Sauer on Geography

Land and Life. A selection from the writings of Carl Ortwin Sauer. John Leighly, Ed. University of California Press, Berkeley, 1963. vi + 435 pp. Illus. $8.95.

Carl Ortwin Sauer, geographer and professor emeritus at the University of California, has placed an indelible mark on the geographic profession in America. Some of the best of contemporary geographers were his students, and their work reflects strongly the inspiration of the teacher. Sauer is unique in that he can offer a collection of scholarly writings extending over almost the entire length of his career and feel no embarassment. *Land and Life* is a testimonial of an active and creative life, and in perusing its pages one feels the abiding interest of the philosopher in the quality of human life and in man's use of the earth.

The volume is divided into five parts: The Midland Frontier, The Southwest and Mexico, Human Uses of the Organic World, The Farther Reaches of Human Time, and The Pursuit of Learning.

Sauer's approach to his studies is essentially historical, and because his interests have taken him into an "ill-defined and unspecialized field of scholarship," as John Leighly points out, Sauer has always seemed to be on the frontier, both figuratively and literally. Because Sauer grew up in the Midwest, his feeling for simple, unaffected people is one of kinship, and it was this feeling that he ultimately developed for the peoples of Mexico and Latin America. At the same time, in order to understand the associations of human life and plant and animal life on earth, his investigations took him into other fields (for example, anthropology and plant ecology), fields that in the past some of his more conservative colleagues have considered on the margin of geography if not, indeed, outside the latter. Therefore, Sauer has not lived without controversy, but he has always been listened to by his colleagues.

There is a romantic element in Sauer's writings which, however stimulating and satisfying, appears anachronistic in the 1960's when abstraction, mechanical equilibrium theories, and statistical analyses are the vogue and seem as removed from reality as the statement of the goal of a Soviet Five-Year Plan. Sauer thrilled at the seemingly limitless possibilities of life and human activity, and his research, whether in the field or at the library, continually fed his deep desire to recreate life and landscapes in various regions and throughout periods of history. Yet, as indicated in one of these essays, "The education of a geographer" (1956) (in part 5), he saw the need for focus on *the problem* and the pursuit of the theme, the need for analysis rather than for regional description for its own sake, and the mere accumulation of often irrelevant facts. Contemporary geography, in part, seems frightened by all that which stimulated Sauer and would exclude from consideration not only irrelevant facts but any facts which would tend to disturb the grand conceptual spatial arrangement of service stations, supermarkets, and garbage dumps.

Leighly's introduction contributes much to the understanding of Sauer, the scholar. *Land and Life* will serve a most useful purpose in keeping before the new generation as well as coming generations of American geographers the scholarship and the quality of the mind that is Carl Sauer's.

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Canadian Shield

The Tectonics of the Canadian Shield. John S. Stevenson, Ed. University of Toronto Press, Toronto, Canada, 1962. x + 180 pp. Illus. Maps. $6.50

The papers in this volume—14 essays written by 21 authors, among them some of Canada's most distinguished geologists—were presented as a symposium at the annual meeting of the Royal Society of Canada, held at McGill University in 1961. Each paper is a complete entity with individually distinctive illustrations and a separate bibliography. In all, there are 52 illustrations and 8 tables.

This well-organized collection begins with a short paper on the major structural provinces of the Canadian Shield, which are those to be used in the forthcoming tectonic map of Canada, and concludes with a stimulating paper of broad scope, "The effect of new orogenic theories upon ideas of the tectonics of the Canadian Shield." Between these are 12 papers that blanket the Canadian Shield and incorporate the most recent concepts of its tectonics.

Several of the articles illustrate how the use of isotopic age determinations in recent years has permitted subdivision of the shield rocks on the basis of folding, intrusion of granitic rocks, and the accompanying metamorphism. The data on isotopic ages, which are distributed throughout the book, are based, in large measure, on 215 potassium-argon age determinations on micas, and they show impressive grouping around 2500, 1700, and 950 million years, suggesting three orogenies. Some skeptics, who have experienced the vagaries of micas for argon retention during deformation and intrusion, may well suspect that this is only the beginning of the interpretations of the isotopic ages of the micas.

The only deficiency that I noted seems to stem from the volume's origin as a symposium. Many place names found in the text are not on the illustrations, and more than one article lacks illustrations needed for readers who are not familiar with the area under consideration. I advise those readers who are not at home on the Canadian Shield to arm themselves with a good atlas and geologic and tectonic maps of Canada.

At only $6.50 per copy, *The Tectonics of the Canadian Shield* is easily a "best buy."

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Geology

Elements of Structural Geology. E. Sherbon Hills. Wiley, New York, 1963. xii + 483 pp. Illus. $8.50.

Although this carefully prepared book, a considerably expanded version of the author's *Outlines of Structural Geology*, is aimed at the undergraduate, it gives complete but not too lengthy coverage to all topics reasonably considered a part of structural geology. The text is beautifully illustrated, thoroughly referenced, and presented in a consistent style. The 14 chapter titles serve as an adequate description of the material covered: "The domain and content of structural geology"; "Depositional textures and structures"; "Non-drastrophic structures"; "Physics of deformation"; "Environ-

ment, time, and material"; "Planar and linear structures and jointing"; "Faults"; "Folds"; "Tectonic analysis of folds"; "Cleavage"; "Major structures and tectonics"; "Igneous rocks"; "Structural petrology" (written by E. Den Tex); and "Geomorphology and morphotectonics." This organization of the subject matter is very effective.

