make their homes. The little book which mother and son have written, "Our Feathered Friends," is but the natural outgrowth of this appreciative friendship for the birds and a longing to guide the steps of the children into this same friendship instead of the usual carelessness of bird life. Would that more of our lawns and gardens were planned for the birds.

Pasadena will rest in memory as a bird paradise. Here no less than thirty-eight of the eighty-three species recorded were new to my life list, while twenty-eight species were seen here and nowhere else during the entire trip. But this is not all. Birds are everywhere in Pasadena. Mockingbirds greet you from every house-top at all times of day and night. Goldfinches, towhees and hummingbirds of several kinds are everywhere. Brewer's Blackbird adds tone by contrast to the tropical splendor all about. But I cannot begin to tell—you must go and see for yourself.

Los Angeles County, Cal., July 6 to 12:

Pied-billed Grebe.
Western Gull.
American Bittern.
Black-crowned Night Heron
Florida Gallinule.
American Coot.
Spotted Sandpiper.
Killdeer.
Plumed Partridge.
Valley Partridge.
Mourning Dove.
Turkey Vulture.
Bald Eagle.
Prairie Falcon.
Desert Sparrow Hawk.
Brewer's Blackbird.
Cassin's Purple Finch.
House Finch.
Willow Goldfinch.
Arkansas Goldfinch.
Western Lark Sparrow.
Western Chipping Sparrow.
Brewer's Sparrow.
Thurber's Junco.
Heerman's Song Sparrow.
Samuel's Song Sparrow.
Spurred Towhee.
Green-tailed Towhee.
Anthony's Towhee.
Western Martin

Road-runner.
California Cuckoo.
Belted Kingfisher.
Cabanis's Woodpecker.
Gairdner's Woodpecker.
California Woodpecker.
Red-shafted Flicker.
Texan Nighthawk.
White-throated Swift.
Black-chinned Hummingbird.
Anna's Hummingbird.
Rufous Hummingbird.
Calliope Hummingbird.
Arkansas Kingbird.
Ash-throated Flycatcher.
Black Phœbe.
Western Wood Pewee.
Western Flycatcher.
Traill's Flycatcher.
Mexican Horned Lark.
Blue-fronted Jay.
American Crow.
Red-winged Blackbird
Tricolored Blackbird.
Western Meadowlark.
Arizona Hooded Oriole.
Bullock's Oriole.
Violet Green Swallow.
Bank Swallow.
Phainopepla.
California Shrike.
Warbling Vireo.
Cassin's Vireo.
Hutton's Vireo.
Least Vireo.
Yellow Warbler.
Audubon's Warbler.
Black-throated Gray Warbler.
Western Yellow-throat.
Long-tailed Chat.
Mockingbird.
California Thrasher.
Pasadena Thrasher.
Rock Wren.
Dotted Canon Wren.
Western Winter Wren.
Tule Wren.
Mountain Chickadee.
California Bush-Tit.
Western Gnatcatcher.
Black-tailed Gnatcatcher.
Western Robin.
Western Bluebird.

The first twilight of July 14 found us well out upon the desert again spinning toward San Francisco. Nothing of special interest was seen until we reached Oakland. During the quarter hour wait on the pier a fine specimen of Pink-footed Shearwater paid me a visit. From concealment it was easy to make out the distinctive features, for the bird came within one hundred feet of the infallible Binoculars. While crossing the bay numerous California Murres forgot to dive until we were almost above them. Western Gulls were feeding and sporting over the bay.

Majave to San Francisco, Cal., July 14.

California Murre.
Western Gull.
Pink-footed Shearwater.
Great Blue Heron.
Lewis' Woodpecker.
Arkansas Kingbird.
Mexican Horned Lark.
American Raven.

Green Heron.
Mountain Partridge.
Mourning Dove.
Turkey Vulture.
Desert Sparrow Hawk.
Burrowing Owl.
American Crow.
Brewer's Blackbird.
Western Meadowlark.
House Finch.
California Shrike.
Cliff Swallow

July 15 and 16, aboard train, placed Ruddy Horned Lark and California Jay upon my life list, but otherwise they were uninteresting bird-wise. Perhaps it was on account of the mountain scenery that the birds were not more in evidence. Shasta was my first snow-clad peak. You who have seen the snow peaks need no description of mine. You, for whom that pleasure is an anticipation, could not understand my feelings if it were possible to describe them. The only proper thing to do, in the presence of that giant, seemed to be to get up there on his highest pinnacle.

Anderson, Cal., to Glendale, Ore., July 15; and Albany to Portland, Ore., July 16.

Mountain Partridge.
Mourning Dove.
Desert Sparrow Hawk
Belted Kingfisher.
California Woodpecker.
Arkansas Kingbird.
Ruddy Horned Lark.
California Jay.
American Raven.
American Crow.
Red-winged Blackbird.
Brewer's Blackbird.
Western Meadowlark.
Heeman's Song Sparrow.
Western Chipping Sparrow.
Western Martin.
Cliff Swallow.
Violet Green Swallow.

At Portland, Ore., on July 16, there was time between trains to climb the hill west of the city where Streaked Horned Lark, Gambel's Sparrow and Russet-backed Thrush were added to the list. It was on this height that the lifting clouds revealed the icy cap of St. Helens. It was not until the Columbia river was behind us that I even suspected the presence of other snow-clad peaks, because not until now did the clouds break away. I feel certain of being forgiven for the break in the bird record after Adams and Ranier joined St. Helens to form as matchless a company of snow-clads as anywhere graces a landscape. As we wound around now toward

them, now away they were always changing, revealing some hidden grandeur or beauty. It was a glorious interlude.

Portland, Ore., July 16.

