

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  $\text{Ca}^+$  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 thermionization 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. Ryschke-witsch. 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

theory where they exist, and to a remarkable extent he finds the time to explain discrepancies between naïve theoretical predictions and the facts. This attitude lends an air of intellectual stimulation and is bound to capture the respect of the reader. I was most impressed by the lucid presentation of the simple electrostatic explanation for the geometry of molecules. It alone is worth the price of the book.

This otherwise excellent little book is badly marred by confused symbolism and typographical errors, particularly in the first two chapters. On the other hand, there are few errors in content, and the book is handsomely printed and sturdily bound. Students and instructors alike will find this book valuable and stimulating.

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## Nuclear Physics

**Nuclear Reactions**, vol. 2. P. M. Endt and P. B. Smith, Eds. North-Holland, Amsterdam; Interscience (Wiley), New York, 1963. x + 542 pp. Illus. \$18.50.

This second volume of the series published about four years after its companion volume, consists of four articles that review recent progress in various aspects of nuclear reactions (247 pages). The remainder is devoted to tables of the coefficients  $C_{KM}^N$  which apply to the analysis of angular correlation measurements of the radiative decay of aligned nuclei. The tables are preceded by a 23-page introduction and guide to their use. Thus, the second half of the book is devoted to mathematical tables which make completely dull reading for those not interested in using them, but which are invaluable to experimentalists who need them for present or future planning and analysis of experiments. This extensive section, by Philip B. Smith, seems particularly appropriate in view of the anticipated wave of experimentation using multi-parameter analyzer systems.

The four articles in the first half of the book are: (i) "Nanosecond experimentation with pulsed machines," by Stewart D. Bloom (41 pages); (ii) "Nuclear fission," by J. R. Huizenga and R. Vandenbosch (71 pages); (iii) "The giant resonance of the nuclear

photoeffect," by E. G. Fuller and Evans Hayward (82 pages); and (iv) "Vibrations of spherical nuclei," by J. M. Araújo (53 pages). The authors are all distinguished experts in their fields, and their articles are generally very well-written reviews in which they attempt to summarize advances and new developments made in these areas in the time that has elapsed since the last major review article on the topic to about 1960. Their attempts to avoid the repetition of material covered in previous reviews frequently results in the complete omission of important areas of the subject.

The first article is devoted to experimental methodology, with particular emphasis on machine techniques for obtaining concentrated nanosecond width bursts from accelerators, and time-to-pulse height circuits suitable for nanosecond time-of-flight studies. Bloom includes many suggestions for future areas of experimentation which should be of considerable interest to those planning experiments in this field. To benefit fully from the somewhat sketchy tour provided in this article its readers must do several times as much reading from the extensive lists of references. (This is also true of the other articles.)

The second article emphasizes developments since Halpern's extensive article on nuclear fission in the *Annual Reviews of Nuclear Science* (1959). The rapid developments since Halpern's article are quite impressive.

I found the third article, by Fuller and Hayward, especially interesting. A large fraction of their article is devoted to a systematic development of the theory of the absorption and scattering of photons in the giant resonance region and to a critical discussion of the present status of the experimental work in this field, work to which the authors have made major contributions. All experimental results are critically reevaluated to provide an extremely valuable up-to-date analysis of the field. For a complete picture the reader should also read the earlier treatments by Bishop and Wilson, by Wilkinson, and by Stephens and the recent book by J. S. Levinger (listed in the references).

In the fourth article Araújo omits discussion of the vibrational states of deformed nuclei and concentrates on the more controversial subject of the collective vibrational motion of "spherical nuclei" near closed shells. The alternate interpretation of Davydov and

his collaborators is mentioned but not discussed. The article is mainly devoted to the theoretical aspects of the subject.

The review articles are well written and authoritative, and they are comparable to the better articles found in *Annual Reviews of Nuclear Science* and similar works. The reader is expected to have a reasonably sophisticated background, and formulas and symbols are occasionally used without definitions of all symbols.

The book should prove to be a must for physicists working in these areas, but its price is such that access to a library copy will probably satisfy most users. The exponentially increasing pace of physics publication places an increasing emphasis on the need for frequent review articles as essential instruments for the effective dissemination of new knowledge to a wide audience.

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## Russian Translation

**Radio Wave Propagation and the Ionosphere**. Ya. L. Al'pert. Translated from the Russian. Consultants Bureau, New York, 1963. x + 394 pp. Illus. \$22.50.

This is an English translation of a Russian book first published in Moscow (1960), and it represents a considerable expansion and updating of a previous monograph entitled *Propagation of Radio Waves* (1953). The book is divided into two well-organized parts, the first of which covers the ionosphere and the second the propagation of radio waves of different frequencies. The translation is well done and exhibits a minimum of idiomatic awkwardness.

The presentation of the material on the ionosphere is closely linked to the radio methods by which most of the information on the ionosphere has been obtained. The main topics are the structure of the ionosphere, its formation, the regular variations in its electron density, effective collision frequency and absorption of radio waves in the ionosphere, and irregular phenomena in the ionosphere.

In the second part the general laws of the propagation of radio waves are reviewed, and then the details of propagation are presented in different wave