

You will receive some shells from the Floridas along with the Bird skins in a few weeks—

Adieu God bless & prosper you—

Your friend

J. J. Audubon.

To

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RECOGNIZING INDIVIDUAL BIRDS BY SONG.

BY ARETAS A. SAUNDERS.

IN the past few years considerable interest has arisen in those problems of bird life that can only be satisfactorily answered by tracing the movements of individual birds. The method of trapping and banding birds has awakened much interest, and results from such work are now appearing. In this connection a question has occurred to me, and probably to others. Is it not possible to recognize and trace the movements of individual birds by other means than banding?

I do not mean to propose any substitute for banding, for no return record by other means can be so satisfactory and indisputable as that of a bird bearing a definitely numbered band. But it would seem entirely possible to supplement the work of banding by other means, that, even though less satisfactory in a general way, would prove of value, and might solve problems that could not be solved by banding.

Occasional individual birds differ so distinctly and peculiarly in song from all others of their species that the species of the singer is not recognizable till the bird is seen. Once such individuals are known they are clearly marked, and returns to definite localities can be obtained from them. Similar returns might also be made from birds of unusual plumage. Some returns of this sort have been put on record in ornithological literature. (For example see Mailliard, Condor, XXII, pp. 38-39.)

But aside from these unusual singers, individual variation in bird song is great enough so that it would seem possible, in some cases at least, to trace individual birds by the peculiarities of their songs. To find out if such a method was practical, I started in the spring of 1920 to record the songs of individuals, and to attempt to keep track of them by this means. The results have proved extremely interesting. While I cannot report that the method can be easily applied to all species, there are a number to which it can be applied with satisfactory results. It not only helps to trace the movements of individuals, but also opens up a wide field of unsolved problems in bird life, a field that seems inexhaustible in its interest and opportunities for new discoveries.

I began my work by concentrating on certain species that seemed to promise the most success. For each species I chose a letter and for each individual a number. Thus, F, S, M, and W, stood for Field Sparrow, Song Sparrow, Meadowlark and Wood Thrush respectively, while F1, F2, F3, etc., stood for individual Field Sparrows, and similar combinations for individuals of other species. I carried in my note-book a map of the country in which I was working, drawn on a scale large enough to show details of buildings, streams, fences, roads and other land marks. On this map I wrote the letter and number of each individual, at the point where its singing tree (See Mousley, *Auk*, XXXVI, pp. 339-348) or headquarters (See Howard, 'Territory in Bird Life,' pp. 127-129) was located. In my note-book I recorded by the graphic method (*Auk*, XXXII, pp. 173-183) the songs of each individual, the dates on which I found it singing, and any other notes that would prove of interest or value.

Individual variation in bird song is of two distinct kinds, variation between individuals and variation on the part of the individual. Both kinds may be found in a given species. The problem of recognizing the individual of that species by its song depends on the extent of these two kinds of variations. *The greater the variation between individuals and the less the variation on the part of the individual, the more easily and certainly can the individual be recognized.*

I have not attempted to work out this problem with many species, as it is obvious that better and quicker results could be

obtained by concentrating on a few. In some cases, recognition of the individual proves comparatively easy. In others it becomes possible only after a considerable amount of field work. In still others it is practically impossible. To illustrate these various conditions I have chosen five species with which I have experimented.

The Wood Pewee (*Myiochanes virens*) illustrates a species in which variation between individuals is too slight to be used in recognition. There are some interesting variations to be found in this species, but they seem to be such as are within the individual and seasonal in character. Of a number of records made from different individuals at the same season of the year, the majority are likely to be almost, if not exactly, identical. An occasional bird might have a song so individual that it could be recognized, but for the species as a whole this cannot be done. This also seems to be true with other species of *Tyrannidae* with which I have experimented.

The Meadowlark (*Sturnella magna magna*) illustrates a totally different condition. The "Spring o' the year" song is short and easily recorded. The pitch of the notes is clear and definite. Variations are numerous. It seemed, when I began the study of this species, that recognition of the individual would be comparatively easy.

