

BOOK REVIEWS

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WILDISH, D., AND D. KRISTMANSON. 1997. **Benthic suspension feeders and flow**. Cambridge University Press. xiii + 409 p. £50.00. ISBN 0-521-44523-X.

Science is built up with facts, as a house is with stones. But a collection of facts is no more a science than a heap of stones is a house.

— Jules Henri Poincaré, *La Science et L'Hypothèse*, 1908

Happily, a three-decade collaboration between a biologist and an engineer has produced a house rather than a pile of stones. Despite some deliberate omissions (“little on corals, or freshwater biology”), this book deserves a space on every benthic biologist’s bookshelf. To work effectively in this area requires knowledge of elementary fluid mechanics, plankton and seston dynamics, invertebrate physiology and ecology, aerosol and chemical engineering theory, and geophysical boundary layers. This book covers all these subjects in sufficient detail to bring the reader quickly up to the level required to understand this complex field.

This book was prepared with a great deal of care. References are current and carefully chosen, although not encyclopedic, and its hierarchical organization is sound and pedagogically effective. The *Introduction* describes how science is done, and gives information that must normally be learned by osmosis from a mentor. *Methods of Study* then introduces the reader to techniques and instruments used to measure water motion, particle concentration, physiological responses, etc. The presentation then progresses through *Dispersal and settlement*, *Flow and the physiology of filtration*, *Mechanisms of seston capture*, *Behavioral responses to flow*, *Benthic populations and flow*, *Ecosystems and flow*, and finishes with a thought-provoking *Future directions*. *Mechanisms of seston capture* is a particularly well-done explanation of the quantitative minutiae of suspension feeding. *Ecosystems and flow* provides a great treatment of material recycling, and hydrodynamics and feeding in kelp beds, seagrasses, and bivalve reefs.

Throughout the book tables enumerate alternative hypotheses, each with a null case, and give citations to relevant studies addressing each hypothesis. This is a very effective way to focus the discussion in the text, and perusal of these tables reveals research gaps. Only one chapter—*Mechanisms of seston capture*—lacks these tables; this is an interesting omission: perhaps the authors feel that the aerosol theory discussed at length here has served so well in elucidating the nature of particle capture that no other hypotheses are current. The authors show a consistent interest in using allometric techniques to investigate scaling effects, and they give proper emphasis to the utility of dimensionless indices in analyzing what might be otherwise intractable organism-flow problems.

A summary section at the end of each main chapter makes ex-

PLICIT prescriptions for further progress and attempts to codify principles learned thus far. I didn’t always agree with their assertions, but if they are wrong, they are wrong in an interesting way, and provide a stimulus for the reader to do better. For example, I don’t think that uni-modal responses of organisms (and populations) to flow will be as ubiquitous as predicted by the authors. Further, I believe that the responses of individual organisms can be scaled up to predict population effects, an enterprise they feel is often inappropriate for reasons having to do with emergent properties of aggregated organisms.

The only major point of annoyance was the index, which is inadequate for such a comprehensive tome; e.g., Reynolds number, Peclet number, drag, encounter rate, isokinetic sampling, feeding efficiency, sea anemone, and many other essentials are missing. Other terms are well-indexed, or even over-indexed, e.g., “tube, opposed to; tube, normal to.” The glossary is adequate, but I would like to see it expanded in a revised edition. Minor annoyance: I personally prefer all literature citations to appear at the end of the book, rather than at the end of each chapter.

Other items that I hope to see in the next revision: 1) A review of the nervous system and control mechanisms for some key species, focusing on how environmental flow signals are perceived and integrated. 2) A more in-depth treatment of the convection-diffusion equation that plays a key role in the formation of depleted seston layers over aggregations, in dispersal and settlement, and even nutrient fluxes at the ecosystem level. 3) A discussion of flow and mass transfer of dissolved substances (flow-modulated metabolism) to and from suspension feeders, and a treatment of the under-studied phenomenon of particle loss after capture. 4) More on corals.

Wildish and Kristmanson exhort the reader to “Stare in wonder, At this world of beauty.” Long ago, waving carpets of tentacles of a frilled anemone induced me to sit in frozen patience, waiting for an inept copepod, or floc of marine detritus, to be snared and withdrawn into the siphonoglyph of this exquisite creature. It was only later, as my thinking as a scientist matured, that I realized the more global ramifications of flow-modulated feeding by suspension feeders (benthic-pelagic coupling, nutrient cycling, etc.) For any scientist who has been mesmerized by suspension feeders in action, this book will enlighten in a way that allows multiple layers of satisfaction. Elegant quantitative insights meet a feeling for these organisms to brilliantly illuminate the important roles that these creatures play in marine ecosystems.

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