

A thorough review of natural gas hydrates in sedimentary basins is presented by Hitchon, including several references to the extensive work by the Russians in drilling hydrates in permafrost regions. The best documented hydrate is in the Messoyakha Field in the northern part of the West Siberian basin. This field contains 14 trillion cubic feet of natural gas, partly in hydrate form. The hydrate section has 54% more reserves than would be expected if the rocks were filled with free gas. The main hydrate zone is between 250 and 870 m. Since a maximum of 23% of the total land area of both hemispheres is occupied by permafrost, the potential for gas hydrates in continental basins is considerable. Separate papers by Stoll, Bryan, and Emery present seismic data indicating the presence of gas hydrates in marine sediments. One problem in all of the discussions of natural gas hydrates is that there is no technique for proving the presence of a hydrate in the sediments except obtaining a core at the in situ pressure. Such equipment has been developed but was not discussed at this meeting.

The acoustic properties of gassy sediments and of gas bubbles in water are reviewed by Hampton and Anderson. Schubel discusses acoustically turbid sediments near the Chesapeake Bay bridge.

The book is valuable in presenting an academic review of the origin and nature of gases in near-surface sediments with some emphasis on gas hydrates. Possibly the biggest gap is the lack of information on known gas seeps, gas charged sediment cones, and gases of mud volcanoes. For example, high resolution geophysical surveys combined with side-scan sonar along the Gulf Coast have shown the presence of such things as columns of bubble clusters rising from the sea floor associated with gas-charged sediment cones going to depths of several hundred feet. None of this is discussed. Also, mud volcanoes which are known to eject huge amounts of gas in various parts of the world are not even mentioned. Mud volcanoes of the South Caspian Sea are known to cause abundant faults and fissures in the near-surface sediments. Adding one chapter on the origin and nature of known, significant worldwide marine gas seeps would have greatly improved the book. Despite the fact that some of these seep areas have been known for decades, there are almost no data on gas components or isotopic composition. It is an important area of future research that was overlooked at this symposium.

In general, the book will be useful to marine geochemists interested in sediment gases and to geologists and geophysicists concerned with the effect of hydrates on coring operations and on the interpretation of seismic data.

John M. Hunt

Woods Hole Oceanographic Institution
Woods Hole, Massachusetts 02543

SIEBURTH, J. M. 1975. **Microbial seascapes.** A pictorial essay on marine microorganisms and their environments. University Park Press, Baltimore. Unpagged. \$9.50.

This handsomely produced paperback contains almost 200 photographs of microbial populations on the surfaces of marine substrates, mostly observed with the scanning electron microscope. An introductory text of seven pages skims over marine microbial ecology, the microbial world, and microscopy, and also provides information about sampling methods and photographic techniques.

Microbial seascapes would make a good present for a high school student interested in natural history, but other uses do not come to mind.

R. Y. Stanier

Institut Pasteur
Paris

RODEWALD-RUDESCU, L. 1974. **Das Schilfrohr. *Phragmites communis* Trinius.** Die Binnengewässer Band 27. E. Schweizerbart'sche, Stuttgart. ix + 302 p. + 11 plates. DM97.50.

Rodewald-Rudescu begins his account of this macrophyte with a detailed discussion of the systematics, nomenclature, and global distribution of this species. The treatment then leads into a thorough description of the gross morphology and anatomy of each of the basic parts of the plants—stem, leaves, reproductive organs, roots, and rhizomes—much of it based on the author's personal research. Analyses of the vegetative propagation and development of *Phragmites* are few; the extension of the plant is quite variable under different conditions of substrate and water level. General characteristics of growth and population development are given, based mostly on the large populations of the Danube Delta of Romania, with few comparisons to other emergent plants.

The review of physiological aspects of nutrient, gas, and water uptake and transport is limited, even though fairly comprehensive. The brief treatment reflects the paucity of existing information on the physiology of aquatic angiosperms in general that makes many aspects of ecological interpretation difficult. Only recently have reasonably sophisticated experimental techniques been applied under in situ conditions.

The long section on the ecology of *Phragmites* is strictly autecological and descriptive. The rather extensive literature on macro- and microclimate, pedology, hydrology, and hydrogeology is systematically discussed in general terms in relation to *Phragmites* development and structure of the plant stands. The information available on the chemistry of the sediments and water of *Phragmites* stands, and especially the microbiology of these littoral regions, is particularly disappointing. The ubiquitous

distribution of *Phragmites* under a wide variety of environmental conditions permitted Rodewald-Rudescu only weak correlations and a rather broad summary of favorable chemical conditions for "optimal" development of the plant. Our physiological knowledge of *Phragmites*, as of most vascular aquatic plants, is obviously quite primitive and in need of greatly intensified research with modern methodology.

