

one-third of all physicists did not pursue physics as a college major. This one-third had majored in mathematics, chemistry, and electrical engineering in the order of frequencies noted. Furthermore, there is tendency for physicists to begin physics a little late in their college careers. Fifty percent took their first college physics course as freshmen and forty-two percent as sophomores. The median class sizes were found to be 27.7 for the first two years of college physics and 10.9 for the last two years.

Physicists indicated a rather high degree of concentration in the natural science fields in college, averaging fifty-eight percent of their total college courses in such fields. This is in contrast with a finding of Stephen S. Visser who reported that the starred men of science were trained along rather broad cultural lines.⁵ Within the natural science fields, the ratios of undergraduate training in physics to mathematics to all other natural sciences were 12:9:8, respectively.

The factor or factors which were the most potent in inducing these men to enter the field of physics were reported as follows:

	High School	College	Scientific
Relative	Teacher	Teacher	Literature
Frequencies of Mention (%)	9	12	55
			24

It is a tribute and a challenge to the college teacher to note that he is, in more than half of all the decisions, the most powerful influence of all.

Out of these studies there emerges a composite picture of the American physicist. An analysis of the central tendencies of the replies indicates that the American physicist spent his elementary and high school years in an urban area with a population of about fifteen thousand. He exhibited a definite preference for high school natural science and mathematics courses. His undergraduate training was pursued at a privately controlled college whose total enrollment was 2240. In this college of medium size he began his physics about the sophomore year in classes averaging twenty-eight students. At the time of entering college he had not decided to become a physicist. One-fourth of his undergraduate training was in physics and one-sixth in mathematics. His upper division physics courses averaged eleven students in enrollment. Under the influence of the college teacher he had decided upon physics as a career, hence had chosen physics as his undergraduate major. Graduating from college at the age of 22.5 years he received his PhD five years later and is now employed by an educational institution.

A second article on the comparative histories of physicists entitled "How They Become Physicists" will appear in the September issue of *Physics Today*. It will treat the various factors covered in this article, delineating the various significant relationships of each factor to the others.

⁵ Visser, Stephen Sargent, "Education of Leading Scientists", *Journal of Higher Education*, 19, 233, May 1948.

Books

Introduction to Concepts and Theories in Physical Science. By Gerald Holton. 650 pp. Addison-Wesley Press, Inc., Cambridge, Massachusetts, 1952. \$6.50.

Whatever classification of elementary text books one may prefer, the present book is, in a very satisfactory sense, in a class of its own. Professor Holton has set himself the very difficult task of endeavoring to trace the main lines of development of the broad field of physical thought—with special and almost exclusive emphasis on physics as such—in a mature and reflective fashion. He seeks to do this in a way which not only gives the student some command of the detailed *methods* and *results* of physics but also acquaints him with the *origin*, *growth*, and *nature* of the more important theories (and of physical theories in general). He does this in a historical way, without swamping the reader with the historic *events* which so often obscure the historic *ideas*.

The book is divided into seven longish sections of which the first six deal with classical physics and the last with the quantum theory and atomic and nuclear phenomena. It begins with a clear and meaty account of motion and forces and gives an excellent treatment of the evolution of our ideas of planetary motion and their culmination in the Newtonian theory of gravitation. Three chapters are then devoted to structure and method in physical science, followed by a section on the laws of conservation, with the sixth section devoted to the atomic theory in physics and chemistry. The last section (about one-fourth of the book) is devoted to electricity, light, and modern physics.

This book is mature, faces troublesome points squarely, and gives no impression of talking down to the reader. It seems, on the whole, the best guide this reviewer has seen, for those interested in giving an introductory course in physics with a philosophical approach to the experimental and theoretical interpretations of the physical world. As such, many conventionally included subjects have been ruthlessly excluded and the material has been selected with the major purpose always clearly in view.

A few matters which detract from, but do not too much affect, this book's usefulness must be mentioned. They lie chiefly in the last section on quantum theory and the nuclear atom. Most users will find the section on electricity unduly pruned. The treatment of light shows evidence of rather hurried preparation; electric and magnetic vectors are introduced without adequate

preparation and no general account of waves is given (diffraction, interference, and polarization are not even mentioned). Hertzian waves and the Maxwellian theory are discussed with no mention of induction, while altogether too much seems to be made of black body radiation (and spectra in general). The introduction of the quantum theory to elementary students via black body radiation is a particularly unrewarding (not to say traumatic) experience.

