rial or at least material of which I was not previously aware.

This volume contains five review papers, the first of which, on "Advances in radar weather," is by the McGill University group, which is headed by J. S. Marshall and includes Walter Hitschfeld and K. L. S. Gunn. In this paper, the authors review recent work in a very effective manner and point out that radar analyses are still quite crude and are largely qualitative rather than quantitative, but that partially successful attempts are being made to correlate the radar signal intensity to rainfall intensity. It is possible to distinguish the ice or snow phase from the liquid phase, and thus the observations are helpful in establishing the freezing level. This article, comprising some 50 pages, includes 130 references that would be more valuable if they had been placed in alphabetical sequence rather than in serial sequence.

The second review paper on "Methods of objective weather forecasting" was written by Irving L. Gringorten of the Air Force Cambridge Research Center. The author mentions, as have many other meteorologists, that weather forecasting is still an art and that objective forecasting is not at the moment preeminently successful as compared with older techniques that are based on synoptic observations combined with tables and charts, experience, and a sense of the weather. He notes that "atmospheric motions and conditions are far too . . . complex to be reduced to a simple mathematical model or unified by a system of equations. . . ." Electronic computers aid greatly, but simplifying assumptions must still be made. If the problem can be limited to one or two forecast features, such as winter rainfall in the given locality, a high degree of forecast accuracy may be attained. But if the answer is simply "rain" or "no rain," then other questions, such as visibility and cloud development, remain to be answered subjectively. On the other hand, objective forecasts also involve the quantitative idea, which is not usually involved in subjective forecasts. The author sets up a detailed classification of objective studies and discusses each in turn. His 40 pages of text are followed by a list of 124 references, which, like those in the previous paper, are listed serially rather than alphabetically.

The longest paper in this group is the one by Willard J. Pierson, Jr., of the department of meteorology and oceanography, New York University, and is entitled "Wind generated gravity waves." Pierson has done a splendid job in drawing together the extensive recent work in this field, but at the same time he has gone back and outlined basic theory. He develops a stationary Gaussian process in one dimension and in three dimensions in some detail, discusses the ergodic theorem briefly, and outlines the principles of energy spectra and the propagation and growth of waves. He closes with an outline of practical methods for observing and forecasting ocean waves and a list of unsolved problems. There are 66 items in the references, also in serial order.

The fourth review paper is a 35-page paper entitled "Geological chronometry by radioactive methods," by J. Laurence Kulp of Lamont Geological Observatory, Columbia University. This review covers lead methods, the carbon-14 method, the strontium method, the potassium methods, the helium method, the ionium method, and other potential methods, with the largest section of the paper devoted to the lead methods, including an extensive table of published results and some of the errors involved or possibly involved in the techniques. In the carbon-14 method, he also considers the situation if the cosmic ray flux had been half of its present value during the Ice Age. The other methods are discussed only briefly; however, references to more extensive material are given. The list of 74 references at the end is an important compilation.

The final review paper is on "Earthquake seismographs and associated instruments," by Hugo Benioff of the Seismological Laboratory, California Institute of Technology, himself an important developer of seismographs. Benioff discusses the principles and merits of the various types of seismographs, including torsion seismographs of various subtypes, carrier-current transducer seismographs, linear-strain seismographs, and various appurtenances. He discusses these various types with respect to components measured and the response characteristics. It is a splendid 50-odd page summary of the instrumentation for earthquake measurement. At the end there is a list of 27 references.

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Essentials of Biological and Medical Physics. Ralph W. Stacy, David T. Williams, Ralph E. Worden, Rex O. McMorris. McGraw-Hill, New York–London, 1955. xiv + 586 pp. Illus. $8.50.

This volume undertakes to include generally all the physical aspects of biology and medicine. It is intended to serve as a textbook in biophysics for "senior undergraduates and graduates in the biological sciences and for graduates in physics." Although both fundamental and applied types of material are included, the dominant viewpoint is that "biophysics is a form of applied physics" and includes any field in which physical instruments may be used.

With such a vast domain of unquestionably interesting material, the authors face the necessity of limiting the scope in some fashion. Thus they say: "Since this text is not to be used as an advanced reference, we have not given complete explanation of all phenomena falling within its scope." In fact, more often than not, mathematical formulations in terms of the calculus or differential equations appear without the supporting logic or derivation. This imparts something of a handbook character to the text. References are offered with each chapter where more thorough treatments can be found.

That the major value of biophysics might lie in power of analysis and conceptual contribution to fundamental biology is certainly not the impression one gains from this textbook. There is even a hint that biology is regarded as an inexact science, and hence that rigor cannot be expected.

Granting that conceptual and logical development have not been stressed, one must still be impressed by the colossal task that has been accomplished in bringing so much material together. It would be futile to enumerate the many fields covered. Practically anything that involves physical technology may be found in this volume. No doubt many will find this a valuable source of information and a possible introduction to various fields of research.

This treatment brings into sharp relief a number of serious questions concerning biophysics. What should be included? What should be stressed? How should its students be trained? There is a growing demand for physical technologists to assist in clinical operations and biologists' research. This leads to courses in applied physics, sometimes referred to as health physics.

At the other extreme are those who aspire to mature thinking in fields of biology and biochemistry, which demands disciplined clarity in the study of biophysical mechanism. It matters little what the original training of such a person may have been, since many more years must be devoted to securing both a greater mastery of more advanced mathematical and physical conceptions and a penetrating grasp of biological ideas.

Educators faced with the impossible task of collapsing both a Ph.D. training in physics and one in biology into the usual span of graduate study are making desperate compromises. Some omit mechanics entirely—the very cornerstone of conceptual physics, both classical and modern.

