

## REVIEWS

**Biology and Comparative Physiology of Birds. Volume I.**—Edited by A. J. Marshall. 1960. Academic Press, New York and London. xii + 518 pp. \$14.—The motivation for the production of this book is admirably stated by the editor in his preface. "I had become extremely bored with the frequent need to go back to the Victorian or Edwardian literature, or to translate from another language, whenever I wanted a relatively simple piece of information about a muscle, bone, the blood, gut or sense organs of birds." American readers, although perhaps not identifying dated literature by a sovereign of the period, have certainly shared the editor's exasperation and will be grateful that his boredom was turned to such good account. When volume II is published, A. J. Marshall will have given us, for the first time in this century, a reasonably complete and up-to-date account in English of the biology of birds.

I see little merit in comparing in detail this reference work with those of other eras or in other tongues. There will always be much to admire in earlier compilations, but there have been enormous advances in knowledge (particularly in physiology) since their time. And doubtless only a handful of the readers of this journal are proficient enough in French, German, or Russian to use with complete facility the recent or relatively recent source books in those languages. In this review, then, I will attempt to evaluate the work as though it were unique—which in some respects it is.

Volume I consists of 12 chapters dealing with the origin, adaptive radiation, classification, distribution, embryology, and various organ systems of birds. Each chapter exhibits a high level of scholarship, and I will give at the outset a blanket endorsement in the form of a paraphrase—every chapter is good, but some are a little bit better than others. There is a different author or pair of authors for almost every section, and this makes it advisable to consider each part separately. If some of the criticism seems picayunish, the reader is asked to bear in mind my comments on the over-all excellence of the entire work.

I. The Origin of Birds, by W. E. Swinton, provides a fine, concise summary of the characteristics of *Archaeopteryx*, its presumed antecedents, and the possible stages in the evolution of avian attributes. There is also some mention of the Cretaceous *Ichthyornis* and *Hesperornis*, but it is not clear whether the author believes that both were toothed, or just *Hesperornis*, or neither. The basis for questioning the presence of teeth in *Hesperornis* is not given.

II. Adaptive Radiation in Birds, by R. W. Storer, is an expert coverage of the major adaptive trends in birds from the Mesozoic to the present. Well-chosen illustrations complement this remarkably succinct treatment of a complex and extensive subject.

III. The Classification of Birds, also by Storer, includes a brief discussion of "adaptive radiation" in taxonomists from Linnaeus to the present, expressed in a reasonable and objective manner. There follows a classification of both fossil and recent birds down to the family level, with a nontechnical characterization of each family. These "thumb-nail sketches" also include "the geographic range, the number of species and genera, the known geologic range, and occasional comments on the relationship of the family where this is not implicit in the classification itself." The arrangement follows what Storer considers the best parts of the classifications of Wetmore (1951), Mayr and Amadon (1951), and some proposed changes based

on more recent data. There are no really radical departures from the systems most familiar to American ornithologists, but such changes as have been suggested are mentioned and some are adopted. *Archaeornis* is retained as a distinct genus (*contra* Swinton); the flamingoes are placed in a separate order; *Chamaea* is included in the Timaliidae; the "Fringillinae-Carduelinae" are considered to be ploceids; Beecher's division of the "Coerebidae" among the Parulidae and Thraupidae is recognized, and the arrangement terminates with the family Emberizidae—"buntings, New World sparrows, cardinal grosbeaks."

IV. Geographical Distribution of Living Birds, by D. L. Serventy, gives another well-balanced summary of present knowledge, and controversial and unsettled points are discussed. The number of widespread families of land birds that have not reached Australia may seem surprising to Neogean readers, but then the list of families absent from the Neotropical region will probably seem less surprising to such readers than to the Australian author. A noteworthy feature is the inclusion of data on the distribution of marine birds, a topic often neglected by zoogeographers.

