

LITERATURE

COMMENTS ON RECENT LITERATURE

Development of Plumage Color Patterns. For the experimental biologist investigating the factors that control the processes of development, a major problem has been the selection of well defined criteria of embryonic differentiation, which, in response to experimental treatment, undergo definite, unequivocal changes. The striking and intricate plumage color patterns of birds, long recognized as important tools by students of speciation and evolution, afford an unexcelled system for the experimental analysis of problems in embryonic differentiation. Willier (1942, 1948) has emphasized the advantages of the feather papilla in this respect: (1) it appears regularly after plucking the feather and is thus readily accessible for experimental study, and (2) it has many characteristics of a developing embryonic organ, for example, axial organization, inductor action, and physiological gradients in response to various stimuli. Willier also has reviewed the recent advances in our knowledge of the genetic and environmental (particularly hormonal) control of development contributed by studies on the differentiation of plumage pigment patterns in the fowl. Most widely studied have been a group of pigments, called melanins, that are probably derivatives of the amino acid, tyrosine, and that range from yellowish brown to black, and that are deposited in the feather in the form of granules by branched pigment cells, the melanophores. These highly specialized cells have their origin in the embryonic neural crest and migrate while in an immature, unpigmented form (melanoblasts) to the feather papillae of the skin. (For extensive review of this phase of the problem, see Rawles, 1948.)

Of the components essential to melanin pigmentation of the feather, only the melanophores have an extrinsic origin. This condition makes it possible to produce feathers which are characteristic, in every respect, of the pigmented breed from which they were derived, except for a complete absence of color. This production is accomplished by transplanting the embryonic limb bud of a pigmented breed, prior to the entrance of the melanoblasts, to the coelom of a White Leghorn embryo, an environment essentially free of pigment cells, where normally shaped, but unpigmented, feathers are formed.

The melanoblasts, under certain physiological conditions as yet poorly understood, invade the feather papille, and are there subject to the action of environmental factors imposed by the growing papillae. The specific response of the pigment cells is, however, governed primarily by their genetic makeup. For example when neural crest cells of one breed are grafted into an embryo of another breed, the resultant color pattern in the host feather invariably resembles that of the donor breed. The analysis of Willier and Rawles (1944) who tested the response of melanophores derived from embryos that have

sex-linked differences in plumage coloration showed that in every instance the kind of response corresponded precisely with the genetic constitution. The response may be uniform in all parts of the body, as in the Black Minorca, or may vary from tract to tract, or even from feather to feather within a tract, depending on the locus of the feather papilla in which the pigment cells occur. However, there is no correlation between the origin of melanoblasts and their differential tract responses. Young pigment cells at all axial levels are identical, as can be seen when they are studied after transfer to ectopic positions. In such experiments the feather color pattern is invariably that of the new position, never of the site of origin. Thus, if melanoblasts of the saddle region are transferred to the wing, the pattern produced is a typical wing pattern. The melanoblast itself, therefore, is not "tract-specific", but is only capable of responding to specific influences of the other components of the feather papilla, and tract differentials must be attributed to regional differences in the physiological characteristics of the papillae. That such differences exist has been shown by injections of female sex hormones into Brown Leghorn capons. In this "estrogen-sensitive" breed, injection of estrogen into the male or capon produces a characteristic abrupt change in pigmentation pattern in the saddle, neck-hackle, and breast regions. The feathers in each region, however, have a distinct threshold of reaction, in that concentrations affecting those in one region may have no influence on those in another. Furthermore, feather papillae within a tract may exhibit an orderly spatial arrangement of response to sex hormones, and in general, the response of the melanoblasts to estrogen is a function of the position of the feather papilla within the tract.

