

PRINCIPLES AND PRACTICES IN COLLECTING AND TAXONOMIC WORK¹

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THE taxonomist has the very difficult task of gathering a large number of sample specimens from the earth's surface, processing them, studying and recording their characteristics and variations, summarizing the facts discovered, and then publishing the conclusions in such carefully chosen words that all of his readers will understand exactly what he means.

It is clear that there are scores of opportunities for introducing errors all through this process, and we shall be wise to stop now and then to see how we can improve our techniques and eliminate sources of error.

When I was asked to discuss this subject, I began by requesting nearly two dozen of the leading men in bird taxonomy for their comments on the practices which had caused them difficulty in their work and for suggestions on improved standards and techniques which they would like to see adopted. Their replies were extremely interesting and are the basis for my selection of the following points.

PREPARATION OF SPECIMENS.—There are several good books and pamphlets on this subject, and yet my associates are of the opinion that certain rules of technique are commonly neglected. These are:

1) "*Stripping the ulna.*" In order to save a few seconds in the process of skinning small birds, some collectors "strip" the secondaries from their attachment to the ulna. Conscientious collectors who follow this practice make every effort, when filling out and arranging the skin, to restore the secondaries to their exact original position, but long experience demonstrates that it is not possible to be sure of doing this, and anything short of complete success results in a skin with wing feathers which are not in their true relative positions. The museum worker using such a specimen may draw erroneous conclusions about wing proportions. It is for this reason that many museums forbid their collectors to strip the ulna of any specimen.

2) *Bill closing.* Many specimens have their value lessened by bills that are improperly closed (and therefore hard to compare with others), bills that have been distorted by being tied shut too tightly, or bills of which the nostrils have been deformed by needle and thread. An exactly closed, unmutilated bill is an essential part of a good specimen.

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THE BIRD SKIN LABEL.—Many fieldmen are inclined to overlook the great importance of the specimen label. (At Michigan we sometimes tell our students that the label is more important than the specimen.) I cannot do better than to quote the statement which Alden Miller wrote in 1940, in a serial publication which perhaps ornithologists do not commonly see (*Museum News*, 17 (17): 6): "The original label written when the animal is taken and prepared is a scientific document. It must never be destroyed or replaced and the essential data it is to bear must be entered at the time, not later. The practice of writing temporary labels is pernicious in the extreme." It is important to keep as much of the data as possible *with* the bird. Data *on* the specimen will be far more useful to you and to everyone else than data in your notes, no matter how perfectly these are made and filed.

Every collector knows that the minimum data on a label include: locality, date, name of collector, and sex of specimen. There are other, very desirable, items which I will mention below, but first let us consider some of the necessary points about the minimum data, for even the minimum data can be recorded in most undesirable ways.

1) *Locality.* In all museum work, a shocking waste of time results from labels on which the locality data are not readily understandable. To avoid that, always list the locality thus: state, county, town, and (finally) locality in relation to the town. If the major locality (state, province, or country) appears at the left end of every label (where museum workers expect it) much time is saved. In the United States, counties should always be given. *You* may know just where "Parker's Prairie, Minnesota," "Silo, Oklahoma," or "Pea Ridge, Arkansas," is, but remember that not all museum workers have had your educational advantages. It should not be necessary to add that altitude is an essential part of the locality data in mountainous country.

2) *Date.* The only safe rule is to designate the month by at least a three-letter abbreviation—never by numbers of any kind. As some people do not seem to realize, there are two diametrically opposite ways of writing the date when designating the month by a numeral. Thus "6/12/1949" may mean June 12, 1949, or 6 December 1949. Americans use one method, and the rest of the world uses the other. To make matters worse, the U. S. Army taught the *European* method to several million Americans during World War II. As a result, to read some of these fiendish all-numeral dates, one must not only know where the collector was born but also whether he recently served in the U. S. Army! Let me repeat: *Never* designate the month on a bird label by a numeral of any sort.

3) *Name of collector.* Even this item is sometimes misinterpreted. We are glad enough to know that Indian Joe brought in a given specimen, but we are more interested in knowing who prepared and sexed the specimen and wrote the label. The problem is solved if we add to the standard label: "Prep. by John Doe."

4) *Sex of specimen.* Experienced collectors may think it obvious that a scientific specimen must *always* be sexed by dissection, but museum experience shows that it would be too optimistic to assume that all collectors follow that rule. Every field worker should realize that no one can sex accurately 100 per cent of the specimens collected; shot damage and other factors make an occasional specimen quite impossible to sex with certainty. When a collector sends in a large number of specimens with the sex marked definitely on all, we know that he is either doing some guessing or, contrary to our explicit instructions, is discarding some of his specimens in the field.