To begin, I chose a bird that sang daily from a certain apple tree that stood alone in the middle of an open field. The first day this bird sang nine different songs, all of which I recorded. Returning a day or two later I recorded seven more songs, none of them at all like the nine of the previous visit. In a few days I had recorded nearly thirty different songs from the bird, or possibly birds, that sang from that apple tree. Not once was a song of a previous day duplicated. The following year, 1921, I tried again. I chose a bird singing in a definite locality and began a record of its songs. After collecting a few songs day after day, on the 28th of April, when the bird's song was at its height, I recorded songs for nearly an hour, obtaining fifty-three distinctly different ones, only two of which were repeated, having once been dropped for another song. If the bird singing from that particular headquarters was always the same individual, then I recorded

ninety-six different songs sung by it that season! Of these ninety-six, only seven were repeated on two different days and only one on more than two different days. Of the seven repeated songs all but two are common Meadowlark songs, songs that I have recorded over and over again from many individuals and in widely separated localities. There was nothing that I could learn about the song of this particular individual that would help me to distinguish it from other individuals of its species.

There was no reason to suppose that this bird was in any way unusual. It seems to be a common thing for individual Meadowlarks to possess a large number of distinct songs. Nor was there reason to think that the number I recorded, ninety-six, was anywhere near the limit of the bird's repertoire. Three other Meadowlarks that sang within hearing of this bird evidently possessed a large number of songs each, though I made no detailed study of them. It is interesting to note, however, that ten of the first bird's songs were sung by one or more of the other birds at times.

At the end of the season of 1922 I had made records of four hundred and seventy-eight different Meadowlark songs. I still find, however, that at least half of the songs I record are new, and not duplicates of others. One hundred and twenty-six of these songs have been duplicated in my records at least once, and some of them many times. Out of thirty-three songs recorded in Cattaraugus County, New York, twelve are duplicates of records from southern Connecticut. Thus, though my work has brought out a number of interesting facts concerning Meadowlark songs, it has convinced me that variation within individuals is so great, and variation between individuals so slight, that recognition of a normal individual Meadowlark by its song is impossible.

The Field Sparrow (*Spizella pusilla pusilla*) presents a totally different case. I have already discussed this song and its variations (Auk, XXXIX, pp. 386-399). There is wide variation between individuals but only slight variation that is mainly seasonal on the part of the individual. The majority of Field Sparrows seem to possess but a single normal song, sung regularly throughout the song period. In three years of study of individuals, I have met only three cases where birds possessed two distinctly different songs, and no cases where there were more than two.

Were it not for the fact that many of the simpler songs are possessed by several individuals, recognition of the individual would be always easy. It is common to find two or more birds breeding in a certain area and possessing songs that are of the same type, and often exact duplicates, as nearly as the ear can distinguish. Such birds cannot be traced with certainty. In a single season they may be known by their choice of singing tree or headquarters, but these are likely to change the next year. There are, on the other hand, many individuals that possess songs that are distinctly individual in character, so unlike any other Field Sparrow song in some definite particular, that the individual is marked and easily recognized, not only from day to day, but in a second season.

In the season of 1920, at Fairfield, Conn., I recorded the songs of one hundred and nine individual Field Sparrows, and marked their locations on my map. Many of these birds were too far from the roads I travelled daily or with regularity to be traced successfully, but I obtained altogether forty-one repeat records in that year, to use the terms repeat and return as does the Biological Survey in trapping and banding work. Some of the birds repeated daily or almost daily for a long time, and became well known to me. Eighteen of these birds returned the following year, occupying essentially the same headquarters again. Of these eighteen, eleven possessed songs so individual that I had no doubt of their identity, but the other seven had simple songs not certainly individual. In 1922 I obtained six returns of birds first studied in 1920, three of which are undoubted because of the marked individuality of their songs, while the remaining three are doubtful. This makes about 10% of returns the second year, and 2.8% the third year. If I had considered only those birds located where I could visit them regularly and almost daily, I should have obtained a much higher percentage of returns. Of forty-two new individuals first studied in 1921, all of which were located where I could visit them frequently, nine returned in 1922, a distinctly higher percentage.

