was so filled with snow that it was practically impossible to see any objects through it as it passed my path. This may not be of any great interest, but I don't recall reading or hearing about whirlwinds in the winter-time, which accounts for my calling the matter to the attention of the readers of SCIENCE.

H. D. MATTHEWS

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"TITANS OF THE DEEP"

I WOULD like to correct a rather vital misconception in regard to the film now running in New York City and elsewhere in the country, called "Titans of the Deep." This is being credited to me and my associates, whereas neither I nor any member of my staff of the Department of Tropical Research, nor any one connected with the New York Zoological Society, had anything to do with it.

At the very beginning are shown a few authentic shots of the Bathysphere, but all the rest of the film is the work of Mr. Otis Barton, and was taken in Panama at his own expense and with no relation to the Bathysphere. I never saw any of it until it appeared on a New York screen. Together with my staff, I would like completely to dissociate myself from this motion picture and to have it known altogether as the work of Mr. Barton. In a recent letter he tells me he has been trying to accomplish this correction, but without success.

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SCIENTIFIC BOOKS

STATISTICAL METHODS

Statistical Methods—Applied to Experiments in Agriculture and Biology. By GEORGE W. SNEDECOR. Collegiate Press, Inc., Ames, Iowa, 1938. xiii + 388 pp. Price $3.75.

IN the preface, the author writes: "It is a pleasure to acknowledge the leadership of Professor R. A. Fisher. . . . By his residence as guest professor in mathematics at Iowa State College as well as through his writings he has exercised a profound influence on the experimental and statistical techniques of the institution." It is not surprising, then, that Snedecor's book should resemble R. A. Fisher's "Statistical Methods for Research Workers" more than it resembles the usual text-book on statistics. And the appearance of a sixth edition of the Fisher book (1936) testifies to the assistance that such a book can render to investigators, especially to those working in biological fields. Fisher's book is a reference book, almost devoid of mathematical proof, giving by detailed examination of numerous problems some of the most important principles of statistical research, with special emphasis upon significance tests. Snedecor's book proceeds along the same general lines, but the latter is a little more informal, it devotes a little more space to making plausible what it does not attempt to prove, and it inserts 417 examples, enough to make it a practical text-book as well as a reference book.

The following three problems taken from the first three chapters will illustrate the type of problem in which the author is most interested:

Example 1.10—An entomologist was trying to adjust the concentration of a spray so as to kill 50% of the flies in a container. Having got what seemed to be a satisfactory mixture, he sprayed a batch of 128 flies, killing 55%. Show that this is not a significant deviation from the 50:50 expectation. 2.30—Assuming that the coefficient of variation of yields in field plot tests with wheat is usually near 5%, would you be surprised if told that in an experiment where the yield was 25 bushels per acre, the standard deviation of plot yield was 0.5 bushel per acre? 3.17—An agronomist interested in the effect of superphosphate on corn yield tried adding the fertilizer to a treatment of manure and lime. Five pairs of plots were tested. The plots with superphosphate yielded 20, 6, 4, 3 and 2 bushels per acre more than their parallels. Was the value of superphosphate demonstrated?

The book contains a number of useful tables for statistical computations. Unfortunately, these are imbedded in the text, instead of being placed in an appendix. Disregarding Table 1.3 as one row of Table 9.1, these tables appear as follows:

Page 58. Values of t at the 50%, 5% and 1% levels. Here t = (Computed average x—Theoretic mean x)/(Computed standard error of the average).

Page 89. Values of the ratio (Range)/(Theoretic standard deviation) for various sample sizes, n.

Page 133. Correlation coefficients at the 5% and 1% levels of significance.

Page 152. Ordinates of the normal curve (4 decimals).

Page 154. Cumulative normal frequency distribution (4 decimals).

Page 163. Chi-square at levels 99%, 95%, 50%, 30%, 20%, 10%, 5%, 1%.

Page 184–187. F = (Larger variance)/(Smaller variance) at 5% and 1%. (Applicable to problems in analysis of variance.)

Page 286. The 5% and 1% points for r and R. (Simple and multiple coefficients of correlation.)

Page 329. Coefficients and polynomials for terminal values and differences for fitting terms up to the seventh degree.

Page 351. Coefficients for sets of independent comparisons for 2, 3, 4, and 5 groups at equal intervals.

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.

GORDON FERRIE HULL

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