Great Blue Heron.
Belted Kingfisher.
Gairdner's Woodpecker.
Western Wood Pewee.
Streaked Horned Lark
American Crow.
American Goldfinch.
Gambel's Sparrow.
Western Chipping Sparrow
Tree Swallow.
Violet Green Swallow.
Cliff Swallow.
Bank Swallow.
Louisiana Tanager.
Cassin's Vireo.
Yellow Warbler.
Russet-backed Thrush.
Western Robin.

A water sprite spirited me away from Seattle, landing me at Everett in the dead of night. It was miserably cold, and nowhere could even so much as a cot be found at that time of night. Those three miserable hours stretched out into weeks. But with the dawn came the birds and some degree of comfort physically. Not until mid-afternoon did Dawson appear. Meanwhile the hill overlooking the bay and town had given up its secrets. No less than thirteen species added themselves to my list of personal acquaintances. Chief among these were Pileolated and Macgillivray's Warblers, Red-breasted Sapsucker and Oregon Towhee. They seemed anxious to know who and what I was, and they sang for me by the half hour.

Everett, Wash., July 17.

Bonaparte's Gull.
Western Red-tailed Hawk.
Desert Sparrow Hawk.
Harris's Woodpecker.
Red-breasted Sapsucker.
Belted Kingfisher.
Vaux's Swift.
Olive-sided Flycatcher.
Hammond's Flycatcher.
Northwest Crow.
Rusty Song Sparrow.
Lazuli Bunting.
Black-headed Grosbeak.
Oregon Towhee.
Louisiana Tanager.
Warbling Vireo.
Macgillivray's Warbler.
Pileolated Warbler.
Bank Swallow.
Oregon Chickadee.
Russet-backsd Thrush.
Western Robin.

The distance from Everett to Wenatchee was covered during the night. The "Switch-back" climb over the mountains was a novel experience. Now a tunnel greatly shortens

the distance and the time over the Great Northern, both east and west. As each forward and backward switch brought the summit nearer, the air became sharp and the lights in the valley far below were a cluster of dots about the tunnel's mouth.

Once out upon the surging, boiling waters of the Columbia, swinging from bank to bank, away from the tortuous currents, birds again became the absorbing interest. The Red-breasted Mergansers were unwilling to leave the water, but literally flew through it in their haste to get away. Perhaps it would be nearer fact if I should say that they ran on all fours over the water. One got the impression that they used their wings alternately instead of simultaneously, but that may have been an optical illusion. In either case they were making no effort to rise above the water, for they ran across the whole width of the river in this way.

It would, perhaps, have been fairer to separate the Columbia River horizon from the Lake Chelan horizon, since we spent one afternoon on the shore of this beautiful lake, and one morning with a whole day between; but the physical conditions were so similar that the horizons would have been materially the same. Indeed, Lake Chelan owes its existence to the terrace of the Columbia which chokes the mouth of the great gorge in which the lake lies. The larger and older river has scoured out a valley upon which the debris of the towering mountains finds a resting place, but along the course of the lake the only habitable spots have been built up by the detritus at the mouths of the side canons. But for these side canons with their streams of ice water, it would be a perfectly walled lake on each side, with walls towering to thousands of feet above water level and with their foundations 2600 feet below. Birds were not numerous here, yet they were in evidence everywhere.

Columbia River and Lake Chelan, Wash., July 18, 19, 20.

Loon.
Bonaparte's Gull.
Red-breasted Merganser.
Great Blue Heron.
Spotted Sandpiper
Killdeer.
Say's Phœbe.
American Magpie.
American Crow.
Bullock's Oriole.
Western Meadowlark.
Brewer's Blackbird.

Mourning Dove.
Ferruginous Rough-leg.
Prairie Falcon.
Duck Hawk.
Desert Sparrow Hawk.
Pigeon Hawk.
Richardson's Merlin.
Belted Kingfisher.
Lewis's Woodpecker.
Red-shafted Flicker.
Rufous Hummingbird.
Kingbird.
Arkansas Kingbird
Western Wood Pewee.
American Goldfinch.
Western Chipping Sparrow.
Rusty Song Sparrow.
Spurred Towhee.
Louisiana Tanager.
Cliff Swallow.
Bank Swallow.
Rough-winged Swallow.
White-rumped Shrike.
Warbling Vireo.
Cassin's Vireo.
Yellow Warbler.
Catbird.
Western Robin.

It was interesting to note the changes in bird-life as we climbed to higher altitudes. In the Stehekin valley, in the dense shrubbery, Russet-backed Thrushes sang, while in the highest reaches of the mountain side we listened to the sweeter notes of the Dwarf Hermit Thrush. In the valey Rusty Song Sparrow made merry, while on the mountain top Hepburn's Leucosticte complained to his mate. Up the almost continuous cascade of Pershall Creek the Dipper haunted the waters like a phantom. But for the fire-wrecked forests bird life would doubtless have been more abundant, for in the remnants of the forest the birds were numerous. No insect-eating bird could find an excuse for going hungry here. With my clumsy hands I caught and killed over 300 deer flies in fifteen minutes.

One is impressed with the fact (or coincidence ?) that the majority of the birds are no fonder of the wilderness than are the majority of mankind, or else that birds and men are kin in preferring the same regions. All along the government train from Stehekin to the Skagit River, birds were far more numerous than in the mountain fastnesses. To be sure, it is largely, but not wholly, valley. But here, also, men may be found every day.

Stehekin to Wright's Peak and return. July 21 to 26.

Baird's Sandpiper.
Spotted Sandpiper.
Sooty Grouse.
Franklin's Grouse.
White-tailed Ptarmigan
Brewer's Sparrow.
Oregon Junco
Rusty Song Sparrow.
Louisiana Tanager.
Barn Swallow.

