REVIEWS

A Comparison of Bird Populations upon "Industrial" and "Rural" Farmland in South Wales.—Bruce Campbell. Cardiff Naturalists' Society's Reports and Transactions, 81: 4–65, 1950–1952.—This publication, a shortened version of a doctoral thesis, represents a great deal of careful, conscientious effort. It is well thought-through and well organized; it is presented with clarity and preciseness. Its central theme, not to mention various of its facets, is marked by originality in that the author selected a type of problem which had not been investigated before. To use Campbell's words—"it can be stated with some confidence that no previous comparison between the bird populations of farmland in close proximity to industrial development (. . . 'industrial farmland') and of farmland in a rural environment (. . . 'rural farmland') has been attempted in Britain; nor can any reference to such study elsewhere be found in the accessible literature."

The study opens with rather full descriptions of the general setting of the problem, including, among other features, a review of the literature on bird population studies and an account of the industrialization of South Wales. The author's field work, which began in 1944–45 and carried through 1945–46 and 1946–47, involved considerable areas (shown by a map) in the eastern part of the South Wales coalfield. The methods used in estimating populations of birds are set forth and are subjected to critical discussion. Both the breeding and winter populations were estimated in selected study areas or sample blocks, each being 100 acres in extent. Four blocks were located in industrial farmland (A^i, B^i, C^i, D^i) and four others, serving as controls, were located in rural farmland (A^r, B^r, C^r, D^r). The "i" blocks represented four types of farmland at different altitudes (each including a farmhouse and its surrounding buildings); suitable control blocks, with freedom from industrial influence being the main variable, were found albeit with some difficulty. Censuses of breeding populations were taken by essentially the same procedure that is followed by contributors to *Audubon Field Notes*. Winter-bird counts were somewhat less accurate and pertained to "visible populations," for which average figures were based on data gathered during at least eight visits or coverages (between late October and early April). Summaries of densities (arranged by year, block-designation, species, and family-group) based on breeding-bird censuses, expressed as number of pairs per block, and winter counts, expressed as number of individuals per block, are furnished in extensive tables.

Let us single out a few of Campbell's findings. From breeding-census data it was determined that "r" populations were greater than "i" in 1946 but that this tended to be reversed in 1947 after a period of severe weather. Considering all species (residents and summer visitors), the grand averages for 1946 and 1947 were 80.0 pairs per 100 acres in "i" blocks and 100.5 pairs per 100 acres in "r" blocks. In both "i" and "r" the two commonest nesting species were the Chaffinch and Blackbird. The author states that "it is likely that fewer species breed on industrial than on rural farmland." This difference is due in large part to a group of "highly tolerant or adaptive species" which concentrate around farmhouses in rural areas but prefer to breed in and about man-made constructions surrounding the farmlands of industrial areas. Some important species among these tolerant "habitation associates" are the Jackdaw, Starling, House Sparrow, Pied Wagtail, Swallow, and House Martin. Other analyses relative to the breeding populations are furnished with a view to determining whether any other industrial effects are apparent. Nesting dates tend to be the same on "i" and "r," and quantitative information on nesting failure in two common species shows very little difference between the two types of farmland.

To quote from the author's summary (p. 59): "Species intolerant of industrial conditions in South Wales are Jay, Chaffinch (to some extent only) and Yellow Bunting in the breeding season; Rook, the scarcer tits and warblers, Wood-Pigeon, riparian birds, water-fowl, waders and game-birds at all times."

The results of winter counts reveal that mean populations are about the same in industrial and rural farmland. For the two types of habitat the grand averages are, respectively, approximately 268 and 260 birds per block. The areas "*i*" and "*r*" are also closely similar not only with respect to monthly averages but with respect to most family-groups; however, an excess of Rooks (Corvidae) occurs on "*r*" and an excess of Starlings (Sturnidae) and House Sparrows (Ploceidae) on "*i*." The last-mentioned species tend to balance the Rooks numerically. Twenty-six species are categorized in terms of frequency of occurrence. The highest category, referring to birds occurring in at least six counts in every block, includes the Chaffinch, Blackbird, Magpie, Blue Tit, Robin, and several other species.

A short account of winter-bird biomass, which appears to be greater on the rural farmland, ought to be stimulating to British and American workers alike. To say that this phase of avian ecology has been rather neglected in both countries is to understate the case. The author's calculations show the weights of mean winter populations on "*i*" and "*r*" to be about 24.6 and 31.2 kilograms, respectively. In both areas the Corvidae contribute more to the population weight than any of the other families. Because of their favoring rural environments, Rooks alone account for a considerable part of the difference in biomass between the two sorts of farmland.

