

The New Look

Radioactive Measurements With Nuclear Emulsions.
By Herman Yagoda. 356 pp. John Wiley and Sons, Inc.,
New York, 1949. \$5.00.

Your average scientist's first appraisal of a new book is made by thumbing through it fairly rapidly, making a subconscious notation of graphs, pictures, tables, etc. If you apply this method of assessment to Yagoda's book you very soon find yourself studying one by one the fine photographs of cosmic ray and meson phenomena in the chapter dealing with nuclear physics. In the light of today's fashions this is the glamor section of the book and shows graphically why it is that photographic emulsions have come to be labeled "nuclear emulsions". As the author points out, scientific instrumentation is subject to cyclic changes, as are women's apparel. And in the current phase of this cycle the photographic emulsions we have been using in our cameras for the past forty or more years now emerge dressed up as nuclear emulsions. The whims of fashion being what they are, I suppose the new name could well have been "atomic emulsions".

According to the preface the author sets out "to describe, coordinate, and define the limitations" of the nuclear emulsion method for detecting radioactivity. He achieved his purpose admirably and in so doing performed a good service for experimenters in a wide variety of specialties. Considering the intense activity and interest in the emulsion technique which existed at the time Yagoda was writing this book, a vote of thanks is due him for taking time out to make the compilation. The book promises to stand out for a long time as a standard reference for laboratory workers, and this includes those who have not yet come to use the emulsion technique; for it is almost certain that the newcomer to the subject will turn to this book for background as well as specific information. As he points out in the preface, the author was fully aware of the many different kinds of specialists who would find the emulsion method useful. This awareness has imparted to the entire presentation a universality which will appeal to the biologist or chemist or physicist or geologist alike.

The source of this universal appeal lies in the author's practical manner. He tells you exactly how to do it. His approach conveys a sense of intimate experience with the subject at hand. Over and over again the text turns to fine print paragraphs in order to give all the myriad details which are so essential to successful experimentation. I estimate that beginning with Chapter 3 about one fourth of each page is devoted to fine print descriptions of details of the kind which are written out all too infrequently in scientific books. This fine print detail is added in the captions of figures and in footnotes. At the risk of appearing trite I quote a typical example of how-to-do-it detail from page 177:

"Support the plate in a petri dish half filled with distilled water—shake about 20 mg. of the mineral grains in about 3 ml. of 50 percent alcohol, and pour the mixture into the dish. Rock the vessel momentarily, and allow the grains to settle for about 1 min. Remove the plate, dry thoroughly,

and expose for several days. It is good practice to prepare two slides, developing one after an overnight exposure and the other about 10 days later".

The book is permeated with down-to-earth information like this assembled from the diverse subjects of petrography, radiochemistry, metallurgy, nuclear physics, biology, etc. The formidable task of shaping this multitude of minutiae about how-to-do-things-with-your-hands into a coherent treatise is nicely accomplished by a highly readable style and well-organized plan of presentation. It is only after a second reading that one becomes aware of the unobtrusive manner in which a wealth of experimental material has been packed into each chapter. The major lines of thought and theory are never lost in a welter of description.

The author's style is the essential ingredient that makes interesting reading of material which usually comprises the humdrum drudgery of laboratory life. This style is not hampered by an occasional mathematical formula nor does it hesitate to turn philosophic as, for instance, when the author recalls a philosophical quotation the source of which he has long since forgotten. I was pleasantly surprised at the meditative point of view displayed throughout this book. One does not usually associate philosophic reflection with a book on a currently "hot" or fashionable subject dealing with the technical details of atoms. But in this case it lends pleasing overtones to an immensely practical treatise. Each chapter has under its title an appropriate philosophic quote from the scientific literature. The one by Leonardo da Vinci, 1500, which is under the title, "Laboratory Manipulations", of Chapter 3 reads: "Trifles make perfection, and perfection is no trifle". This struck me as being thematic for the entire book. While outlining the broad principles in each application of the emulsion method Yagoda also keeps the reader apprised of the trifles that lead to its perfection.

The only defect in this book is a minor one in that there is a lack of pictures showing the traces made by electrons in the nuclear emulsion. There is one close-up picture of an electron trajectory and it falls below the high standard of excellence set, for instance, by the nuclear evaporation pictures. Of course, part of the difficulty lies in the fact that electrons are certainly not as photogenic as the heavy nuclear constituents like alpha particles. But to turn to a special instance, in biological studies the normally occurring elements are beta emitters, the known heavy particle emitters appearing only as toxic agents in living systems. It seems that more electron pictures would have served to give a graphic insight into the behavior of beta particles as they bounce around in the emulsion, this behavior being already well described in the text. They would have been valuable to the non-physicist readers. A few more electron pictures would also have served to balance the presentation of excellent heavy particle pictures.

The arrangement of the material into specialized sections deserves notice. After having explored the subject in six chapters from the standpoint of general technique the approach changes to a series of chapters each devoted to a special application. Thus a petrographer, or the medical student, can consult his special chapters without being hampered by the material pertinent to nuclear physics which takes up the last and longest chapter. The historical background of the various emulsion techniques is well developed. Starting with the earliest historical foundations of each phase of the subject there is recounted a story of the growth of the nuclear emulsion into an ultra-sensitive tool for the detection of radioactivity. A true sense of historical per-

spective enabled the author to select the lasting features of theory and experiment. Although the subject of emulsions has expanded rapidly, especially with the dissemination of radioisotopes, this book will not soon become outdated. There are thirty-one tables of laboratory data which taken along with the details of practice and the extensive bibliography serve to make this an excellent reference text. It is a basic treatise for experimenters which could only have been written by a skilled experimenter.

