

FROM FIELD AND STUDY

More about Hawks.—I read with great interest the recent article (Condor, xxxii, 1930, p. 15) by McAtee and Stoddard in defense of hawks and owls, the methods heretofore employed in investigating their food habits, and expressing the disfavor of papers that tend to supply ammunition for those who are proponents of the extermination of our raptors. With all their views I am in hearty accord. The above article has prompted me to call attention to an aspect of the matter which is seldom or never considered in the discussions pro and con the conservation of our so-called predaceous animals.

Major Brooks (Condor, xxxi, 1929, p. 222) has published his observations of the frequent capture and consumption by bald eagles of scoters and grebes; and, of course, in ornithological and sporting literature there is much reference to the destruction of other birds even by such species of hawks and owls as are not considered habitually to feed on such prey. The unthinking reader takes such statements at their face value and accordingly condemns the species concerned as destructive in greater or lesser degree; and it is rather astonishing that ornithologists apparently follow the same course.

Having had experience in collecting both scoters and grebes, and having been highly exasperated by the manner in which the former dives beneath the water from full flight without a pause, and both disappear from the surface, at the flash of a gun, I am extremely loath to believe that any bald eagle can regularly capture either scoter or grebe in good health and in full possession of its normal faculties. Having never observed the technique employed by a bald eagle on such a quest I will concede the possibility that I may grossly under-estimate the skill of that grand bird; but nevertheless I am ready to argue the point with considerable spirit and no little determination, backed by the concurrent opinion of a number of able ornithologists with whom I have talked.

But that is neither here nor there in the present instance. The point at issue is the fact that almost never is it taken into consideration that many of the game birds, as well as those of non-sporting sorts, caught by hawks and owls, bob cats and foxes, are ailing, either from sickness or injury. All of our wild life is abundantly used to coping successfully with its natural enemies in normal numbers, and a healthy individual is able to take care of itself in the vast majority of cases. Of course there are exceptions, both as concern the individual and restricted areas, as when a flight of goshawks has descended upon the luckless heath hen remnant on Martha's Vineyard.

A raptor's very existence is often dependent upon its ability to discriminate instantly between prey that it can capture with relative ease, and that which may be secured only after the expenditure of a disproportionate amount of effort. It is such an ingrained ability that it may be considered as virtually instinctive for a hawk to discern in a split second the bird or small mammal that for any reason is acting abnormally. This accomplishment appears to be common to all predaceous birds and mammals. Instances where hungry wolves can tell that an approaching fellow has been slightly wounded and promptly fall upon and devour the unfortunate, or coyotes congregate to pull down an ailing steer (for which they are always blamed rather than praised), are not mere travelers' tales but are sound truths.

In spite of this we are prone to lose sight of the fact that the role in nature of the predators is that of a sanitary brigade. They are essential elements of any and every fauna, promptly to eliminate those individuals that have fallen ill before the latter shall have had opportunity to transmit the ailment to their healthy comrades; and to act as a check upon overcrowding, so as to prevent the epidemic usually consequent upon any marked augmentation in numbers.

Significant in this connection are the conclusions of Dr. August Brinkmann who, after investigating the alarming reduction in Norway of the willow grouse, ascertained that this was ascribable to recent great destruction of birds of prey. Lacking predators there was at first an increase in the grouse population, followed by sickness, and the lack of natural enemies permitted the spread of this in disastrously epizootic form. In addition, Dr. Schroeter, another European conservationist, has reported that a number of years ago the foxes were purposely extermi-

nated from a certain district in Bohemia, and following this action there occurred such a severe epidemic among the hares of this area that it was necessary to reintroduce foxes.

It is my personal conviction that if our hawks and owls now existed in something like their former numbers, bird malaria would be far less prevalent among the quail of California, and that the very existence of the eastern ruffed grouse would not now be threatened by a complex of diseases.

This being the case—that the sanitary brigade as represented by our predators is a very vital factor in the numerous representation of our game bird species—ornithologists should certainly be the last to condemn unqualifiedly the killing of an occasional individual, but rather presume that in the majority of instances every two out of three birds captured were on the sick list. The third may be cheerfully ceded, by sportsman as well as conservationist, as payment for the good office performed in removing a threatened source of infection, even without taking into account the injurious rodents that have been eaten between times. Naturally, however, when goshawks or other habitual game-getters invade territory in which birds are being raised or conserved in large numbers, that is a horse of another color.

And to those who may be reluctant to concede that more sick than healthy birds are usually captured by the hawks that frequently favor such fare, I would say that I, as an American citizen, am entitled to my just share of ducks, grouse and quail—perhaps not to the tune of fifteen per day during the open season, but to my fair proportionate share. During the last ten years I do not recall to have killed a duck or a quail, and only half a dozen grouse for specimens. This uncollected increment, together with the proportion to which I shall be entitled in the future, I hereby bequeath to the bald eagle, the duck hawk, the prairie falcon and their kith and kin, in partial payment for the service that our fine raptors have rendered us economically and aesthetically.—A. BRAZIER HOWELL, *Department of Anatomy, Johns Hopkins Medical School, Baltimore, Maryland, February 5, 1930.*

Some Observations on Erythrocyte Count in Birds.—Some years ago while engaged on a study of the body temperatures of nestling altricial birds, the results of which are awaiting publication, I was struck with the evidences of a high metabolic rate in birds, such as the high temperature, fast respiration, and rapid cardiac rate. Such metabolic activity necessitates the supplying to the tissues of large quantities of oxygen. The red blood cells bearing hemoglobin are the only specific tissues differentiated for this purpose and it therefore became of interest to study briefly the number of cells and the hemoglobin content of the blood in birds.

The counting of blood cells has become a standardized procedure, simple in preparation and fairly accurate in skilled hands. It consists of drawing a column of blood into an accurately gauged pipette and diluting with normal salt solution to a 1-200 dilution. A drop of this dilution is expelled onto a hemacytometer ruled to measure exactly one millimeter square and 1/10 mm. deep, or in other words the contents measure 1/10 cubic millimeter in quantity. By means of further rulings within the chamber mathematical fractions of this quantity are obtained and the cells in this portion counted. The estimation of the number of cells per cubic millimeter of blood consists therefore of multiplying the number of cells counted by the necessary factors and the dilution. The estimation of hemoglobin content is done by means of comparison with a color scale.

On various field trips Mr. R. C. McGregor and I combined forces and armed with microscope, guns, and collecting equipment sallied into the jungle surrounded by a most omnipresent and noisy group of native children. Killed birds were retrieved immediately, the chest and heart opened and the blood pipetted out. The results were exactly nothing, since it was found that the clotting time of blood which in man averages three minutes, in birds is almost immediate. Fluid blood could not be withdrawn even from the chambers of the heart. Eventually it was found that blood could be used only from living birds and even this clotted in the pipette while the diluent was being added.

To correct this troublesome tendency of the blood to agglutinate and to clot, one percent of potassium citrate was added to the diluting fluid and this served as an anti-coagulant. The interior of the pipettes had to be moistened to prevent the formation of small clots in the bore.