

to them that anyone would attempt the study of underwater phenomena without utilizing an element of in situ observation.

The early generation will not profit greatly from this book. Workers long engaged in underwater studies have already learned their lessons the hard way: performance even in clear, warm, shallow water is at least an order of magnitude more difficult than that in the laboratory and degrades as the log of the depth; keep the equipment simple and negatively buoyant (lest it fall up); document with photography; plan judiciously. But they should certainly scan the bibliographies accompanying the nine chapters. The authors are all British, and their illustrative material naturally draws heavily on work done by members of English institutions. Some of these citations could easily have been overlooked by workers in the United States.

The book should prove most valuable to those considering or just beginning scientific studies involving diving or divers' performance, and it could serve well as a text or supplemental reading for scientific diving courses. Certainly administrators at institutions where diving is done under their cognizance will learn much, as will non-diving researchers and military leaders, who frequently have asked the impossible from divers and experimental subjects. There are many good leads for the designers of diving equipment. Finally, a better understanding of the underwater environment will be gained by all readers.

ERIC BARHAM

*Navy Undersea Research and  
Development Center,  
San Diego, California*

## Trouble-Making Terrains

**Karst.** J. N. JENNINGS. M.I.T. Press, Cambridge, Mass., 1971. xviii, 254 pp., illus. \$8.95. Introduction to Systematic Geomorphology, vol. 7.

**Karst.** Important Karst Regions of the Northern Hemisphere. M. HERAK and V. T. STRINGFIELD, Eds. Elsevier, New York, 1972. xiv, 552 pp., illus. \$35.

Regions of the countryside underlain by carbonates, gypsum, and other soluble rocks develop a characteristic suite of surface and subsurface landforms

collectively known as "karst." Karst research in the United States has always been a rather minor effort, but the new significance attached to environmental geomorphology in the past several years has shown that karst terrains above all others present a unique set of environmental problems. Highways collapse into sinkholes, building foundations subside, dams leak, water supplies are polluted, and the development of groundwater resources is hampered by the peculiar hydrology of a mature karst. In spite of the great reawakening of interest in carbonate hydrology and geomorphology, there has been nowhere an interested student could turn for a summary of the present state of knowledge. However, this situation is rapidly being corrected, and to the writer's knowledge there are a half dozen books on karst somewhere in the pipeline. The two reviewed here are the first to appear in print.

Jennings has written a textbook for topical reading at the senior or graduate level. It is the seventh of the series of volumes on landform studies. Modern geomorphology emphasizes processes: rivers, winds, waves, snow and ice, and chemical attack by solution. Karst landscapes result from strong chemical attack by surface, soil, and groundwater on rocks of specific lithologies with strong guidance by structural elements. Solutional sculpturing of the landscape differs from other geomorphic processes in that in addition to a characteristic set of landforms—sinkholes, dry valleys, bold residual hills, and a variety of small etching and sculpturing of the bedrock surface—there is also a corresponding set of underground structures: caves of many shapes and descriptions, underground streams, and deep vertical shafts. They are all here: the description of the landforms, the processes that formed them (although the book is a bit thin on chemistry, considering that karstification is mainly a chemical process), the role of structure, the role of climate, and the way in which karst areas have evolved through time. Jennings is widely traveled, and his examples flit lightly from Australia to the Adriatic, to the United States, to Britain, and back to Australia, all within the same paragraph. The book is a delight to read and should serve its purpose as an introductory text very well.

Herak and Stringfield's book is an attempt to provide a monographic de-

scription of the important karst regions of the Northern Hemisphere. The book was conceived through the working group on carbonate terrains of the International Hydrologic Decade, and the chapter authors are mainly Europeans. The European chapters describe the karst areas of Yugoslavia, Italy, France, Germany, Austria, Czechoslovakia, Poland, Romania, Great Britain, and the U.S.S.R. Each chapter follows more or less the same format: an overview of the distributions of karst areas within the country, a summary of the geology of each, and then a major discussion of karst landforms, hydrology, and in some cases the special problems, such as the perennial flooding of the farmlands in the poljes of Yugoslavia, that arise in each.

In terms of the authors' expressed desire to describe the "important karst regions of the Northern Hemisphere" the book falls considerably short of the mark. Even within Europe, the arctic karst of Norway, particularly Lapland and Spitzbergen, and the arid karst of Greece, Iran, the circum-Mediterranean countries and North Africa are conspicuous by their absence. Asia is represented only by the eastern U.S.S.R. Some of the world's classic tropical karst occurs in South China and North Vietnam. These pass without mention, as do those islands of Oceania north of the equator. North America fares little better. There is a chapter on the tropical cockpit karst of Jamaica. The United States gets roughly 40 pages with emphasis on the Appalachians, the Atlantic coastal plain, and the interior lowlands, mainly southern Indiana and Kentucky. The most exciting field studies of karst terrains in North America during the past decade have been carried out in Canada and Mexico, and these go entirely unnoticed.

The authors, of course, had set themselves an impossible task. What we karst zealots would like to have seen would have been a ten-volume work, rather than a single book. For the areas covered, this book provides an invaluable overview of the geological problems, in some cases the only one available in English, and an extensive bibliography to guide one into the literature.

WILLIAM B. WHITE

*Materials Research Laboratory and  
Department of Geosciences,  
Pennsylvania State University,  
University Park*