

THE USE OF THE BURSA OF FABRICIUS AS AN INDICATION OF AGE IN  
GAME BIRDS

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Game investigators, ornithologists, taxidermists, and laboratory workers are often called upon to estimate or judge the age of birds when preparing them as specimens or performing autopsies or other examinations. While the estimate is usually limited to determining whether the bird is a "bird of the year" or an "adult", it is not very easy, especially for those workers who are not technical ornithologists, to always judge with suréty the age of the bird. The accuracy and exactness of the determination is too often dependent upon individual interpretation of qualitative characters such as plumage, skull ossification, etc. In some species of birds, and especially up to the moult into adult plumage, the young are easily distinguished from adults, but in other species (such as the ruffed grouse) this is not so easy, and in fact, very difficult unless the individual is very familiar with the species in question.

A number of different characters have been used to judge age, chief of which are plumage characters and skull ossification. Plumage is perhaps the most universally used of all the characters, for it is the most obvious, and is about the only one that can be used unless the bird is dead. It is, without doubt, very good, and reasonably accurate in most cases, but still leaves much to be desired. In ducks for example, age determination by plumage depends to a great extent upon personal interpretation of the quality of various markings, and such would inevitably lead to discrepancies in the determinations of two different workers, especially if they were not equally familiar with the species. Plumage characters as age

indicators, in general are rather complicated, require considerable taxonomic knowledge of a given species, and do not lend themselves to simple instructions. The use of skull ossification is even more complicated, and may be used with certainty only during the time the bird is so young other characters are more obvious and equally reliable. An ideal character must be purely objective and of such a nature that no interpretation is necessary.

The burden of Fabricius, a small sac-like diverticulum lying dorsal to the large intestine and opening into the cloaca, seems to fulfill these conditions. Its use is limited, but during the time when it can be used, it is purely objective, and is as nearly constant as a biological character can be. It is universally present in young birds, so far as is known, and is never present in adult birds (except the Ostrich). The structure was first described by Fabricius in 1621, but it was not until the researches of Jolly (1915) and Boyden (1922) that the organ was very well understood. While at the present time the anatomy and embryology of the bursa is pretty well worked out, the function, at least in part, is still a matter of speculation. According to Jolly, the bursa reaches maximum size at the time when the sex cells are just beginning division, and by the time sexual maturity is reached it has disappeared. It has been surmised from this and other indications that its function is, primarily, of endocrine nature and very closely associated with sex. That it is composed of lymphoid tissue, and serves in a haemopoietic capacity is known, but these are probably secondary.

In using the bursa as an age character, only two factors need be considered: (1) its location and appearance, and (2) its span of existence. The bursa (figures 1 and 2) is located dorsal to the large intestine in the extreme posterior region of the body cavity. It is

attached to the dorsal body wall by a mesentery, and, in position, lies close to the small intestine. It opens into the cloaca posteriorly, and of course, is closed at its anterior end. Externally it resembles the proventriculus in appearance, but is very different from that organ structurally. If cut open, the walls are found to be relatively thick and folded longitudinally into long, thick, folds. These folds contain much lymphoid tissue, and are covered by epithelium. Very often in a healthy bird, the bursa may be almost completely embedded in fat, so that a reasonable amount of care must be exercised in looking for it. The only organs with which it might be confused are the shell gland in a female or the penis in those birds in which this structure is found (Anatidae). The shell gland being a part of the uterus should be easily distinguished, and the penis in males, having been seen once, is easily identified. Jolly has shown that the bursa reaches maximum development in chickens at about four months of age, and is possible of gross demonstration up to about eight months of age. Over a period of four years, I have found the organ to be easily seen in ducks through December, and in all but a few cases through January. After the first of March, however, it is not present. During two seasons, with the aid of fellow workers in the Game Division, I have been able to check the presence of the organ during the hunting season, and in some cases later, in the following birds: ruffed grouse, sharp-tailed grouse, prairie chicken, spruce grouse, ring-necked pheasant, Hungarian partridge, woodcock, coot, and several species of ducks. At the time these birds were examined (chiefly in October) the bursa was relatively large in all of the species listed above, and it is logical to assume that it must be present for about the same duration that it is in chickens and ducks. If this is proven correct by further research, the bursa may be used as a positive age character throughout December, and

possibly into January for all the above species. Work is being done at the present time to determine the exact length of existence in pheasants and Hungarian partridges, and probably in the future work will be done on enough species of different families to formulate a more or less definite rule for the use of the bursa.

At the present time the chief disadvantage to the use of the bursa are that it may not be safely used beyond January first, thus leaving a period of four or five months until the next breeding season in which birds of the previous year cannot be told from adults. The fact that a bird must be dead for the bursa to be demonstrated is obviously limiting. However, in spite of the handicaps, and within its scope, the bursa is a much more objective than any of the plumage or other qualitative characters. It is hoped that more work will be done on the organ in the near future, and that its use in this capacity will be of value to workers in the field.

#### SUMMARY

The bursa of Fabricius is an organ located on the dorsal surface of the large intestine of birds, opening into the cloaca. It is present in game birds in Michigan during the fall hunting season, and may be used throughout December as an objective character to separate the birds of the year from the adults. It is especially valuable in birds such as the ruffed grouse in which there is little plumage difference.

#### LITERATURE CITED

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