A Comprehensive Reference Source

Avian Physiology. Paul D. Sturkie. Cornell University Press, Ithaca, N.Y., ed. 2, 1965. xxx + 766 pp. Illus. $15.

The first edition of Stukie's *Avian Physiology* (1954) was well received, and it has served as a reliable reference work in a field with a widely scattered literature and few comprehensive indices. That a revised and much enlarged version has been published is an indication of its usefulness and of the increasing dependence inevitably placed on such a work.

In this edition emphasis is again on discussion of the domestic chicken and other barnyard birds, ducks, geese, and pigeons. This is not a criticism, but a sad reality brought about by our still very fragmentary knowledge of the physiology of wild species of birds. The available data on wild birds have been introduced and properly correlated with the more exhaustive knowledge of their domestic relatives. Each of the 22 chapters has its own bibliography, and a number of new contributors have added their information and reflections to the contents of the volume—D. J. Bell on blood chemistry; R. L. Hazelwood on carbohydrate metabolism; M. R. Kare on special senses; R. K. Ringer on thyroids; D. M. Stringer and T. G. Taylor on egg shell formation; and J. Ten Cate on the nervous system. Ten Cate has contributed an entirely new chapter; some of the others, like the main contributor, Paul Sturkie, have amplified and brought into current focus the information on other aspects of avian physiology.

In a short review it is not possible to pick out individual items or to look for shortcomings. Inevitably some omissions make the coverage less complete than it might have been. Thus, Stager's work on olfaction in carrion-eating vultures probably appeared too late to be included here, but this was not the case with my studies of cerophagy in the honey-guides. On the other hand, it is gratifying to find a good summation of recent work by Schmidt-Nielson and others on extra-renal salt excretion.

This well-printed and carefully proof-read book can be recommended highly; it is certain to be a useful addition to the laboratory library.

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Gila Pueblo and the Hohokam Culture

Excavations at Snaketown: Material Culture. Harold S. Gladwin, Emil W. Haury, E. B. Sayles, and Nora Gladwin. Reprinted for the Arizona State Museum by the University of Arizona Press, Tucson, 1965. xviii + 305 pp. Illus. Plates. $7.

Although archeological sites are continually being looted by collectors, or by their agents, for whom mere possession crowds out any concern about the context or significance of specimens, the science of archeology has repeatedly been advanced by the dedicated, skillful work of amateurs. Harold S. Gladwin, whose enthusiasm for Southwestern archeology led him to found Gila Pueblo as a private research center in Globe, Arizona, accomplished, from the 1920's on, a series of fundamentally important studies of the prehistoric cultures of the region from Texas to California. None of these surveys or excavations was more significant than the excavation of Snaketown, in the southern Arizona desert. It provided a wealth of details for a major prehistoric culture, the Hohokam, which previously had been scarcely recognized. It dislodged many long-held dogmas of Southwestern archeology and provided the basis for a major reorientation in thinking about the nature of the prehistoric occupations of Arizona and adjacent states. Although the comprehensive descriptive publication on Snaketown [*Medallion Paper No. 25* (1937)] was distributed to many scholars and museums, it has long been out-of-print and virtually unobtainable. In spite of new interpretations based on its data, and serious disagreements about its chronology, it has remained indispensable for its detailed reporting of house remains, ball courts, canals, cremations, pottery, carved stone, and other artifacts. Its reprinting is therefore a significant boon to scholars everywhere. It is particularly timely because Emil Haury, who played a major part in the 1934 and 1935 excavation and its reporting, has just completed extensive additional digging at the site to verify and expand the earlier work. Preliminary reports indicate that the sequence of phases will stand essentially as originally defined, that irrigation was practiced on a large scale many centuries earlier than previously believed, and that the new data will vindicate the much-disputed chronological estimates. This original report will be the cornerstone on which the new data and interpretations will rest, and its reappearance is extremely welcome.

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Genetics

The Theory of Inbreeding. Sir Ronald A. Fisher. Academic Press, New York, ed. 2, 1965. viii + 150 pp. Illus. $6.

When I was a student a story current among undergraduates was that every year when George Kistiakowski taught physical chemistry he thought that finally he really understood entropy, only to discover that it still evaded him.

The theory of inbreeding is like that. Notions of inbreeding lie at the very heart of genetics of sexual organisms, and every discovery in classical and population genetics has depended on some sort of inbreeding experiment. But a full understanding of the theory and ramifications of inbreeding always seems to evade us, just.

The theory of inbreeding can be divided into three parts, dealing with three quite different problems; and the methods used to study one of these aspects are not always appropriate to the others. First, there is the evaluation of the degree of homozygosity resulting from some irregular pedigree with inbred and outbred components. These problems are of interest to anthropologists and to some extent to animal breeders. Second, there is the question of inbreeding resulting from finite population size and its implication for evolution and also for population genetic experimentation and closed population breeding. Finally, there is the theory of regular inbreeding systems such as long-repeated uncle-niece or cross-cousin mating. This set of

problems is, in a practical sense, the least interesting, for outside of special experimental situations, there are no populations that experience such regular breeding systems. Even the reported cases of cross-cousin marriage systems in the anthropological literature cannot be taken too seriously, and they are much more likely to fall into the category of irregular pedigrees. From the purely formal side, however, regular systems of inbreeding are basic to the development of inbreeding theory, and it is to these that Fisher's book is devoted.