Golden Eagle.
Bald Eagle.
Richardson's Merlin.
Desert Sparrow Hawk.
Belted Kingfisher.
Harris's Woodpecker.
Red-shafted Flicker.
Vaux's Swift.
Rufous Hummer.
Olive-sided Flycatcher.
Western Flycatcher.
Black-headed Jay.
Clark's Nutcracker.
Cassin's Purple Finch.
White-winged Crossbill.
Hepburn's Leucosticte.
Pine Siskin.
Violet Green Swallow.
Cassin's Vireo.
Calaveras Warbler.
Audubon's Warbler.
Macgillivray's Warbler.
American Dipper.
Rock Wren.
Western Winter Wren
Rocky Mountain Creeper.
Red-breasted Nuthatch.
Western Golden-crowned Kinglet.
Townsend's Solitaire.
Russet-backed Thrush.
Dwarf Hermit Thrush.
Western Robin.
Arctic Bluebird.

A comparison of the list which follows with that which precedes will show that while the number of species is almost the same, there are some interesting differences, due partly to topography, partly to progress westward. All was valley, practically, except the climb up the eastern side of the pass.

Stehekin to Summit Cascade Pass, July 27, 28, 30.

Spotted Sandpiper.
Dusky Grouse.
Gray Ruffed Grouse.
Western Goshawk.
Desert Sparrow Hawk.
Belted Kingfisher.
Pileated Woodpecker.
Red-shafted Flicker.
Western Nighthawk.
Vaux's Swift.
Black Swift.
Calliope Hummingbird.
Olive-sided Flycatcher.
Western Wood Pewee.
Black-headed Jay.
Clark's Nutcracker.
Pine Siskin.
Cassin's Purple Finch.
Western Chipping Sparrow
Rusty Song Sparrow.
Arctic Towhee.
Lazuli Finch
Louisiana Tanager
Violet Green Swallow.
Cedar Waxwing.
Warbling Vireo.
Cassin's Vireo.
Calaveras Warbler.
Lutescent Warbler.
Yellow Warbler.
Hermit Warbler.
Pileolated Warbler.
Catbird.
Western Winter Wren.
Rocky Mountain Creeper.
Red-breasted Nuthatch.
Mountain Chickadee.
Chestnut-backed Chickadee.
Western Golden-crowned Kinglet.
Townsend's Solitaire.
Russet-backed Thrush.
Western Robin.
Varied Thrush
Mountain Bluebird

We have left Dawson on the mountain-top, revelling in the wild scenery of the Cascade summit. For mountain scenery this is certainly the climax of our travels. The greater humidity and consequent greater erosion on this side of the Cascades has sculptured the mountains of rocks into huge pillars, over which cloud masses rest. Here, too, the trees are at least a third taller than those on the other side, and the brushy jungles are correspondingly impenetrable. Huge trees seem to delight in completely blocking the trail.

The descent of the western side of the pass to the Cascade River level consumed the rest of the morning. After a lunch of Grape-nuts and water, and huckleberries which are abundant on this slope, we dragged our blistered feet down the trail toward the Skagit River. The monotony of the forced march was pleasantly relieved by the notes of Varied Thrush, by the chatter of the jays in the tree tops, and by the excited cries of warblers in the brush fringing the trail. Dippers were diving for dinner into the rapids; one would scarcely step aside where we crossed the mouth of a rushing torrent. A gray old Bald Eagle refused to be startled from his favorite perch just across the river, but sat and gazed at us while we studied him at leisure and then passed on. But the longest journey has an end. The ferry put the first stage of our return behind us. But we cannot dwell upon the experiences which followed on the remainder of the homeward march. How, on the second day, too foot-sore to tramp further, we built a raft on which we floated ten dangerous miles down the Skagit without a mishap other than a severe shaking up as we bumped over one riffle. Of the early morning start in a driving rain to catch the stage four miles beyond, and of the stage ride over stretches of corduroy road, root road and gullied road, on the keen jump; when we were not holding the seat down it was gathering itself to receive us lovingly, vigorously! But not even physical discomforts could turn our notice away from the abundant Ospreys, Ravens and Northwest Crows, along the river's course.

Skagit River, Aug. 1.

Great Blue Heron.
Spotted Sandpiper.
American Osprey
Northwest Crow.
American Crossbill.
Rusty Song Sparrow.

Belted Kingfisher.
Harris's Woodpecker.
Northwest Flicker.
Vaux's Swift.
Olive-sided Flycatcher.
Western Flycatcher.
Hammond's Flycatcher.
Traill's Flycatcher.
Steller's Jay.
American Raven.
Oregon Towhee.
Black-headed Grosbeak.
Barn Swallow.
Bank Swallow.
Violet Green Swallow.
Warbling Vireo.
Audubon's Warbler.
Slender-billed Nuthatch.
Oregon Chickadee.
Russet-backed Thrush.

An afternoon, night and morning, spent between Mount Vernon and Burlington, proved fruitful in species. It was here that Vigor's Wren mocked our efforts to make his acquaintance. The elusive Pileated Woodpecker gave us the merest glimpse, but Lewis's Woodpecker was very much in evidence. Steller's Jay was everywhere, and even more talkative than his eastern cousin. Oregon Junco, Oregon Towhee, Oregon Chickadee, seemed to feel a community of interest.

Burlington, Wash., Aug. 2 3.

