American Archeology

John Lloyd Stephens' **Incidents of Travel in Yucatan.** vols. 1 and 2 (Victor Wolfgang von Hagen, Ed. University of Oklahoma Press, Norman, 1962. 696 pp. $15) are among the major classics of American archeology. In their entertaining yet soundly informative travelogs they first brought to the attention of the public the glories of the old Maya, and they introduced that word into the American vocabulary. They found an eager audience; the books were among the best sellers of 1845. Although *Yucatan* went into 22 editions, copies are becoming rare items. But they are still important sources for the archeologist, for some of the buildings and monuments described by Stephens, and so masterfully and meticulously depicted by Frederick Catherwood's engravings, have been destroyed or damaged. Forty-four sites were visited, described, and portrayed.

This excellent new edition is therefore most welcome. The full text and all of the illustrations are included, unedited except for the standardization of punctuation, proper names, and a few Spanish and English words. The addition of a few footnotes, several modern maps, and indices makes the work more useful, and in his introduction von Hagen gives an excellent background and full biographies of Stephens and Catherwood.

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Physical Sciences and Engineering

Oceanography Source Books

The Sea. Ideas and observations on progress in the study of the seas. vol. 1, *Physical Oceanography*. M. N. Hill, Ed. Interscience (Wiley), New York, 1962. xv + 864 pp. Illus. $25.

This considerable work of reference, intended as a source book of ideas and observations, illustrates the major progress made since the still invaluable *The Oceans* was first published 20 years ago.

Thus, at that time, the theory of wave motion in the sea was essentially little advanced on the classical results of hydrodynamics. Now we have in this volume at least 100 pages devoted to the statistics of the sea-surface and the central concept of the spectrum of waves, from the high frequency ripples to the climatic changes in sea level. Most theoretical attention has been focused on the storm and swell waves, but good accounts are given of the gamut of wavelike motions. Internal waves, too, are now beginning to be systematically investigated. Discussion of the newer theories of the mechanism of energy transfer from wind to waves is brief.

The contributors to this volume have responded to the editorial intentions in different ways. Some chapters are brief reviews; others attempt a fully documented survey of their subject. In this respect, Malkus' most readable chapter (of over 200 pages) on large scale interactions between atmosphere and ocean is a highlight. Malkus uses energy budgets and flux computations with the intention of achieving some understanding of the central problem of the dynamics of the ocean-atmosphere system. The problems are posed, data critically examined, and partial solutions suggested within the limitations of the data. On the other hand, there are only 20 pages devoted to the solubles, insolubles, and gases in the oceans, although some aspects can be expected to be expanded in volume 2 of the series.

The theory of ocean currents too has changed its emphasis over the years. Much theoretical work is now directed toward understanding the circulation of the oceans as an entity. These developments are well reviewed.

Aside from the research into the hydrodynamics of the ocean, there are extensive discussions of sound in the sea. Sound is used, for example, to probe the distribution of biological life by using both man-made sources and the animals' own noises. The physical properties of the medium give acoustic methods a prime place in underwater communication.

However, the importance of electromagnetic radiation, of light in particular, in biological processes makes chapters on this subject welcome. The closing chapter on the physical properties of sea-ice complements an earlier one on those of the liquid state and provides much informative detail.

The importance of this book will be in its ability to provide sound information and good references in those fields with which one is not familiar. It probably achieves this end (though a lone reviewer cannot, of course, be sure of this), and it should enjoy a long and useful life in the hands of all oceanographers.

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The Sea. Ideas and observations on progress in the study of the seas. vol. 2, *Composition of Sea Water.* Comparative and descriptive oceanography. M. N. Hill, Ed. Interscience (Wiley), New York, 1963. xv + 554 pp. Illus. $25.

This is the second volume of a three-volume series directed toward giving a view of progress made in the study of the seas during the past 20 years and toward depicting present ideas and

research trends. Although it is not a textbook, nor so intended, many chapters will nicely supplement existing text material, and some chapters will serve better in this capacity than the previously available material. The broad and rapidly expanding field of oceanography cannot be covered in a few volumes—and perhaps not even adequately sampled. The distinction between what should and what should not be included is an individual's choice, and there are probably as many different opinions about this matter as there are scientists concerned with the sea.

The subject matter of volume 2 (24 chapters by 29 authors) ranges from the chemistry of the sea through productivity, food chain relations, descriptions of current systems and regional oceanography to the bathyscaph as a research instrument. Biology is restricted to aspects rather directly related to the physical, chemical, and geological processes in the ocean and on its floor. Some chapters give a thorough and stimulating treatment of selected topics and others barely an introduction.