In addition to the mere fact that birds return to the same locality, many other interesting points were noted. An example will illustrate some of these. The first Field Sparrow that I put on record in 1920, my original F 1, proved to be one of the most interesting. Its song, first recorded on May 2, was used in the

illustrations of my article on the song of this species as number 15 (*Auk*, XXXIX, p. 390). I have already commented on its peculiarly rhythmic character, a point that distinguished it immediately from other Field Sparrows. In all my Field Sparrow records, now numbering between two and three hundred, I have only two other songs at all like it, and these are easily distinguished by constant differences in pitch.

After recording this bird on May 2, 1920, I did not again hear its song for a long time, so long that I decided the bird must have been a late migrant that had moved elsewhere. When it did sing again on June 14 I had forgotten the original record, and recorded it as F 61. Not until the following fall, when going over records, did I realize that F 1 and F 61 were identical, both in song and in headquarters. I had recorded a number of repeat records of F 61 from June 14 to July 25. Its silence from May 2 to June 14 may at first seem remarkable, but a study of this and other species has convinced me that such a phenomenon is really very common, and except for the fact that it began a little earlier than normal in this individual, it is entirely regular and to be expected.

The next spring, on March 27, a Field Sparrow appeared in the vicinity of F 1 headquarters, singing a type IV song of only two parts. This bird I recorded as F 115, and began to record repeat records daily. In about a week it began sometimes to add a third part to its song, when the song was identical with that of F 1. A few days later the two part song was entirely discarded, and I felt sure that my bird was F 1. Observation has shown that this curtailment of the song early in the season is a common phenomenon, both in Field Sparrows and other species. It might be termed prenuptial variation.

In the season of 1921 this bird sang regularly till April 29, but was silent from then till May 24, sang a little that day, and was not heard again till June 8, when it began a second period of song, and sang regularly till the end of June when I left Fairfield for the summer and was unable to keep further track of it. In 1922 this bird arrived on April 6, singing some prenuptial variations at first, mainly consisting of the regular song with three, six and nine notes to the part, rather than four, eight and twelve. By April 14

the bird was singing its normal full song, and continued till May 8, then ceased till June 3, sang a little that day, and on June 15 began a second period of song, which again lasted till I left for the summer at the end of June.

This irregularity in song period is what I have referred to as the individual song period. (Auk, XXXVIII, pp. 283-284.) Every Field Sparrow I have studied individually has exhibited it, though the periods come at different seasons, and last sometimes longer, sometimes shorter times. As previously stated, it is my opinion that these periods of song and silence have a definite relationship to nesting. It is common in many other species as well.

By a study of this individual I obtained not only the fact that it lived in the same locality three successive summers, making use of the same singing tree each year, but also the date of its return two of the years, notes on its individual song period, and on its variation from the normal early in the season.

Field Sparrow songs such as those numbered 1, 6, 8, 12 and 17 in my previous article on the song of this species (Auk, XXXIX, p. 390) are so common, at least in southern Connecticut, that it is impossible to trace individuals that sing these forms. In 1920 I found two birds in a certain area singing a type IV song like number 17. They were in close proximity and I did not succeed in locating the headquarters of each definitely, for the birds changed their locations slightly, so that I never felt sure which was which. On April 5, 1921, there were seven Field Sparrows singing in this locality, and four sang duplicates of the songs of last year, and the three others sang songs of the same type, but with slight variations. An eighth bird in the vicinity sang a totally different type II song. With this number of birds about, all singing so nearly alike it was impossible to keep track of individuals. It is this fact concerning the simpler forms of Field Sparrow song that makes work with this species not always certain.

The Song Sparrow (*Melospiza melodia melodia*) requires much more field work in the recognition of individuals than the Field Sparrow. Records of its songs are more difficult to make with accuracy. Variation both between individuals and within the individual is great. Each individual has a number of totally distinct songs, and often minor variations of the same song. Yet

cases where two birds sing the same song are rare. In five hundred and fifty-two records of the songs of this species, I have only three cases where two individuals sang songs that were duplicates. I have two other cases where songs are approximately though not exactly alike. Variation between individuals is so great that I believe every individual could be known by its songs, were the songs all carefully studied. Variation within the individual, the possession by each individual of a number of distinct songs, makes a sufficient study to recognize it a matter of difficult and time-absorbing field work.