There are other analyses. For example, "in some closely related species, Fieldfare and Redwing, Great Tit and Blue Tit, a different [abundance] ratio according to altitude is probable." Such statements as this (often supported by data that seem plentiful) are illustrative of the care and caution with which Campbell summarizes his findings and shapes his conclusions. In general the analyses and comparisons embodied in this study are thoroughgoing and devoid of loose ends. It is true that the statistically-minded reader might here and there look for something more. He might, for instance, look for a comparison of data from "*i*" and "*r*" blocks in terms of coefficient of community or some analagous measurement (cf. Bray, Ecology, 37: 21–28, 1956). Such refinements would, however, result in but slight enhancement of the value of the study. Surely they would not alter substantially any of the author's conclusions.

Information from the literature together with Campbell's data indicates that the status of many of the commoner species in the region in question "appears to have been relatively stable for possibly fifty years." Even so, this general conclusion is reached: "There has been an impoverishment in the bird population, especially in the remaining semi-natural habitats, due to the industrialization of the South Wales coalfield." The reviewer can add only this: There has been an improvement, an enrichment, in the nature of bird-population studies, especially those conducted in farmlands of South Wales coalfields, due to the industry and scholarship of Bruce Campbell.—ROBERT A. NORRIS.

Natural History of Birds.—Leonard W. Wing. New York, Ronald Press Co., xi + 539 pp., 1956. Price, $6.75.—According to the preface, "this book was written for people interested in birds wherever found or studied—whether in classroom, laboratory, library, garden, woods, or field." The form is that of a classroom text, and as Wallace's "Introduction to Ornithology" is the only other one available the present book is sure to be widely considered for such use. While Wallace's

work is avowedly aimed at the beginning student, Wing's book is more ambitious and seems intended for both beginners and advanced students as well as for the general reader.

This book is a large one, and it ranges over the entire field of ornithology in varying amounts of detail. There are 24 chapters, each with selected references, an 18-page bibliography, a glossary, an index, and lists of leading periodicals, official state birds, and the avian orders and families (Wetmore's 1951 arrangement). There are numerous illustrations. Topics discussed include systematics, anatomy, embryology, physiology, evolution and genetics, ecology, behavior, song, distribution, migration, conservation, and economics. This breadth of subject is commendable, and there is much material that one is not likely to encounter outside of the professional journals. The author has undertaken a difficult task in trying to encompass all this and to present it for readers of various backgrounds. Be that as it may, a work intended for students and for use as a general reference should maintain the highest possible standards in disciplined use of language, inclusion of recent advances in knowledge, adequate explanation of pertinent material, and accuracy in statements of fact. In short, it should meet the tests of a work of scholarship, and I have tried to evaluate the book in terms of these criteria.

Although this book has many virtues, including its scope, the abundance of illustrations, and the wide variety of references that it brings together, I find the quality of the writing to be largely unsatisfactory. The book not only lacks a smoothly-flowing style, but the writing is loosely-organized, rambling, and often ambiguous, tautological, and redundant. Consider the following examples: "It seems clear enough, even with the scanty information available through the fossil record, that the bird of the Mesozoic was indeed a bird. Hence, we may conclude that any further development would be more properly the evolution of the bird rather than its origin. The study of birds from the Mesozoic onward becomes the study of creatures already birds. The birds of the Mesozoic may therefore be considered as true birds . . ." (p. 13). "Generally speaking, the over-all range of birds forms a continuous one with but scattered pockets beyond the main limits." (p. 190). "The sex of birds having marked sexual dichromatism (or other sexual dimorphism) often may be recognized by appearance." (p. 347). "Because some characters are sex-linked, the gene for that character is carried by the sex chromosomes." (p. 393).

