Book Reviews

American Mammalogist

Last of the Naturalists. The Career of C. Hart Merriam. KEIR B. STERLING. Arno (New York Times), New York, 1974. xvi, 482 pp. + plates. $23. Natural Sciences in America.

Clinton Hart Merriam (1855–1942) has been called the father of American mammalogy. Working through the Biological Survey of the Department of Agriculture, he pioneered in conducting large-scale field investigations of North American mammals. His method was to obtain as many specimens as possible over wide geographic areas, prepare skins and skeletons with care, describe the species, map their ranges, and revise the genera. In his voluminous reports he named some 660 new species and varieties of mammals. Although his work was mainly factual and descriptive, he propounded a theory of life zones in which temperature was held to be the dominant factor in the geographical distribution of mammals.

Merriam's life-zone theory is now discredited, and his list of new species has been much reduced at the hands of the lumpers. Nevertheless his success in finding out what mammals live where in North America provided a base for biogeographic and ecologic studies in the 20th century. Furthermore Merriam worked during that transitional stage in natural science "connecting the pioneer period of exploration with the present time of experimentation and interpretation," in the words of W. H. Osgood, Merriam's good friend and associate. Thus an account of the life and works of this one man could be instructive to historians of American science whose interests range beyond mammalogy, or even zoology. Sterling's biography admirably turns this possibility into a reality.

The central two-thirds of the book concentrates on Merriam's work with the Biological Survey, begun in 1885 and continued for a quarter of a century. This section is introduced by chapters on his boyhood in the Adirondacks and on his schooling and brief career as a physician. The last chapter deals mainly with Merriam's involvement with the Fur Seal Advisory Board and with his career as free-lance naturalist and ethnologist following retirement from the Survey at the age of 55. The text ends with a summary critique of Merriam's methods, concepts, and contributions.

The image of Merriam here developed is that of an extraordinary person—a prodigy. His interest in natural history began when he was about five. Thanks to the influence of his father and his father's influential friend Spencer F. Baird, he was appointed at age 17 a naturalist to the second division of the Hayden Survey into the Yellowstone region. His report of findings, listing 33 species of mammals, was published when he was 18. He completed an undergraduate course of study at Yale in three years and received a medical degree from the College of Physicians and Surgeons of Columbia before his 24th birthday. Meanwhile, he had published his first major work, *A Review of the Birds of Connecticut with Remarks on Their Habits*. Merriam did not allow his practice of medicine to end his studies of natural history. In 1885, when Congress authorized the establishment of a section of ornithology within the Entomological Division of the Department of Agriculture, Merriam was asked to head the new office. He accepted and set to work before his 30th birthday.

The central part of the book tells how Merriam developed his original small section into the status of a bureau, and how he introduced purely scientific investigations into work funded solely to bring direct economic benefit to farmers. Separate chapters are given to Merriam's views and debates on speciation, to the development of his life-zone theory as a result of studies in the San Francisco Mountain–Painted Desert region, and to his interactions with President Theodore Roosevelt and members of Congress.

The story of Merriam's contests with congressmen over appropriations has a distinctly modern ring. Beginning in 1896, Merriam came under the fire of Congressman James W. Wadsworth of New York State, who strove to hold down appropriations to the Department of Agriculture. In 1907, Wadsworth's successor as chairman of the Agricultural Committee, Charles F. Scott of Kansas, continued the battle and raised questions as to the practical value of the Biological Survey to farmers. Diplomacy was not one of Merriam's virtues, and in 1907 Wadsworth's committee became so vexed with this inflexible naturalist that they voted to eliminate completely the $52,000 budgeted for the Survey. The fund was restored only after President Roosevelt and Senator Henry Cabot Lodge had exercised their powers of persuasion.

Sterling's account of the relationship between Theodore Roosevelt and Merriam shows that these two strong-willed persons were bound in friendship by bonds of mutual respect strong enough to bear the strain of intellectual differences. No mean naturalist himself, Roosevelt objected to Merriam's tendency to split species. At one time Merriam proposed seven new species of coyotes, and at another 86 species and subspecies of grizzly and big brown bears. T. R. protested this taxonomic extravagance in the pages of *Science* and in public debate. But the President seemed pleased when Merriam named for him a new species of elk—that is, until the new name turned out to be a synonym for a species previously described.

Merriam is portrayed as a complex person—energetic, magnetic, enthusiastic, original, sensitive, hardheaded, and whimsical. His capacity for doing the unexpected cropped out early in life. While at preparatory school he cooked a housecat and served it to his fraternity brothers as woodchuck. Later he extended his experiments at cookery to the lynx and skunk. His contrary-mindedness was the despair of his associates, and never more so than after Mary W. Harriman, widow of the railroad magnate, provided him a life endowment of $12,000 a year for the independent conduct of his research and writing. Friends had hoped that Merriam would use his years of vigorous late maturity to complete his great work on North American mammals. Instead he turned his attention to ethnology and studied Californian Indians. As Osgood put it, "Although he plunged into this [new] work with much fervor, it soon became evident that he had changed horses and instead of advancing toward the farther shore he was being carried downstream." Roosevelt lamented that "Merriam . . . was fitted to be a great architect. He has trundled wheelbarrows of bricks instead."

This account of Merriam as a "transitional figure between the old school of natural historians . . . and the modern zoologist" is told in a carefully researched and thoroughly documented text. The writing is lucid, and it sparkles with humor in

many passages. Illustrations include 25 pictures of Merriam and persons or places associated with him. The bibliography of primary and secondary sources is extensive. Unfortunately, there is no index. The text is reproduced from typescript of uneven quality. Misprints are fairly numerous, but most are flagged in a list of 56 errata pasted in the back.

