Ornithology at a Centennial

Perspectives in Ornithology. Essays Presented for the Centennial of the American Ornithologists' Union. ALAN H. BRUSH and GEORGE A. CLARK, JR., Eds. Cambridge University Press, New York, 1983. viii, 560 pp., illus. $29.95.

The American Ornithologists' Union had an important birthday on 26 September 1983. Complementing the celebration of 100 years of growth and scientific contribution is this affordable volume of provocative reviews. Over this century ornithology has matured into the expanded, diverse science of avian biology. Ernst Mayr opens this series by reviewing the progress of his field with grandfatherly pride. Dominating the fibers of *Perspectives in Ornithology* are open debates by a suite of young iconoclasts. The self-reflective temper in the context of timely synthesis of a broad range of topics marks a healthy future for ornithological studies.

Some of the most exciting frontiers in ornithology belong to research on song learning (dealt with here by P. J. B. Slater, L. F. Baptista, and D. E. Kroodsma), navigation (C. Walcott and A. J. Lednor, K. Able), molecular genetics (G. F. Barrowclough, J. C. Avise, and G. F. Shields), cooperative breeding systems (S. T. Emlen and S. L. Vehrencamp), and physiological ecology (G. E. Walsberg). For each of these the contributors review the known, but they also stress what is not known. Still mysterious, for example, remain the nature of a bird's navigational "map," why some birds learn their songs but others do not, the genetics of speciation, and the annual cycle of energetic constraints. Still lacking, moreover, are quantitative data to decide among alternative models of the evolution of cooperative breeding in birds; kin selection has now shuffled to the side and tentative models of ecological constraints, reciprocal help, and individual conflicts occupy center stage.

Perspectives in Ornithology is full of controversy and academic vitality. Tart reviews are the core of the volume. They are complemented and challenged by commentaries, many of which provide critical alternatives and thereby reinforce the effort to define priorities for the next round of ornithological research. The defense of optimal foraging theory by J. R. Krebs, D. W. Stephens, and W. J. Sutherland, for example, emphasizes the burgeoning set of second-generation models that struggle to address the deep complexities of behavioral performance in stochastic environments. J. P. Myers then challenges the fragile foundation of even these deterministic models with a persuasive analogy of the vulnerability of computerized nations to an errant electromagnetic pulse.

Open tensions in community ecology and biogeography are now familiar to readers of *Science*. Here, iconoclasts J. A. Wiens and D. Simberloff push again to restructure the tenets of future research. Healthy signs include the growing appreciation of stochastic forces and the need for a balanced blend of dispersal and vicariance in biogeographical theory. Though the null statistical models that Simberloff and his colleagues propose doubtless will be replaced by others that are biologically more appropriate, Simberloff's basic challenge is sound. Ornithological intuition may be right, but science demands more than intuition.

Two of the most refreshing contribution to *Perspectives in Ornithology* are D. W. Mock's unorthodox approach to the study of avian mating systems and L. D. Martin's bold reorganization of the history of Mesozoic birds. In the first, Mock turns our thinking to the challenges of understanding both avian monogamy and the problems of genetic paternity. These, he suggests, are where breakthroughs may lie in the study of avian mating systems, a field that, I think, may be in danger of bogging down with historically asserted tenets, excessive fascination with polygyny, and a heavy burden of capitalized terminology. Mercifully, Mock never once resorts to "Male Emancipation," a prime piece of Victorian jargon.

The current renaissance of paleornithology is changing our views of the evolutionary history of birds. In his chapter, Martin revitalizes the pseudosuchian-crocodilian ancestry of birds and, in his most effective exposition yet, swings the pendulum away from Ostrom's influential papers on the relations of birds to dinosaurs. Martin also sides with advocates of an arboreal origin of avian flight and an aerodynamic origin of feathers. His views on these subjects, however, are weakened by his failure to mention, much less address, Regal's model of the evolution of feathers (*Q. Rev. Biol.* **50**, 35 [1975]) and Caple *et al.*'s model (*Am. Nat.* **121**, 455 [1983]) of the jumping ballistics of a bipedal reptile.

Martin also provides his own detailed analysis of derived character states of *Archaeopteryx* and other Mesozoic birds, concluding that *Archaeopteryx* may not have been on the main line of avian evolution after all but may instead have been a primitive member of the Sauriurae. Included in this radiation of Cretaceous birds are the Enantiornithiformes, a diverse group described from Argentina, as well *Gobipteryx* from Mongolia and *Alexornis* from Baja California. The other proposed lineage of Mesozoic birds, the Ornithurae, includes the Hesperornithiformes and Ichthyornithiformes as well as modern birds. Intriguing as this scheme may be to the naïve neontologist, D. W. Steadman severely criticizes the details of Martin's argument. A clear picture of the early evolutionary history of birds is not yet in sight, but Martin—right or wrong—has made a major contribution toward its crystallization.