The habit of song of this species is interesting. Each bird sings one of its songs over a number of times, then changes to another, sings that over and over in the same manner, changes to a third, and so on, after a time coming back to one of the songs it had sung previously. After half a dozen different songs have been sung, one may return the following day and recognize the bird by its repetition, sooner or later, of one of the songs of the previous day. One may add daily to its song records until nearly its entire repertoire is on record. Individuals I have studied have possessed all the way from nine to twenty-four distinct songs. One may never feel sure that he has recorded all the songs a given bird sings, but he may be sure when he is near the limit, for it becomes increasingly difficult to obtain a new record.

These facts make recognition of the individual Song Sparrow a matter of much field work, but once its songs are known its identity can hardly be doubted. It has been impossible for me to study any such number of individuals as I did in the case of the Field Sparrow. The number of returns is therefore necessarily smaller. There have been a number of disappointments when some favorite bird was studied carefully for hours in the field and then could not be found the following year.

I have actually obtained only three records of the return of a Song Sparrow to the same locality the second year, and none for the return a third year. A number of interesting facts are revealed by the study of individuals even though they do not return in all cases. The general results show that to one who has time and patience for the field work, the Song Sparrow is an excellent species for experiment.

In May, 1920, I noted a particular Song Sparrow singing in an open lot back of my home in Fairfield. I recorded its songs and entered it in my note-book as S 4. Though I spent much time in study of this bird I succeeded in obtaining only nine different songs, an unusually small number when compared to other Song Sparrows. Further than that, this bird had one favorite song above all others, and sang only that one the great majority of the time. This song is number 1 in the illustrations of the songs of this species. The bird sang it so much that it was difficult to obtain records of its other songs. This particular song, however, became so well known to me, that I recognized the bird by it alone, and kept records of its presence all through the months of May, June and July till August 3, when it was last heard that year. Other birds of this species sang that year till August 13, so that this bird ceased ten days earlier than the last of its species to be heard.

On March 6, 1921, I was delighted to hear the familiar song of this bird from its old headquarters in a small bush back of my home. The bird was heard singing both the 6th and 8th, and then ceased till the 17th, when its song was curiously curtailed by the omission of the middle one of the three introductory notes, leaving a pause there instead of a note. A few days later the bird added this note again, and dropped the final series of notes, substituting a single short note on the same pitch. The bird continued singing in this manner till March 31, then became silent, or perhaps absent, till April 16, when it began again with the full song, sang a day or two in late April, but was not singing regularly till May 3. From then till June 30, when I left for the summer, it sang in full vigor, and was recorded daily.

Having only nine songs for this bird I tried, in 1921, to study it more carefully and get records of any other songs it possessed. But in spite of this attempt I obtained only three different songs that year, every one a duplicate of one of the nine recorded the previous year. In 1920, the bird had sung its other songs with fair frequency, particularly early in the morning, but in 1921 the greater part of the time I could hear nothing but the one favorite song. It was a disappointment when 1922 came around, that this bird not appear in its old place. Another bird, with a different set of songs, and a somewhat different headquarters,

occupied the locality. This bird possessed one song peculiarly like the favorite one of the bird of the two years previous, particularly in time characteristics, but differing in pitch. I have included the record of this song in the illustrations as number 2. I have often wondered whether the similarity of these two songs might be due to relationship, or merely to accident.

On June 3, 1921, I started on a trip to the shore. As I left my home the S 4 bird was singing in his accustomed place. As I neared the edge of a salt marsh a good half a mile away, I was surprised to hear this same song, with which I had become so familiar, from another bird. The song was a duplicate in every way except that this bird added a single terminal note, one tone lower in pitch than any previous portions of the song. This is one of the three cases I have known where two Song Sparrows had duplicate songs. I heard no other song from this bird, and was unable to find it on other dates either that year or the following. Here is another case where possible relationship between the two birds may have been the cause of similar songs.