The index is not cross referenced to the other volumes in the series. Each volume, and to a considerable extent each chapter, stands alone. Some authors refer to chapters in the other volumes, and others probably could have improved the presentation of their subject, and the book, by better awareness of related material included in the series. The reader may be left with more of a feeling for the chapters as entities than for the sea as a whole.

Despite the lack of continuity and the unavoidable gaps in any work of this type, the *Composition of Sea Water* will be very useful to researchers in contributing disciplines. For the topics covered, the volume will serve not only as an entry into the very scattered literature of the field, but, for some topics, it will also serve as an abbreviated monograph. In keeping with the times, its cost is high; the price, combined with the volume's incompleteness for specific text usage, may unfortunately limit its distribution among the many students who should have it readily at hand. The editor and his staff deserve the thanks of the oceanographic community. Unfortunately, the proof copy available for my inspection contained numerous typographical errors which I trust will be eliminated in the finished volume.

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Solar-Terrestrial Phenomena

Physique Solaire et Géophysique. A. Dauvillier. Masson, Paris, 1962. iv + 362 pp. Illus. NF. 72.

In this 362-page book Dauvillier allows his imagination to roam freely over what is frequently called solar-terrestrial phenomena. On a level which may be suitable for graduate students and with a historical perspective rare in modern books, the author elucidates the solar surface, solar magnetism, the solar corona, the zodiacal light, and various terrestrial phenomena of solar origin. On the whole, these factual résumés are authoritative, but there are occasional omissions of important material. For example, the solar chromosphere is described without reference to any work carried out since 1945; and the modern student will be somewhat surprised to learn that "As one goes from the exterior towards the photosphere the outer layers of the sun show, in effect, first the presence of hydrogen, then of helium, then of light metals, with the heavy elements being confined to the deepest layers. The case of calcium, which is observed in the highest regions of the chromosphere, is special since the ions of Ca^+ are ejected by radiation pressure."

Readers will find the interpretative chapters that follow each résumé most challenging. In these the author integrates the factual material into a theoretical whole. Some of his major conclusions are best illustrated by the following direct quotations (my translations).

On solar magnetism: "To take account of solar magnetism we appeal not to electrostatics, not to induction, but to thermoelectricity. The thermoelectric currents engendered in the photospheric material have the properties of an electric arc and their incurvation under the action of appropriate magnetic forces brings about the magnetic field. The problem is considered as a simple problem of electrotechnique."

On solar granulation: "The photospheric granulation is considered as an electric discharge of the nature of an arc. The isothermal layer where neutral atomic hydrogen meets with thermoionization is the site of an electronic pressure which is directed towards the surface and which constitutes a thermoelectric generator of the type of the indirectly heated cathodic arc studied by Medicus and Wehner."

On sunspots: "Sunspots arise not from thermal convection nor from magnetohydrodynamic effects (dynamo effect) postulated by Gouy and numerous other authors. Their properties are those of a Davy electric arc burning in a gas."

On the zodiacal light: "The theories based on the role of cosmic dust and of interplanetary gas are discussed and discarded for the same reason as those relevant to the corona. The feeble contribution caused by the interplanetary gas has been evaluated. Only the electronic theory is adequate to take account of the daily variations of the zodiacal light. The latter appears to be the necessary intermediary in the electromagnetic relations that exist between the sun and the earth."

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Structural Theory

Chemical Bonding and the Geometry of Molecules. George E. Ryschkewitsch. Reinhold, New York; Chapman and Hall, London, 1963. x + 116 pp. Illus. Paper, $1.95.

In four chapters of nearly equal length, the author of this paperback covers the electronic structure of atoms, ionic compounds, the covalent bond, and the geometry of molecules. He aims to present modern structural theory in a qualitative way without rigorous proof. His treatment is up-to-date, and a good selection of outside readings is provided. The book makes instructive and interesting reading for one who already has a sound knowledge of fundamental chemistry and physics.

The level of sophistication is high. Among the advanced concepts introduced are the Hund Rule, lanthanide contraction, lattice energy, coordination number and radius ratios, the Madelung constant, the Born-Haber cycle, formal charge, electronegativity, dipole moment, resonance, and delocalization energy. All in 107 pages! The style is concise and clear, but I frequently felt that a good deal of additional exposition by lecture would be required to provide undergraduate chemistry students with a grasp of many of the topics.

The author is to be congratulated for avoiding oversimplification. He is careful to point out limitations to the