The style of presentation detracts from the overall merit of the book. In the preface Hills states that "Particular attention has been paid to definitions . . . [and that readers will find this] far from being dry as dust material for rote learning. . . ." He succeeds in maintaining such a sharp focus on definitions that one often wonders whether the book is a textbook or an expanded, well-illustrated glossary. This lackluster effect is reinforced by the author's unwillingness to commit himself to any theory or groups of theories that would form a unified basis for the presentation of the material. The result is a disjointed presentation that is sure to defeat even the most concerted effort to keep one's mind on the subject. In the preface it is also stated that the reader will witness "as much discussion of pros and cons as is possible within the limit of a text book." Instead, references to genesis, comparative environment of formation, and other underlying principles are commonly restricted to a single clause or sentence immersed in a much larger volume of purely descriptive material; or such references are presented in separate sections so that they will not jeopardize the presentation of the descriptive material. The net result is a very antiseptic treatment of the material.

Owing to the slow progress in the field of structural geology during the last few decades, one would expect new textbooks in the field to be up to date, particularly with respect to any attempt to present a quantitative description of the genesis of structures. Yet such work is not covered to any degree in this text. The two notable omissions are (i) the buckling analyses that relate fold wave lengths to rock type and physical environment (by Biot; Curie, Patlode, and Trump; and Ramberg) and (ii) the thermodynamic studies on the crystallization of minerals in stressed environments, which are basic to a quantitative understanding of petrofabrics (by MacDonald; Verhoogen; Kennedy; and Kamb).

Regardless of these shortcomings, the scope and organization of the material presented and the abundance of illustrations and references should make this a good text around which to build an introductory course covering the traditional subject matter of structural geology.

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Chemical Technology

Physical Chemistry of Petroleum Solvents. W. W. Reynolds. Reinhold, New York; Chapman and Hall, London, 1963. x + 211 pp. Illus. $10.

This handbook on the physical properties of petroleum hydrocarbons which characterize their solvent characteristics in practical systems such as resins, paint films, and printing inks resulted from a ten-year study carried out at Shell Oil Company's Wood River Research Laboratory under the supervision of the author, W. W. Reynolds. Few of us realize how, in recent years, advances in petroleum technology have provided a "spectrum of solvents and hydrocarbons extending from essentially pure isoparaffins to pure aromatics." Their use and adaptability in a variety of practical solvent systems has not been fully exploited, and this is essentially the message and purpose of this small volume.

Chapter 1, largely written by the author's colleague, G. W. Waters, contrasts the physicochemical properties of the three main categories of hydrocarbons—the paraffins, the naphthenes, and the aromatics—with practical properties or criteria of acceptable solvent behavior—solvency, viscosity, volatility, and odor. The data of the American Petroleum Institute's Research Project 44 on pure hydrocarbons are extensively quoted in this section. The second chapter very briefly reviews the thermodynamics of binary solutions, *a la* Hildebrand and Scott, together with the elementary Flory-Huggins approach to the thermodynamics of polymer solutions. The remaining seven chapters deal with more practical aspects of the nature of paint resin solutions, their flow properties, and the final characteristics of surface coatings. The treatment throughout is essentially thermodynamic in nature, and it is unfortunate that the author has not devoted some space to the importance of the kinetic aspects in this area.

The choice of solvents and compounding will remain an art until modern advances in theories of liquids and their mixtures can be reduced to a more useful semiempirical basis. This volume will be very useful to those who work in the area of solvent technology and should stimulate physical chemists to make a greater effort to understand the fundamentals of solvent behavior.

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Astronomy

The Solar System. vol. 4, *The Moon, Meteorites, and Comets.* Barbara M. Middlehurst and Gerard P. Kuiper, Eds. University of Chicago Press, Chicago, 1963. xxii + 810 pp. $15.

In this fourth volume of a five-volume series on the solar system, 28 authors present 22 chapters that are up-to-date and authoritative. Twenty percent of the book is on the moon, 60 percent on meteors and meteorites, and 20 percent on comets. The book can be recommended without reservation to all who are interested, professional astronomers as well as amateurs. Its appearance is especially timely now that exploration of the solar system by means of rockets has begun in earnest. The final volume of the series, on planets and interplanetary material, should soon appear; it will also deal with such subjects as selenography, tektites, the origin of meteorites, and the primordial composition of the solar system.

Two remarks by the late F. G. Pease on lunar observations made with the 100-inch telescope at Mount Wilson are worth quoting: "The photos do not begin to show the exquisite detail that is seen visually when we have good seeing. They really do not tell the truth. The smoothed surface about Copernicus becomes a billion crater pits, each showing typical crater shadows at low sun; rifts become sharp and angular sometimes with acute angles; the light streaks appear to be but a series of very low mounds touched here and there with white. The dark streak in the rim of Aristillus is a veritable maze of fine threads." About the Mount