The existing information on the gross ecology of *Phragmites*, e.g. effects of water levels and fluctuations and climatic variations on growth rates, is similarly at a most fundamental descriptive stage of understanding without physiological interpretations. Furthermore, the algae, microflora, and fauna associated with *Phragmites* stands are very poorly known and little has been done on the rates of degradation, grazing, and population dynamics and metabolic interactions. Diseases and herbivory-parasitism by invertebrates of *Phragmites* are only briefly discussed. Rodewald-Rudescu concludes the ecological section of his treatment with a detailed summary of existing information on the general growth characteristics of *Phragmites* populations and its productivity in comparison with that of other annual emergent macrophytes.

One has to visit regions such as the enormous *Phragmites* delta of the Danube on the Black Sea in Romania to appreciate the magnitude of the development of this plant and its economic importance to many countries of Europe, the Middle East, and northern Africa. Although *Phragmites* has been for centuries, and continues to be, widely utilized in many ways for simple construction, its cultivation and exploitation for the manufacturing of paper, especially in Romania, is its most intensive use at present. Rudescu accordingly devotes much of his compilation on this species to the chemical composition of the plant parts under differing environmental conditions in relation to use for paper. Limited experimental work on the culture of *Phragmites* under manipulated conditions yields some insight into effects of nutrient availability and sediment composition on growth. The plant has sufficient value to warrant intensive cultivation under fertilization or by transplantation into new natural areas or those damaged by exploitation.

The concluding sections are devoted to manual and mechanized means of harvesting *Phragmites* with limited damage to the sensitive rhizomal portions of the plants.

This book is an excellent guide to a major portion of the existing literature on all aspects of the biology of *Phragmites communis* Trinius. The German, written by a Romanian to whom the language is not native, is direct, unencumbered with philological formalities, and easy to read. In German, its contents are more accessible to a wider audience than the earlier version written in Romanian (Rudescu et al. 1965). The discussions, however, are largely descriptive in an uncritical

manner. The book, although expensive, is a reference source that maintains the high standards of *Die Binnengewässer* series and is essential to limnological libraries. Botanists will also welcome this compilation to the limited number of summaries available on aquatic vascular plants.

Robert G. Wetzel

W. K. Kellogg Biological Station
Michigan State University
Hickory Corners 49060

Reference

- RUDESCU, L., C. NICULESCU, AND I. P. CHIVU. 1965. Monografia Stufului din Delta Dunarii. Editura Acad. Rep. Soc. Romania.
- SALÁNKI, J., AND J. E. PONYI [Eds.]. 1975. **Limnology of shallow waters.** Symp. Biol. Hung. v. 15. Akademiai Kiado, Budapest. 303 p. \$19.00.

This well produced volume encompasses 29 short papers presented at a conference held on the shores of Lake Balaton, Hungary, in autumn 1973. The participants no doubt benefited from this location overlooking a large lake so shallow that fishing boats are reputed to hit the sandy bottom in wave troughs on stormy days. However, the editors must have been overcome by the lake's magic to entitle the volume the *limnology* of shallow waters. The volume is heavily biased towards productivity, with eleven papers on primary productivity, seven on bacterial decomposition, and the remainder on secondary production. A few papers are more concerned with "pollution" or chemistry, but readers should anticipate aquatic productivity rather than overall limnology for their money. That said, there is much in this volume to commend. Limnology books are not common, and non-European (and British) readers may well benefit greatly since central European lakes and ideas dominate numerically. Much work on the interrelations of phytoplankton, periphyton, macrophytes, zooplankton, and fish is reported (e.g. Spondniewska). This provides a good compendium of modern data on production.

In the compressed environment of shallow waters, plants and animals fight a bitter struggle for dominance that often forms a pattern so interwoven that investigators must be especially careful with their methods. Unfortunately, this has led to a uniform overemphasis on methodology in the papers presented. I would have preferred less space devoted to methods and more to discussion of the results in a comparative fashion.

The lack of any other than a broad similarity in topics—a lack of knowledge by any author of the preceding and following papers—is probably the volume's greatest drawback. One longs for a draw-