

drop the worker after crushing it in their bill to get the honey.

In the examination of 3,398 stomachs of flycatchers the animal food was found to average 94.99 per cent and the vegetable 5.1 per cent. The presence of a considerable percentage of parasitic Hymenoptera in the stomachs of flycatchers appears to be the one thing that makes their service questionable. However, "weighing as impartially as possible the injuries done and the benefits conferred by them, their good qualities outweigh the bad."

The tables giving a summary of the results of the stomach examinations furnish an interesting comparison of the food of the different species. The long lists of identified insects show careful and painstaking work. Although these lists may be overlooked by most of the farmers reading the bulletin, they give the publication a more permanent value than it would otherwise have.—H. C. BRYANT.

A HISTORY OF THE GAME BIRDS, WILD-FOWL AND SHORE BIRDS OF MASSACHUSETTS AND ADJACENT STATES, by EDWARD HOWE FORBUSH, State Ornithologist of Massachusetts. (Issued by the Massachusetts State Board of Agriculture.) 1912; 8 vo, pp. xvi+622, 36 pls., 26 figs.

Of great immediate, practical use in the swelling campaign against the extermination of American game animals, the book under notice deserves warmest commendation. Its purpose is admirably realized in the scientifically accurate tenor of treatment throughout, combined with the logical and convincing sequence of the subjects as presented.

Here we find just the information needed in regard to the history and in some cases direful fate of Atlantic Coast game birds, and from which lessons can be drawn as to how not to treat our Pacific Coast birds. It is too bad that it is impracticable to secure wide distribution in the west, of Mr. Forbush's work, because of the limited edition and local demands for it. If sportsmen and legislators could but acquire some of the knowledge therein made so clear, a long step would have been taken towards securing proper treatment of our game before it is too late.

It is not possible to adequately describe the book in its numerous useful details, in our limited space; but some of our readers may be interested to know that, as long as they last, copies can be purchased at bare cost price plus postage (\$1.40 in all) by addressing the Secretary of the State Board of Agriculture, 136 State House, Boston, Mass.—J. GRINNELL.

THE PHYLOGENETIC VALUE OF COLOR CHARACTERS IN BIRDS. BY WITMER STONE, A. M.

(Journ. Acad. Nat. Sci. Phila., 2nd ser., xv, Dec. 4, 1912, pp. 313-319, pl. 27).

This brief paper is a *multum in parvo* of first-grade philosophic ornithology. We have of late heard a great deal about the meaning of coloration. Mr. Stone recalls the reader's attention from the various concealing and direct-action-of-environment theories, and invites him to consider some facts more easily explained upon grounds of directive or phylogenetic significance.

Whole groups—genera and even families—of birds possess certain color patterns which occur but slightly modified throughout their members. Other features come and go, but a certain color pattern may persist, to no apparent adaptive purpose. Such a feature surely does show community of descent as much as, and in certain cases, more than does position of nostril or proportions of mandibles.

Attention is called to the over-emphasis often given such "structural" characters as compared with color features, this undue emphasis to be observed in parts of our modern schemes of classification. In some cases it is shown that color features prove more dependable taxonomically than the structural characters currently recognized. But the author refrains in this paper from any specific attempt at revising classification.

Mr. Stone shows convincingly that an extremely promising line of investigation awaits the student who will make a special study of the colors and color-patterns of birds, with problems of genetic relationship in view. The reviewer is not, however, quite ready to agree with Mr. Stone that there is more need of search in the direction of resemblances than in that of minute differences. *Both* are of great value, and equally important, though not necessarily of the same sort of meaning. The well-balanced student will neglect neither.—J. GRINNELL.

THE EXPERIMENTAL METHOD OF TESTING THE EFFICIENCY OF WARNING AND CRYPTIC COLORATION IN PROTECTING ANIMALS FROM THEIR ENEMIES. By W. L. McATEE (Proc. Acad. Nat. Sci. Phila., LXIV, September 6, 1912, pp. 281-364).