California Partridge.
Band-tailed Pigeon.
Desert Sparrow Hawk.
American Osprey.
Belted Kingfisher.
Harris's Woodpecker.
Pileated Woodpecker
Lewis's Woodpecker
Northwest Flicker.
Vaux's Swift.
Olive-sided Flycatcher
Western Flycatcher.
Traill's Flycatcher.
Hammond's Flycatcher.
Steller's Jay.
American Raven.
Northwest Crow.
Bullock's Oriole.
Western Meadowlark.
Brewer's Blackbird
American Crossbill.
Cassin's Purple Finch
Oregon Junco
Gambel's Sparrow.
Rusty Song Sparrow.
Oregon Towhee.
Black-headed Grosbeak.
Lazuli Finch.
Louisiana Tanager.
Barn Swallow.
Violet Green Swallow.
Tree Swallow.
Bank Swallow
Yellow Warbler.
Western Yellow-throat.
Western Winter Wren.
Vigor's Wren.
Oregon Chickadee
Western Golden-crowned Kinglet.
Russet-backed Thrush.
Varied Thrush
Western Robin.
Western Bluebird.

On the homeward stretch we were too much excited over the prospect of seeing familiar faces once more to notice birds.

A chance glance from the window caught a Turkey Vulture on the wing—a rarity here. At Whatcom gulls swarmed over the bay.

The four days spent at Blaine were not wholly given to bird study, yet some effort was made to make a fairly accurate survey of the species to be found at this time of year. One half day was given to the Canadian shore line, when the Loon, Marbled Murrelet and Pigeon Guillemot were added to the list. One half day on the waters of the bay, and another baking clams on the sand spit, clinched our records of the three gulls, the two Scoters and Old-Squaw, and added five sandpipers and the Black Brant. It seemed a wonder that so many commonly supposed northern birds should be here. The boating trip proved that they were wounded birds, unable to accomplish the long northward journey. They haunted the long rafts with gulls, terns and sandpipers, and clumsily waddled into the water upon the approach of danger. Bonaparte's Gull, by far the commonest bird about the bay, constantly hovered about the salmon canning plants and the reducing plant during the day, and many roosted under them and under the walks from shore to buildings, during the night. At low tide gulls and sandpipers followed the waters to and fro over the mud and sand flats, feeding upon whatever might be stranded, but during high tide the larger gulls, with most of the smaller ones and ducks and sandpipers, waited patiently on the rafts, for the turn of the tide. They literally covered these small rafts, and rose from them, on our approach, in a cloud.

Blaine, Washington. Aug. 4–8.

Loon.
Marbled Murrelet.
Pigeon Guillemot.
Western Gull.
California Gull.
Bonaparte's Gull.
Common Tern.
Old-Squaw.
White-winged Scoter.
Surf Scoter
Black Brant.
Great Blue Heron
Baird's Sandpiper.
Western Flycatcher.
Hammond's Flycatcher.
Northwest Crow.
Western Meadowlark.
Cassin's Finch.
Pine Siskin.
Gambel's Sparrow.
Western Chipping Sparrow.
Sooty Song Sparrow.
Oregon Towhee.
Black-headed Grosbeak.
Lazuli Finch.
Cliff Swallow.

Semipalmated Sandpiper.
Western Sandpiper.
Western Solitary Sandpiper.
Spotted Sandpiper.
Band-tailed Pigeon.
American Osprey.
Desert Sparrow Hawk.
Belted Kingfisher.
Lewis's Woodpecker.
Northwest Flicker.
Western Nighthawk.
Black Swift.
Vaux's Swift.
Allen's Hummingbird.
Barn Swallow
Tree Swallow.
Bank Swallow.
Rough-winged Swallow
Cassin's Vireo.
Cedar Waxwing.
Yellow Warbler.
Audubon's Warbler.
Parkman's Wren.
Vigor's Wren.
Oregon Chickadee.
Russet-backed Thrush.
Western Robin.
Western Bluebird.

The lonely homeward journey began when the boat swung free of the wharf at Blaine, at about three o'clock in the afternoon of August 20. If we could believe that every parting was but the promise of another meeting we should avoid a great deal of sadness.

Beyond the long slender sand spit, beyond the forest of salmon nets, everywhere, even into the fading twilight, swarmed the gulls and scoters, while an occasional flock of sandpipers scurried across our bows. The white caps of the distant Olympics threw back the rays of the setting sun. Surely the setting of these Thousand Isles of the Pacific cannot be rivalled in any land. The islands themselves are diversified beauty and grandeur, still possessing, in large measure, their primitive characters.

Morning dawned upon a birdless waste of water, but by full day the gulls had awakened and ducks had come out of their hiding places. But these do not appear in the day's horizon. Only those are entered which could be seen from the wharf after arrangements had been completed for the overland journey. Only the gulls ventured near enough to the wharf to be seen clearly.

It was an interesting and varied landscape that passed in review during the day's ride from Seattle to Pasco—from tide water, over the most humid stretch of country in the land, up and over the Cascade range, down the course of the Yakima River to and across the Columbia. Naturally the bird life was varied, yet scarcely equalling the topography in that respect. Nothing new appeared until we were racing down the east side

of the Cascades, when a short stop near Ellensburg gave the opportunity to see satisfactorily the Mountain Song Sparrow. Further along, beyond Dawson's late parish—Ahtanum—in the sage brush region of Toppenish, I was made glad by the sight of a flock or small company of Sage Grouse as they clumsily made way for the train. Many times during the remainder of the day, as well as on the following day, the Sage Grouse left the track on the approach of the train. The The Dusky Horned Lark was the last addition to my life list for the day, as we approached the Columbia River.

Seattle to Pasco, Wash. Aug. 10.

