SUGGESTED ORNITHOLOGICAL WORK FOR BIRD BANDERS.

BY ALFRED O. GROSS.

IT is now recognized that the work of bird banding has contributed much which is important and interesting to our knowledge of ornithology. The most striking, if not one of the most valuable features of this new movement, is the large number of persons in all parts of the country who have been stimulated to taking an active interest in the study of birds and in their protection. But no matter how enthusiastic a bird bander may be he cannot make the most of his opportunity unless he has some knowledge of the fundamental facts concerning birds. In order to meet this apparent need and to assist beginners in maintaining a permanent interest in birds, especially in the work of bird banding, the Northeastern Bird Banding Association arranged with Dr. Glover M. Allen, of the Museum of Comparative Zoology, Cambridge, to give a series of ten lectures.[1] These lectures were scientific, yet not too technical for the average person unequipped with a biological training. The success of these lectures has been a source of great satisfaction to the members of the committee who developed and fostered the plan.

The interesting facts presented in these lectures are of the utmost importance to the bird bander who would really appreciate the bird in nature, and especially if he desires to contribute to the science of ornithology. Not all of us have the inclination nor the time to devote to a continuous, intensive study of birds, but I am sure there are many members of the bird banding associations who will be willing, if not eager, to assist, if certain problems concerning birds are pointed out to them. If the members of the association cooperate and concentrate their efforts on specific problems in addition to merely placing the bands on the birds, we will be able to accomplish results which are worth while. Noth-

[1] This article embodies a considerable part of a lecture, delivered in Boston, March 8, 1924, to those interested in bird banding at the close of Dr. Allen's series of ten lectures here referred to and under the same auspices.

ing will insure a continued individual interest in bird banding and ornithology in general more than the satisfaction that the worker is actually contributing to the sum total of our knowledge of birds.

Much of the ornithology of the past has been problems which have been attacked principally by the comparative study of large series of skins such as we have in more important institutions and museums. This work has been chiefly the study of the dead rather than of the living bird. I do not wish to be understood that this work is not of the greatest importance and absolutely essential for the development of scientific ornithology. But this work, as necessary as it is, has been limited to a comparatively few specialists and most of us have been able to contribute nothing. Any one of us, however, can assist materially in the tremendously big study of the bird as a living organism and the part it plays in the economy of nature. This kind of investigation has become so important that it is given the special name ecology. Haeckel, as early as 1869, defined ecology as comprising the relations of the animal to its organic environment; particularly to those animals or plants with which it comes into direct contact. Whether with the ecologist we regard the organism in relation to the world or with the physiologist as a wonderful complex of vital energies these two branches of study have this in common, that they do not confine their attention to a series of stuffed animals and anatomical dissections but to life itself.

Ecology in its broadest sense, as we consider it today, is concerned with fundamental biological problems which include all of the responses of an organism to its complete environment.

We may, according to Dr. Charles C. Adams,[1] study ecology from the standpoint of the individual, or the group of individuals, considering the interrelations of all of the organisms found in the environment. In the case of the individual, our study will be limited to a single habitat or locality, but it may be extended throughout the entire geographic range of the animal. Most of the experimental and physiological work as well as studies of life history have been made from this point of view.

Instead of using the individual as the center of the microcosm, you may investigate the ecological development and responses

[1] Guide to the Study of Animal Ecology.

of animals based on taxonomic units such as genera, families, orders, etc. Any such group is made the basis for study. For example, you may consider the races of Song Sparrows, or Horned Larks, in connection with their size and color correlated with climate, humidity, light, and all other factors of the environment; or our study might include all of the members of the family Fringillidae; or it may be comprehensive enough to include all birds. From this standpoint or approach, the activities and reponses of the group are traced throughout all environments and associations within the area studied and responses and adjustments to the whole environment receive primary attention. Many of the contributions to ecology by the taxonomist are made from this standpoint.