V. Development of Birds, by Ruth Bellairs, will be especially welcome to ornithologists who have had little contact with embryology since taking an undergraduate course in that subject. The author opens with pertinent questions as to why birds have never developed viviparity, and after a suggested answer proceeds with a compact history of avian embryological studies. Then there is a detailed account of development from the fertilized egg through early stages of all the organ systems. Numerous illustrations aid in the visualization of these processes. Among the many useful parts of this chapter are the discussions of inductive processes in the bird (instead of the better-known amphibian) and the utilization of yolk by the developing embryo. Most of the data are necessarily derived from the domestic chick. One can appreciate the need for working with such an easily available form on reading of the technical difficulties faced by experimental embryologists. For example, studies on the effect of removal of the pituitary may give uncertain results as the gland is removed by decapitation of the embryo. The author dutifully notes (p. 179) that headless embryos, although living, are incapable of hatching because of the absence of the egg caruncle.

VI. The Integumentary System, by M. E. Rawles, deals principally (as it should) with feathers. On the subject of their development, growth, and pigmentation the author is on sure ground, and she provides the best available summary of these processes. There is some evidence, though, that the author's familiarity with birds is more or less restricted to the domestic fowl. One of the valuable aspects of this chapter is that it points up the need for analysis of the control of pigmentation in more and different avian species.

VII. The Skeleton of Birds, by A. D. A. Bellairs and C. R. Jenkin, includes in the opening paragraph the observation that "one has the impression that knowledge of the subject [avian osteology] was much more widespread during the nineteenth century than it is at the present time." The authors' treatment of the skeleton needs no apologies to past centuries, for their discussion manages to be general, detailed, and comparative. There are many excellent illustrations. If there is some emphasis on the skull, it must be admitted that this is a most complex part of the skeleton. Apart from a brief section on the use of the bony palate in classification, there is little reference to osteological studies in relation to systematics. Although the unusual hyoid specializations of woodpeckers are deservedly admired

(p. 279), there is no mention of the similar developments in hummingbirds. The complexities and open questions regarding skeletal pneumaticity are of special interest, and it is regrettable that reference to some of the most successful recent techniques (such as Tompsett, 1957, *Ibis*, 99: 614-620) could not be included. The authors' justifiable nostalgia for the anatomical expertise of the nineteenth century may be unconsciously responsible for the frequent use of Edwardian or other obsolete scientific names—references to *Plotus*, *Parra*, *Palamadeca*, *Tinnunculus*, etc. could surely have been brought up to date by a little checking. None of these minor criticisms really detracts from the over-all excellence of treatment.

VIII. The Musculature, by A. J. Berger, is a predictably expert descriptive account, with thorough attention to important details and with excellent illustrations. The discussion is largely restricted to the major skeletal muscle groups, particularly those associated with the appendages. Readers will share the author's regret that space limitations did not permit any detailed interpretation of phylogeny and relationships as suggested by myology. The presence or absence of certain muscles or patterns of attachment in totally unrelated forms (for examples, see pp. 331 and 333) may dismay the nonanatomist, but it makes him even more eager for a discussion of the functional significance, if any, of these similarities and variations.

IX. The Blood-Vascular System, by J. R. Simons, is short and almost entirely anatomical. There is a detailed treatment of the heart, descriptions of the position and function of the major blood vessels, and a list of the kinds and characteristics of different blood cells. Except for the account of the carotid arteries, there is no indication of how much variation (if any) there is in the pattern of major vessels in different avian groups. Kern is given as the source of the drawings of the heart, but his work is not listed in the bibliography at the end of the chapter. If the paucity of physiological information on the avian circulatory system is as great as this chapter suggests, there is indeed a vast and scarcely touched field open for investigation. One example: what are the characteristics of avian cardiac muscle that permit heart rates of 1,000 per minute?

One other question—when the author of a review paper such as this finds the data of two contemporary investigators in glaring conflict (p. 346), should he not consult both authors and attempt to find an explanation? This would be of much greater profit to the reader than the mere pointing out of a striking discrepancy.

X. The Respiratory System, by G. W. Salt and Erik Zeuthen, is long and thorough, treating anatomy, respiratory mechanics, nervous control, and physiology. There is a mine of good information and discussion here, bolstered by ingenious calculations. This chapter will be one of the most useful to avian physiologists as the authors have interpreted respiration broadly and their coverage is correspondingly wide ranging. They have also given additional cause for biologists to marvel at the career of William Harvey, whose publications as cited here span just over 300 years (1651 to 1952).

