Mention also should be made, in this connection, of the chart on page 70 for estimating the size of sample required for significance in group comparisons.

The foregoing tables indicate that the author's interest centers about significance tests. Such tests appear in a study of means, variances, covariances, regressions and correlations, simple or multiple or partial, linear or curvilinear, interclass or intraclass.

Although the book avoids mathematical proof, there are 175 citations, among which appear the names of Bartlett, Brandt, Davenport, Ezekiel, Fischer, R. A. Fisher, Galton, Gauss, Goulden, Irwin, Lipka, Neyman, Pearl, Karl Pearson, Egon Pearson, H. L. Rietz, Sheppard, Snedecor, "Student," W. R. Thompson, Tippett, Wallace, Wishart, Wilks and Yates. Even those who are interested primarily in theoretic probability and statistics may derive considerable benefit from a perusal of such a book as Snedecor's, where detailed consideration is given to particular problems.

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THE PHYSICAL WORLD

Our Physical World. By ECHELS, SHAVER and HOWARD. Pp. xi + 801. Benj. H. Sanborn and Company, 1938.

IT appears from what we read in the preface of this book that new light came to this dark world in 1929. The depression was an event which transcended in importance the world war. "Since that time the emphasis in curriculum development has been laid upon improving the philosophy of persons connected with education, such as teachers, pupils, administrators, parents and other adults." After some "innovating experiences resulting from the translation into practice of the improved educational vision of the members of the educational staff" of the Pasadena schools this book resulted. "The written statement comes after the innovating, rather than before it." (The preface was not written by the authors.)

To be brief, this book is now to be used as a text in the instruction of pupils of pre-high-school and high-school age in very elementary physics, chemistry, meteorology, geology, biology, engineering and social science, though these terms are not stressed and the material is slightly intermingled. The nature of the contents can be seen from the headings of the divisions or units: Science Changes our Environment; The Structure of Matter; Radiant Energy in Modern Life; Electricity in the Service of Man; The Action of Atoms; Making New Molecules; The Control and Use of Heat Energy; The World of Sound; The Universal Laws of Motion; The Earth, Man's Abode; The Infinite Universe; The Control of Scientific Achievements. As must be perfectly obvious, the treatment of all these topics in a book of even 800 pages is necessarily qualitative and exceedingly elementary.

The authors are not pioneers in this endeavor. Various high schools and colleges have attempted to present courses in general science. In one college with which the reviewer is acquainted this kind of course, though a more exacting one, was required of all freshmen for about ten years but was finally abandoned.

But these teachers are under obligation to teach general science to a large number of very young students. They must make the subject-matter attractive, they must arouse interest. In the text they discuss each unit topic for forty or fifty pages, then there is an "Interpretation and Review," then "Outcomes" under the headings "Understandings and Meanings," "Attitudes and Appreciations," "Techniques and Skills." After this kind of discussion the method changes and we have "Student Activities in the Laboratory." Here a few experiments are described, but they are not written up in the ordinary matter-of-fact manner. Then there are study questions in all manner of forms, historical and qualitative, true or false, choice of words, similarities and contrasts. Finally, at the end of each unit there are suggestions for teachers, including a list of visual aids, films, slides, charts, references, demonstrations and bibliography.

It looks like a full schedule for the teacher. With so many questions of all kinds coming at him has a student a chance to ask a question? Might not some of the extremely light material be omitted? For example, here are a few questions under one general head. "What experiments would you perform to test whether this is true or false?—Knocking on wood will prevent bad luck. A fat person is always good-humored." (The reviewer will try sticking pins into his fat friends).

There are a few scientific errors: "An electron in the outer part of an atom has just as strong an electrical charge as the positive charge in the nucleus" (p. 216). "Hydrogen atomic weight is the unit or standard of comparison for the weights of all other atoms" (p. 294). "All materials expand when heated and contract when cooled" (p 489). At least one in English, "All these particles are too small *to see.*" (If they were large enough they would see something).

But the book is a serious and, the reviewer thinks, a successful attempt to present to young students some of the chief phenomena of the physical world. With competent and enthusiastic teachers a course of study based on this book should assist such students in acquiring a general knowledge of, and, perhaps what is more important, a lively interest in, nature and nature's laws.

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