The quotations above are not isolated examples; similar ones may be found in virtually all sections of the book. It may be that awkward constructions are inevitable in a text and that they are not important if the facts are there and the meaning can be made out. But consider the following passages from the section on the avian nervous system: "The nervous system as a whole consists of sensory organs and the *central* and *sympathetic* (*involuntary*) nervous systems. . . . The great sense organs of sight and hearing and the seat of many other mental faculties are located in the brain." (pp. 72–73). Apart from the serious confusion over the major divisions of the nervous system, the eye and ear are unequivocally stated to be in the brain. Of course the author does not actually mean this, but surely he should take the trouble not to say it. There is more of the same on p. 75, where it is stated that "The spinal nerves . . . are part of a complex organization through which the heart, lungs, digestive tract, blood vessels, and many other parts of the body are controlled 'involuntarily.' " This passage continues the complete confusion of the spinal nerves with the autonomic fibers, which may of course run in either spinal nerves or cranial nerves such as the vagus. Some of the functions of the

vagus are in fact listed in a table on p. 74, but in this the 11th cranial nerve is erroneously said to control the heart. In these paragraphs, and in other less important ones, the facts are not presented correctly and the meaning is misleading. For additional examples, see pp. 63–65 (digestion), p. 69 (exchanges between blood and tissues), the portal systems (see below), and many others.

Teleological phrasing is used frequently throughout the book. Here are some examples in which natural events are explained in terms of purpose: "Scavenger birds . . . usually have bare heads, perhaps because plumage on the head tends to become excessively 'soiled' in the Vulturine way of life." (p. 46). "Wading birds have the legs lengthened in order to hold the body above the water. As a compensation, the neck has lengthened so that the bill will still reach the ground." (p. 48). "The *winnowing* of the Snipe . . . is caused by air vibrating the outer tail feathers especially developed for this purpose." (p. 326). Now, one may remark in casual conversation that birds evolved wings so that they could fly, but it is another matter to put such phraseology into a text. Pursued to its logical conclusion teleology leads to a vitalist position, and unless an author intends this I feel that special efforts should be made to avoid it. A naive reader would certainly be led to believe that unexplained forces act directly on the bird and cause development of structures specific for its needs.

In my opinion, the attempt to reach readers of all levels of background results all too frequently in compromises that will satisfy neither the beginner nor the advanced reader. On p. 13, we are told that "Biologists recognize two major divisions of living things and have designated them as the PLANT KINGDOM and the ANIMAL KINGDOM." On p. 51, one reads that "the skeleton acts as an internal framework or scaffolding, somewhat as a steel frame reinforces and supports the masonry, brick work, and trim of a skyscraper." These statements are clearly intended for readers at the most elementary level, but such introductory remarks are often followed by a discussion that is surely too complex for the beginner, including uses of technical terms that are not defined precisely, if at all (see later comments on the glossary). This mixed approach is best exemplified by the discussion of circulation: "The circulatory system in the bird consists primarily of the *lymph apparatus*, and the *heart, arteries, veins* [what about capillaries?], and *blood* (Fig. 4–15). The circulatory system follows the higher reptilian pattern, but the postcaval vein connects directly to the renal portal system." (p. 68). The reader who needs to be told what the circulatory system consists of (and it is told rather poorly) will have no idea of what is meant by the higher reptilian pattern, the postcaval vein, or a portal system. The text figures referred to do not label these things, and unhappily the captions are transposed. The reader in search of a definition of a portal system gets the following: "The part of the venous system operative in the viscera, particularly in returning the blood through the great liver, is the *hepatic portal system.* That gathering blood from the lower limbs is the *renal portal system*, and the whole is called the *systemic venous system.*" (p. 69). The kidneys are completely left out, and there is never any mention of the capillary bed lying between two sets of veins that is the distinguishing feature of a portal system. Many additional examples could be cited; for a lesser one, see the treatment of the endocrine system on pp. 71–72.

In other instances, there are inadequate explanations that seem to be the result of haste or carelessness. Of many possible examples, consider this one on p. 13: "A bird fossil described as *Ichthyornis* from the Cretaceous marine deposits of Kansas (on the basis of an incomplete skeleton) has been shown to have had a jaw agreeing

with the jaw of mosasaurs. It is concluded that the jaw found with the fossil was not that of a bird (Gregory, 1952)." This is not only a self-contradictory passage, but there is no mention (here or elsewhere) of the important point that *Ichthyornis* was long thought to be a toothed bird, that this belief was based entirely on the presence of teeth in the associated lower jaw, that mosasaurs were contemporaneous marine reptiles, and that the removal of *Ichthyornis* from the Odontognathae is a major revision in paleornithology. A reference to Gregory's paper is given, to be sure, but the reader who does not look this up or who lacks ready access to the journal is left uninformed.

