A CRITIQUE OF OÖLOGICAL DATA.[1]

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I WISH to direct attention briefly to the subject of oölogical data, by presenting the views of a non-collector, one who has been looking at egg collections as a possible source of data which may be used in the study of biological processes of somewhat wider scope than those contemplated by the average gatherer of bird eggs. Following some studies on amphibians, in which I found interesting control of the seasonal breeding programs of various species by different environmental conditions, I began a search for material among other groups of vertebrates that might be studied with the same end in view. Knowledge of the breeding activities of fishes and reptiles, particularly in the west, where my previous work was done, is so fragmentary that little of profit could be gathered there. The data pertaining to mammals is, while limited, extremely interesting; and I shall present that elsewhere at a later date. When I turned to birds, I began the examination of egg collections and the remarks that follow have arisen as a by-product of this last field of interest. I have great appreciation for the reliable basic material already accumulated regarding bird eggs. My effort here is to indicate some of the shortcomings of the present day work in oölogy, and to point out several directions in which the means of study in this field might be improved.

After listening to many discussions about egg collecting and reading many criticisms and defenses of the subject, I think it may safely be concluded that egg collecting is prompted by three main motives:

1. Mere exercise of the acquisitive instinct.
2. A desire for outdoor pleasure.
3. A sincere interest in increasing the bounds of knowledge relating to bird eggs.

In the minds of most collectors these three motives are inextricably mingled. With a few the second or, worse still, the first

[1] Contribution from the Division of Zoology, College of Agriculture, University of California. Read at the forty-fifth stated meeting of the American Ornithological Union, at Washington, D. C., November 17, 1927.

is the principal motive. A few collectors are strictly of the third type.

Again, collectors may be classified as to those interested in the whole egg, as compared with those whose attention is focused solely upon the shell. There is an important distinction here, for the egg, the ovum, that contained *within* the shell, is after all the part which should really engage the major part of our attention. The shell has been carefully measured, weighed, and described in detail, whereas an almost negligible amount of consideration has so far been given to the contents. Thus, with only one or two exceptions, the shell of every species on the A. O. U. list is known. There are several books treating of the egg shells of North American birds, and several classifications of shells have been based upon size, shape, surface, texture, pigmentation, pattern, number in a clutch, and place of deposition. The adaptive nature of many of these features has been indicated and discussed. Only in a few instances have data from egg shells (in combination with other data) been used to indicate major errors in our previous scheme of classification. Until new means for studying egg shells are devised, further contributions in this direction will, at best, be of a minor nature. The shells of bird eggs are about as subservient to the needs of the individual species as are beaks or claws, and in some groups we find adaptive modifications in the egg shell to meet particular conditions under which those species reproduce. Before attempting to indicate some of the lines of inquiry which may profitably be followed with regard to the true ovum some attention must be given to the shortcomings in our existing collections of egg shells.

These collections are of all degrees of value. Some of the smaller ones based upon the personal take of collectors who make sure of the identity of each bird, and composed of adequately labeled specimens are as trustworthy as any material of science. Other collections, especially the larger ones, assembled from many sources, where dealers, commercial collectors, and "exchange value" have figured, are practically useless from the standpoint of science. Eggs purchased from dealers, eggs obtained in trades where exchange value was the important consideration, and eggs obtained from untrained or unscrupulous collectors are, in general,

of little or no value; often they are misleading and dangerous. An egg with any error in its necessary chain of data may be compared to a palaeontological specimen or an artifact with imperfect labeling as to locality or horizon, save that the latter two classes of articles may sometimes be safely allocated in these respects by subsequent comparisons, while an egg shell seldom or never bears any mark by which its locality of deposition may be determined. The phrase "identification positive" gives no clue to the subsequent user of a set as to the actual basis for identification.

A first important criticism of egg collections pertains to identification. How many collectors of bird eggs are able to identify in the field all of the several species whose eggs they gather? Certain it is that many collectors of skins are unable to identify some of their skins in the field. Are egg collectors sufficiently familiar with the less strikingly marked coloration of the females of many species of birds to ensure correct determination? Is the collector prepared, if necessary, to collect the bird to insure the identity of the eggs? Does the collector depend on the form and location of the nest to identify the eggs or does he wait to see one of the parents flushed from the nest? Is the bird which "scolds" about a nest certainly the "owner" of that nest, or may it not be the owner of another, undiscovered nest nearby? Are the eggs marked *at once* in the field with adequate data to preclude subsequent mixing or erroneous application of data slips?

To show the necessity of raising these questions, I may call attention to specific cases in California. A record for the breeding of the Golden-crowned Sparrow is in doubt because of the circumstances surrounding the taking of the eggs and because of failure to find subsequent nestings in later years. A published record for the early breeding of the Lutescent Warbler with an unusually large clutch of eggs has been questioned as being that of the San Diego Wren, for which the date and size of clutch would not be noteworthy. I have seen one collection where, among the Hawks, the field collector's identifications have been changed (by another hand) on the data blanks, without indication of the reason or authority for the change. I have been told of another collector, imperfectly acquainted with Buteos, who used to label all of his larger eggs *calurus* and the smaller ones *swainsoni*. Another

collector separates the data slips from his eggs, and the cryptic marks on the latter mean nothing to anyone else examining that collection. Another offends still more by gathering eggs in quantity without any sort of identifying marks, believing himself entirely capable of remembering which set belongs with a given data blank.