The third method is to devote your attention to all the organisms in a given association. The interaction among the members of such an association might be compared to the different cells and organs of an individual. As the cells are the units of structure, so are the individuals the units of the environment. In such a study you would not confine your attention to an individual or even a large group of individuals but to all the existing birds as well as all other organisms concerned with the environment. This is the standpoint taken by the general ecologist.

These three methods of approach are not always distinct but one may frequently overlap or converge with the other; yet in our field work there is an advantage of each point of view in aiding the analysis and synthesis of any problem.

Most of us have developed an interest in ornithology by casual observations of birds followed perhaps by a desire to know all of the species within range of our homes. If not at all times of the year at least every spring we obey that irresistible impulse to get out of doors to the fields and woods. We are thrilled by the arrival of our old friends from the South and we delight in their songs and activities but our chief, perhaps only, contribution is a long list of birds we have seen and identified. These lists, especially if they are supplemented with notes, have a great value, but is it not possible for us to make a greater contribution to ornithology if we make an intensive study confining our attention preferably to an intensive study of a single species or at most to a few problems in ecology.

An eminent ornithologist once remarked that the bird student is handicapped because unlike the botanist and entomologist he can not handle and examine the living individual. This statement was made before the days of bird banding. Our new method of bird study has made possible the solution of many problems and best of all problems to which many of us may aid in solving.

When a bird is banded and properly recorded you have initiated a work which may be destined to have an important bearing on the solution of some large and general problem of ornithology. But in addition to this service every operator of a bird banding station has opportunities to secure valuable information which can never be obtained from the record cards sent to Washington.

Many of these problems which are open to us are suggested by Dr. Allen's lectures, and I shall attempt to emphasize only a few of them from the standpoint of my experience in the field. For example, in lecture No. 2 the bird bander learns there is a regular sequence in plumages and moults in birds, yet in very few species have these changes been followed through on the individual living a normal life in nature. Birds kept in confinement live under such abnormal conditions that we cannot be sure that studies made of the plumages and moults of these birds truly represent the changes made in nature. Careful notes taken of any bird captured at frequent intervals throughout the year will be of value and will give us more specific information than we can secure by a study of changes represented by different specimens of a large series of skins. But on the other hand the student of the living bird will make a serious mistake if he ignores any chance to make comparisons of his ever-changing individual with the fixed conditions in preserved specimens. Furthermore, matters will be suggested in examining a series of skins which will lead you by a more direct route in the solution of field problems. Since access to museum specimens is not always possible in making comparisons of successive plumage changes in the individuals, the observer should endeavor to record a detailed description based on color determinations made with the use of some well known color standard.

It is gratifying to know that several bird banders are already interested in problems of this nature and are making observations

which are destined to be of great importance in substantiating what has been done by museum workers and of adding information concerning many details of plumage changes which cannot be clearly determined by any other method.

In a study involving color determinations, it is advisable to have Ridgway's ' Color Standards and Color Nomenclature,' as no two persons have the same conception of color as designated by name. For example, the name sepia brown suggests a certain color sensation to me which is probably very different from your impression, hence the urgent necessity of a standard. The changes in color of any individual bird are sometimes very slight and your memory of preceding colorations will be confused unless you have a museum specimen for comparison or a detailed description based on accurate color determination.

Another very important matter along this line to which some bird bander might give special attention, if he has the proper material, is the determination of the colors of the iris of the eye and the soft or fleshy parts found in certain birds. This is something which cannot be determined from the study of all the dried skins in existence, for these colors quickly disappear, some of them a few hours after the death of the bird. To illustrate how the colors of the eye may change in the developing bird we may use the following determinations made during the course of a study of Black-crowned Night Herons:

AGE OF BIRD	COLOR
1 day	Grayish Olive
2–3 days	Reed Yellow to Olive Yellow
4–5 "	Chalcedony Yellow
10 "	Barium Yellow
20–25 "	Lemon Yellow
30 "	Strontian Yellow
40 "	Deep Chrome Yellow
50 "	Pinard Yellow
1 year	Orange Chrome
2 years	Flame Scarlet
Adult	Scarlet to Scarlet Red

There are also marked changes in the color of the feet, lores and other naked parts of the Herons which are relatively constant for different individuals of the same age.