XI. Digestion and the Digestive System, by D. S. Farner, must be singled out both for its high quality and its comprehensiveness. This chapter is a veritable encyclopedia on avian digestion and represents an astonishing coverage of more than two centuries of world literature as well as the author's own research. If desperate to find something to criticize, one may suggest that pellet-forming and disgorging deserve more than bare mention (p. 433), and that *Colymbus* (p. 446) is used as a generic name (as it is in several other chapters). Like the preceding one, this chapter will be particularly valuable to avian physiologists.

XII. Excretion, by Ivar Sperber, covers the gross and microanatomy of the kidney and especially its functioning. Those who take their physiology straight will perhaps be more enthusiastic than those who would prefer an attempt to relate the specializations of avian renal function to the needs of the bird in nature. Still, one should not cavil at so authoritative an account of a complex system that does not fall easily to investigation, and ecologists can be thankful for the rich source of basic information provided. A little more elaboration at some points would be helpful to the general reader—the significance of the mitochondria in the tubule cells (p. 474), or the form in which material excreted as semisolid uric acid is transported across cell membranes are two examples that come to mind. There is apparently some disagreement between Simons (p. 357), who considers the renal portal system not significant as such, and Sperber (p. 478), who seems to feel that it is. The chapter concludes with mention of the recently discovered extra-renal salt excretion by the nasal gland in marine birds.

A few general comments are in order in conclusion. The frequent use in various chapters of obsolete scientific names is a minor but unnecessary flaw. Although the syrinx merits detailed attention, it receives only brief mention in the sections on musculature and on respiration; apparently this organ was not considered a special responsibility by any of the authors. The illustrations are invariably well executed and helpful, and the bibliographies at the end of each chapter would alone constitute a valuable contribution. The volume as a whole is a landmark in twentieth-century ornithology, and everyone seriously interested in avian biology should familiarize himself with this book. A. J. Marshall and all the contributors are to be congratulated, and ornithologists everywhere will hope for the early issuance of volume II.—THOMAS R. HOWELL.

**Vogeltek.**—4th Edition. G. J. van Oordt. 1960. E. J. Brill, Leiden. xi + 195 pp., 44 figs. ca. \$3.00.—Eleven years have elapsed since the publication of the third edition of this very useful general treatise of migration. These 11 years constitute a period of extensive advances in research on migration, especially from the aspects of orientation and metabolism. These advances in our knowledge of migration have been sufficiently incorporated in this new edition to maintain its position as the best general nontechnical treatise of migration. The first chapter (pp. 1–18) deals primarily with generalities and definitions and is essentially the same as in the previous edition. The second chapter (pp. 21–94) presents the various empirical aspects of migration—migratory routes and schedule, contributions of banding investigations, day and night migrants, invasions, broad-front and restricted-front migration, etc. This chapter has been extensively rewritten and its illustrations improved. The third chapter (pp. 95–112) reviews the difficult and controversial subject of the influence of meteorologic conditions on migration, with attention primarily to wind and temperature. Clearly in the more typical spring and fall migratory patterns we are confronted with the superposition of weather-induced influences on the more basically established internal changes that exert the compelling tendency to migrate. Included in this chapter also are reverse migration, late-summer movements, and the so-called *vorstvlucht* of Vleugel associated with food shortage in very cold periods. The fourth chapter (pp. 115–132), with its semantically unsatisfactory title, *Het Trekinstinct*, is concerned largely with the physiologic basis of the migratory state and with the stimulation and timing thereof. As in the previous editions, the author has included this chapter in the *Theoretisch Gedcelte* of the book. In a number of ways this chapter is not up to the standard

of the other chapters, although I do sympathize with the author in the difficulty of effecting a satisfying analysis of the almost explosive number of pertinent publications of the past decade. It is my feeling that there is now sufficient knowledge at hand so that these matters need be regarded as no more *theoretical* than most aspects of the effect of weather on migration. The final chapter (pp. 133-171), also included in the *Theoretisch Gedeelte*, is concerned with orientation in migration. It has been extensively rewritten in light of recent research and presents a sound synthesis of the known orientation and homing abilities of birds (young and adult), the empirical experiments that define these abilities more precisely, and the more recent experiments that delve into the mechanisms involved. This revision of *Vogeltrek* allows it to continue to be the best general treatise on bird migration; an English edition would be of very great importance in extending its usefulness.—D. S. FARNER.

