

but it's worth a browse. Quite likely you will encounter a viewpoint you hadn't considered before.

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BECKEL, A. L. 1987. **Breaking new waters.** A century of limnology at the University of Wisconsin. Trans. Wisc. Acad. Sci., Arts, Lett. (Spec. Issue). Available from Center for Limnology, University of Wisconsin, Madison 53706. 122 p. \$10.00. Soft-cover.

This small volume, written by Beckel with a contributing chapter by Frank N. Egerton, will have an impact far beyond its size and scope. As a documentation of the beginnings and maturation of the science of limnology that centered in Madison, it is a lesson for all. As a compilation and compendium of the work of a leading university in a specialized branch of knowledge, it illustrates what should be meant by "center of excellence." And as a biography of three of the leading lights in the field, its contribution to the history of science is exemplary.

The book is a chronicle of three men, one living and two long since gone. Edward Asahel Birge, an early giant in the field of limnology, had a long and illustrious career, culminating in his presidency of the University of Wisconsin. There continues to be some question, however, of what his contribution might have been without the collaboration and almost constant companionship of Chancey Juday. Together, the two built a broad scope and long-term program in lake investigation that became one of the most productive efforts in science and in higher education. Following their lead, and building on their foundation, Arthur Davis Hasler succeeded in bringing limnology into a modern experimental and theoretical framework whose fruits are still being harvested. This volume, then, is a panoply, and in some sense, a potpourri, of the life, times, and work of this outstanding triumvirate.

The book is organized into only five chapters, cryptically titled "Beginnings," "New waters," "New directions," "Expansion," and "The Wisconsin limnology community," the last by Egerton, a noted and prolific contributor to the history of ecology. Between chapters 4 and 5, pages 57 through 84 carry 32 photographs, spanning 70 years (1917-1987), many of historical interest (including a photo of John T. Curtis, my own major professor, at the Trout Lake Station in 1935!), that show the development of both facilities and program. The figures are well chosen and pertinent to the volume, although they are not tied to the text. Consequently, there are only 94 pages of text (crammed with information, to be sure), including references and a 7-page appendix listing the students, with dates and thesis titles, of Chancey Juday and Arthur Hasler.

Three related events contributed in immeasurable ways to the production of this volume. The first was an address, "A house half built," by E. A. Birge to the Madison Literary Club in 1936. The text survives and is perhaps the closest thing we have to a Birge autobiography. Second, a major conference was convened in Madison in 1983 with a focus on the "History of limnology in Wisconsin." This meeting brought together many former students in the program and enabled present staff at the Center for Limnology to conduct both formal and informal interviews with the participants. As a marvelous source of anecdotal material, this conference is perhaps unequaled in the history of science and, of course, was the springboard and catalyst for this volume. Finally, the continued activity and good health of one of the key players, Art Hasler, permitted a great deal of interview and interaction throughout the development of *Breaking new waters*. Each of these contributions to history comes through in shining array, with excerpts and interview quotes woven skillfully into an amazingly readable text. Both history and biography have a (partly) deserved reputation for dryness, but this book does not share that drawback. It is exciting reading and, to a degree, makes the protagonists come alive in the narrative pages.

Two items of note in a century of limnology are most evident. The first is the concentration of Birge and Juday on the physical and chemical environment of inland lakes, in contrast to the more biological thrust of Hasler and his students. The second is the obvious shift from descriptive to experimental and theoretical limnology. Not that Birge and Juday ignored theory or neglected biology. It was simply an approach to the study of lakes that prescribed an environmental description in early attempts to relate structure, function, and behavior of the biotic community to the physicochemical constraints of the "lake as a microcosm."

Egerton's chapter on "The Wisconsin limnology community," the longest (at 30 pages) of the five, is an excellent summary of the century of limnology, although there is a good bit of redundancy with preceding sections. Also, for unknown reasons, Egerton sets up the state of Michigan as a straw man and asks why Wisconsin succeeded where Michigan failed. The comparison with the University of Chicago-University of Nebraska beginnings of plant ecology is strained, and one wonders why the attempt was made. Egerton's grasp of scientific history, however, particularly focused in and around Wisconsin, and in limnology and ecology, is abundantly clear, and adds perspective and interpretation to the contents of the volume.

Scientific societies always play a role in the development of schools, programs, and new science. It is noteworthy that Juday was the first president of the American Society of Limnology, serving one term (1935-1936) in an appointed capacity, and elected for the 1936-1937 year. Art Hasler followed as President of the American Society of Limnology and Oceanography in 1949-1950. Perhaps illustrative of the close connection with ecology, both men also served as presidents of the Ecological Society of America, Juday in 1926-1927, and Hasler in 1960-1961.