The peculiarity of the S 4 bird in singing one song almost to the exclusion of all others I supposed was entirely individual. In 1922, however, I obtained return records of another Song Sparrow I had first studied in 1921, and found a somewhat similar case. I had recorded twelve songs in 1921, no one of which appeared to be a particular favorite. In 1922 it returned and, so far as I knew, sang only one song, the song recorded as number 3 in the illustrations. Its return was not noted until May, but since it was not near my home, as was the other bird, I might easily have overlooked it before that date. The experience with these two birds has led me to think that young Song Sparrows in full vigor sing a great variety of song, but that as they grow older the variety becomes gradually less till they sing but a single song. Perhaps the number of songs possessed by an individual is a clue to its age.

This second bird showed another interesting fact. In 1921, it sang regularly from the top of a small elm along a roadside. In 1922, it had moved to a different location, a telephone wire about 50 yards further along the same road. Such a change of headquarters from one year to another may not be an uncommon phenomenon. Changes might easily be made for greater distances

than this one. If a Field Sparrow changed its headquarters any great distance, I should feel doubtful about its identity, owing to the fact that songs of so many individuals are nearly identical. But in the case of a Song Sparrow, with a whole repertoire of known songs, the individual ought to be so well known as to be recognized even at a considerable distance from its old headquarters.

Repeat records of Song Sparrows are easily obtained, and usually not of special interest. One however was interesting. A bird I had not studied particularly, nor even given a number, sang a certain song which was rather peculiar in rhythm, and in the fact that the notes were pitched on the notes of a major chord. The song is number 4 in the illustrations. The bird was noted singing this song in a definite locality June 19, 23, and 24, 1922. This was the only one of its songs recorded. On October 14, 1922, the bird sang again from exactly the same place. I had forgotten it, and its song, but since it sounded familiar I made the record, returned and searched my records for a song like it, and found the former record an exact duplicate, both as to song and locality. A bird then may remain in its summer locality and sing from its headquarters in October, after both the mating season and post-nuptial molt are over.

The Song Sparrow proves to be a species whose individuals can be recognized by song almost without question. The chief difficulty lies in the great amount of field work necessary to study each individual. Out of three birds studied quite thoroughly in 1920, and six more in 1921, I obtained altogether only three returns, none for more than two years in succession. The number of birds studied is too small, however, to arrive at any definite conclusion as to the percentage of returns possible.

The Wood Thrush (*Hylocichla mustelina*) presents a still different case. The song of this bird consists of a series of phrases sung at short intervals. Each phrase may have three parts, an introduction of two or three short notes, usually low in pitch and not especially musical; a central phrase of two to five notes, most commonly three, loud, clear, flute-like and extremely musical; and a termination of three or four notes, usually high-pitched, not so loud, and generally the least musical part of the song. Phrases may be sung either with or without either introduction,

The image displays five musical staves, labeled A through E, each containing a sequence of notes on a grid. The grid has 8 columns and 9 rows of notes. The notes are labeled G, F, E, D, C, B, A, G, F from top to bottom. The notes are connected by lines, forming a melody. The staves are labeled A, B, C, D, and E on the left side. The columns are numbered 1 through 8 at the top. The notes are as follows:

Staff	1	2	3	4	5	6	7	8
A	G	F	E	D	C	B	A	G
B	F	E	D	C	B	A	G	F
C	D	C	B	A	G	F	E	D
D	G	F	E	D	C	B	A	G
E	E	D	C	B	A	G	F	E

WOOD THRUSH SONGS.

termination or both, and sometimes, especially late in the season, birds indulge the habit of singing only introductions and terminations, leaving out the beautiful central phrases.