**The Birds of Finca "La Selva," Costa Rica: A Tropical Wet Forest Locality.**—Paul Slud. 1960. Bull. Amer. Mus. Nat. Hist. vol. 121, art. 2, pp. 49-148; maps, text figs., photo. pls. \$2.75.—This is a welcome ecological study of the birds in an area of 1,500 acres in the northeastern lowlands of Costa Rica. After previous experience in that country, the author spent a full year in the selected area observing the birds, in preparation for this doctoral dissertation submitted to the University of Michigan. A preliminary review of the local environment and habitats and of foraging habits introduces the more detailed information. An annotated list indicates the habitat niche of the 331 species observed, their seasonal status and abundance ("common," "uncommon," "rare"), and whether occurring alone, in pairs, or in groups. A separate ecological classification lists the species in each habitat, subdividing the major habitats into convenient vertical strata. Included are comments on the foraging behavior of many species. A table of migrants shows the months of observation in the area. Considering the paucity of information on neotropical birds, all this is especially useful to the increasing body of students of this rich avifauna.

General readers will find the final section of the work controversially thought provoking and interesting. The author takes issue with the emphasis on a hypothesized former independent "North American tropical fauna" as a source of North American birds. He argues that since ancient times the neotropical region, centering in tropical South America, has been a reservoir and fount of the American avifauna. Advances and retreats of neotropical birds into peripheral areas (including North America) have depended on fluctuating climatic cycles, which directly affected vegetation on which birds depend. He also vigorously attacks the notion that the American suboscines (Tyranni) are competitively inferior to and are being replaced by the oscines (Passeres). Using a comparative table, he urges that while the proportion of suboscines to oscines decreases as one leaves the Amazonian center of the neotropics (where two-thirds of the Passeriformes are suboscine), the suboscines are not replaced by oscines, but rather the total of species is reduced. The suboscines, he finds, are primarily birds of the humid tropical forest, and the extent (as well as the complexity) of this environment, with its variety of niches, is markedly reduced as one proceeds northward and southward. This reviewer agrees with the author that the American suboscines show no competitive disadvantage. In the Neotropical Region (and to some extent in North America) they maintain themselves in niches occupied in the Old World

by oscines. It is an interesting fact, however, that although many suboscine tyrannids and furnariids have adapted to open, and even terrestrial, environments, the great majority of the suborder remain predominantly insectivorous (though some, particularly in the Cotingidae, are mainly frugivorous). Despite the wide extent of grassland in the neotropics, there seem to be no *essentially* granivorous suboscines; the seed-eating niche is left to the oscines even in South America. There is no evidence that suboscines ever occupied that niche, but their failure to do so may indicate that their adaptive potential is less than that of the oscines. Slud's well-written and stimulating discussion serves as a needed counterpoise to the tendency of northern ornithologists to forget that for birds, as for insects and plants, the temperate zones are submarginal areas.—E. EISENMANN.

**Vergleichend morphologische Untersuchungen am Vorderhirn der Vögel auf cytologischer und cytoarchitektonischer Grundlage.**—Werner Stingelin. 1957. Helbing and Lichtenhahn, Basel, Switzerland. 123 pp. 32 figs.—Stingelin has produced a beautiful monograph on the avian forebrain. One of his main interests is the study of homology, and he discusses from a number of angles whether or not the forebrain of the bird contains a structure homologous to the neocortex of the mammal. In an earlier publication (1955) he answered this question with a definite affirmative. In this more extensive monograph, after collaboration with Haefelfinger (1958) on embryological aspects of the problem, he has considerably modified his conclusions.

Some investigators, like Kappers, have not taken much interest in comparing the brains of different families of birds because there is less difference in surface anatomy among birds than among different mammals. The extensive uniformity of avian brains seemed to make it unlikely that one would get anything out of a study of the cyto-architecture. But Stingelin, working in Portmann's laboratory in Basel, was impressed with the latter's quantitative work on the bird's forebrain, which gave an index of cerebralization. This index has important bearings on two other main subjects of the book: evolutionary development and the rank order of intelligence of different kinds of birds. Because the forebrain is composed of variable elements, the index can be used only as a general expression of the degree of development of the nervous system. Therefore, Stingelin believes that the different parts of the forebrain must be analyzed quantitatively. He adds that the comparison of the external form and the cyto-architecture of the forebrain (on the one hand) with its size (on the other hand) is an especially rewarding endeavor. The solid forebrain of birds has fundamentally different evolutionary possibilities from the flat, cortical structure of mammals. In birds one does not look for convolutions, but observes the sculpture of the mass and the complex integration of the different parts of it, as well as its cytological differences and histological relationships. He thus introduces his objectives and goes on to present his evidence, based on the brains of 51 species of birds of 11 different orders. Twenty-five of these were cut in serial sections.