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Cytogenetics of Malignancy

Chromosomes and Cancer. JAMES GERMAN, Ed. Wiley, New York, 1974. xxviii, 756 pp., illus. $35. Chromosomes Series, vol. 1. A Wiley Biomedical-Health Publication.

This volume is the first in a proposed series on chromosomes and related topics. It is appropriate that the initial subject is the chromosomal basis of cancer, since the relationship of these topics has been the subject of speculation from the time of Boveri. (It is also true that the intrinsic interest in cancer has recently been augmented by the glitter of federal gold.)

It is probable that the high expectations engendered by this combination of topics could never be met by any book. The multifarious nature of cancer, with its plethora of questions and dearth of answers, has necessitated multiple authorship. While the list of authors is most impressive, their very multiplicity exaggerated the problems of organization and coordination. Although the editor's words give evidence of the effort he has made to solve these problems, as well as to achieve comprehensibility for the nonspecialist, it is this reviewer's opinion that these goals have only partially been met.

It should first be noted that there is no introductory chapter covering chromosomes and their structure in general terms, despite the professed concern for the nonspecialist. In particular, no review of chromosome nomenclature or chromosome banding is included. It is likely that much of the planning for this book was undertaken before the current techniques of chromosome banding were developed. In many chapters, the latest citations are from 1972. Since chromosome banding did not attain widespread application until 1971, significantly less than half of the current information from this technique has been covered by many of the contributors.

The rapidity with which new developments occur in cytogenetics shortens the lifetime of some arguments. Ohno's chapter, for example, explores the possibility that malignancy is a recessive condition. Under this scheme, mutation leading to malignancy would be more likely to develop in an aneuploid cell that is monosomic for part of a chromosome and hence possibly hemizygous for some critical loci. At the time the chapter was written, the Philadelphia chromosome was thought to be a deletion, and its association with chronic myelogenous leukemia is cited as support for Ohno's thesis. Unfortunately for the thesis, the Philadelphia chromosome is now believed to be part of a reciprocal translocation and is *not* evidence for hemizygosity. No footnote to acknowledge this new information is included in Ohno's chapter, although the information appears in several other chapters. Such unevenness in information flow is found repeatedly in the book.

Several of the sections of the book are sufficiently basic in approach and broad in subject matter to remain valuable despite the passage of time. Comings's chapter "What is a chromosome break?" and Evans's chapter on ionizing radiation are particularly excellent. Their lucid explanation of basic concepts and their copious diagrams are worth special mention.

Other sections are of value for their synthesis of published information or their summarization of their authors' research or both. About one-third of the book has these virtues and may well provide the principal justification for reading or purchasing the book. The clinical cytogeneticist, hematologist, and oncologist will find the information useful for interpreting the cytogenetic phenomena encountered in their patients.

The interface between two such explosively developing fields ought to be an area of intellectual ferment. Only two chapters conveyed such an atmosphere to me. O. J. Miller's review of cell hybridization in the analysis of the malignant process is thorough and beautifully written. Miller effectively transmits his conviction that this tool will be a major source of new understanding of malignancy. Bloom and his co-authors are equally successful in their presentation on the development of established human lymphocyte cell lines and their cytogenetic characterization. No cancer researcher can afford to omit these writings from his readling list.

The excellence of the sections by Miller and Bloom points out how much the reader benefits from contributions preparing him for future developments. It is always easier to judge the importance of topics in retrospect, but there are some omissions that it seems to me should have been obvious. One of the themes pervading this book is the probable importance of aneuploidy as a determinant of, at least, tumor phenotype. This is essentially a problem in gene dosage, about which much could have been written. Testing for gene dosage in aneuploid states in turn requires a knowledge of the chromosomal location of specific loci. There was more than enough information available several years ago to warrant giving this subject significant space.

In summary, this book will provide a good review of the facts known prior to 1973 but will not alert the reader to the areas that are exciting in 1975.

My last comment is directed to the publisher. The book is printed on heavy, glossy paper that should withstand many years of usage. The binding, however, significantly deteriorated during the first reading.

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Models of Memory

Human Memory. Theory and Data. BENNET B. MURDOCK, JR. Erlbaum, Potomac, Md., 1974 (distributor, Halsted [Wiley], New York). xii, 362 pp., illus. $12.95. Experimental Psychology Series.

Over the last 15 years work on human memory has undergone two changes of paradigm. About 1960 the stranglehold of interference theory was broken, to be replaced mainly by information-processing approaches. Yet it was soon discovered that apparently simple critical experiments in the new paradigm were in fact very complex, and the number of plausible models escalated. This metaproblem has led more recently to some widening of the empiricist methodology typical of experimental psychology: the use of a broader relation between theory and data and of ideas derived from linguistics, artificial intelligence, phenomenology, and neuropsychology.

Whether these new methods will be more fruitful is not yet clear, but at present they represent the more exciting parts of the field. Murdock's book, however, stands very squarely within the paradigm of the 1960's. The experimental situations and narrow quantitative models considered stem directly from the work on human memory of that time. The organization of the book makes this clear with four pairs of chapters comparing theories and data on item information, associations, serial order, and free recall, the first two pairs being primarily concerned with recognition memory and paired associates. Only in a final chapter does Murdock move