The election that these authors have

made is very interesting: to include a tremendous amount of material, both applied and fundamental, with little explanation of its origin; to include the collegiate level mathematics without showing how it arises; to include the equations and formulas without the orderly development of the ideas that they represent.

In any case this volume brings together the physical aspects of a vast array of biological phenomena. The challenge is unmistakable, and no doubt the student will seek his understanding in his own way.

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The Psychology of Human Differences. Leona E. Tyler. Appleton-Century-Crofts, New York, ed. 2, 1956. 562 pp. Illus. $6.

It was not many years ago that psychologists asked such questions as: "Which is more important, heredity or environment?" "Are whites really brighter than Negroes?" and "Are women as intelligent as men?" Today, however, the questions on these topics are formulated differently. Instead of asking about the relative importance of heredity and environment, we ask how amenable a particular characteristic is to change, and under what circumstances we may expect changes to occur. Differential psychology has matured considerably as a result of continuing experimentation and continuing review of the assumptions, methods, and results of research.

This maturity is reflected in Leona Tyler's meaty and thoughtful volume. In fact, it would be more appropriate to state that this maturity is the reason for, and basis of, her revision of this useful treatise. Nine years have elapsed since the first edition, 9 years in which much significant research in human (individual and group) differences has been completed, 9 years in which earlier work has been placed in better perspective. Tyler has done a masterful job of bringing together, digesting, and integrating the important studies of individual and group differences, drawing on animal studies when they throw light on issues, and pointing up emergent understandings and questions.

It is typical, for example, that in treating the varieties of individual differences she has chapters not only on intelligence, school achievement, vocational aptitudes, personality, and interests and attitudes but also on perception. This last is a field in which much important work has been done since World War II, one that has now developed to a point at which it is clear that perception is indeed basic to any other field. Similarly, the part dealing with group differences covers the traditional topics of sex, race, and nationality, class, age, the deficient, and the gifted but in a strictly up-to-date manner. These two parts are preceded by a part treating the field of differential psychology, and the book closes with a substantial part on factors producing differences. Tyler has written a book that not only treats the traditional topics of differential psychology but does so in a way that makes this field fundamental to any study of social, educational, clinical, or counseling psychology.

Recent contributions receive due emphasis and are related to earlier work. For example, Eysenck's studies of the nature of psychoticism and neuroticism are discussed in some detail, and their contribution to understanding the basic dimensions of personality is incorporated into Tyler's thinking. Jung and Eysenck are juxtaposed in dealing with introversion-extraversion, and authoritarianism and ego-strength get their share of attention, as do the factor analysts.

Behavioral scientists, and others interested in bringing their knowledge and interpretations of the facts on human differences up-to-date, will find this treatise invaluable. Tyler has written in a scholarly but easily understood manner, she has marshaled facts, she has related them to theory, and she has achieved a synthesis which, in my judgment, reflects the best current thinking on this important subject.

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New Books

The Chemistry of Phenolic Resins. The formation, structure, and reactions of phenolic resins and related products. Robert W. Martin. Wiley, New York; Chapman & Hall, London, 1956. 298 pp. $9.50.

The Theory of Sound. vols. 1 and 2. John William Strutt, Baron Rayleigh. With a historical introduction by Robert B. Lindsay. Dover, New York, rev. ed. 2, 1945. 480 pp. and 504 pp. Paper, $1.95 each.

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Preface to Empathy. David A. Stewart. Philosophical Library, New York, 1956. 157 pp. $3.75.

Electrochemical Affinity. Studies in electrochemical thermodynamics and kinetics. Pierre Van Rysselberghe. Hermann, Paris, 1955. 109 pp. F. 1250.

Nouveau traité de chimie minérale. vol. I, *Généralités, air, eau, hydrogène, deutèrium, tritium, hélium et gaz inertes.* G. Bouissières, M. Haïssinsky, G. Pannetier, P. Pascal, R. Villard. Masson, Paris, 1956. 1097 pp.

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Industrial Research Laboratories of the United States. Compiled by James F. Mauk. National Academy of Sciences–National Research Council, Washington, ed. 10, 1956. 560 pp. $10.

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Plant Physiology. Meirion Thomas with the collaboration of S. L. Ranson and J. A. Richardson. Philosophical Library, New York, ed. 4, 1956. 692 pp. $12.

Office Work and Automation. Howard S. Levin. Wiley, New York; Chapman & Hall, London, 1956. 203 pp. $4.50.

New Lives for Old. Cultural transformation—Manus, 1928–1953. Margaret Mead. Morrow, New York, 1956. 548 pp. $6.75.

The Men behind the Space Rockets. Heinz Gartmann. Translated by Eustace Wareing and Michael Glenny. McKay, New York, 1956. 185 pp. $3.95.

A Dictionary of Dietetics. Rhoda Ellis. Philosophical Library, New York, 1956. 152 pp. $6.

Demographic Yearbook 1955. 7th issue. Special topic: Population censuses. Statistical Office of the United Nations, New York, 1955. 781 pp. Cloth, $8.50; paper, $7.

Bibliography of Solid Adsorbents, 1943–1953. An annotative bibliographical survey. NBS Circular 566. Victor R. Deitz. National Bureau of Standards, Washington, 1956 (order from Supt. of Documents, GPO, Washington 25). 1528 pp. $8.75.

Analytical Experimental Physics. Michael Ference, Jr., Harvey B. Lemon, Reginald J. Stephenson. University of Chicago Press, Chicago, Ill., rev. ed. 2, 1956. 623 pp. $8.

Radio Electronics. Samuel Seely. McGraw-Hill, New York, 1956. 487 pp. $7.