The physiology and morphology of this color change in various cases is most interesting, but this part of the work is a purely laboratory problem which would require facilities that the average bird bander does not have. The color determinations, however, with a little preliminary practice are easily made and the worker will have the satisfaction of contributing to a field in which relatively little has been done.

WEIGHTS OF BIRDS.

There are so few records of the weights of birds that Bergtold in his book on incubation complained of the lack of data in the literature on the weights of birds which he desired to use in correlating the weight of the bird with the size of the egg and the period of incubation. We know so little concerning these matters that a series of weights of birds under varying conditions would be of importance. Care must be taken, however, to record the condition of the bird, especially such matters as the fullness of the crop. In fact, a series of weighings of the same individual taken at different times is necessary in order to approach within a reasonable accuracy of the correct weight of the bird. A method of weighing birds which is practicable in the field is to place the bird in a light muslin bag which has previously been weighed and recorded. If much of this work is to be attempted, special weighing devices may be constructed. It is advisable to use the gram as the unit of weight. In fact, the metric system is by far the best and most convenient for all scientific measurements.

TEMPERATURE OF BIRDS.

In order to make an intelligent study of all the phases of incubation, a large series of determinations of temperature of birds are needed. We know that the temperatures of different species of birds vary considerably. What effect does that difference have on the relative length of time required for incubation? Such problems and many more of a more general character cannot be solved until we know more about temperatures of birds under varying physiological conditions. Some very important work, such as that by Alexander Wetmore, has been done on comparative

temperatures of high and low orders of birds but there is need of much more work of a kind any responsible bird bander can do. The temperature of birds can be taken with the ordinary clinical thermometer. The temperature of the atmosphere should be recorded at the same time and we should be careful to note any striking physiological condition of the bird and all other factors which we think might be the cause of abnormal readings.

PATHOLOGICAL CONDITIONS.

It is of course important for us to know the normal bird before we attempt to record abnormal or pathological conditions of the birds we find in our traps. Some birds will present conditions which are obviously abnormal and surely these are all worth recording. One of the most remarkable cases of this kind is the foot disease present on the feet of the Chipping Sparrows. It is quite possible that if such work is carried on intensively by some worker it would provide material of the utmost importance in conservation. Bird pathology has not received the attention that its importance deserves. We cannot successfully combat diseases of birds if we know nothing about them and certainly we are neglecting an opportunity if we make no effort to discover the existence of disease.

PARASITES.

In addition to diseases, many birds have characteristic external parasites which in themselves offer material for interesting collections and study. In the Yellow-billed Tropic Bird of the Bermudas, the author found four species of mites, one of which proved to be a new species. There is a louse peculiar to the Heath Hen of Martha's Vineyard. Should this bird become extinct the louse will probably go with it. In 1918, while working on a life history of Traill's Flycatcher in central Illinois, the young of three out of four nests met an untimely ending by mites. The nests when closely examined proved to be a living seething mass of these minute organisms which had literally sapped the life from the helpless young. Several other instances of this sort have come to my attention in the course of field work. I know of no cases where

adult birds have been killed but doubtless mites and lice prove a menace when they are present in large numbers. Many birds, especially water birds, have at least a few of these parasites and if a bird bander discovers them, representative specimens should be preserved for future determination by some specialist.

SONG.

