

SPONGES IN TIME AND SPACE—BIOLOGY, CHEMISTRY, PALEONTOLOGY. Rob W. M. van Soest, Theo M. G. van Kempen, and Jean-Claude Braekman (eds.). Proceedings of the 4th International Porifera Congress Amsterdam, Netherlands, 19-23 April 1993. A. A. Balkema, Rotterdam. 1994. 515 pp. ISBN 90-5410-097-4. \$95.00 U.S.

The 4th International Porifera Congress continued a fairly young (starting in 1970) but increasingly important tradition of periodic scientific information exchange among a growing number of researchers on sponges. Few will disagree that the personal interactions during such a conference—particularly the exchanges over a few beers after hours—are far more informative and stimulating than stacks of printed pages. On the other hand, many workers bring polished gems among their latest discoveries before their peers and demonstrate what new scientific ground was broken since their last publications slipped into cloudy memory. *Sponges in Time and Space* is a vivid document of the considerable recent advances in the exciting and dynamic field of sponge biology.

This elegant book is presented by a trio of editors, appropriately representing the principal subject fields of biology, paleontology, and chemistry, and the scene is set by a piece of poetry—*Sponge Rap*. More enthusiasm for spongiology is sparked in the preface by a thoughtful review of current issues in poriferan biology and their historical roots. Its title reflects its conclusion: Onwards and upwards with sponges. The body of the book is comprised of 54 articles grouped into six major disciplines.

Paleospongological discussions deal with archaeocyathan affinities with demosponges, Calcarea soft-body morphology, and aspects of stromatoporoid and hexactinellid ecology and biogeography.

The systematics and classification chapter starts with the shocking question, are sponges animals? Thank Heaven they still are although some ways of analyzing ribosomal sequences puts them dangerously close to plants. Other papers are similarly thought provoking by applying novel and advanced versions of proven methods of genetics, biochemistry, phylogenetic systematics, and artificial intelligence to the study of evolution and classification of sponge taxa.

In biogeography and faunistics, worldwide distribution patterns of demosponges and hexactinellids are discussed and we learn about geographic affinities and diversities of selected Indo-west Pacific and boreal Pacific faunas.

Ecology and life history studies make up the largest and most diverse section of the book. Principles of sponge growth are demonstrated by geometric modeling (that also shaped the Congress' logo and the book's faint cover design) and by aquarium time-lapse photography of developing body processes. Then, various aspects of community structure on Caribbean reefs are discussed, including the relation between sponge abundance and fish feeding. Associations with representatives of other phyla are shown to be diverse and strongly affecting the sponges' biology, such as bacteria attacking spongin fibers, zoanthids affecting coralline sponge calcification, and hermit crab-sponge and clam-clionid borer interactions. Life history studies are presented for some tropical and boreal marine sponges

but primarily focus on fresh-water species. Spongillids were found remarkably resistant to heavy-metal concentrations and suitable as aquatic pollution indicators; morphological reactions to certain pollutants were found to be expressed as malformations in the spicules. One report, on Mediterranean island spongillids, would have found a more suitable place in the previous chapter.

The section on cell biology and biochemistry contains some very useful papers on novel cell culture applications. A captivating study of hexactinellid sponge development is a bit out of place here but shows real progress in fixation techniques for fine-structure examination of these difficult sponges. Dissociated and gemmule-hatched sponge cells allow observations of a number of new phenomena, such as cytoplasmic streaming in a hexactinellid and morphological reaction to substrate chemistry, and the first discovery of homeobox genes in sponges. Finally, there is an analysis of S-type lectin in *Geodia* and an in vivo documentation of phagocytosis of algal cells in a spongillid.

Natural product chemistry is the last chapter but was actually a central theme of the Congress and the subject of a special workshop. Six invited papers summarize the state-of-the-science and do not ignore the important links between chemistry and biology. These reviews treat the biosynthesis as well as methods of separation of secondary metabolites in sponges. They describe cytotoxic compounds, pay special attention to the contributions from sponge-associated microfauna and follow the fate of these chemicals when taken up by predators. Finally, the multimillion dollar question is asked, "from seabed to sickbed: what are the prospects?" (It will cost you about \$95.00 to find the answer.)—*Klaus Rützler, Department of Invertebrate Zoology, National Museum of Natural History, Smithsonian Institution, Washington, D.C. 20560.*