The museum worker is sometimes confronted with specimens on which the collector's statement of sex disagrees with the plumage indications. Then, to be safe, the museum man will probably assume that there is an error and leave that specimen out of his calculations, unless there is some indication on the label that the collector realized that his diagnosis was surprising. Such a situation is automatically provided for if the collector follows the practice, standard in some modern museums, of recording the size of the gonads on all specimens. Many collectors follow J. P. Chapin's system and write "t. e." (testes enlarged), "t. n. e." (testes not enlarged), etc.; others record in millimeters the measurements taken with calipers; still others take the measurements in the same way but record them graphically by drawing an actual-size outline of the gonads on the back of the label.

5) *Age determination.* This is a very important matter. Many collectors have long marked the age on labels, but one may easily be led astray unless some additional record on the label shows that the collector was critical in his determination. (One well-known ornithologist of the last generation had the habit of marking "adult" on the label of any specimen which was not obviously a nestling!) Fortunately, some collectors have long followed the practice, proposed by Chapin, of recording by initials the condition of the skull of passerine birds: "s. o." (skull ossified), "s. n. o." (skull not ossified).

6) *Weights.* It is no longer necessary to defend the practice of recording bird weights, but it was not always so in the A.O.U.! When Alfred Gross and I began systematically weighing our specimens in Panama in 1925, we were lampooned more than once in the pages of 'The Auklet' for that ridiculous over-refinement of technique.

Now many articles based on weight data have appeared and other, more interesting, ones await only additional data on certain species. Dozens of uses for weight data have become apparent, and an increasing number of field workers are systematically recording the weights of the specimens they collect. Nevertheless, there are still many who are unwilling to take the trouble to weigh birds in the field. It is to these that this reminder is addressed. Actually, it is very easy to arrange portable sets of scales, and their use while making up birds in the field takes extremely little time.

7) *Colors and physical condition.* The process of recording the perishable colors of the soft parts of birds is indeed a time-consuming and difficult one. However, there is no need to record elaborate color data on every specimen; many of us make such records only on an occasional bird from a locality in which we have not taken a representative of the species before. Secondly, there is little to record in the case of the majority of small passerine birds. We must, of course, watch constantly for exceptions. A few birds that are very much alike as museum specimens prove to be distinguishable in life by their differently colored tarsi or other soft parts (*e.g.*, the Black-poll Warbler and Bay-breasted Warbler in fall).

There is one complication, resulting from the lack of an adequate but inexpensive book of standard colors. Ridgway's "Color Key" was long the accepted standard, and our printed literature is largely based on it. Unfortunately, the permanence of Ridgway's color plates is now seriously questioned and, in any case, the book is no longer available. The younger generation will have to turn to some other standard. The more recent color standards published in the United States (Maerz and Paul, Munsell, etc.) seem to many of us to have serious drawbacks, but fortunately a new color guide just published in Buenos Aires and reviewed in "The Auk" (67: 114-115, 1950) seems well adapted to our purposes and includes complete tables for conversion from Ridgway's color names.

Other matters which should be recorded on the label are the details of physical condition (*i.e.* degree of fatness, presence of brood patches or other evidences of breeding), readily identifiable stomach contents, and an indication of the habitat.

8) *Hieroglyphics.* Before we leave that 3- by 5/8-inch slip of paper—the bird skin label—I should mention one other matter, that of legibility. Probably more errors arise from our mis-reading carelessly written labels than from any other source. A few extra seconds spent in writing a clear, legible label will be well invested. There is, after all, little use in attaching especially full data to your specimen if they

cannot be read easily or perhaps be read at all. The many items discussed above may seem beyond recording legibly on the two sides of a standard 3- by 5/8-inch museum label, but the fact is that many of us regularly do so. For the occasional bird that is unusually rich in data, we add a second (unprinted) label to carry the extra information.

Further, it may seem that I have placed too much emphasis on minor details of collecting, but unless we do a good job of collecting birds and recording data, all our slide-rule calculations and philosophical conclusions will certainly go astray.

ANALYSIS OF SPECIMENS.—The techniques used in analyzing specimens for taxonomic purposes are too numerous even to outline in this paper; therefore I shall speak only of certain controversial items.

1) *Measurement*. Obviously the measurements published by workers in various parts of the world cannot be compared and used for common purposes unless they are made in the same way or at least in ways that other workers understand. In 1931, Baldwin, Oberholser, and Worley attempted to standardize the methods in "Bird Measurements" (Sci. Publ. Cleveland Mus. Nat. Hist., 2)—an excellent and well illustrated report in spite of the criticism that a large number of the measurements described there are of bird parts not ordinarily used by taxonomists or of structures that are characteristic of only two or three of the nearly nine thousand known species.