Joseph G. Hoffman
University of Buffalo

Agricola on Mining

De Re Metallica. By Georgius Agricola. Translated from the Latin by Herbert Clark Hoover and Lou Henry Hoover. 638 pp. Dover Publications, Inc., New York, 1950. \$10.00.

It's a long way from cover to cover of this painstaking translation of the *De Re Metallica* and few readers will sustain the interest to complete such a journey. This is a book, however, for all those whose historical and human curiosities are stirred by a tireless, enthusiastic, and monumental intellectual labor of love. For Georgius Agricola wrote of his subject passionately and with fond detail and declared in his dedication, "I became afraid that I might die before I should understand its full extent, much less before I could immortalize it in writing."

Agricola was the Latin name of Georg Bauer, a peasant born in Saxony in 1494, who became a physician, burgo-master, public servant, author of historical and political writings including a tract on the Turks who were then the menace of central Europe, and student of the sciences. There was no subject, however, that so fascinated him as the art of metals and their mining. He begins his story (and story it is rather than a textbook) with a fervent defense of mining, which during the sixteenth century was under considerable attack for inciting avarice, spoiling nature, and being a source of weapons of war. He follows his moral justification of the subject with a history of mining, a description of the mines then existing, patiently detailed descriptions of the engineering processes involved in mining, the relationship of miners to mine owners, the best methods for locating ores, the personal qualities desirable in people devoted to such careers, and so forth through carefully and conscientiously written page upon page. The flavor of Agricola's work can be suggested by a few of the topics in the index columns. One finds listed such subjects as alchemists, ants, assaying, Athens, Babylonia, beer, borax, Chinese copper smelting, church, demons, dynamite, Egyptians, garlic, goblins, gunpowder, holidays for miners, Japanese steel, law suits, map making, medicine, philosophy, Polish lead smelting, stone juice, Theodosian code, ulcers, and wizards! Without reading the vast whole it is possible to make thoroughly delightful excursions into chosen chapters and enjoy the "technical" drawings and graphs with their cheerfully beaming miners, sleeping dogs, and singing birds.

Agricola died in 1555 and his work on metals was not equalled or surpassed until the work by Schlüter in 1738. The translation by ex-President Hoover and his wife reads smoothly although it is too generously foot-noted for this reader's taste. The Dover edition is a reprint of the original Hoover translation which appeared in the *Mining Magazine*, London, 1912.

Louise Smoluchowski
Pittsburgh, Pennsylvania

Briefly Noted

Geophysical Studies in the Antarctic. By Thomas C. Poulter. 180 pp. Stanford Research Institute, Stanford, California. \$4.00.

Assembled under the sponsorship of the Office of Naval Research, this volume gives geophysical data collected by Dr. Poulter (the senior scientist and second-in-command of the Second Byrd Antarctic Expedition) and his staff of more than twenty scientists and technicians during nearly thirteen months spent at a base camp and in field work on the floating shelf ice of the Ross Barrier, Bay of Whales. The geophysical seismograph was extensively used for the first time in polar exploration to uncover new information on crevassed areas and to explain many of the mysteries of the Ross shelf ice. Of interest as a reference for students of geophysics, seismology, physical geography, physical oceanography, meteorology, and cartography, the book is currently available from the Stanford Research Institute, Stanford, California.

Electronic Equipment Construction—New Objectives, New Techniques and New Components. PB 101 745. 300 pp. Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. \$7.00.

Prepared by Stanford Research Institute under contract to the Office of Naval Research, the above report was originally intended simply as an investigation of the means for minimizing maintenance requirements of military electronic equipment, and was expanded to its present scope in response to interest in and demand for information on progress in the entire electronics field. The study includes a description and evaluation of new components, a discussion of new construction techniques, and a survey of research at sixty-two of the nation's leading electronics development firms and university, government, and private laboratories. Orders for the report should be addressed to the Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C.

Professional Opportunities in Mathematics. 24 pp. The Mathematical Association of America, Buffalo, N. Y., 1951. \$0.25, \$0.10 each for orders of 10 or more.

Prepared by a committee of the Mathematical Association for undergraduate students of mathematics, this report was reprinted from the *American Mathematical Monthly*, Vol. LVIII, No. 1, January, 1951. Its purpose is to aid the student who is considering mathematics as a career; to give him some idea of the types of work mathematicians do in universities, in business, and in government; to suggest the types of positions available to young people with mathematical training; and to advise him of the types of college preparation he will need. Reprints may be obtained from Professor H. M. Gehman, Mathematical Association of America, University of Buffalo, Buffalo 14, N. Y.

What you should know about Biological Warfare. 30 pp. Federal Civil Defense Administration publication PA-2, Washington 25, D. C., 1951. \$0.10; 25% discount for orders in excess of 100.

This booklet is the official U. S. Government publication summarizing the facts of biological warfare and the defenses against it. It can be purchased from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.