The central phrases of the Wood Thrush song are the most noticeable part, and since they are louder and carry farther, are sometimes the only part heard. They are usually quite perfectly pitched according to the intervals of human music, and are consequently easily recorded. Between the notes there is usually an l-like consonant sound, which I represent in diagrams with a loop. I begin my study of an individual's song with its central phrases. Each bird has from two to nine different ones. They are sung in no definite order, but it is not common for one phrase to be repeated immediately without some other intervening. The bird usually shows preference for one or two of its phrases and sings them more frequently than others.

When central phrases of an individual are all, or nearly all recorded, I pay attention to the terminations and introductions. There are, in normal birds, two or three introductions and four or five terminations, and these are sung with first one phrase and then another, then omitted entirely. The individual may be identified by central phrases alone, but the addition of introductions and terminations to the record will make one doubly certain of the identification, and will add much of interest to the study of the bird's method of singing.

The illustration shows the central phrases of five different Wood Thrushes that sang in a certain wood in Fairfield in the season of 1921. I have arranged them so that phrases that are nearly alike in different individuals occur in the same or nearly the same vertical column, so that comparisons may be more easily made. The phrases are not in the order in which they are sung, for that order is seldom twice the same. The phrases recorded in the first four or five columns are common ones that nearly all Wood Thrushes possess, though they differ somewhat in pitch. Those in the last three columns, that do not compare so well, are the ones that most easily serve to distinguish the individual.

The five-note phrase in column eight of the record for bird A is a most unusual one. In study of over sixty individual Wood Thrushes in the past three years I have nothing else like it. The

bird was first noted May 8, 1921, and sang with more or less regularity from then till June 29, when I could no longer keep track of it. It returned in 1922, being first noted May 17, and occupied a territory about a quarter of a mile from that occupied in 1921. In spite of this fact I feel sure of its identity, not only because of the five-note phrase, but all the other phrases, and the numerous terminations it used were identical in both years.

Bird B was best identified by the phrases in columns 7 and 8. That of column 7 is not an uncommon type of phrase, and that of column 8 is a type found in about one bird in ten in southern Connecticut, but I have not noted it in a study of birds in central New York. With bird B the combination of phrases rather than any single phrase identified it. The bird was first noted June 15, 1920, and sang with more or less regularity till July 18. It returned in 1921, being first noted on May 24, and occupied the same territory and exactly the same singing tree as in 1920. It returned again in 1922, being first noted May 29, but this time it moved its headquarters about 200 feet and sang from a new singing tree.

Birds C, D, and E were known only in 1921 and did not return. They were near neighbors of the other two birds, and often sang in alternation with them, though on no one day were all five birds singing together. Bird C was distinguished most easily by the fact that two of its phrases ended in notes that sounded flat to the ear trained to human intervals of music. Bird E possessed a phrase like that of bird B in column eight. Other facts, however, always distinguished it from B, particularly the lack of a phrase such as that in column 7.

One cannot rely on slight differences in the pitches of the phrases to distinguish individuals, for the phrases change slightly in pitch from day to day. When I first noted this I supposed my first records had been faulty in pitch, and consequently took them with greater care, but after a number of experiences with birds that changed the pitch of notes here and there, apparently overnight, I came to the conclusion that this was a common Wood Thrush characteristic. Exact pitches are not necessary to identify individuals, for it is the forms of the phrases and their relation to each other that are characteristic. One or two individuals I have studied have been identifiable by the fact that they possessed

only two or three phrases altogether, being as unusual in this respect as the bird that possesses nine is in the opposite.

Although I studied the songs of about fifteen individuals in 1920 and twenty-two more in 1921, I have obtained altogether only four returns, the two birds mentioned above, A and B, and two others. One of these others brought out an interesting fact. This bird sang in the area directly across the street from the Birdcraft Sanctuary of Fairfield, a spot well-known to many bird-lovers. The bird possessed one five-note phrase that was extremely beautiful and unusual. It also possessed a two-note termination which was as loud and musical in quality as the central phrases. Occasionally it sang its five-note phrase and added this two-note termination, making a series of seven clear, musical, flute-like notes in quick succession, a most beautiful and unusual performance. I studied this bird and its phrases quite thoroughly in 1921. On May 17, 1922, I heard this seven-note phrase again in the same locality. Having little time that morning, I merely noted the fact that the bird had returned, intending to make further studies of the song some other day for comparison with the records of the year before. I did not succeed, however, in hearing this bird again. Not long after, another individual took its place, singing a totally different set of phrases. Perhaps some tragedy had overtaken my seven-note bird, or perhaps the new individual being more vigorous in other respects if not so wonderful in song had driven it from its old headquarters.