In contrast to subjects discussed above there are other phases of bird life which may appeal more to our aesthetic senses. Any bird bander is certain to become, if he is not already, interested in the notes and songs of the birds he traps. In fact many of us have become acquainted with our first birds by being attracted to their songs. Though the song is one of the most attractive it is also one of the most difficult features of bird life to study scientifically, especially for the observer who is not born with a musical ear. It is not an easy task to analyze the details of an intricate song and most of us fail when we attempt to record the notes in a way that our reader may receive a reasonable conception of them. A few workers have been most successful in analyzing and interpreting bird songs and a few of them have devised remarkable systems of signs and symbols for recording the various tones, pitch and quality of bird notes. But unfortunately, most of these symbols thus far devised are too intricate and complicated to be of any use to anyone other than the authors of them. We need some simple means of recording. To intrepret a bird's song in terms of our own words is not satisfactory. For example, the Dickcissel song, which is one of the simplest, has received as many interpretations as there have been persons to describe it. Here are just a few of these attempts:

Wilson: Tship, tship, tshe tshe tshe.

Nuttall: Tie tie-tshe tshe tshe tship.

Coues: Look! Look! see me here! see! and Chip-Chip-chee, chee, chee.

Longville: Chic chic chelac-chick-chick-chick and Chick-ticktsh-chick-chick-chick.

Butler: Clenk, clenk, clenk-clenk-clenk.

Ridgway: See, see,-Dick, Dick,-cissel, cissel.

If you are well acquainted with the song of the Dickcissel you can, if you have a vivid imagination, see the suggestion of any of

these interpretations. But if those not familiar with this bird should attempt to imitate the song by these representations I dare say the results would prove ludicrous.

Pitch, tone and quality are not represented in these series of written words. Some of our musically inclined bird banders might be able to make us a valuable contribution if they would undertake the study of the interpretations of bird songs scientifically with a view of devising a simple but adequate means of recording the notes.

Certainly the various phases of bird song, the mechanics of the vocal organs—evolution and general significance of song, and notes in courtship, intercommunication and expression afford material for a life-long study.

BANDING OF NESTING BIRDS.

Interesting as is the experience of banding and studying the visitors to our traps, the banding of nestlings and especially the study of the life of the birds centered around the nest at least to some workers eclipses all other ecological work on birds that we may do. Not only can we do here the matters suggested in the study of the transient individuals secured in our traps, but there opens up at once innumerable fascinating problems of courtship, domestic relations, associations with other birds, bird psychology and behaviour which all warrant intensive study. The possibilities of securing important information by banding the adult parent birds and young has been demonstrated by Mr. Baldwin's work with several Wren families. His results have given us a fascinating story and has stimulated the work of bird banding to a remarkable degree. Work of this kind might be repeated on any bird which is found breeding in abundance in places convenient to our homes. The bird bander should not be content with the mere capturing of the parent birds, placing bands on their legs and banding the young when they attain the proper size. Very few, even our commonest birds, have been studied intensively and continuously through an entire life cycle. Observations of nest building, measurements, weights and specific gravity of eggs at different stages of development, intervals of time between laying of individual eggs, exact time required for incubation,

time spent by young in the nest, food and method of feeding, feather development, growth as shown by daily weights and measurements, means of recognition and the relations of the birds to other animals and plants of the environment, are all clear cut determinations which any one who is really interested in this kind of work can make. Such observations if accurately made will be of great value when included with numerous records of the same sort in making generalizations concerning the life of our common birds.

There are some who will differ with me but rather than to make a supreme effort to establish a record in the number of species and individual birds banded I would prefer to spend a whole season or several seasons if necessary in the study of a single species or of a specialized problem concerning some one bird.

If the bird bander does not have the time at his disposal to attempt an intensive study of some problem he should by no means be discouraged from operating a banding station, for the banding of birds is in itself very important. But banding birds as an end, soon becomes routine and after the novelty wears away the bird bander may lose much of his interest and enthusiasm. Like all other fields of work, the more we put into it the more we are destined to get out of it. It is sincerely hoped that many, after they have studied Dr. Allen's lectures, will desire to make studies of some special problem of ecology and those that have the time and inclination to make complete life history studies of some of our common birds.

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