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METHODS IN TEACHING ORNITHOLOGY

T. C. STEPHENS

A brief outline is here presented of a course in ornithology (bird study, if you prefer) as I have tried to give it — never with complete success, however.

In the first place, I have planned a course to give the student four semester hours of credit. (As a matter of fact, the undergraduate student of this day has so many "requirements" to satisfy, for graduation, for major and minor, for a teaching certificate, for practice teaching, or in his pre-professional schedule, that most students have difficulty in finding time for a 4-hour elective course). In many respects the second semester is the best time to offer a bird course, mainly because it includes the migration season and part of the nesting season. Good bird work can be done in the fall and winter, but the number of possible problems is more limited, and the number of kinds of birds available for study is less. Nevertheless, there are some very good reasons for beginning bird study during the fall and winter season. The smaller number of birds reduces the possibility of confusion; and absence of foliage makes observation a little easier.

A well rounded course in ornithology must be built up along four lines, viz.,

1. Class Work
2. Library Work
3. Laboratory Work
4. Field Work

So, we may consider these phases of the course in some detail.

Class Work. There is no very complete textbook on the subject of ornithology in existence. Gradual progress in the development of the science has probably not encouraged textbook writers; and, furthermore, the limited attention given to the subject in the schools has not promised great pecuniary reward. So we are left with the necessity of conducting the class by means of lectures and assigned library readings. The lectures should cover such topics as bird anatomy, ancestry, classification, distribution, migration, nest building, egg-laying and care of young, territory, food habits and economic aspects, psychology and behavior, and a host of subsidiary subjects.

Since the class room work is based mainly on the lectures, there should be some literary work provided for the student to do.

Library Work. Therefore we may plan for him to prepare some short essays or reports based on his library reading. It has been my custom to ask for an essay on some passerine family of birds, and another on a non-passerine family. The exercise of preparing such papers gives a little drill on the taxonomic phase, as well as some familiarity with literature sources. For the sake of a balanced study I also ask for two essays on bird behavior or structure, on topics of the student's own selection.

These essay subjects will presumably be brought to the student's attention through the lectures or by suggestion. In the writing of his essays the student is expected to make correct citations from his reading, and to compile as complete a bibliography as may be reasonably expected from the time and resources at his disposal. He is urged to present this bibliography in a correct and uniform style.

Very little more needs to be said on this matter of library work, except, perhaps, to note that it requires some library resources on the subject. But the output of literature on ornithology in recent years has been enormous (as in all scientific fields) and it may be assumed that colleges in general will have adequate library facilities before undertaking such a course. Much useful literature is published and distributed by various governmental agencies and other foundations free of charge. The only problem is to know where and how to secure these things.

Laboratory Work. The laboratory work includes two general projects, one of which is the study of the topography and general anatomy of the birds; the other is the identification of a series of bird skins by means of keys. The pigeon serves best for the study of anatomy. Since the recognition of the bird in the field depends so much upon a knowledge of the markings and physical characteristics of the plumage, the student should learn the various kinds of feathers and their distribution. I have never emphasized the internal anatomy, although each student is expected to make an examination of the viscera and a few of the muscles. Sometimes the bones are cleaned up by the few who have developed an interest to that extent.

There is a great range of possibility for making drawings of the structure of the bird's body—such as the bird's body after being plucked, the feather tracts, muscles groups, various viscera, bones, etc. Students who manifest a special interest are encouraged

to go ahead in the work which most appeals to them. I usually ask all members of the class to pick out one typical feather of each kind and attach it to a sheet of drawing paper, properly labelled.

The second laboratory project is the identification of a collection of bird skins. Formerly I required the identification of 150 skins, but later the number was reduced to 100. I now think that fifty would be sufficient if well selected to represent most of the orders. Perhaps this number might be regarded as the minimum, with the student being allowed to do more if he wished to.

In tracing the skin through the key the student learns a great deal about the general scheme of classification, and some things about other genera and families than those to which his specimen belongs.

Formerly the only satisfactory key available was Chapman's "Handbook." Now that the keys of Roberts' "Birds of Minnesota" have been published separately, it also becomes a suitable manual for use in the upper Mississippi Valley, and is a little less expensive.

The wear and tear of handling the bird skins is rather hard on them and yet a well made skin may have surprising durability. Dr. Strong used to have his skins mounted on a stiff wire to the end of which a wooden handle was attached. Others have placed the skins in glass tubes; while others have more recently used cellophane tubes. These practices help to preserve the skins from damage, but they are awkward. In my mimeographed instructions I always include a list of precautions in handling the skins.