Stingelin's most important contribution is found in Part III, "The Differentiation of the Hemisphere." Here he describes and illustrates with many fine figures the fact that the ganglia that make up the striatum vary greatly in size, position, and cell structure in different families of birds. It has long been known that the hemispheres of the forebrain consist almost entirely of large basal ganglia, which collectively have usually been called "striatum." The principal ganglia are paleostriatum, archistriatum, neostriatum, hyperstriatum (ventral, dorsal and accessory),

the nucleus intercalatus, and the nucleus basalis. In addition there is a well-developed hippocampus (archicortex) and three corticoid areas, which are poorly developed and superficial. The degree of differentiation of these ganglia, corticoid areas, and the hippocampus is certainly variable and must have important implications. The variation is least in the paleo- and archi- and most marked in the neo- and hyperstriatum, especially in the "Wulst," which is composed of *hyperstriatum accessorium and dorsale* and *n. intercalatus*. The author believes that the study of the integration of the different parts of the telencephalon is the way to throw light on the evolutionary development of the avian brain. In order to compare the forebrains of different species more effectively, he makes a serious, though complicated attempt at quantitation. This is difficult to do because it is hard to choose the elements to be measured, and hard to make objective measurements.

The attempts at quantitative analysis seem to this reviewer to belabor the problem. They do not show as much as the drawings. The one thing brought out clearly is that there is little difference among species in the phylogenetically older ganglia and more in the more recent ones.

Obviously the difficulties of comparing the ganglia of one species with those of another are great, especially when one tries to measure the size of a ganglion and the size and concentration of nerve cells. In addition, the author rightly points out that in each bird the size and position of a ganglion must be compared with a more constant part of the brain. Accordingly he takes Portmann's brain stem (*Stammrest*) as a relatively stable topographical basis and on this builds a model of a primitive avian brain (*Grundtypus*) with which he compares 18 different species. A parrot (*Amazona ochrocephala*) and a crow (*Corvus frugilegus*) are described at length as two very differently constructed, but highly developed types of forebrain, illustrating convergent evolution. In comparing a highly developed brain with the "Grundtypus," the following main features are important: (1) Increase in size of the hemispheres; (2) Reduction of olfactory bulb; (3) Decrease of archi- and paleostriatum; (4) Caudal shift of lateral ventricles; (5) Reduction of nucleus basalis; (6) Enlargement and differentiation of *Wulst*; (7) Reduction of area praepyriformis. The systematic comparison of these seven points shows that convergent evolution can take place from a behavioral standpoint with quite different types of organization of the striatal ganglia. *Amazona* is greatly changed in the fronto-parietal area, but in the basal parts resembles the "Grundtypus," while *Corvus* is strongly developed in the basal and frontal parts, but in the occipito-parietal parts is relatively archaic.

In the chapter entitled "Comparison and Extent of Striatal Fields" (pp. 33 to 70), there is a comparative description of the ganglia in 18 species with clear diagrams of each. In the "developed" species there is a tendency to marked frontal enlargement. This is achieved in two ways: A. The frontal pole is made up of the *Wulst*, the rostral end staying in contact with the *Bulbus olfactorius*. B. The frontal pole is made from the neostriatum and ventral hyperstriatum, the *Wulst* having reached a position on the vertex by successive caudal shifts. In both A and B as the *Wulst* becomes larger, there is a more-conspicuous differentiation of the cells in the ganglia. From these important observations Stingelin deduces a morphological rank in relation to the "Grundtypus." This concept is elaborated in Part IV, "The Analysis of Form." In developmental line A, crows and owls are considered the more highly developed groups; in line B, the higher ones are snipe,

spoonbill (*Platalea*), and parrot, with a plover considered as "lower" and the lapwing as "middle." This rank order seems to be entirely based on cerebral anatomy; no mention is made of body posture, cerebral axis, anatomy of the skull or behavioral criteria.

