

REVIEW

GEOLOGISTS AND IDEAS: A HISTORY OF NORTH AMERICAN GEOLOGY, edited by Ellen T. Drake and William M. Jordan. This is Centennial Special Volume 1 (CSV 1), the first of the series of 71 volumes, transects, and maps to be published under the aegis of the Decade of North American Geology (DNAG) project of the Geological Society of America, Boulder, Colorado, 1985, x + 525 pp., 8 3/4 x 11 1/4 inches, illus., index, casebound, \$37.50

This volume is the Centennial contribution from the History of Geology Division of the Geological Society of America. In addition to four topical special volumes, of which this is one, there will be 28 volumes on the *Geology of North America*, comprising a synthesis of the present state of knowledge of the geology and geophysics of the continent and the adjacent oceanic regions (a joint project of the Geological Society of America and the Geological Survey of Canada). Six volumes of *Centennial Field Guides*", each describing geologic sites within one of the six regional sections of the Society, twenty-four packets of continent-ocean transects across the continental margins and seven maps of North America, each set with accompanying separate volumes, complete the DNAG series of 71 volumes and packets.

The present volume, prepared and presented by the History of Geology Division of the Society, includes thirty-three scholarly papers, arranged in four sections, *The Evolution of Scientific Ideas* (9), *Contributions of Individuals* (9), *Contributions of Organized Groups* (8), and *Application of Significant Ideas* (7), followed by an index. As the editors state so well, "the papers range in subject matter from geosynclines to plate tectonics, from the origin of life to the origins of caves and craters, from James Hall to George Gaylord Simpson, from the Arctic to Mexico, and from deep-sea drilling to orbital remote sensing." The broad scope of this important volume is both impressive and satisfying, and it surely represents a most worthy expression of the Centennial celebration.

The Evolution of Scientific Ideas begins with the origins of Isostasy and the Geosyncline, two original concepts uniquely American in their origin and which still hold an important place in the conceptual background of plate tectonics. Dwight Mayo presents the complementary relationships of these "made in America" ideas, their contemporary origins, and traces their historical development from James Hall and Clarence Dutton to their present position in structural theory. Subsequent papers deal with Evolving Tectonic Concepts of the Central and Southern Appalachians from the earliest and primitive catastrophist ideas of the brothers Rogers and others to the modern thesis of accretionary and allochthonous belts of micro-continents and their interrelationship with plate theory; the application of the mélangé concept and the role of underthrusting in the origin of the Franciscan Series in California, including its varied lithologies and age relationships; the Coon Butte Crater Controversy; the Development of Quantitative Geomorphology; the History of American Theories of Cave Origin, from the two-cycle deep-phreatic solution origin described by William Morris Davis to the more recent empirical demonstrations of cave formation through solutional and mechanical action near and above the water table; the development of Glacial Geology and the North American Craton from the primitive notions of glacial erratics and drift formed through the action of icebergs early in the century to detailed description and maps compiled in the mid- to late nineteenth century leading ultimately to favor for Richthofen's eolian hypothesis for the origin of loess and to Chamberlin's recognition of multiple glacial advances separated by warmer, nonglacial periods and the formal classification for the Pleistocene in North America; J. Tuzo Wilson's personal account of the development of Ideas about the Canadian Shield during the past sixty years; and concluding with Pres Cloud's *Vestiges of a Beginning*, a charming review of what we have learned about the

REVIEW

beginnings of the planet Earth, its sister planets, and the Sun, as well as the emergence of life upon Earth.

In *Contributions of Individuals*, Robert Dott describes James Hall's Discovery of the Craton and recognition of the fundamental difference between the central plate and the bordering orogenic belts, emphasizing that Hall himself was much more interested in acquiring and describing fossils and extending our knowledge of stratigraphy than in publishing his mountain building theory; George Merk reviews the controversial concepts of E. O. Ulrich which supported and fostered the Werne-rian "onion peel" or "layer-cake" geology in America during the first three decades of the twentieth century even though the concept that stratigraphic and faunal units normally end in a facies change was in common usage in Europe at the time. Additional essays deal with the pioneer geologist J. A. Udden and his research on wind-blown sediments that led to the particle distribution scheme used by modern sedimentologists, the Udden-Wentworth scale; R. S. Tarr, one of the pioneers of glacial geology and physical geography who devoted his brief professional life to the study of ice masses and the effects that they have had on the landscape; L. R. Wager and the Geology of East Greenland; Dr. Atl, Pioneer Mexican Volcanologist and muralist; and, Joseph A. Cushman and the Study of Foraminifera, including a review of his life work on the description and classification of these organisms which have had such a profound effect on subsurface geology and correlation, and of the famed controversy with J. J. Galloway over the publication of their respective classifications. The last paper in this section, Wrong for the Right Reasons: G. G. Simpson and Continental Drift describes the opposition to Continental Drift of this pre-eminent geologist who was wrong about Continental Drift and used his own historical biogeography based on Cenozoic mammals to refute the theory.

