is divided into three main sections in which the author discusses the general properties of dislocations, the behavior of dislocation networks, and the interaction of dislocations with other defects. A most valuable addition, and one that immediately establishes the physical reality of the subject, is the inclusion in the first chapter of some excellent photographs of optical, electron microscope, and x-ray observations of dislocations. With the aid of this visual advantage, the subsequent chapters seem to describe reality well. The author's style has not suffered in the translation, the fluency of the French version being retained, and this retention makes the book valuable both as a reference work and one that could be used as an advanced textbook. Its value as a source book is increased by lists of colloquia, books, and review papers published in the field, together with a most comprehensive set of references to the original papers cited in the text. Anyone who wishes to understand dislocations will find this list a more than adequate introduction to the field.

In summary, the book fills a place too long vacant in the literature of the solid state, and provides a very adequate introduction and a stimulus to further endeavor in an area that is fundamental to our understanding of the behavior of real solids.

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Statistics

Statistics for Scientists and Engineers. R. Lowell Wine. Prentice-Hall, Englewood Cliffs, N.J., 1964. xvi + 671 pp. Illus. $12.

The title means "an introduction to standard statistics for undergraduate (or first-year graduate) students in science and engineering." In the preface we read that "There are good statistical books for research workers in science and engineering, but generally speaking they are not very useful as a first introduction to statistics." It is not made clear why the author believes this. There are now at least 25 textbooks in English that cover the same ground that this one covers, for students with the same preparation and interests. Some of these start at more elementary levels, some at more advanced levels. There is a high degree of accord on what should be included. All agree that the field of statistics is growing rapidly, yet all have very nearly the same content, presented in very nearly the same order.

There is some pedagogical innovation in the present text in that applications of elementary statistical methods are occasionally given before the presentation of "theory." This is excellent. Many sections end with good sets of exercises, and many of these deal with real life situations. But the author's interests are mainly mathematical, and mostly arithmetical and algebraical. He is not concerned, or not concerned enough, with the actual *fitting* of the mathematical model to the physical situation.

The well-known *t*-test for judging the reality of a single comparison is discussed in 40 pages (in this case a new rat diet tried on 12 rats is compared with a standard diet). But the student scientist or engineer is not told which are the key assumptions for its valid use. The author writes, "Assume that the twelve sample values were independently obtained from the same normal population." There is no hint that normality is unimportant but that independence is crucial. There is no discussion of, or warning about, the extreme technical difficulty of guaranteeing that the data are indeed a fair sample of the population about which inferences are to be made. Without this guarantee the *t*-test becomes an exercise in arithmetic; its so-called significance level, meaningless. The principle of randomization, judged by many to be one of modern statistics' major contributions to scientific methods, is mentioned only incidentally in later chapters.

The largest and best problem in the text concerns a four-factor experiment, one factor being at three levels, the others at two each. The whole set of 24 experimental conditions was produced three times. The effects of deliberate variation in the proportions of *cement, water, type of water* (tap or sea water), and *thickness of concrete test strip* on the rate of corrosion of an embedded steel ribbon were measured. The usual "analysis of variance" is carried through to conclude mainly that embedded steel corrodes more rapidly when seawater is used in making the surrounding concrete! Four other minor and rather complex findings are stated to be significant at or near the level of 1 percent, and *are then not interpreted.* The interested reader is invited to study the tables himself. If the statistician had studied these tables before rushing into arithmetical routines, he might have noticed that a combined analysis is not justified since the pattern of the tap water responses (with error about 1000) is quite different from that of the seawater results (with error about 5000). There are, furthermore, three tap water values that one might want to discuss with the experimenter, since they appear to show large *negative* rates of corrosion! Otherwise a simple interpretation of the two sets of results seems entirely manageable. It is difficult to see how the analysis given will deepen the engineer's understanding of the physical situation.

The general adverse comments made here should not be taken as applying only to this text. They apply to many others. But this work does not distinguish itself from the mass of its competitors in the way it handles, and ignores, the problems of getting generalizable data, of checking the key assumptions behind the statistical tests used, and of interpreting the statistical judgments made.

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Phosphorus Compounds

Topics in Phosphorus Chemistry. vol. 1. Martin Grayson and Edward J. Griffith, Eds. Interscience (Wiley), New York, 1964. viii + 262 pp. Illus. $12.

This volume, the first of a new series, endeavors to summarize and survey some relatively defined subareas in the field of the chemistry of phosphorus compounds. In the words of the editors, "no fixed pattern has been established" for the series.

Volume 1 deals with five topics: synthesis of organophosphorus compounds from elemental phosphorus, nucleophilic displacements by organometallic compounds on phosphorus halides and esters, the Michaelis-Arbuzov and related reactions, the lower oxo acids of phosphorus and their salts, and, finally, the condensed phosphates containing other oxo acid anions. Thus, the division between organic and inorganic derivatives is very nearly balanced.

The first chapter gives a clearly drawn, largely descriptive picture of