In Section IV, "The Analysis of Form," there is a chapter on "Form and Sculpture" (pp. 87-109), in which is described and illustrated by beautiful photographic plates the surface anatomy (dorsal, lateral and ventral) of 43 species from 11 different orders. Here is an atlas of great value.

Under "Discussion of Results" (pp. 109-119) the author gives his theories about the evolution of the bird's brain. He emphasizes the importance of new structures such as the *Wulst*, which in the lizard *Varanus* shows only a primordial anlage. He also points out that the differentiation of the reptilian neostriatum into the avian neo- and hyperstriatum is a new development, along with the *Nucleus intercalatus*, which goes through an extraordinary differentiation. He states that his cyto-architektonic analysis has led to the formulation of laws of construction that make possible the classification of the types of hemisphere into two divergent directions of evolution, "A" or "B." When the observed forms do not seem to fit the proposed evolutionary sequences, he explains the discrepancies by the concept of vertical modification (makro-evolution) as contrasted with horizontal modification (mikro-evolution).

The presentation in this book fills the need for a systematic description of the construction of the avian cerebral hemisphere. The evolutionary and taxonomic implications of the work may be of some importance, but need verification through more cytological studies to clarify the homologies.—STANLEY COBB.

**Ptitsy SSSR. Tom. IV. [Birds of the USSR, Part IV.]** L. A. Portenko. 1950. Zoological Institute of the Academy of Sci. USSR., Moscow. 414 pp. 24,85 Rub.—This volume deals with the remainder of Passeres, the XXth order of birds, thus being the final volume on Passeres. There is a key to the families of Passeres in USSR. It includes the following families: Sylviidae, Regulidae, Muscicapidae (subfamilies Muscicapinae and Monarchinae), Prunellidae, Motacillidae (subfamilies Motacillinae and Anthinae), Bombycillidae (subfamily Bombycillinae), Laniidae (subfamily Laniinae), Sturnidae, Zosteropidae, Parulidae, Ploceidae (subfamily Passerinae), Icteridae, Fringillidae (subfamilies Fringillinae, and Carduelinae), and Emberizidae.

There is a supplement to Part III, an index of Russian and scientific names as well as of synonyms. In each family there is a key to the genera.

The relatively numerous nomenclatorial changes, based on extensive material in collections, are not in accordance with Wetmore's system. Some examples: genus *Carpodacus* has been divided into *Rubicilla* f. r the red holarctic and *Erythrura* for the rose Asian species. The former *Carduelis spinus* is separated into genus *Spinus*, the Linnets into genus *Linaria*, etc. The descriptions and keys are good, as are also the drawings.—F. J. Turček.

**Der Flug der Tiere.**—Edited by Herta Schmidt. 1950. Verlag Waldemar Kramer, Frankfurt am Main. 164 pp., 174 illus.—In conjunction with the Internationale Luftschiffahrts-Ausstellung in Frankfurt am Main in 1909, the Senckenbergische Naturforschende Gesellschaft presented a display, "Flugorgane der Tiere und Pflanzen," on biological flight. On the fiftieth anniversary of this exposition a special display, "Der Flug der Tiere," was presented in the Senckenberg Museum.



This was accompanied by a similarly named number of the Museum's popular journal *Natur und Volk*, which has been revised and enlarged into this book. The result is a most useful small volume on the biology of flight. The initial chapter by Dr. Wolfgang Struve is concerned primarily with the evolution of flight in aquatic animals, insects, reptiles, birds, and bats. This is followed by a most useful chapter on flight in insects by Dr. Elli Franz, an excellent chapter on flight in birds by Dr. Joachim Steinbacher, and a most interesting discussion of flight in bats by Dr. Heinz Felten. All three of these chapters present the empirical and mechanical aspects of flight, although, in general, the problems of energetics and control are not considered. The book closes with brief chapters on the aerial movements of amphibians and reptiles (Professor Dr. Robert Mertens), thread-spinning spiders (Dr. Otto Kraus), and "flying" aquatic animals (Dr. Wolfgang Klausewitz). The book is replete with useful and well-chosen illustrations.—D. S. FARNER.