In happy contrast to all of these is a certain egg collector who, in searching for the eggs of certain species, collects the bird and submits it to a recognized taxonomist before finally labeling the set in question as to the species involved.

Second, the terminology used in describing the stages of incubation in bird eggs is as chaotic as any to be found in the entire field of science. The terms used by any one collector are probably applied with some degree of consistency, but they mean little or nothing to anyone else using his material or even to another collector. In going over any large collection of eggs assembled by exchange or purchase from different sources, one encounters a variety of terms such as "incubation begun," "just turning," "blood," "1/3," "½," or "nearly complete." For accurate study these terms are valueless. The embryology of the chick and of a number of other species of birds has been studied with sufficient detail, so that it would be rather easy to formulate a list of terms, based upon successive appearance of blood, embryonic membranes, feather buds, skeletal elements, natal feathers, and other features which would indicate with some degree of accuracy the stage of incubation encountered in any particular egg. The so-called "small-hole" specialist, who delights in removing the contents of a shell through an aperture of minimum size, is not likely to contribute much in the way of accurate information on the stage of incubation.

A third principal criticism of egg collections as now constituted is that they are comprised to a large extent of fresh first sets and therefore give imperfect information on the extent of the breeding season. Most of the egg collectors plan their program of collecting on the dates for first fresh full sets, and give a much lesser amount of attention to such matters as second sets, second nestings, and average or extreme dates for termination of breeding activities in particular species. Only in a relatively small number of species do we have data showing the entire seasonal program of nesting activities.

What, then, may we hope to obtain from egg collectors through correction of some of the shortcomings mentioned above? First, more accurate identification; this is a subject about which there can be no argument. We need only to impress beginning collectors with the absolute importance of this feature. Any set about which there is the least shadow of doubt should be discarded forthwith.

Second, it is becoming increasingly important that an adequate amount of data be marked on each individual egg. This, at a mimimum, should include an identifying check list number, the date, the set mark, and the collector's initials. The date should be indicated in no equivocal manner; 4–3–27 bears a meaning of April 3 or March 4 and should be written IV–3–27 or Ap–3–27. These data may be applied with pencil, but better still with India ink. Such marking will make it possible for anyone to associate the eggs with the corresponding data blank.

Third, a more rational scheme for indicating the degree of incubation must be developed. It is important to know the degree of incubation so that we may calculate back and ascertain the approximate date upon which the set was complete. Comparison of data sheets shows a surprising weekly periodicity due to the sabbath day activities of egg collectors. This feature in large series may produce an erroneous impression from the raw data.

Fourth, more attention should be paid to second and subsequent sets. Save in the case of rare or vanishing species, absolutely no harm can result should all our egg collectors suddenly begin collecting throughout the nesting season. It is important that we have data on the later seasonal history of many species; and egg collectors are, in many instances, the persons best situated to carry on this sort of observation.

Finally, let me offer some suggestions regarding permits for egg collecting. There has been altogether too much indiscriminate collecting in the past; there is little justification for it to continue. On the other hand, it is important that no beginner in bird study be dissuaded by limitation of his collecting activities. The present high standard of ornithological investigation in this country is due in considerable measure to the extensive early field experiences of many of the workers who for the most part, began by collecting bird eggs. No youngster, at all likely to develop into a serious

student, should be hindered from increasing his knowledge and developing his powers of observation by collecting. He should, if possible, be accorded the help and advice of some reliable experienced worker in the ornithological field. There is no method quite so good as collecting for learning the habits of species intimately and correctly.

But this free-reined opportunity to collect should not be continued indefinitely if the individual fails to improve in his technique and if he fails to obtain and publish material of value to the general field of ornithology. There should be a time limit, during which the "juvenile" manner of collecting should be permitted. For men of mature years who have been collecting for a decade or more to take eggs to no other end than that of selfishly increasing the bulk of a personal collection is of no particular value, and it should not masquerade under the broad cloak of science.

The continued gathering of eggs of our larger birds of prey by collector after collector, simply for the gratification of personal ambitions, is likewise without any particular scientific merit and in some instances may jeopardize the standing of the species. Contrast the barrenness of results from such efforts with the abundant returns to science where one or several bird students combine to study intensively the life history of a scarce species without "collecting" as in the case of the Bald Eagle studies by Professor Herrick and his associates.

Our permits, federal and state, are usually designated as "scientific collecting permits." How much of the material obtained under these permits is genuinely of scientific value?

Oölogy, though always a useful adjunct to the general field of ornithology, must take a fresh viewpoint; when this is done, new and valuable contributions will again be made by its devotees.

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