Field Work. The greatest opportunity in a bird course lies in the field work. Regular weekly trips are made, usually on Saturday morning. Students must be instructed concerning their own behavior when in the field seeking to make acquaintance with such elusive creatures as birds—especially when they are out in a party of some size.

They must also be trained in the art of making written notes on their various observations. The ability and habit of recording observations accurately is of as much importance as making the observations in the first place. Even where the student is not expecting to engage in such work professionally, but intends to follow it only for pleasure, there is still added pleasure in being able to refer, for comparison, to the observations of previous years. If such notes are kept for a number of years it becomes a matter of practical importance to have them kept systematically and

in a uniform manner. Both the pleasure and scientific value of field notes increase with the number of years covered.

The field trips afford the means of leading the student to an acquaintance with the birds and their habitats. Besides keeping a list in his notebook of the birds seen on each trip he is asked to also note the number of individuals of each species, thus making a census. Such a method will give him some idea as to when the height of migration is reached.

If nests are found he makes notes on the location and structure of the nest; as well as on the number and color of the eggs; perhaps also on which parent is incubating, and other similar matters.

But beyond this routine work each student in the class is asked to make some independent field study. This is to be an original bit of observation. For the purpose of training it does not matter if the student studies a problem which has already been solved, since there is not thought of publication. (However, several such undergraduate studies by my students have been published). But the purpose is to give the student the thrilling experience of getting some first-hand information from Nature, rather than from books.

I will probably have just about enough time left to enumerate a few of the field problems in bird study which are suitable for this purpose.

1. A Nest Study. This is a careful and painstaking piece of work, but yields the surest and biggest results when properly done. It may be completed in a few days, but requires a good deal of time while in progress. It is usually carried out in a blind for concealing the observer, and which is located very close to the nest. Where possible this kind of a study may cover the entire period from hatching of the young to the time of their departure from the nest — about two weeks.

2. A Mortality Study. Here the problem is to locate as many nests as possible, at least twenty-five or thirty. By observation at sufficiently frequent intervals we are to determine how many eggs hatch, how many young die, and how many young successfully depart from the nest at the proper time.

3. An Area Census. This consists of making a careful census of the breeding birds in a selected area. Two such censuses of the same section of farm land at a ten-year interval have been published in the Proceedings of the Academy. Such a census might be taken on a smaller area, such as a cemetery, a park, or a campus, an-

nually. Rules for standardizing such censuses have been pretty well worked out.

4. A Cross-country Census. In this project the student travels on foot in a straight line, preferably along a secondary highway, and counts the birds seen within a certain distance of the road on both sides. The number of birds per acre or square mile may then be computed. Several of my students have made such censuses across Woodbury County in both north and south and east and west directions. I have always wished to make such a highway census, and then check the computations arising from it by making one or two area censuses bordering the same highway. Some students who have made this highway census across the county tell me they would never do it again, but that they would not have missed the experience for anything.

5. A Cat Census. Since cats are a menace to bird life, how many cats are there? The most reliable information is obtained by taking a cat census—either in town or in the country. We have done both. When a student chooses to make a cross country bird census, we try to have another student go along to make a cat census. In this case the census taker visits every farm house along the route, and tries to ascertain the number of cats on the premises. We have made several such cat censuses across Woodbury County in the long diameter—east and west—about 35 miles. We have kept a record of the remarks of the farmers in answer to our questions.

6. A Migration Study. This requires the keeping of an accurate record of the arrival in the spring or departure in the fall of a selected number of species, or of birds in general. It covers a longer period of time, and will be chosen only by students who are much devoted to the work.

7. Studies on Bird Song. The student may select a single species of bird and endeavor to keep a record of when it begins to sing during the season. And he may also make a study of morning and evening song, possibly making use of a photoelectric cell to correlate the song period with light intensity. Some work has been done in this field, but there is still plenty of opportunity.

Perhaps I have now indicated enough examples of this individual field work to show the general nature of it. The purpose of it is not research, but training; and it is believed that this kind of work also instills a deeper appreciation of the world of nature and a greater interest in the problems of conservation.

I may now close by saying that while the program of work out-

lined here has been included in my bird course, and thus tested out in a measure, yet I regard the whole thing as in the experimental stage.

The course is rather an expensive one for the student. He must, or should, provide himself with some sort of a field glass. He must buy (or borrow) a book of some sort to enable him to identify the bird skins. He should also have a guide book of some kind to assist him in identifying the birds in the field. If there is a laboratory fee for the course, the whole expense may add up to \$25 or \$30, unless the student already possesses or can borrow some of the items required.

However, this expense is perhaps not too great if the course provides the individual with a lifetime hobby and means of recreation.

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