**The Christopher Happoldt Journal; His European Tour with the Rev. John Bachman (June-December, 1838).**—Edited by Claude Henry Neuffer. 1960. Contributions from the Charleston Museum XIII. 214 pp. + unpagged index. The Charleston Museum, Charleston, S. C. \$5.00.—In 1838 John Bachman, preacher, civic leader, and distinguished naturalist, left his adopted city of Charleston and toured Europe, ostensibly for his health. Whatever the effects of seven months of hard work and harsh travel, the tour resulted in the diary of Christopher Happoldt, a 14-year-old Charlestonian, who accompanied Bachman. Bachman's own record of the trip was unfortunately destroyed in the burning of Columbia near the end of the Civil War.

This work consists of three parts. A biographical sketch of Christopher Happoldt himself occupies 12 pages. Then comes a pleasant surprise that the reader is totally unprepared for by the title, a biography of John Bachman filling 90 pages. The remaining 95 pages of text are taken up with an annotated transcription of Happoldt's diary.

Neither the biography of Happoldt nor his journal is of much value to the naturalist, although they are admirable in their own way. The meat of the book is the point where Professor Neuffer leaves off being editor and becomes the author of the biography of John Bachman. This is the only serious recent effort at the full-length story that Bachman so richly deserves. Neuffer acquaints us with the major printed sources of information on Bachman and quotes freely from unpublished Bachman letters in the Charleston Museum. A fine portrait of Bachman is included.—DANIEL MCKINLEY.

**Symposium on Energy Balance.**—*The American Journal of Clinical Nutrition*, 8 (5): 527-774. 1960. The American Journal of Medicine, Inc., 11 East 36th Street, New York.—This number includes the papers and discussions of the Symposium on Energy Balance, organized by Jay Tepperman and John R. Brobeck, and sponsored by The Upjohn Company, at Brook Lodge, Augusta, Michigan, in September 1959. The symposium was concerned basically with problems of energy intake, appetite, and most extensively with fat deposition and fat metabolism. There were 28 formal papers, accompanied invariably by extensive discussions. Of direct interest to ornithologists is "Premigratory hyperphagia in birds," by Eugene P. Odum. This paper summarizes well our knowledge of the nature of premigratory fat deposition and relates this knowledge to the general problem of fat

deposition in animals. Beyond this paper, however, the serious student of the physiology of migration will find much of importance to aid in his thinking and planning of experiments. These include papers on such subjects as effects of glucagon on metabolism, appetite and satiety, mechanism of fatty acid synthesis, metabolism in adipose tissue, and hormonally induced obesity.—D. S. FARNER.

**Das Tierreich. VII/5. Vögel.**—Hans-Albrecht Freye. 1960. Sammlung Göschen, Band 869. Walter de Gruyter, Berlin. 156 pp., 69 fig. D.M. 3.60.—As a condensed general review of the biology and systematics and biology of birds, this little volume is remarkably good. Indeed it is difficult to imagine how it would be possible to do more in the same number of pages. The shortcomings are primarily those of excessive condensation. The treatments of skeleton and integument are perhaps the most effective, whereas that of the endocrine system is relatively weak. The systematic section (pp. 103–145) recognizes 32 orders.—D. S. FARNER.

**The Birds of West-Central Ellesmere Island and Adjacent Areas.**—David F. Parmelee and S. D. MacDonald. 1960. National Museum of Canada, Bull. No. 169, 85 pp. 2 figs., 10 plates. \$1.50.—This is an important contribution to the breeding biology of the birds of Arctic North America. It is based on studies by the authors during the period of 16 April–27 September 1955. The extensively annotated list contains 23 species, of which 20 had been previously recorded; nests of 15 species have been recorded. The observations and specimens obtained are carefully related to previous investigations in this and other areas of the American Arctic.—D. S. FARNER.

**Hypothermia and the Effects of Cold.**—A. S. Parkes, Editor. *British Medical Bulletin*, Vol. 17, No. 1, 73 pp. 65 Davies Street, London, W. 1. \$3.25.—This number consists of 18 review papers, which cover a very substantial fraction of the aspects of this interesting field. Seven of the authors are Canadian; the remainder are from the United Kingdom. Of particular interest to biologists are "Resistance of Poikilothermic Animals to Cold," by R. W. Salt, "Hibernation in Mammals and Birds," by L. Harrison Matthews, "Physiological Effects of Continued Cold on Animals and Man," by J. S. Hart, and "Biochemical Changes in Exposure and Acclimation to Cold Environments," by F. Depocas. Collectively, these reviews contribute much to an understanding of the physiologic requirements for existence in low temperature and the kinds of changes and adaptations that occur with hypothermia. There is unfortunately a pronounced bias toward English-language literature. Nevertheless, this is a most useful collection of reviews, and the *British Medical Bulletin* is to be commended for its insight and efforts in assembling and publishing it.—D. S. FARNER.