California Gull.
Western Gull.
Bonaparte's Gull.
American Coot.
Spotted Sandpiper
Killdeer.
Sage Grouse.
California Partridge.
Mourning Dove.
Turkey Vulture.
Swainson's Hawk.
Prairie Falcon.
Richardson's Merlin
Desert Sparrow Hawk.
Belted Kingfisher.
Lewis's Woodpecker.
Northwest Flicker.
Western Nighthawk.
Kingbird.
Arkansas Kingbird.
Streaked Horned Lark.
Dusky Horned Lark.
American Magpie.
American Raven,
American Crow.
Northwest Crow.
Western Meadowlark.
Brewer's Blackbird.
Cassin's Purple Finch.
Mountain Song Sparrow
Sooty Song Sparrow.
Oregon Towhee.
Barn Swallow.
Bank Swallow.
White-rumped Shrike.
Oregon Chickadee.
Western Robin.
Western Bluebird

Daylight left us creeping over the sage brush plains and hills of south-eastern Washington, but found us again safely in Montana, hemmed into the valley of the North Fork of the Columbia. This was August 11, a day with many pleasant surprises. The first surprise came while we were toiling up a sharp grade at a slow walk. On a small pond beside the track a flock of Cinnamon Teal sat undisturbed while we passed. Not far beyond a smaller flock took wing and went to join the others. Along the bottoms of the Flathead River Western Vesper Sparrows were playing the same antics I have so often seen in their eastern relatives. At Missoula Bobolinks took

me wholly by surprise. Nor was I prepared to see so many White-winged Scoters on the head waters of the Missouri. Just before we reached Bozeman, during a gentle shower, Arctic Towhee came into view, and in a field just beyond the outskirts of the city a family of Columbian Sharp-tailed Grouse skurried away under the fence. Thus ended the second day ornithologically, but not meteorologically. During the day there had been an ever increasing indication of trouble ahead, but nothing definite could be learned. The rumors of a great washout on the Yellowstone beyond Billings began to die out as darkness settled down upon the walled valley of this great river. Near midnight our dreams of the green fields of the old home were rudely dispelled by the summons to leave the train. A few moments later the intelligence that no trains would leave Billings for three days came rather startlingly, but even midnight wayfarers can find where to lay their heads. There had been a great cloud-burst in the Yellowstone valley which left broken embankments and ruined bridges in its wake.

Thompson's Falls to Livingston, Mont. Aug. 11.

Cinnamon Teal.
White-winged Scoter.
Great Blue Heron.
Spotted Sandpiper.
Killdeer.
Columbian Sharp-tailed Grouse.
Mourning Dove.
Marsh Hawk.
Sharp-shinned Hawk.
Swainson's Hawk.
Ferruginous Rough-leg.
Desert Sparrow Hawk.
American Osprey.
Belted Kingfisher.
Lewis's Woodpecker.
Red-shafted Flicker.
Western Nighthawk.
Kingbird.
Arkansas Kingbird.
Say's Phœbe.
Desert Horned Lark.
American Magpie.
American Crow.
Bobolink.
Brewer's Blackbird.
Pine Siskin.
Western Vesper Sparrow.
Western Lark Sparrow.
Mountain Song Sparrow.
Arctic Towhee.
Green-tailed Towhee.
Black-headed Grosbeak.
Barn Swallow.
Bank Swallow.
Yellow Warbler.
Western Robin.
Mountain Bluebird.

Serious as delay at first appeared, it proved a boon in reality, for the opportunity to study the birds of the region was a rare one. Among the thirty-seven species recorded two were new to my life list and ten were new to the trip.

Billings lies near the middle of a broad valley made fertile by irrigation. On three sides the Bad Lands rise abruptly two or three hundred feet like a fortification wall. The river washes the talus from the east and south wall, crossing the narrowed mouth of the valley below the city.

Eastward toward the river, in the fenced cattle ranches, the sage brush and the weeds which grow along the irrigation ditches afforded shelter for innumerable sparrows, while the alkali ponds occupying old river beds fairly swarmed with waders and both Blue and Green-winged Teal. The old birds flew from me and circled as long as I remained in the vicinity, but the young and many of the females lost themselves completely in the thick growth of rushes. It was at one of these sinks that a Grinnell's Water-Thrush startled and electrified me by perching on a stump not four feet away, scolding vociferously. I had started out to climb the higher eastern cliff, but the river turned me back to the northern one. In crossing a sheep ranch one could not help noticing the entire lack of birds due to the fact that the sheep had cropped the herbage of every sort except the cactus, to the ground. There was no refuge for the birds.

The talus of this north cliff has accumulated to the depth of nearly a hundred feet from the level of the valley, and a convenient crack in the wall of soft stand-stone helped me the rest of the way to the upper level. The sand-stone is capped by a relatively thin stratum of poorly cemented conglomerate. The few stunted trees which cling to the edge of this sand-stone bluff add picturesqueness to the scene. Here it was that a troop of Woodhouse's Jays paid me a visit. They worked vigorously among the cones in the tree-tops for a few minutes, then passed nervously on down the valley. Here the Rock Wren alternately scolded me in true wren fashion and sang for me when I stood still. In the wind caves and beneath overhanging rocks Cliff Swallows had hung their bottle nests. White-throated Swifts vied with each other in cutting the air into sections about my head, but I could find none of their nests. At the foot of the bluff Arkansas Kingbirds patrolled rocks and bushes, while farther out on the level valley Kingbirds replaced them. Among the outlying houses Robins and Bluebirds were feeding and singing.

Early on the morning of August 13 the Western Meadowlarks were in full song, making a chorus with Robins, Western Lark Sparrows and Desert Horned Larks. A flock of Pipits passed overhead. But we can not stop to call all by name. The list which follows will do that. What most impresses one who is familiar with the eastern regions is the almost lack of birds anywhere out of the valley or at a distance from water. Under such conditions it is far easier to find the birds than where we must look for them everywhere. With an 8-power Bausch and Lomb one can almost sweep the breadth of the valley from the bluff top.

At about 9 o'clock some good angel suggested the possibility of a train leaving during the morning. Sure enough, there was barely time to pack and get back before time to start. But once aboard the train there seemed to be no hurry! We did finally start some time after 11 o'clock.