The most used measurement—that of the length of the folded wing—is still unstandardized and perhaps will always remain so. Baldwin, Oberholser, and Worley described in full the method of measurement that they preferred, briefly mentioning the other method (which, however, seems to be the one that the majority of the ornithologists of the world now use). They rightly emphasized the importance of specifying the method employed. Unfortunately, they did not attempt to standardize the terminology for describing the two methods. The point is this:

The closed wing of most birds presents a surface which is at least slightly convex. Therefore, when measuring the wing with a straight ruler, one has the choice of measuring the chord of this natural curve or of flattening the wing against the ruler and taking a measurement that will be the equivalent (or nearly the equivalent) of measuring the arc of the naturally curved wing with a flexible rule. Obviously the measurement of the flattened wing will be somewhat greater than that of the wing measured across the chord of the curve, and one *must* say which measurement one has taken. Many of us have attempted to label the wing measurements we publish by adding in parentheses the word "chord" when we have measured the chord of the curved wing

and "arc" when we have measured the arc of the curved wing. What could be more simple? We thought the problem solved. But the difficulty is this: When we use the word "arc" we automatically produce in the minds of some readers the picture of a *curved* line, but note that we are using it to indicate that we have measured the *straightened* wing (not the curved wing). The confusion caused by this simple fact was evident even in some of the letters that I received recently from well-known practicing museum ornithologists. Frankly, I am puzzled. Perhaps someone more skilled in exposition can suggest a solution for this absurd but tantalizing little problem.

Another much-used measurement is that of the culmen. There are many ways of measuring the bills of birds, and bills show such extreme variation between species that no single method will suffice for all. However, my associates emphasized two points: First, we must always record what measurement we intend. Secondly (and they were almost unanimous in this), the measurement of the so-called "exposed culmen," popularized and established in the literature by Ridgway, is a very poor one and should be dropped. In practice, it is apparent that the indefinite character of the proximal end of the line being measured makes it impossible to secure uniform results.

2) *Numbering of primaries.* The outer wing feathers, or primaries, of birds form a very precise pattern which is so unvarying in any given species that it is frequently used in taxonomic studies. To enable us to designate particular feathers, we give the primaries serial numbers. Most small birds have 10 primaries, but certain families (such as the pipits) have 9, others (*e.g.*, vireos) vary within the family. Since reduction in the number of primaries is always by loss of the outer primary, it is necessary to number the primaries from the inside outward. Then when the outer primary is lost (as we pass from one family to another), the missing primary is the tenth, the others retain their original numbering, and we can still compare homologous primary feathers in various birds. This method of numbering is very general in America, but some workers, apparently not understanding the reason back of this numbering system, occasionally advocate our using the opposite and (in counting) slightly more convenient method, which, strangely enough, is general among Old World ornithologists.

DESCRIPTION OF NEW KINDS OF BIRDS.—There are at least two recent papers that analyze the degrees of difference to be demanded of proposed new forms (Condor, 51: 250–258, 1949; Auk, 67: 169–183, 1950), and I shall confine myself to touching briefly on two points:

First, I should like to repeat the warning which several of my correspondents expressed against describing forms that are simply

parts of a cline in one character, such as size—unless, indeed, it is a well-marked step cline. Taxonomy has already been unnecessarily complicated by too many descriptions of “intermediates between intermediates.”

Secondly, I wish to express my considered opinion that, with possible rare exceptions, we should no longer give new names to single specimens. Perhaps some of you think of that practice as characteristic of the last generation, but I remind you that only this summer one of us (a curator in one of the big ornithological research departments) described as new a single, doubtfully sexed, immature specimen of a rare bird taken more than a thousand miles outside of the known range of the species. Surely such a paper does not constitute proof of the existence of an undescribed subspecies; it is only a suggestion—a wager—that a new form will probably be found there by some future worker, on whom will fall the real burden of proving the existence of the subspecies and describing its characteristics.

PREPARATION OF THE PAPER FOR PUBLICATION.—Finally—about the publication of the scientific results—let me mention one or two points which, my associates remind me, need attention:

The best taxonomic paper will be expressed in clear, simple English and will contain few or no superlatives. If you are describing a new form, your cynical colleagues will only be the more sceptical if you tell them that the new form is “strikingly” or “outstandingly” different, or that your specimens are (as someone recently put it) “ultra-typical.” Let them have the measurable differences, and they will decide for themselves whether the new form is “startlingly” different or, perhaps, just recognizable.

The well-written paper will include references to all of the papers you have found useful in your investigation, and the references will be sufficiently full to obviate any necessity for bibliographic research before your reader can find and use them. Please remember that almost no one who follows you and uses your work will—when he begins—have the literature in mind as you then do.

IN CLOSING, let me say that the techniques of field collecting and taxonomic work in America have unquestionably reached a degree of excellence never before attained, but there remain some very uneven spots, and I sincerely hope that this discussion may contribute to further improvement in the quality of our work.

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