Guides to Numerical Results

An Index of Mathematical Tables. vol. 1, *Index Acccording to Functions*. vol. 2, *Bibliography, Lists of Errors in Published Tables, References*. A. Fletcher, J. C. P. Miller, L. Rosenhead, and L. J. Comrie. Addison-Wesley, Reading, Mass., ed. 2, 1962. xi + 994 pp. $42.

Guide to Tables in Mathematical Statistics. J. Arthur Greenwood and H. O. Hartley. Princeton University Press, Princeton, N.J., 1962. lxii + 1014 pp. $8.50.

The publication, after 16 years, of the second edition of *An Index of Mathematical Tables*, familiarly known as FMR, will be welcomed by all who need to reduce analytical solutions to numerical ones. The new edition preserves the general organization, scope, and fine typography of the original, but has doubled in length and, unfortunately, more than tripled in price.

The expansion of the contents is partially accounted for by part 3 (151 pages), in which errors that have been discovered in the tables cited are discussed, and part 4 (61 pages), in which there is a far more detailed and valuable index than the 5-page one of the first edition. Most of the growth, however, is due to the revolution that has occurred in table-making since 1944, the closing date for the first edition. The availability of automatic computers has made it possible to construct acceptable tables without the devotion required of the great tabulators of previous generations. Many of the new tables demonstrate the dangers that await the inexperienced tablemaker, even when assisted by an electronic robot, but the increased number of tables, particularly of the less common functions, is so great as to make the first edition obsolete.

The *Guide to Tables in Mathematical Statistics* is the culmination of more than 20 years of effort sponsored by the National Research Council. Although admittedly indebted to FMR for organization and for many of the details of format, the authors have included several features that will increase the *Guide's* usefulness. In the first place, the analytical table of contents has been expanded to 27 pages, thus allowing an easy grasp of the interrelations of the various functions. In addition, an index contains all permutations of the names of the functions, although, unlike the FMR index, it does not include authors. For the benefit of those who use automatic computers, rational approximations and methods of generating pseudorandom numbers are included. Finally, the authors decided to sacrifice elegance of typography in the interest of cost. Although the photoreproduction from typed copy is not beautiful and is marred by difference in weight of impression and type face, their decision made it possible to keep the *Guide's* price within the means of the average individual.

There is a certain amount of duplication in the contents of the volumes, because statisticians frequently require tables of standard mathematical functions and some of the statistical distributions—such as the normal—are of general mathematical interest. The extent of the overlap with the first edition of FMR is explicitly indicated by Greenwood and Hartley. The emphases are, however, sufficiently different so that the overlap is almost trivial. The FMR index is concerned with tables of functions of general mathematical interest, and statistical tables are included only if the functions have nonstatistical applications. Greenwood and Hartley are concerned only with functions that might be used by mathematical statisticians; their list of generally useful tables does not pretend to be complete. Moreover, the inclusion of approximations in the *Guide* and the listing of errors in FMR will make it desirable to consult both sources in searching for tables that might be listed in either.

Although these volumes will be consulted primarily by those who wish to find suitable tables of some specific function, this is not their only use. The introductions to the sections contain definitions of the various functions which may be of great value in suggesting methods of reducing a result to tabulated forms. They also discuss variations in notation. FMR has long been used in selecting convenient and nonconflicting symbols; unfortunately, symbols are not included in the otherwise comprehensive index to the new edition, so that the identification of a function denoted only by its symbol is not easy. FMR is also a convenient source for 15 to 30 decimal values of key mathematical constants. An appreciation of the finer points of tabulation is another benefit that can be obtained by browsing through these volumes. All the authors are masters of the art, and all are extremely critical in their evaluations. The neophyte who contemplates the computation of a table will benefit from considering the standards that these authors use in judging a table.

All institutions where numerical results are produced will need these two important works. In addition, many individual statisticians will find that Greenwood and Hartley's *Guide* is a valuable, and relatively inexpensive, reference. The new FMR, by Fletcher, Miller, Rosenhead, and Comrie, will, unfortunately, be beyond the means of most individuals, although many would benefit from having it readily available.

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Histological Technique

Animal Tissue Techniques. Gretchen L. Humason. Freeman, San Francisco, Calif., 1962. xvi + 458 pp. Illus. $8.

It is the author's stated intention to provide a guide to basic histological techniques and an introduction only to more specialized procedures. The volume is written primarily for the beginning student or the novice technician. It is therefore a practical treatise, but Humason has managed to lace it with theoretical considerations where they can appropriately be given. Histological technique is one discipline, at least, in which, contrary to the old saw, only those who can, can teach. The author's practical experience is clearly reflected in her description. Short of looking over her shoulder, I doubt that the description could be made clearer. The expositional portions of the text are written in as interesting a fashion as one could hope for, but a text on histological technique is hardly the book to settle down with in an easy chair in the company of a pound box of candy.

Original literature is cited throughout the text, which contains a bibliography of some 26 pages. In addition, a list of standard references precedes the table of contents. The author has also, thoughtfully, included in the text the sources of various materials.