From paleontology to captive propagation, electromagnetic pulses, and physiological ecology the branches of avian biology seem to be growing vigorously. The editors of *Perspectives in Ornithology* have done well, the American Ornithologists' Union is to be congratulated, and readers of this fine volume will quickly sharpen their own ornithological perspectives.

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Adaptations of Colonizers

The Evolutionary Biology of Colonizing Species. PETER A. PARSONS. Cambridge University Press, New York, 1983. x, 262 pp., illus. $29.95.

Parsons has patterned this book explicitly after the highly influential symposium volume *The Genetics of Colonizing Species*, edited by Baker and Stebbins, which was published in 1965. Since then much has been learned, and Parsons deals with those aspects of physiological ecology, behavior, and life-history evolution that are especially relevant to colonizing species.

The book makes some important points well. Parsons's emphasis on coordinated studies of the behavior, life history, ecology, and genetics of tractable species will benefit the field. The historical separation of these specialties, it is now widely agreed, was artificial. This book demonstrates that greater insight can be gained from a combined approach. Parsons's emphasis on the organism as the unit of selection is also welcome because it comes at a time when discussion of levels and units of selection is intense. However, Parsons

settles too easily on the organism as the unit of selection, without adequate discussion of evidence to the contrary or of alternative points of view. More pluralistic attitudes (as taken, for example, by Price, Hamilton, or Wade) emphasize that selection can have simultaneous impact on several levels, with varying intensities, in a manner that depends both on the way in which genetic variation is partitioned among levels and units and on the degree of differential survival and reproduction of units on each level.

Parsons uses the framework of *r*- and *K*-selection to organize much of his discussion. As has been repeatedly pointed out in the literature, there are many problems with this scheme. Parsons clearly regards it as a provisional system and acknowledges its difficulties, but then proceeds to use it for classification because of its convenience. This creates the potential that readers will draw misleading conclusions about what causes the evolution of life-history traits. Parsons also makes repeated comparisons between predictable and unpredictable and stable and fluctuating habitats. Such dichotomies are not useful. The concrete mechanisms that mediate selection are, first, extrinsic age- and size-specific shifts in mortality rates that interact with, second, the intrinsic constraints and potentials of organisms. These are known to differ among lineages. Such interactions are complex and multidimensional, and to present them in terms of simple dichotomies seriously prejudices the analysis.

The selection of material and topics is uneven and not clearly justified. Much of the material concerns a single genus, *Drosophila*, mostly as it has been studied in Australia. The book provides a good summary of this work, much of which is important and should be drawn to the attention of a wider audience than just the *Drosophila* researchers. However, the subject matter covered is much more specialized than the title promises.

The central chapters were written uncritically; the material is not well digested. Not enough emphasis is placed on providing an overall structure that ties the chapters together and shows the reader clearly why the work discussed is important, where it fits, and what it means.

In summary, this book is a mixed bag. I suspect that a good book on the evolutionary ecology of Australian *Drosophila* has been compromised by the author's understandable desire to generalize.

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Contributions to Microscopy

History of Staining. GEORGE CLARK and FREDERICK H. KASTEN. Third edition. Williams and Wilkins, Baltimore, 1983. x, 304 pp., illus. $29.95.

The great advances made during the second half of the 19th century in the microscopic examination of animal, plant, and microbial cells were in part a consequence of the work of organic chemists in the synthesis of artificial dyes for the textile industry. Natural coloring materials (carmine, hematoxylin) had been used by biologists before and continued to be used later, but the availability of the many new synthetic dyes produced by a burgeoning chemical industry (especially in Germany) greatly broadened the scope of stain technology. In the hands of a series of notable investigators, among them Paul Ehrlich, Walther Flemming, and Rudolph Heidenhain, these new dyes not only revealed the presence of structural elements of cells (for example, chromosomes) but also laid the cytological groundwork for the study of cell dynamics in heredity and embryonic development.

The book under review summarizes this story and brings it up to date until recent times. The first edition, prepared by Harold J. Conn (1886–1975), appeared 50 years ago; a second edition was published in 1948. This edition was begun by Ralph D. Lillie (1896–1979), and the opening chapter (34 pp.) provides a biographical memoir of Lillie, with a full list of his publications. The organization of the material in the remainder of the book follows closely that used by Conn, except for the addition of new chapters on the staining of connective and nerve tissue, on immunological staining, on fluorescence techniques, and on the histochemistry of proteins and nucleic acids, which make the new edition more then twice the size of the first.