It is characteristic of Fisher's work that it often appears to be developed in a kind of splendid isolation. Thus, the basic method of "generation matrices" used by Fisher to solve the problem of inbreeding is simply a special case of the stochastic matrix, and the use of the eigen vectors to find higher transition probabilities is standard in the algebraic theory of Markov chains. Fisher, and earlier Haldane, came to this procedure simply as the solution of simultaneous recurrence equations, quite independently of the development of Markov theory. Fisher's failure in the book to relate the two gives the work a kind of old-fashioned feel that is not characteristic of most recent treatments of inbreeding. Moreover, framing the process of inbreeding in terms of Markov chains allows us to go on immediately to the problem of random drift in finite populations, a matter not treated at all by Fisher. Although we know that he did not regard random drift as an important phenomenon, even Fisher would have conceded that it is at least as common an occurrence in nature as selfing in a hexasomic organism, an occurrence to which he devotes three pages.

This book is a kind of monument, a monument to human intelligence and human frailty. The very great intelligence and insight involved in dealing with the problems of inbreeding will be obvious to any reader. The frailty is hidden from the uninitiated. That Fisher could have completed a manuscript on the theory of inbreeding in 1961 without a single mention of Sewall Wright, without a single allusion to finite population effects, without any hint of the vast literature in existence, bears witness to the power of pride and prejudice.

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Biological Sciences

Mammalian Cytogenetics and Related Problems in Radiobiology. Proceedings of a symposium (Sao Paulo and Rio de Janeiro, Brazil), October 1962. C. Pavan, C. Chagas, O. Frota-Pessoa, and L. R. Caldas, Eds. Pergamon, New York, 1964. xviii + 427 pp. Illus. $15.

One of the problems encountered in publishing a collection of scientific papers delivered at a symposium or a conference is that it takes too long to get the volume on the market. When the monograph is finally available many of the articles are more or less out of date. I have had my personal and bitter experiences in writing chapters for such collections, one of which required more than three years for publication. By that time my contribution had become old hat instead of brand new data and ideas. Investigators, therefore, like to attend conferences or symposia, especially those held in exotic settings, but they shy away from publishing their best papers as a part of the records of such meetings. They would rather submit their good articles to reputable journals.

Mammalian Cytogenetics and Related Problems in Radiobiology, edited by C. Pavan, C. Chagas, O. Frota-Pessoa, and L. R. Caldas, is such a collection of papers. The meeting was held in Brazil in 1962, but the report, this monograph, was published in 1964. Indeed, the volume contains papers by many well-known mammalian cytogeneticists and radiobiologists, but I would not think that the authors consider the papers they wrote for this book among their better contributions. Many are perfunctory writings that merely fulfill the obligation of having a good time in Rio de Janeiro.

I always thought that a monograph should contain papers of a relatively broad nature, with synthesis of past knowledge in an area of research, plus new information and discussion of, or even speculations about, deeper strata of the problems. Not many papers presented in this monograph belong in that category. The book is roughly divided into two portions, "Mammalian Tissue Culture and Cytology" and "Selected Topics in Radiobiology." One can find little coherence among the topics. For example, several papers are simple case reports and descriptions of single karyotypes. Such articles should be published in specialized journals rather than monographs.

Admittedly, as stated in the foreword and in the preface, the meeting was held in Brazil to promote biological research in Latin America. The symposium may have achieved this goal, but, because of the heterogeneous quality of the papers, the book, as a whole, is a disappointment.

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Blood

Comparative Hematology. Warren Andrew. Grune and Stratton, New York, 1965. viii + 188 pp. Illus. $22.75.

Only rarely does there appear a book that is destined to be a classic in its field. But Warren Andrew's *Comparative Hematology* is such a book. Andrew has brought together most, if not all, of the relevant information concerning the morphology and physiology of the wandering cells and blood cells of animals ranging from sponges to mammals. The core of the book is a series of chapters that contain a detailed review of the literature, of both the older works and the latest material. Considerable emphasis is placed on phase-contrast and electron microscopy and histochemistry. These are chapters packed with interesting bits of information that make you want to set up a microscope and look for yourself. The author points out innumerable areas which should be fruitful for further investigation. Although there are details aplenty for the specialist, other chapters will hold more interest for the more general reader. The summarizing chapters include sections devoted to such topics as respiratory pigments of invertebrate blood hemopoiesis in vertebrates, some comparisons between invertebrates and vertebrates, and comparative hematology in relation to clinical hematology. These chapters will especially appeal to the clinical hematologist who is interested in biology.

The book is well written. The use of common names for some species would have been helpful to the general reader. ER should be clearly defined as endoplasmic reticulum. The fact that certain cells of sea urchins have the appearance of rat-tailed mag-