Billings, Mont. Aug. 12–13.

Green-winged Teal.
Blue-winged Teal
Lesser Yellow-legs.
Semipalmated Sandpiper.
Spotted Sandpiper.
Killdeer.
Mourning Dove.
Marsh Hawk.
Ferruginous Rough-leg.
Desert Sparrow Hawk.
Red-shafted Flicker,
Western Nighthawk.
White-throated Swift.
Kingbird.
Arkansas Kingbird.
Say's Phœbe.
Western Wood Pewee.
Desert Horned Lark.
Woodhouse's Jay.
Western Meadowlark.
Pine Siskin.
American Goldfinch.
Western Savanna Sparrow.
Leconte's Sparrow.
Western Lark Sparrow.
Clay-colored Sparrow.
Western Field Sparrow.
Arctic Towhee.
Barn Swallow.
Yellow Warbler.
Grinnell's Water-Thrush.
American Pipit
Rock Wren
Western Robin.
Mountain Bluebird.

Progress was slow. During the afternoon frequent and considerable stops had to be made, both on account of the soft embankments and on account of a heavier train which had started some hours in advance. The cloud, in bursting, had emptied more water close to the south bluff than could find its way into the natural channels, so it rushed straight on to the railroad embankment and tunneled it in a hundred places with-

out actually displacing the track, except that whole bridges were gone from the larger streams. If the stops had been made between stations the bird list would have been larger. As it was Krider's Hawk and Prairie Sharp-tailed Grouse exhibited themselves conspicuously.

Billings to Miles City, Mont. Aug. 13.

Great Blue Heron.
Greater Yellow-legs.
Yellowlegs.
Western Solitary Sandpiper.
Spotted Sandpiper.
Prairie Sharp-tailed Grouse.
Swainson's Hawk.
Krider's Hawk.
Desert Sparrow Hawk.
American Osprey.
Belted Kingfisher.
Red-headed Woodpecker.
Red-shafted Flicker.
Western Nighthawk.
White-throated Swift.
Kingbird.
Arkansas Kingbird.
Western Meadowlark.
Bullock's Oriole.
Brewer's Blackbird.
American Goldfinch.
Western Vesper Sparrow.
Western Lark Sparrow.
Barn Swallow.
Tree Swallow.
Bank Swallow.
Yellow Warbler.
Catbird.
Brown Thrasher.
Chickadee.
Western Robin.

The morning of the 14th found us racing over the plains of western North Dakota, crossing river valleys and so getting a better impression of the whole country. Bad Land conditions were giving place to the long rolling swells of the vast prairie region, but still inadequately watered. Gradually water became more abundant, gathered into ponds and small lakes held between the hills. Here waders and swimmers swarmed. The sight of the packs of sandpipers resting on the water or at its edge, of ducks in masses, made my fingers tingle, for the species could not even be guessed at. But there was no stopping here. We fairly flew after the smoking spot far ahead until it began to lengthen, and as it careened around a curve, the cars might be counted. Then our speed slackened, and once we were obliged to stop on a prairie switch. Beside a ditch just over the fence I made out the motionless form of a Wilson's Snipe. The poor fellow stood there on one foot during the whole five minutes of our stay, and did not so much as wink, for all I could see. The Long-billed Curlew was the only species added to the life list in North Dakota. At

one place they were numerous. As we neared the Minnesota line native trees began to put in appearance, and water became more abundant. But across the river in Minnesota the physical conditions seemed so different that a separate horizon was kept. It will be seen from the lists that the bird life was not a little different also. Doubtless more Minnesota forms would have been seen in North Dakota if the time of day had been favorable.

North Dakota. Aug. 14.

Pectoral Sandpiper.
Yellowlegs.
Solitary Sandpiper.
Bartramian Sandpiper.
Long-billed Curlew.
Killdeer.
Prairie Hen.
Prairie Sharp-tailed Grouse.
Mourning Dove.
Marsh Hawk.
Swainson's Hawk.
Ferruginous Rough-leg.
Desert Sparrow Hawk.
Prairie Falcon.
Burrowing Owl.
Belted Kingfisher.
Western Nighthawk.
Red-headed Woodpecker.
Red-shafted Flicker.
Kingbird.
Arkansas Kingbird.
Desert Horned Lark.
American Crow.
Bobolink.
Western Meadowlark.
Brewer's Blackbird.
American Goldfinch.
Chestnut-collared Longspur.
Western Vesper Sparrow.
Western Chipping Sparrow.
Song Sparrow.
Lark Bunting.
Cliff Swallow.
Barn Swallow.
White-rumped Shrike.
Red-eyed Vireo.
Brown Thrasher.

In Minnesota timber became more abundant and small lakes glimmered everywhere. Here and there broken skeletons of huge trees told the story of great forest fires, and brought back the picture of the fire swept mountain sides bristling with blackened needles. We have passed from the desert into a garden.

Western Minnesota. Aug. 14.

Pied-billed Grebe.
Blue-winged Teal.
Great Blue Heron.
Wilson's Snipe.
Greater Yellow-legs.
Yellow-legs.
Mourning Dove.
Nighthawk.
Kingbird.
Prairie Horned Lark.
American Crow.
Bobolink.
Red-winged Blackbird.
Western Meadowlark.

Marsh Hawk.
Red-shouldered Hawk.
Sparrow Hawk.
Black-billed Cuckoo
Belted Kingfisher.
Red-headed Woodpecker.
Flicker.
Bronzed Grackle.
American Goldfinch.
Western Vesper Sparrow.
Song Sparrow.
Dickcissel.
Barn Swallow.
Yellow Warbler.
Western Yellow-throat.