As in the first edition, among the chapters dealing with particular staining methods are interspersed brief biographical sketches of several contributors to the field, from the 18th-century botanist John Hill to Frank B. Mallory (1862–1941). In addition biographical material about other scientists (for example, Robert Feulgen) is included in the chapters written for this edition. There is an extensive bibliography and an adequate index.

Perhaps because the authors of the third edition wished to retain material from the earlier ones, there is some looseness of organization that might have been corrected by more drastic revision of Conn's editions. For example, the new chapter on protein and nucleic acid histochemistry contains a much better account of the development of synthetic dyes (pp. 203–217) than that presented in an earlier chapter on aniline dyes in histology. Also, in this new chapter more attention is given to the biological problems whose study was affected by advances in staining techniques.

This volume provides the most useful historical summary now available in English of the development of stain technology.

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Books Received

Algorithmic Studies in Mass Storage Systems. C. K. Wong. Computer Science Press, Rockville, Md., 1983. x, 411 pp., illus. $32.95.

Alsos. Samuel A. Goudsmit. Introduction by R. V. Jones. Tomash, Los Angeles, 1983. xxx, 260 pp., illus. $28. Reprint, 1947 edition.

Alternative Energy Sources for the Centralised Generation of Electricity. R. H. Taylor. Hilger, Bristol, 1983 (U.S. distributor, Heyden, Philadelphia). xvi, 310 pp., illus. $36. Modern Energy Studies.

Ambident Anions. O. A. Reutov, I. P. Beletskaya, and A. L. Kurts. J. P. Michael, Transl. Ed. Consultants Bureau (Plenum), New York, 1983. xiv, 338 pp., illus. $59.50. Translated from the Russian.

American Familes and the Economy. The High Costs of Living. Richard R. Nelson and Felicity Skidmore, Eds. National Academy Press, Washington, D.C., 1983. x, 307 p., illus. Paper, $18.75. From a conference.

Analysis, Design and Evaluation of Man-Machine Systems. G. Johannsen and J. E. Rijnsdorp, Eds. Published for the International Federation of Automatic Control by Pergamon, New York, 1983. xviii, 424 pp., illus. $180. IFAC Proceedings Series. From a conference, Baden-Baden, Germany, Sept. 1982.

The Analysis of Gases by Chromatography. C. J. Cowper and A. J. DeRose. Pergamon, New York, 1983. xii, 147 pp., illus. $25. Pergamon Series in Analytical Chemistry, vol. 7.

Behavior and the Natural Environment. Irwin Altman and Joachim F. Wohlwill, Eds. Plenum, New York, 1983. xvi, 346 pp., illus. $35. Human Behavior and Environment, vol. 6.

Behavior Modification with the Severely and Profoundly Retarded. Research and Applications. Thomas L. Whitman, John W. Scibak, and Dennis H. Reid. Academic Press, New York, 1983. xiv, 423 pp., illus. $34.50.

Better Translation for Better Communication. G. Van Slype *et al.* Published for the Commission of the European Communities by Pergamon, New York, 1983. xx, 194 pp. $20.

A Bibliography of Lambda-Calculi, Combinatory Logics and Related Topics. A. Rezus. Mathematisch Centrum, Amsterdam, 1983. vi, 86 pp. Paper, Dfl. 12.10.

A Bibliography of the Philosophy of Science, 1945–1981. Compiled by Richard J. Blackwell. Greenwood, Westport, Conn., 1983. xx, 587 pp. $75.

Biobehavioral Bases of Coronary Heart Disease. Theodore M. Dembroski, Thomas H. Schmidt, and Gerhard Blümchen, Eds. Karger, Basel, 1983. xviii, 482 pp., illus. $95.25. Karger Biobehavioral Medicine Series 2. From a conference, Altenberg, Germany, June 1981.

The Biological Basis of Reproductive and Developmental Medicine. Joseph B. Warshaw, Ed. Elsevier, New York, 1983. xvi, 445 pp., illus. $49.50.

Biological Health Risks of Sludge Disposal to Land in Cold Climates. P. M. Wallis and D. L. Lehmann. University of Calgary Press, Calgary, Canada, 1983. vi, 388 pp., illus. Paper, $18. From a symposium, Calgary, Nov. 1982.

Biological Structures and Coupled Flows. Avraham Oplatka and Miriam Balaban, Eds. Academic Press, New York, and Balaban, Philadelphia, 1983. xiv, 519 pp., illus. $60. From a symposium, Rehovot, Israel, June 1982.

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