The third section, *Contributions of Organized Groups*, begins with Surveying the Geology of a Vast, Empty, Cold Country, the enormous task of taking inventory of Canada's minerals, rocks, and fossils, so

overwhelming that "numberless difficulties inherent in such an undertaking, embracing a range of country so vast and so difficult to explore, or even to obtain access to, must necessarily render any attempt of this nature very imperfect" (Isbister, 1855). The geological description of the second largest country on Earth (nearly ten million square kilometers) began with the establishment in 1842 of the Geological Survey of Canada, headed by William Edmund Logan. The early work began with travel by canoe or on foot under conditions arduous at best and confronted a vast and empty hinterland so sparsely populated that no more than 100,000 indigenous persons dwelt there. Even today, more than 20 of Canada's 24 million people live within a narrow southern strip bordering the United States and extending along its maritime provinces. McGill College, founded at Montreal in 1821 by Royal Charter, became McGill University in 1843. John William Dawson became its head in 1855 and remained for 38 years, never yielding from his fundamentalist views on the origin nor from his opposition to the theories of organic evolution and continental glaciation. He exerted enormous influence on early Canadian science. That so much scientific progress took place during the nineteenth century is an everlasting tribute to the stalwart pioneers of Canadian geological investigation. Other papers in this section are concerned with the Contributions of the State Geological Surveys (many founded by the students of Benjamin Silliman); the Role and Development of the Smithsonian Institution in the American Geological Community, the unsurpassed contributions of both the institution and its personnel (so ably recounted by Ellis Yochelson); A Brief History of the Geological Sciences at Yale, beginning with the appointment of Benjamin Silliman as Professor of Chemistry and Natural History in 1802, continuing with James Dwight Dana (1850) and through five more generation-long stages (the seventh and last beginning in 1965); and, A History of Geology at the University of Pennsylvania, from the early ruminations on diverse geological and geophysical matters by Benjamin Franklin, John Bartram, Benjamin Silliman

REVIEWS

Barton, Benjamin Rush, and other early Philadelphia scientists, through Henry Darwin Rogers (the first Professor of Geology and Mineralogy), J. Peter Lesley, Ferdinand Vandiveer Hayden, Joseph Leidy, Edward Drinker Cope, and many others associated both with the university and other Philadelphia institutions such as the Academy of Natural Sciences and Charles Willson Peale's museum. The section concludes with A Chronology from Mohole to JOIDES, a review of the major progress during the past three decades in exploring the nature of the Earth's interior by studying the floors of the oceans ("The ocean's bottom is at least as important as the moon's behind").

The seven papers in the final segment of this volume, *Application of Significant Ideas*, include North American Paleomagnetism and Geology, sketching the developments in this field which have led to a magnetic time scale based on the chronology of field reversals and other discoveries which have markedly affected current geological thought; the Early Development of Archaeological Geology in North America; the Anticlinal Theory of Oil and Gas Accumulation; Application as Stimulus in Geology; Seismic Exploration of the Crust and Upper Mantle of the Basin and Range Province; The Development of Earthquake Seismology in the Western United States; and, Geology from Space, A Brief History of Orbital Remote Sensing. This last section helps to place the historical development of geological thought into current perspective.

The historical importance of this Centennial Volume cannot be overstated. It comprises a most refreshing review of many aspects of the development of both practical and theoretical geology and serves to place these factors into their proper historical perspective, and provides a base for comprehending the limitless scope of geological investigation as we near the final decade of the twentieth century. This volume should be welcomed by all functioning geoscientists and deserves a convenient place on our reference shelves.

THE MARINE BENTHIC DIATOMS IN CHINA, Volume I, by Jin Dexiang (T. G. Chin), Cheng Zhaodi, Lin Junmin, and Liu Shicheng. Published by China Ocean Press, Beijing, China, and distributed by Springer-Verlag, Berlin, Heidelberg, New York, and Tokyo, 1985, x + 313 pp., illus., atlas of 67 pls., \$99.50

Work on marine diatoms in China is unfamiliar to western readers because of the language barrier and *The Marine Planktonic Diatoms in China* (1964, in Chinese) is the only previous book-length work on this subject. The present volume is the first of three planned and intended to survey the knowledge of marine diatoms along the coasts of China for the English-reading scientist. They will supplement but not fully duplicate the diatoms reported in the earlier work in Chinese, and may be considered a continuation of that work. In this first volume, 445 species and varieties from the Fujian Coast and vicinity are presented. The second volume will deal with diatoms from the South China Sea, and the third with those from the other waters along the coasts of China.

This book describes diatoms principally from the intertidal zones, but those from brackish and inland fresh waters also are included, together with some diatoms from sediments of the continental shelf and slope of the East China Sea and the Okinawa Trough. Only the most important or major species are covered in this volume, with only names and additional descriptions given for those reported in the previous volume (in Chinese).

Aside from a brief introduction and a short treatment of the Taxonomical System of Diatoms which includes the rudiments of classification and a Key to the Representative Genera in Each Family and the Common Genera in China, this book is an illustrated and descriptive catalog of species from Chinese Coastal Waters. Though somewhat limited and difficult to use, it will be useful to paleontologists working with diatom assemblages throughout the world.

—H.C.S.