For its length (468 pages) the book is remarkably complete. Chapters 1 through 8 deal with specimen preparation, from fixation through sectioning and mounting. A practical description

of the microscope is given in chapter 9, with just enough optical theory to make the beginning student feel comfortable. In addition, brief descriptions of rather advanced microscopic techniques are included. Chapter 10, which deals with stains and staining principles, is brief but informative. Routine staining and mounting procedures are covered in chapters 11 and 12, while methods for specific tissues and cell products are given in chapters 13 through 20. Chapters 21 through 24 deal with rather sophisticated special procedures, such as histochemistry, autoradiography, electron microscopy, chromosome cytology, and others. Although the author's preface states that such descriptions are intended merely as introductions, they seem rather detailed. One can only hope that the student will follow the author's admonition to refer to the original literature. The last two chapters are essentially appendixes of helpful hints and reference tables which seem extremely useful.

The rather parsimonious use of illustrations may account for the book's modest price, by today's standards. However, one wishes that the publisher of a text on histological technique could have seen his way clear to include one photomicrograph of some tissue—any tissue.

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A Catalytic Career's Records

Adventures in Radioisotope Research. The collected papers of George Hevesy. vols. 1 and 2. Pergamon, New York, 1962. 1047 pp. Illus. $30.

There are few who will cavil at the statement that we are living in a golden age of biology, and certainly there are none who will deny that George Hevesy is one of its major architects. For by his discovery of the technique of using isotopic tracers and his elaboration of its methodology, Hevesy contributed a tool that has proved essential in the creation of modern quantitative biology. The labors of this quietly unassuming and very great investigator have won him the encomiums of the civilized world, among which are included the Nobel Prize and the Ford Foundation's Atoms For Peace Award. Therefore, it is an occasion of some importance when the essential corpus of Hevesy's great career in biological and chemical tracer research appears in the form of a two-volume set, which contains 100 original research papers that were selected, annotated, and evaluated by him.

The presentation is organized under the two headings—inorganic and physical chemistry (15 papers) and life sciences (85 papers). Under the two headings, papers are grouped chronologically in sections, each of which covers a single research area. At the end of each section, Hevesy has provided a critical commentary. A special feature is a preface that presents a charming and informative autobiographical sketch.

The great breadth of Hevesy's interests are best appreciated by a list of the topics that underlie the book's classification into sections. Thus, under the general heading of inorganic and physical chemistry, we find analytical applications (for example, determinations of solubility of lead salts), activation analysis (for example, neutron activation of rare earths), electrochemistry, studies of interchange in solid and liquid phases, self-diffusion, and researches on the existence of new stable elements. In the life sciences, the list ranges over practically every aspect of modern biochemistry and physiology—for example, studies in distribution, permeability, the dynamic state of cellular constituents, metabolism, radiation biology, the dynamics of plant growth and nutrition. Nor should we neglect to mention Hevesy's most recent interests—clinical researches on tumor metabolism, prefigured by some studies of uptake and excretion in human subjects, two papers on which are included in the present set.

These papers represent all but a few of Hevesy's publications on tracer research. Not included are a very few that appeared originally in languages other than English. However, these omissions do not affect significantly the statement that the present collection constitutes the essential body of Hevesy's contribution to tracer methodology.

These two volumes not only contain a tremendous wealth of material for investigators in a staggering variety of research areas, but they also contain material of intense interest to the historian of science. The intelligent layman will also find much to fascinate him. Everywhere there is evidence of the remarkable ingenuity and bold imagery which have characterized Hevesy's researches.

The format is of good quality, and there appear to be few misprints. Modern scholarship in all areas of biological science is indebted to Hevesy, and to the Pergamon Press, for the successful prosecution of this undertaking which brings together all of the relevant papers by a great innovator and pioneer, so that their study is greatly facilitated.

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Practical Investigator

The Psychology of Jung. A critical interpretation. Avis M. Dry. Wiley, New York, 1962. xiv + 329 pp. $6.

The author of this work, a psychologist "and in some measure a historian," examines the various aspects of Jung's analytic psychology with a view to making it "more understandable to interested though uncommitted general readers." That this is a sizable task can be readily appreciated.

Although we know little about Jung as a person, we come to know of the complicated elements and the "many layered native soil from which his system drew its first nourishment and in which it is spiritually rooted." Early, Jung saw psychiatry as the meeting point of medicine and philosophy—with Schopenhauer *et al.* in the foreground and the great idealistic systems in the background. Unlike Freud, Jung desired his system to be eminently practical. He was not an investigator for investigation's sake. His questions were "does it work?" and "will it help people?" The reason why it worked was "a problem for his spare time."

Jung's early productions were universally acclaimed as important; his later efforts were controversial. In his book we see him first alone, then on the edge of the Freudian epoch in psychopathology, then as a friend of and the "heir apparent" to Freud, and finally, after a quarrel with Freud, again on his solitary path.

The author leads us through each step in the development of Jung's conceptions of mind, and he compares Jung's views with the views of those who held similar ideas. All of the latter seem to place more importance on