In addition to the melanoblasts, the feather papilla contains 2 components essential to normal differentiation: (1) the dermal papilla is the permanent body of the follicle, without which regeneration is impossible; (2) the epidermal component that, as a result of "induction" by the dermal papilla, produces a new feather. The epidermal component forms anew with each regeneration. In a series of well controlled experiments, Lillie and Wang (1944) and Wang (1943) have demonstrated that the dermal papillae are not tract specific in their organizing action, but that the specificity of response in feather regeneration is due to the specificity of the epidermal component. A dermal papilla of the breast placed in a saddle follicle leads to the formation of a saddle feather, and conversely a dermal papilla of the saddle region placed in a breast follicle induces a breast feather. It would appear, therefore, that the response of melanoblasts to estrogen is conditioned by the properties of the epidermal component of the feather germ. This conclusion has been confirmed by Trinkaus (1948) who further demonstrated that the inability of melanoblasts in young chicks to respond to estrogen is due to an "immaturity" of the epidermis. To show this, it was necessary to combine melanoblasts from an adult (in which they normally respond to estrogen) with epidermis of an immature papilla,

and following their establishment, to test the effects of estrogen. The results are summarized as follows: (1) when melanoblasts of regenerating breast feathers of an adult Brown Leghorn capon are transplanted to the wing bud of a 72-hour White Leghorn embryo, the coloration of the down and pigmentation pattern of the juvenile feathers of the host are typically like those of the donor chicks. (2) Upon administration of estrogen, these melanoblasts show no response, which is in contrast to the marked response of similar melanoblasts to estrogen when in the epidermis of breast feather germs of the adult.

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JAMES D. EBERT

BOOK REVIEWS

Know Your Ducks and Geese. A. H. SHORTT and B. W. CARTWRIGHT. Sports Afield Publishing Co., Minneapolis, Minn. 1948. \$5.00.

This book, a superb example of a combination of art and science, presents excellent portraits of 36 ducks and geese with concise, modern descriptions. For each species there is a 10 x 12 inch colored plate of 1 or more individuals in flight and, printed on glassine paper, there is a small black and white sketch of male and female on the water, a map of the wintering and breeding distribution and a discussion of distribution, migration, food, weights, courtship, and nesting as well as references and a description of various plumages. The book measures 12 x 14 inches and is bound in padded leatherette. The low price is truly amazing in these days. The plates, made from oils or water-colors by A. H. Shortt, are lively, colorful, have splendid backgrounds, and are true to life. The picture of a pair of Cinnamon Teal exploding from the water, and that of the Baldpates settling quietly into the marsh are especially satisfying. The text, written by B. W. Cartwright, is a model of brevity and clarity. The emphasis on courtship and nesting data exemplifies modern studies of ducks. The Wilson Ornithological Club can indeed be proud that two of its members have produced this outstanding contribution.

DAVID E. DAVIS

The American Wild Turkey. HENRY E. DAVIS. Small-Arms Technical Publishing Co., Georgetown, South Carolina. 1949. 319 pages, illus. \$5.00.

For hunters of our finest game bird, this book provides an interesting merger of personal adventures and opinions with the scientific data culled from the excellent research of Mosby and Handley. Much of the book deals with methods of hunting. Concerning conservation of

the turkeys the author emphasizes stocking and control of predators with a bare mention of environmental improvement for turkeys. This book is reviewed here because ornithologists need to be better acquainted with the opinions and problems of the sportsmen.

DAVID E. DAVIS

The Avian Egg. ALEXIS L. ROMANOFF AND ANASTASIA J. ROMANOFF. John Wiley and Sons, Inc. 1949. xiii + 918 pages, 424 figs. \$14.00.

Every serious student of ornithology should examine this book in order to appreciate the vast store of knowledge about the egg of the most abundant bird in the world, the domestic fowl. The ornithologist will be disappointed, however, to find so little about the eggs of wild birds. Indeed, only a few introductory or comparative remarks are included. This discussion of the chickens' egg is divided into 3 parts: morphogenetic expression, biophysicochemical constitution, and bioeconomic importance. From these titles it is obvious that the book emphasizes the physiologic aspects. It is hoped that the appearance of this splendid compendium of information will stimulate an ornithologist to write a book about the eggs of all birds.