This work, reviewing critically the literature of such experimentation, is indispensable to students of protective coloration. The main point emphasized, backed up by abundant evidence, is the danger of drawing conclusions from experiments upon animals in captivity, unless the results are carefully compared with what is known about the habits of the same animals under natural conditions. The evidence seems conclusive that animals in captivity do not re-act to the stimu-

lus of food as they do in a wild state. Hence the fact that a given animal is indifferent to, or even rejects, a certain species of insect when in captivity, by no means indicates that it would be indifferent to or reject the same species under natural conditions. Indeed, it has been definitely shown that many "disregarded" and "rejected" species are actually taken by wild animals of the same species as those experimented upon.

The whole doctrine of warning colors and mimicry is built upon the presumption that the species mimicked is disagreeable or dangerous, and hence under the law of natural selection the mimicking species has come to assume the same colors as the one mimicked; this presumption is in many cases unsupported by any evidence, and in many other cases is quite contrary to the known facts. Dr. McAtee's conclusion is that since acceptance or rejection of food in captivity bears no close relation to food preferences under natural conditions, the value of experiments upon captive animals to determine the efficiency of warning colors and other protective adaptations in their insect food is very questionable. It should be checked up with such definite knowledge of the natural food as is obtained by the examination of contents of stomachs or other portions of the alimentary canals. He clearly shows that many species which have been considered to be protected by noxious secretions or other adaptations are not really so protected, a conclusion supported not only by the definite evidence produced by Dr. McAtee, but also by the fact that if such species were not preyed upon by various enemies they would soon people the whole earth. Whether the reader finally agrees with Dr. McAtee or not, he will find in this timely paper much information and food for thought, and by having read it will be better prepared for intelligent consideration of the subject. By no means the least valuable feature of it is the series of bibliographies occurring at intervals under the proper sub-headings.—JUNIOUS HENDERSON.

CONTRIBUTIONS TO AVIAN PALAEOLOGY FROM THE PACIFIC COAST OF NORTH AMERICA. By LOYE HOLMES MILLER (Univ. Calif. Publ. Geol., vol. 7, no. 5, October 12, 1912, pp. 61-115).

The present paper is a detailed summary of our knowledge to date of the fossil birds of the Pacific coast. The accompanying bibliography shows that there have been published eleven separate papers relating to this field of ornithology. By far the most important of these are obviously those of Miller himself who has been fortunate in having full access to the rich material accumulated under the

direction of Dr. J. C. Merriam in the department of palaeontology of the University of California.

Of the eight localities on the Pacific slope, in which fossil birds have been found, six are in California. The most notable of these localities, the now famous Rancho la Brea, near Los Angeles, has produced no less than forty-nine species of birds, with promise of further discoveries as excavations there are continued in the future.

Miller's present contribution includes an account of each of the fossil faunas, with lists of the species known from each. Past distribution as thus shown in the regions concerned is compared with present day conditions. Various lines of evidence point towards a Pleistocene climate of higher temperature and greater humidity than now.

The Pleistocene avifauna contained several types of birds not now found north of South America. There appears to have been a retraction in the ranges of these types to the southward. There were many more species of eagles and vultures in California in Pleistocene times than now.

Among causes of the extinction of raptorial species Miller considers as of probable importance, the disappearance of forests and luxuriant meadow vegetation, and the great reduction in the population of herbivorous mammals. J. C. Merriam's studies indicate the disappearance of many species of carnivorous mammals at about the same time with the raptorial birds now extinct. Dr. Miller believes the coincidence significant of dependence of the scavenging birds upon the beasts of prey, in that the former fed largely upon the discarded kills of the latter.—J. GRINNELL.

AN INVESTIGATION CONCERNING THE FOOD OF CERTAIN BIRDS. By JOHN HAMMOND, B. A. (Journal of Agricultural Science [Cambridge], June, 1912, 4, pp. 380-409).

As a further contribution to a knowledge of the food of the birds of England has come a paper entitled "An investigation concerning the food of certain birds" by John Hammond. This paper gives some of the results of an investigation instituted by Professor Wood and Mr. Warburton of the School of Agriculture, Cambridge, "to determine whether or not certain birds were harmful to agriculture." The method adopted in the investigation was "the examination of stomach contents, together with a collection of field notes concerning each bird."

In beginning the investigation the following points were taken into consideration:

"(1) That the examination of the stomach contents ought to be continued throughout the