**Bird-Banding. Index to Volumes XII–XXI. 1941–1950.**—Margaret B. Hickey. 1960. Published by the Northeastern Bird-Banding Association with the assistance of the Eastern Bird-Banding Association and the Inland Bird-Banding Association. Available from Mrs. James B. Downs, South Londondery, Vermont. iv + 247 pp.—This index is indeed an important contribution to ornithological literature. It makes more readily available the important original papers and notes in this journal; furthermore, because the reviews also have been indexed, it will be useful as an index to much of the important ornithological literature of the world for this period. Entries are made by geographic localities, subjects, species,

and authors. Mrs. Hickey is to be commended for this important contribution to ornithology.—D. S. FARNER.

**Binoculars and Scopes and Their Uses in Photography.**—Robert J. and Elsa Reichert. 1961. Modern Camera Guide Series, Chilton Company, Book Division, 56th and Chestnut Sts., Philadelphia 39, Pennsylvania. 128 pp., 55 figs. Paper, \$1.95; cloth, \$2.95.—This is an amazingly well-conceived nontechnical discussion of binoculars and scopes with primary attention to their construction, functional features, performance, operation, and care. I cannot overemphasize its potential value to anyone who has, or plans to procure, such an instrument, since only a minute fraction of ornithologists, amateur or professional, are really adequately informed in such matters. This little book provides the benefit of much important experience gleaned from many years of operation of the well-known Mirakel Optical Company.—D. S. FARNER.

**Bucerotidae (Aves/Upupae).**—Kurt Sanft. 1960. *Das Tierreich*, Lieferung 76: 1–174. Walter de Gruyter, Berlin. 106 fig. DM 3.60.—As throughout *Das Tierreich*, this treatise is primarily systematic with limited introductory material on the distinguishing characteristics, anatomy, ecologic adaptations, food, breeding habits, molt, parasites, and evolution of the hornbills. The systematic section (pp. 11–137) is provided with keys, tables of measurements, diagrams, and maps. The author recognizes 14 genera, 44 species, and 76 subspecies as compared with the 12 genera, 46 species, and 87 subspecies recognized by Peters (*Birds of the World*, Vol. 5, 1945). The major change in this monograph, aside from the smaller number of subspecies accepted, is the restoration of *Tropicranus* W. Sclater for the West African species, *albocristatus* Cassin, and *Rhyticeros* Reichenbach for a group of oriental species—*leucocephalus* Vieillot, *corrugatus* Temminck, *cassidix* Temminck, *undulatus* Shaw, and *plicatus* J. R. Forster. Of very substantial value is the list of ecto- and endoparasites (pp. 5–11). This is a commendable and most useful monograph.—D. S. FARNER.

**Birds of North Carolina.**—T. Gilbert Pearson, C. S. Brimley, and H. H. Brimley. Revised by David L. Wray and Harry T. Davis. 1959. North Carolina Department of Agriculture, State Museum Division, Raleigh. xxvii + 434 pp., 97 figs., 47 plates (many in color). \$5.00.—This book was first published in 1919 and revised in 1942. The present revision is largely a reprint of the 1942 edition with some minor deletions and the addition of several new plates by Roger Tory Peterson. For most species a short paragraph has been appended giving recent observations compiled by the revisers. Twelve new "kinds" of birds have been added to the state list since the last edition. Although it is stated that the present edition is up to date for 1959, one notes the use of certain generic names not applicable according to the latest A.O.U. *Check-list*; viz, *Colymbus*, *Cygnus*, *Pelidna*, *Ceophloeus*, *Dryobates*, *Otocoris*, and *Corthylio*. However, in general, the terminology is quite up to date. The high quality of paper, binding, text, and illustrations combine to make this one of the best bargains in bird books in many years.—G. E. HUDSON.