At midnight we were in the St. Paul depot, the first train out leaving at seven the next morning. So far as eyes could see St. Paul has a midnight closing ordinance, rigidly enforced, which applies to saloons, hotels and boarding houses indiscriminately. But the depot was warm and the seats arranged for one—sitting upright.

The day on which I should again be at my old Iowa home opened ornithologically as we were crossing the Mississippi River, where four of the five possible swallows were breakfasting. The bird world had now become wholly familiar, and beyond the likelihood of introducing anything new, yet it was none the less interesting. I felt among friends and familiar acquaintances once more, after weeks of foreign travel. The greatest interest attached to the changing physical conditions well illustrated by the farming interests. Passing through the distinctively wheat belt and the transition belt, poorly defined of course, we emerged into the midst of the great corn belt. Never have I seen such corn! It was simply a marvellous crop, barring accidents late in the season. In natural things one could not help remarking the disappearance of the continuous or nearly continuous woods of Minnesota, and in its place the woods-dotted rolling prairies of Iowa. In the more settled regions Minnesota and Iowa can not be told apart.

St. Paul, Minn., to Grinnell, Iowa. Aug. 15.

Greater Yellow-legs.
Yellow-legs.
Solitary Sandpiper
Spotted Sandpiper.
Mourning Dove.
Red-tailed Hawk.
Broad-winged Hawk
Sparrow Hawk.
Yellow-billed Cuckoo.
Cowbird.
Red-winged Blackbird.
Meadowlark.
Baltimore Oriole.
Bronzed Grackle
American Goldfinch
Vesper Sparrow
Lark Sparrow
Dickcissel.

Red-headed Woodpecker.
Flicker.
Chimney Swift.
Kingbird.
Phœbe.
Prairie Horned Lark.
Blue Jay
American Crow
Bobolink.
Cliff Swallow.
Barn Swallow.
Tree Swallow
Bank Swallow.
White-rumped Shrike.
Yellow Warbler.
Western Yellow-throat.
House Wren
Robin.

Readers of THE BULLETIN must be familiar with the landscape surrounding Grinnell, from former descriptions of mine. It is but a part of this same woods-dotted rolling prairie, upon which countless artificial groves have sprung up with the farm houses. There is now practically no native prairie in all that region. In a quarter of a century great changes have taken place which have seriously affected some birds, causing more or less modification in the habits of most of them, but the fauna is made up of the same species still.

I was at Grinnell from August 17 to 25, always on the lookout for birds, but making only two special efforts to find them. One of these was an early morning, when 33 species were recorded, some of them fall migrants. The other was an hour spent in the old home woods where birds first came to be anything to me. It was mid-afternoon. The wealth of bird life in this singularly favored spot is attested by 31 species seen. But the day of its glory has passed. Next June corn will spring up where trees have stood for centuries. One of mother Nature's pearls has been cast before—but it isn't the old home any more.

Grinnell, Iowa. Aug. 17–25.

Yellow-legs.
Spotted Sandpiper
Bartramian Sandpiper.
Killdeer.
Bob-white.
Mourning Dove.
Cooper's Hawk.
Red-tailed Hawk.
Red-shouldered Hawk.
Sparrow Hawk.
Screech Owl.
Yellow-billed Cuckoo.
Bobolink.
Red-winged Blackbird.
Meadowlark.
Baltimore Oriole.
Orchard Oriole.
Bronzed Grackle.
American Goldfinch.
Field Sparrow.
Towhee.
Rose-breasted Grosbeak.
Indigo Bunting.
Dickcissel.

Black-billed Cuckoo.
Hairy Woodpecker.
Downy Woodpecker.
Flicker.
Red-headed Woodpecker.
Whippoorwill.
Nighthawk.
Chimney Swift
Ruby-throated Hummingbird.
Kingbird.
Crested Flycatcher.
Phœbe.
Wood Pewee.
Traill's Flycatcher.
Least Flycatcher.
Prairie Horned Lark.
Blue Jay.
American Crow.
Cowbird.
Cliff Swallow.
Barn Swallow.
Bank Swallow.
Rough-winged Swallow.
Bell's Vireo.
Black and White Warbler.
Yellow Warbler.
Western Yellow-throat.
Wilson's Warbler.
Canadian Warbler.
American Redstart.
Catbird.
Brown Thrasher.
House Wren.
Short-billed Marsh Wren.
White-breasted Nuthatch.
Chickadee.
American Robin.
Bluebird.

A night and the following half day spent with Mr. Benj. T. Gault, at his delightful suburban home in Glen Ellyn, Ill., was a most grateful rest and change from the pushing crowds of the "Windy City." We enjoyed going over together the ground where Mr. Gault made his "Early Summer Horizons" for Milton Township, DuPage County. The writer also had the pleasure of looking upon the bush where the first Kirtland's Warbler for Illinois sat. The muddy borders of a small lake afforded excellent feeding for a company of sandpipers, while the surrounding woods were filled with returning warblers. No less than 43 species showed themselves during the early twilight tramp. During the post-breakfast walk into the fields eight more were recorded, making an unusually good half day's work.

Glen Ellyn, Ill. Aug. 28.

Pied-billed Grebe.
Great Blue Heron.
Least Sandpiper.
Yellow-legs.
Solitary Sandpiper.
Spotted Sandpiper.
Mourning Dove.
Red-tailed Hawk.
Red-shouldered Hawk.
Baltimore Oriole.
American Goldfinch.
Field Sparrow.
Song Sparrow.
Rose-breasted Grosbeak.
Scarlet Tanager.
Cliff Swallow.
Barn Swallow.
Cedar Waxwing.