There are many instances in which a provocative or debatable point is raised but not fully discussed. Some are merely curious. On p. 127, it is said that "The three nonvisual values [of color] are absorption of light or heat rays, reflection of these waves, and the deposition of excretory products." The first two values are discussed adequately, but the third, which is most in need of clarification, is never mentioned again. Other examples are subject to more serious criticism. On p. 149, we read: "But a fundamental weakness (and to some nongeneticists an insurmountable flaw) in the evolution-by-mutation concept is the field and laboratory evidence that mutations are well-nigh universally of a weakening nature adversely affecting vigor (page 395)." Is the author among those "nongeneticists"? We are not told. In any case, this evident rejection of a fundamental tenet of modern evolutionary theory fairly cries for explanation. If not evolution by mutation, then by what? The author does not give the slightest indication of what his alternative interpretation, if any, may be. The reference on p. 395 only points out examples of color abnormalities and other anomalies that are maladaptive. The point is not that the concept of evolutionary change through mutation is too sacred to challenge, but that we are entitled to an adequate explanation for its rejection and to a reasonable hypothesis to replace it.

A long list of less important controversial statements could be compiled. "The fossil record testifies to the principle of *racial senescence*." (p. 155); this seems to be contradicted, however, on p. 165. The picture of fierce competition between birds and pterosaurs evoked on pp. 161–162 is questionable on both chronological and paleoecological grounds, and the author indicates as much in an afterthought at the end of the discussion. The use of vernacular names for subspecies, as in the section on scientific nomenclature (pp. 29–30), is also open to question.

The book is reasonably successful with regard to inclusion of recent advances in research. There are even some 1956 references, including a useful illustration (p. 145). However, there are a few omissions, some of them minor, that need to be mentioned. The old explanation that barred feather patterns are caused by changes in blood pressure and mitotic activity at night (p. 116) is surely rendered obsolete by more recent experimental work (see Rawles, M. E., Physiol. Rev., **28:** 383–408, 1948, for a review). More information on photoperiodism in relation to breeding cycles than is given in the brief paragraph on p. 91 would be welcome, especially since nothing on recent work on the significance of interruptions of the dark period is included. Farner's excellent review on the annual stimulus for migration (Condor, **52:** 104–122, 1950) is not cited. De Beer's monograph (1954) on *Archaeopteryx* is not mentioned, and this is especially unfortunate in view of Wing's discussion of this important fossil: "The upper arm muscles apparently were large and powerful, though the hand muscles were almost nonexistent, while those of the lower limbs were much reduced and rather weak as in modern birds. The flight muscles (pectoral) were evidently highly developed and massive in order to

operate the arm . . ." (p. 12). Apart from De Beer's work, more accurate information than this is available in many publications on the Jurassic bird fossils, and the author himself partly contradicts the above assertions on p. 268.

The illustrations are numerous, as they should be, and this is a commendable feature of the book. Some of them are outstanding, especially the muscle drawings from Hudson's papers and the anatomical diagrams of Beecher. However, the original figures prepared for this book do not always measure up to the quality of the reproduced illustrations. Many of the former are quite amateurish and were possibly prepared in haste; the drawings in the chapter on plumage (pp. 113–132) are a case in point. Captions are occasionally transposed (pp. 68, 128) or are inadequate to explain the illustration (p. 116), or are evidently omitted (p. 43). There is some duplication in the text figures that could have been eliminated in the interest of economy or replaced by such things as illustrations of the internal anatomy of the syrinx, diagrams to supplement the discussion of genetics, or maps of biotic provinces and biomes.

Editorial and typographical errors are too numerous to list in full, but a few of the more obvious ones should be mentioned. "Ovums" (p. 395) and "caecums" (used repeatedly) are given as plural forms instead of ova and caeca, and "apteria" and "apterias" are both used as plurals (pp. 113–114). *The Catalogue of the Birds of the Americas* has been complete since 1949, but its date of publication is given as (1918—) and Conover is not mentioned as one of the authors. The class name of leeches is spelled Hirundinea (which would refer to swallows) instead of Hirudinea (p. 404). Pearson's calculation of the non-stop flight range of the Ruby-throated Hummingbird is quoted as 835 miles (p. 307) instead of 385, which destroys his point that this species probably could not fly 500 miles across the Gulf of Mexico (since shown possible by additional data of Odum and Connell [Science, **123**: 892–894, 1956]).