DAVID E. DAVIS

Birds in Britain. FRANCES PITT. Macmillan and Co., London. 1949. 576 pages, photographs and 16 colored plates. \$7.25.

Those who wish a simple description of the behavior of British birds will find this book satisfactory. Although the colored plates by Roland Green are rather crowded with an assortment of small birds, the photographs, which are present on almost every page, give a good representation of most species. The first 90 pages of the book describe the structure, distribution, migration, and behavior while the rest of the book discusses the species in familial order starting with the Crows. The material is rather anecdotal and unorganized but does provide a general idea of the species. Detailed indices make information easy to find.

DAVID E. DAVIS

Wildlife Management. Upland Game and General Principles. REUBEN EDWIN TRIPPENSEE. McGraw-Hill Book Co. 1948. x + 479 pp. \$5.00.

The field of ecology suffers from a genuine scarcity of attempts to establish general principles. This book is a serious attempt to present the facts and to develop principles for game management, one of the adolescent offspring of ecology. But unfortunately this presentation merely accentuates rather than satisfies the need for generalizations. The book is divided into sections on farm, forest, and wilderness wildlife which discuss the game species of these habitats. The ornithologist will welcome the summaries of the life histories of pheasants, quail, grouse, and turkeys, especially because quantitative data are brought together in tabular form. The last 2 sections of the book, called Wildlife Relationships and Administration, are a condensation of material which was to be added to a discussion of aquatic wildlife in a second volume. Hence, the treatment is sketchy and oversimplified. For example, the discussion of predation, covered in only 9 pages, completely omits the extensive work on theory of the predator-prey system. While this book will be useful for its accumulation of factual matter, it is hoped that the author will be able to publish the second volume.

DAVID E. DAVIS

High Jungle. WILLIAM BEEBE. Duell, Sloan, and Pearce. New York. 1949. 379 pages, 49 illus. \$4.50.

Beebe, who in the past contributed to the science of ornithology, here describes in simple anecdotal style his everyday adventures with the animals in the Venezuelan Andes. Most of the book is about insects but one chapter describes the courtship of some hummingbirds and another tells about the migration of the Blackpoll Warbler. One is impressed by the ad-

vantages of the use of telescopes from the laboratory windows; indeed, it was seldom necessary to enter the jungle itself. It is a relief to read a book of tropical natural history which avoids the spectacular and usually fictitious episodes with poisonous snakes and man-killing mammals. A list of published scientific papers from the Venezuelan trips, the technical names of the species, and a fair index complete the book.

DAVID E. DAVIS

Bird Hiking. LEON AUGUSTUS HAUSMAN. Illustrations by Harold Minton. Rutgers University Press, New Brunswick, New Jersey. 1948. 5½ x 8¼ in., 107 pp. \$2.00.

Dr. Hausman, recently the author of several bird books including 2 guides (*Field Book of Eastern Birds* and *Beginner's Bird Guide*) has now written this attractive little volume to encourage bird hiking. According to him, bird hiking "is measured, not by the number of miles covered, but by the number of birds seen, or by the number of interesting experiences with birds—or other forms of life or natural objects—that have been enjoyed."

In 5 successive chapters Dr. Hausman tells in earnest detail, sparked with quiet humor, where to go on bird walks, what to wear and what to take by way of essential equipment, how to get close to birds and watch them, when to search for birds, and how to identify birds and become familiar with their habits. In another chapter he explains the desirability and methods of collecting bird nests deserted in the fall and winter. The final chapter is concerned with recommendations of books that will provide the bird hiker with up to date information on birds and other natural history subjects to be encountered.

The book is directed to beginning, or potential, bird hikers, not to experienced field ornithologists. Hence it is necessarily elementary,—an approach which is a virtue rather than a detraction. We have here an excellent supplement to many bird manuals and guides which too often ignore some of the simple pleasures and fundamental techniques of bird finding and study on the assumption that they are too obvious, when to beginners they are not obvious at all.

OLIN SEWALL PETTINGILL, JR.