Yellow-billed Cuckoo.
Belted Kingfisher.
Downy Woodpecker.
Red-headed Woodpecker.
Flicker.
Nighthawk.
Chimney Swift.
Kingbird.
Wood Pewee.
Traill's Flycatcher.
Prairie Horned Lark.
Blue Jay.
American Crow.
Bobolink.
Red-winged Blackbird.
Meadowlark.
White-rumped Shrike.
Red-eyed Vireo.
Yellow-throated Vireo.
Black-and-white Warbler.
Tennessee Warbler.
Black-throated Blue Warbler.
Magnolia Warbler.
Blackburnian Warbler.
American Redstart.
Catbird.
Brown Thrasher.
Short-billed Marsh Wren.
Chickadee.
Wood Thrush.
Olive-backed Thrush.
American Robin.
Bluebird.

There are occasions when we wish for the abundance of time which seems to be at the service of the Orientals. It was but a short call, scarcely more than a glimpse, with a few of the many Chicago friends. But even a glimpse remains as a pleasant memory.

The return from Glen Ellyn to Chicago marked the close of the ornithological reconnoissance, for we left Oberlin at nightfall and returned during the night. The time covered was thus exactly two months—June 29 to and including August 28. The states traversed are Missouri, Kansas, Colorado, New Mexico, Arizona, California, Oregon, Washington, Idaho, Montana, North Dakota, Minnesota, Iowa and Illinois, not to mention a few hours spent in British Columbia among the Band-tailed Pigeons. There were stops, from inconsiderable to considerable, in New Mexico, Arizona, California, Washington, Montana, Iowa and Illinois. Idaho should really be counted out, since darkness hid it from view. Of course there was much of the country passed over during the night which could not be seen, and not a few breaks in the bird life, but on the whole there was far more profit than loss. A second time over the same ground would no doubt discover some species overlooked the first time, but under practically the same conditions there would necessarily be far smaller results.

The species recorded number 309, 181 of them being new to the writer's life list. Of this number (181) only 18 were seen

aboard train and then only, while the remaining 163 were approached closely enough to make identification certain, or were captured. Among these 18 there are none about which there can be any reasonable doubt. Either the region in which they were seen made a mistake out of the question, or else their characters were unmistakable, usually both. Taken all in all it was a most enjoyable and satisfactory horizon, with Pasadena the brightest spot. To one who knows only the region east of the Great Plains the mountain fauna is pretty sure to be disappointing, even after repeated and urgent warnings from those who know. Unknown conditions make an understanding of these warnings impossible. But the scenic grandeur and beauty of the mountains more than compensate for the paucity of bird life. I am bound to say, however, that in my opinion the bird life would not seem so little were it less difficult to follow the moving companies. It is like an Ohio winter woods, where one unacquainted with the habits of the birds may roam the woods for hours without so much as hearing one bird, simply because he does not happen to come upon one of the roving companies. So on the mountain side one has to choose his way with great care; he must wait for the birds to come to him, for he cannot go to them. But the birds one sees upon the mountain tops are among the most interesting to be found anywhere. In the wooded valleys and canons there is no lack of individuals. The greatest difficulty here, on the west side of the Cascades, is the stupendous height of the trees and the impenetrable tangle of the underbrush.

There can be but one thing better than this reconnoissance, and that is another similar one.

LYNDS JONES, Oberlin, Ohio.

ERRATA.

Page 5, line 19, for "fins" read "fin," and line 23, for "rules" read "rule."
Page 16, line 19, for "Pied-bill" read "Pied-billed."
Page 17, left column, 3d name, for "Flnch" read "Finch."
Page 18, at bottom, for "Majave" read "Mojave."
Page 22, line 5 of coarse print, for "valey" read "valley."
Page 24, insert the following horizon:

Cascade River Basin. July 30–31.

Bonaparte's Gull.
Oregon Ruffed Grouse.
White-tailed Ptarmigan.
Band-tailed Pigeon
Bald Eagle.
Richardson's Merlin.
Desert Sparrow Hawk
American Osprey.
Belted Kingfisher.
Harris's Woodpecker.
Pileated Woodpecker.
Northwest Flicker.
Western Nighthawk.
Black Swift.
Vaux's Swift.
Allen's Hummingbird.
Rufous Hummingbird.
Calliope Hummingbird.
Western Wood Pewee.
Western Flycatcher.
Steller's Jay.
Oregon Jay.
Clark's Nutcracker.
American Raven.
Northwest Crow.
Pine Siskin.
Oregon Junco.
Cassin's Purple Finch.
Rusty Song Sparrow.
Black-headed Grosbeak.
Lazuli Finch.
Lutescent Warbler.
Yellow Warbler.
Audubon's Warbler.
Macgillivray's Warbler
American Pipit.
American Dipper
Western Winter Wren.
Rocky Mountain Creeper.
Red-breasted Nuthatch.
Chestnut-backed Chickadee.
Western Golden-crowned Kinglet.
Townsend's Solitaire.
Russet-backed Thrush.
Dwarf Hermit Thrush.
Western Robin.
Varied Thrush.

Page 32, line 8 from bottom, for "untl" read "until."

Old Series, Vol. XII. New Series, Vol. VII, No. 1.

THE WILSON BULLETIN.

No. 30.

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WARBLER SONGS.

(MNIOTILTIDÆ.)

BY LYNDS JONES.

Subscription 50 cents a year.

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THE WILSON BULLETIN.

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A MONOGRAPH OF THE FLICKER.

(*COLAPTES AURATUS.*)

BY FRANK L. BURNS.

Price 50 cents.

Oberlin, Ohio, April, 1900.

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THE WILSON BULLETIN.

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GENERAL NOTES.

EDITED BY LYNDS JONES.

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THE WILSON BULLETIN.

No. 33.

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A SUMMER RECONNOISSANCE IN THE WEST.

BY LYNDS JONES AND W. L. DAWSON

Oberlin, Ohio, October, 1900.

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