Turning to the glossary, it is discouraging to find the same type of carelessness that was discussed earlier in this review. A glossary should provide definitions that are concise, accurate, and meaningful, but far too many in the present one do not meet these standards. Some are hardly useful at all (Pharyngeal gills: gills located in the pharynx; Aorta: a large artery, usually one connected to the heart), others are variously inadequate (Isolation: the separation of groups by which taxonomic differences may arise; Species: a population of birds reproductively isolated), and some are simply erroneous (Columella: a bone of the inner [*sic*] ear; Oxygen debt: use of oxygen stored chemically; Homozygous: having both genes of a pair either recessive or dominant), right down to the last entry (Zygodactyly: "yolk-toed" [*sic*] condition, as in the Kingfisher [*sic*]). When a glossary provides definitions like this, the reader will do better to ignore it and consult the index instead—in which case the glossary need not have been included.

The documentation and discussion of many adverse criticisms leaves me little space for favorable comments. Some of the good features of the book have already been mentioned, and I found much to admire in the chapters on ecological relations, territory, behavior, flight, migration, song, courtship and nesting, and conservation. But in virtually every chapter, including those just listed, there were numerous matters of style, organization, or content with which I could not agree. In my notes for this review I find over 120 points of criticism of the sort that I have discussed previously, and this figure does not include typographical errors or disagreements with the glossary. A more discerning critic could doubtless find many additional examples, for troublesome points arose in the most unexpected places. In

the section on bird protection, for instance, where there is much good material, one finds the following statement: "Interest in nature as a form of enjoyment is a characteristic of the British, Teutonic, and Scandinavian cultures. It is less apparent in Latin, Slavic, Oriental, and other cultures. The underlying motives for this would surely be a fruitful source of philosophical inquiry." (p. 416). To say that this is a dubious assertion is to put it mildly, and further comment can best be left to members of the allegedly less appreciative societies.

In reviewing this work, I have assumed that students of ornithology are entitled to texts that maintain the same standards of accuracy and intellectual discipline that are demanded as a matter of course in other, less "popular," sciences. This book is the only attempt at a comprehensive text on birds that is available in the English language, and many people here and abroad may assume that it is an authoritative representation of the status of ornithological knowledge in America. I feel, therefore, that special responsibilities are inherent in a work of this kind. The final authority on whether or not a book measures up to its responsibilities is not the reviewer, of course, but the book itself. This one should be carefully examined and evaluated by everyone with a serious interest in ornithology.—THOMAS R. HOWELL.

The Birds of the Soviet Union.—Edited by G. P. Dementiev and N. A. Gladkov. (State Publishers, "Soviet Science," Moscow, 1951–1954.) 6 volumes. (In Russian.)—This important work is reviewed and summarized by Harber in 'British Birds,' 48: 218–224, 268–276, 313–319, 343–348, 404–410, 447–453, and 505–511, 1955. We can do no better than to refer our readers to this useful review and to add that even for those of us who cannot read Russian, the distribution maps will prove useful.—R. W. S.

RECENT LITERATURE

EDITED BY FRANK McKINNEY

ANATOMY AND EMBRYOLOGY

BERGER, A. J. 1956. Anatomical variation and avian anatomy. Condor, **58:** 433–441.—Attention is drawn to the fact that anatomical variations are the rule instead of the exception. Especially is this indicated in avian nerves, bones, and blood vascular system. Anatomists are cautioned against generalizations on a "typical" pattern because variations are to be expected.—D. W. J.

BLAKE, C. H. 1954. Gape color in Eastern Purple Finches (*Carpodacus p. purpureus*). Bird Banding, **25:** 133–136.

FRAZER, R. C. 1957. Somite genesis in the chick. I. Partial characterization of stimulating factors in egg white. Growth, **21:** 29–43.

HANKE, B. 1957. Zur Histologie des Ösophagus der Tinamidae. Bonner Zool. Beitr., **8:** 1–4.—The histology of the esophagus of *Crypturellus obsoletus* and *Tinamus major*.

STORER, R. W. 1956. The fossil loon, Colymboides minutus. Condor, **58:** 413–426.—Through this exhaustive osteological study comparing *Colymboides* with recent loons and grebes, the conclusion is drawn that *Colymboides* was a primitive loon which reached an adaptive level comparable to that of grebes. It is further concluded that loons and grebes did not arise from a common swimming ancestor, but that loons were derived from a primitive larine ancestor and evolved a diving habit.—D. W. J.