Recent interest in the history of ecology has spawned a wealth of new books, including both histories and

biographies. As part of the larger picture, this volume should occupy a place on the shelves of all limnologists, aquatic ecologists, and historians of science. And, at \$10.00, it's a bargain for graduate students, who, we find, are often oblivious to the very roots from which they spring. In summary, the authors, the Center for Limnology, and the Wisconsin Academy are to be congratulated for this exceptional contribution to history, to science, and to the role of academia, and for a truly fine tribute to Birge, Juday, and Hasler.

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SOUTHWARD, A. J. [ED.] 1987. **Barnacle biology**. Crustacean Issues V. 5. A. A. Balkema, Rotterdam. 443 p. \$83.75.

This book has two stated purposes. The first is to honor Dennis Crisp. This is achieved in a foreword (complete with a list of publications) by Knight Jones that chronicles Crisp's remarkable career, with particular emphasis on his role in initiating and leading the marine biological laboratory at Menai Bridge, Wales. This foreword details both Crisp's direct contribution to our understanding of barnacles and his indirect contribution through his influence on students and colleagues.

The second purpose is to provide a general view of barnacle biology and thereby serve as a revision of portions of Charles Darwin's monographs on the cirripeds. *Barnacle biology* consists of 22 chapters divided into four sections: evolution and genetics; physiology and function; larval biology and settlement; and pollution and fouling. The first is the best; its authors have combined reviewed studies with new material or insight. It starts with Newman reviving a discarded hypothesis on the origin of balanomorph barnacles as part of his revision of barnacle taxonomy. He also argues that the rhizocephala and ascothoracica, groups traditionally placed in the cirripedia, are sister groups of the true barnacles. The editor apparently agreed since readers will have to turn to other sources for information on these unique parasites. The acrothoracica (burrowing barnacles) are reviewed by Tomlinson in a short chapter, while the other 21 chapters are almost completely devoted to the thoracica. Newman's chapter is nicely complemented by a chapter on barnacle paleontology (Foster and Buckeridge). In one of the most conceptual chapters in the book, Charnov discusses the factors producing the diversity of breeding systems that evolved in the cirripeds. Dando's chapter on the use of electrophoresis in studies of taxonomy,

breeding systems, and adaptation also breaks new ground.

The section on physiology and function includes less new material than the first section. It consists of standard reviews that describe circulation, excretion, neurobiology, lipid biochemistry, muscle cells, shell composition, and formation in cirripeds. Anderson and Southward's chapter on feeding activities is a strong point in this section. They document, and then discuss, patterns of intraspecific and interspecific differences in cirral activity.

The section on larval biology and settlement is timely given the current surge in interest in the role of recruitment in structuring benthic populations. Unfortunately, most of the chapters appear to have been written in 1984 and therefore do not include the wealth of information on barnacle recruitment that has appeared in the last 4 years. Reviews of the functional morphology of balanomorph (Walker et al.) and lepadomorph (Moyses) barnacles both do a fine job of integrating larval structure with ecology. The mechanisms involved in switching from a planktonic to a benthic existence are well covered in a review of adhesion (Yule and Walker).

The final section is the shortest in the book and deals with applied aspects of barnacle research. It covers fouling and its prevention (Christie and Dalley) and the detoxification of heavy metals and the use of barnacles as indicators of pollution (Rainbow).

The ecology of barnacles is given little attention. This is unfortunate given both barnacles' and Crisp's prominent roles in studies of epibenthic communities. Foster gives a short overview of factors affecting barnacle distributions, and Hui and Moyses discuss interspecific competition among cirripeds. The effects of barnacles on other organisms are completely unexplored in this volume.

Barnacle biology has a degree of unity that is unusual for a multi-authored volume. Southward has done a fine job of editing the book. Typographical errors are few and the many authors were coerced into using the same taxonomic nomenclature. Furthermore, the chapters are cross-referenced so readers know where to look for related material in another chapter. Most authors provide a historical context for their chapter by discussing how views have changed in their particular field since Darwin's time.

The greatest strength of this volume is that it fills a real need. Despite the abundance of barnacles and their prominence in marine research, they have not received a comprehensive treatment since Darwin's monographs. This book will be required reading among students of barnacles. Those wishing to learn about a particular facet of barnacle biology will turn first to this book.

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