Only one of my four returns of Wood Thrushes was a return to exactly the same headquarters. From the small percentage of Wood Thrush returns, I am inclined to think that this species, in southern Connecticut at least, is at its maximum abundance, and that there is keen competition for territories in the area available for its breeding. This would account for the small number of returns, and for the change of headquarters from year to year.

Like the Field Sparrow, the Wood Thrush shows the phenomenon of individual song period. The individual sings irregularly, being usually more or less silent in late May or early June for periods of two to five weeks. In two cases I have found nests which I believed belonged to certain males whose songs I knew. In one case the nest was found when the first egg had just been laid.

The male was in full song not far away that day, and continued in full song for two days more, that is, till the day the last egg was laid, then ceased. I did not hear it again till the young had been out of the nest at least two days and perhaps longer. In the other case a nest containing young was found about fifty feet from the singing tree of an individual I had studied earlier in the season. I had not heard it sing for some time. Two days after I found the nest some enemy, a Blue Jay, I think, destroyed the young. Two days after this my bird was in song again, but had changed its headquarters by a hundred and fifty feet. It sang in this new place for a few days and then was silent again. I did not find the second nest until November when the fall of leaves revealed it about thirty feet from the singing tree.

Less complete studies of the individual songs of other species have shown that the same general rules apply. Individuals of some species can be easily recognized. Those of others require considerable field work or are entirely unrecognizable. The Vesper Sparrow, for example, is rather like the Field Sparrow, save that the differences between songs of individuals is less marked. The Yellow-throated Vireo suggests the case of the Wood Thrush, but its phrases are less musical, more difficult to record with accuracy, and less distinctive. The Red-eyed Vireo, except in unusual individuals, seems to be almost impossible to work with, for each bird possesses twenty to thirty distinctly different phrases, yet these phrases are not easily distinguished from those of other individuals. The Maryland Yellowthroat seems to have a trick of singing one song for a few days, then changing to an entirely different one, so that one never feels quite sure of the individual from day to day, and not in the least sure from year to year.

In most respects this method of recognizing and tracing movements of individuals cannot compare with the method of bird banding. While I feel entirely certain of the accurate identification of the individuals whose returns I have mentioned, others will probably feel that it is more open to doubt than the return of a banded bird. Only males can be traced by this method, and only in the period of song. Only certain favorable species can be experimented with successfully. Returns from a totally different locality would be open to too much doubt to be of value.

Only those field ornithologists who have good musical ears and a good knowledge of music and the physics of sound could use the method.

On the other hand, there are those who object to bird banding on the ground that some bird may be injured thereby, who could not object to this method. Those who have not equipment or localities where they could band birds could use this method. Birds that are newly arrived in a locality would be heard in song the first day, but might not go into a trap immediately. Thus the date of arrival of breeding individuals could be definitely learned by the song more easily than by trapping. Peculiarities of habit and of song that would not be noted by trapping would be noted in using this method. Problems of the relation of song to nesting and to territory, the return of individuals to the same or different territories, and other related facts could be solved or partially solved by this method. A larger area could be studied and kept under observation than by trapping and banding. Species that have not yet been trapped, and that perhaps cannot be, might be studied by this method.

These are the disadvantages and advantages of this method as compared to bird banding. It is not, however, a question of whether one outweighs the other or not. Certain things can be accomplished by banding that could never be accomplished in any other way, and at the same time certain things could be accomplished by this method of study that are impossible by banding. The two methods are supplementary. Both should help us to learn new things about bird life. The field student who is equipped to do such work as this in bird song will find in it a wonderful opportunity to gain new ornithological knowledge.

*48 Longview Ave.,
Fairfield, Conn.*