provides a concise but comprehensive account of certain aspects of the physics of sensory phenomena. Defares and Wise contribute lengthy papers on physicomathematical aspects of the respiratory system: the theory of pulmonary carbon dioxide diffusion is well treated, with particular emphasis on its application to the measurement of cardiac output; furthermore, there is good agreement between the theory and experimental evidence.

In the course of several chapters, Landahl concerns himself with such diverse topics as the retention of airborne particles in the human respiratory tract, mathematical models for pharmacological systems, neural nets, and a variety of psychological phenomena. Although his interests seem to range over an amazingly wide spectrum, Landahl's treatment of many of these topics is highly speculative. In the light of Rashevsky's remark in the introduction to this volume—"The successful development of any science is contingent upon an harmonious co-operation between experiment and theory . . ."—I am forced to conclude that Landahl's work falls short of this goal.

Polissar and Rapaport discuss cardiac function by dealing primarily with the problem of evaluating valve insufficiency by means of indicator curves. In a very good analysis of some statistical aspects of radiation hazards, Wise points out the utility as well as the necessity of empirical laws in biomedical sciences. He concludes that "We must be prepared to use any material however untidy or unpromising." In the concluding chapter, Rashevsky discusses what he considers to be general principles of biology; for him the relational rather than the metric aspects of physics are of prime relevance to the biologist.

This last point should be borne in mind by physicists to whom this volume is primarily directed: A deeper appreciation of relational aspects is needed by the physicist who hopes to make a contribution to biology. At a moment in history when biology is moving rapidly towards a better fit between theory and data, this book gives an accurate though highly selective picture of recent developments in the physicomathematical treatment of certain biological phenomena.

ANDREA CAVAGGIONI
Center for Communication Sciences, Research Laboratory of Electronics, Massachusetts Institute of Technology

The World's Third Pole

Mount Everest. Formation, population, and exploration of the Everest region. Toni Hagen, G. O. Dyhenfurth, Ch. Von Fürer-Haimendorf, and Erwin Schneider. Translated by E. Noel Bowman. Oxford University Press, New York, 1963. xiv + 195 pp. Illus. $8.

This is not just another picture book about Mount Everest, "the world's third pole"; instead, the four authors have put together a definitive yet readable account of the geology of the Himalayas (Hagen), a history of exploration of the Everest area (Dyhenfurth), a study of the Sherpa people (Fürer-Haimendorf), and an account of surveying the area, that includes a superb Swiss-style shaded contour map with 20 meter intervals at the scale of 1:25,000 (Schneider).

The translator's preface correctly states that this ". . . is quite out of the run of the usual type of literature concerned with the area; in fact it can be considered as the best book about the Himalayas and in any case is the most comprehensive work on the scientific research of the Everest massif." Each of the authors has had a long experience in the area. Thirty-one handsome plates and two dozen geological diagrams add to the brief text. There is a picture of Chomo-Lungma (Chomo-Lungma, the Nepalese name for the Goddess Mother of the World, is sometimes attributed to Everest), whose corrected height is 8,847.6 meters, or 29,028 feet.

In structural terms, the Himalayas represent a series of great overthrusts and recumbent folds, directed from the north, not unlike the Alps, which evolved from sediments in the ancient Tethys Sea. Hagen's geological work in Nepal spread over 6 years and involved 96 profiles that range from the Ganges Plain to the Tibetan frontier. As an illustration of the local relief, his field studies covered 14,000 kilometers horizontally and 750 kilometers vertically, all on foot.

Since the uplift of the Everest chain took place after regional drainage was established, the Ganges-Tsangpo watershed lies well to the north of the crest of the Himalayas; in fact a further shift of only 15 kilometers would result in the piracy of the upper 600 kilometers of the Tsangpo. The political boundary between Nepal and China follows the main crest line through Everest rather than the watershed.

Mount Everest was "discovered" from a distance in 1852. Attempts to climb it date from 1893; that attempt was followed by scores of expeditions until Everest was conquered by Hillary and Tenzing in 1953. Reports of later Soviet and Chinese expeditions remain unsubstantiated, but in 1957 a Swiss expedition put two parties on the summit of Everest, in splendid weather, and "they took photographs, changed films, ate with a good appetite, and were able to do without oxygen."

Fürer-Haimendorf writes about the Sherpas, a Mongoloid people who live in Nepal but who originally came from Tibet. Most of their villages lie around 12,000 to 13,000 feet, with summer grazing ground up to 16,000 feet. Their traditional economy is based on grazing of yak on seasonal pastures, combined with intermediary trade between Tibet and the rest of Nepal. Cultivated crops are limited to buckwheat, potatoes, and a few vegetables.

The problem of surveying the Himalayas is well described by Schneider, one of the first Britishers to map the Everest area from the north. Of Tibet he says, "I must place on record that Tibet is a wonderful country To Have Been In, rather than To Go To." Successive survey sheets have culminated in the magnificent topographic map which accompanies this volume and which was originally published in 1957.

GEORGE B. CRESSEY
Department of Geography, Syracuse University

Industrial Processes

The Chemistry of Rhenium. K. B. Lebedev. Translated by L. Ronson. Butterworth, Washington, D.C., 1962. x + 105 pp. Illus. $7.50.