In actual classroom use the chapters seem to be of very uneven length, with rather inadequate attention paid to subdivision into sections of convenient length and grouping.

The introduction, as illustrative of the laws of conservation, of examples from *atomic* and *nuclear* physics, long before such matters are discussed in the text, is of doubtful pedagogic value.

These remarks, however, must not be taken out of context and are relatively unimportant in the light of the general excellence and value of this mature though unconventional book.

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Cloud Chamber Photographs of the Cosmic Radiation. By G. D. Rochester and J. G. Wilson. 128 pp. Academic Press Inc., New York, 1952. \$10.80.

To those who find no beauty exceeding that of a cloud chamber photograph containing an unusual event, this book will be a priceless treasure. The publishers cannot be too highly complimented on the quality of reproduction of the photographs; apparently, no expense has been spared in this production.

The book is, by design, for a limited audience. It is the authors' aim to "include both particular photographs of historic importance and typical examples of the principal phenomena of the subject, weighing our selection towards topics in which the cloud chamber method is at present making, and may be expected to continue to make, important contributions". The sections of the book are entitled "Technical Features of Operation; Electron and Cascade Showers; Slow μ Mesons and their Decay; Nuclear Disintegrations and Interaction of Secondary Particles; and *V*-Particles". There is also a reproduction of Ney, Oppenheimer, and Freier's picture of a heavy cosmic ray primary taken at 95,000 ft. altitude. The characteristics of the cloud chamber and details of its operation are given for each picture, and frequent use of arrows has been made for rapid identification of the track of interest.

While the assemblage of this number of photographs is itself worthwhile, the atlas is the more valuable, since it contains a considerable number of photographs not otherwise published. The choice of material for inclusion in a book of this sort is always arbitrary and necessarily so; but it would have been nice if Schein's impressive picture of nuclear disintegrations in gold plates could have been included. Otherwise, the assembly is quite excellent, ranging from Anderson's first picture of

the positron to disintegrations produced by artificially accelerated nucleons, and the newer *V*-particles.

No mention is made of the "diffusion" cloud chamber. Also, the authors assume that the readers know all the background of interpretation of cloud chamber photographs, momentum measurements, etc.

The book should prove exceedingly useful to students of cosmic radiation and users of the cloud chamber technique, for reference purposes, and illustration to new students.

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The Science of Color. Prepared by the Committee on Colorimetry, Optical Society of America, under the chairmanship of L. A. Jones. 385 pp. Thomas Y. Crowell Company, New York, 1953. \$7.00.

A series of papers published by the Committee on Colorimetry in the *Journal of the Optical Society of America* in the years 1943-45 each contained the footnote "Chapter — of the forthcoming Colorimetry Report". The anticipation so awakened has been put to rest by the publication of the complete report under the title *The Science of Color*. However, it is not likely that any report could have fulfilled the expectation aroused by a decade of anticipation, and consequently it is not surprising that this book is a disappointment.

It is not easy to point a finger to any part of *The Science of Color* and to say it is in this place that it is wanting. The membership list of the Committee is filled with names renowned as experts in the field of color. The Table of Contents indicates that the subjects treated range from the art of coloring (in antiquity), through the physical, physiological, psychological, and psychophysical aspects of color, to colorimetry *per se*. Careful reading of the text reveals that it contains all of the important matter that one might expect. And yet, the book leaves this reviewer with a sense of dissatisfaction.

Most likely, this dissatisfaction has its origin in the cumulation of many minor irritations. These irritations arise from the irregular pace at which the material is presented, argumentative presentation in some instances where the opponent is not evident to the reader, carelessness in writing, and careless editing.

In a work of this sort, it is to be expected that the material on the physiology and the psychology of color might be treated in the style of a textbook, and that the chapter headed "Quantitative Data and Methods of Colorimetry" might have the appearance of an excellent engineering handbook. It is not to this sort of irregularity of treatment that one objects. Rather, it is the lack of balance exhibited, for example, in Chapter 1. Here the growth of the use of color in decoration and in art up to the Mycenaean Age of Greece is accorded 18 pages; the growth of the science of color from the time of Aristotle to that of Newton is covered by the one sentence "Two thousand years passed without any important addition to, or modification of, Aris-