The title of this small monograph is somewhat misleading. A more descriptive title would be "The Industrial Chemistry of Rhenium." Ronson, the translator, points out that, unlike the monographs by Tribalat (1957) and Druce (1948) or the recent article by Woolf in the *Quarterly Review* (1961), little of the pure chemistry of rhenium is included in Lebedev's monograph. Only that chemistry which is pertinent to the extraction and recovery, the preparation and purification, and the

analysis of rhenium metal and industrially manufactured rhenium compounds is included.

The first chapter gives a very brief (3 pages) history of rhenium. The second chapter is devoted to the properties of rhenium metal and some of its alloys (including phase diagrams) and to the properties of rhenium oxides, sulfides, and perrhenates. The third chapter lists the applications of rhenium and provides production figures to 1956. Chapter 4, on rhenium sources, discusses the general geochemistry of rhenium and the concentration of rhenium in molybdenum and copper metallurgical processes. Chapter 5 covers in detail the extraction of rhenium from the metallurgical concentrates. This is the most detailed chapter in the book and is devoted primarily to the Russian practices. The preparation of rhenium metal is covered in some detail in chapter six. The final chapter is a very brief summary of the analytical chemistry of rhenium.

The vast majority of the references are to the Russian literature, and they include a substantial number of the lesser-known publications. The book was published in the Russian language in 1960, so references only up to 1958 are included in the bibliography.

Those persons concerned with the industrial production of rhenium will find the book useful, but those concerned with the basic chemistry of the element will find it of little value.

CHARLES R. NAESER
Department of Chemistry,
George Washington University

Introductory College Texts

Understanding the Physical Sciences. Olaf P. Anfinson. Allyn and Bacon, Boston, Mass., 1963. xvi + 456 pp. Illus. $8.50

Basic Concepts of Physics. Arthur Beiser. Addison-Wesley, Reading, Mass., 1961. x + 341 pp. Illus. $7.75.

One of the choices that must be made by an author who embarks on the task of initiating the nonscientist into the activities of the scientist—a task that is not only worthwhile, but one that is essential in our culture—is how much space and effort to give to the "philosophical, historical, and cultural aspects" of science. In this respect the two books here considered differ radically, with Beiser stating clearly in his preface that his decision is to limit himself to the formal content of physics. A second choice is the order in which the topics to be considered are presented, and which topics are to be included. In this respect, too, Anfinson and Beiser differ; Anfinson considers topics from almost every branch of the physical sciences, and he presents them in a rather unusual order—for example, he begins with a consideration of sound and light.

I find this an unfortunate choice, and I am not convinced of its validity by the reasons the author advances in the preface—"Beginning our inquiry in the realm of sound and light," he states, "is not by chance. As children we became dependent on the sense organs as our primary means of learning about our surroundings." It is, of course, simply not true that, as Anfinson seems to imply, our earliest means of learning about our surroundings are through sound and light—Piaget has amply documented this—and, when sight does become an important means of communication with the environment, we do not become aware of light as a wave in the sense that we early become aware of masses translatable through effort. It is not, indeed, by chance that science developed historically in the order it did.

It is true that the order of presentation used needs no justification other than the results obtained, but beginning with sound and light appears to have forced Anfinson to present an abnormally large number of statements that must be accepted on pure faith long before any rational basis for this faith has been established, either by experimental evidence or by supporting conceptual schemes. Thus, we find the principle of conservation of energy stated, without any justification, on page 9; on page 49 he tells us that light waves "manifest a combination of electric and magnetic effects," but it is only on page 322 that the first statements of elementary electric effects are given, and then they are incompletely presented. The number of such examples could be extended almost indefinitely.

Clearly, the method does not lend itself to the exploration of the historical aspects of science, and the many asides that seem to be intended to probe into the cultural and philosophical aspects strike me as neither novel nor deep. A few questions and problems are given at the end of each chapter, and the book is provided plentifully with illustrations. The format is the fashionable two-column page. I must confess to a deep and irrational dislike of this format for a textbook.

The order in which topics are presented by Beiser is traditional but in this case I feel there is much to be said for tradition. Within its self-imposed limits (the volume is intended as an introduction to physics designed for use in a one-semester college course), this is a fine book, clearly written, and with the elegance of accurately used language. One could question whether the basic concepts have been sufficiently plumbed: is it enough, for example, to state Newton's first law without explicitly questioning the frame of reference with respect to which the "straight line" and "constant speed" are measured? It may be true that common practice is to leave this question unasked, but I doubt that this really constitutes a valid excuse for continuing the practice today.

Beiser's book is plentifully supplied with problems, and the illustrations used seem to have been chosen to clarify the text, rather than simply to make the book "attractive." Some of these illustrations, however, as well as the use of two colors in the printing (some of the sentences are in a rather garish red), seem to me rather in poor taste, especially when they are compared to the sober clarity of the author's language.

CLAUDIO ALVAREZ-TOSTADO
Department of Chemistry,
Stanford University

Geophysics

Principles of Applied Geophysics. D. S. Parasnis. Methuen, London; Wiley, New York, 1962. vii + 176 pp. Illus. $4.50.

The author states that "the object of this monograph is to give a brief but fairly comprehensive survey of the principles of applied geophysics, including some of the recent advances in the technique of interpreting geophysical data."

The physical property principles, on which the various methods are based, are, with a few exceptions, tersely and explicitly presented. If for no other reason, the concise statement of these physical property concepts makes the book a valuable starting point for any university student in geophysics.