disappointing. For example, a reference (1930) is given for the application of a correction to apparent intensities measured on oscillation photographs, but none for the other kinds of photographs now in more common use. Similarly, there is some vagueness about problems concerning crystals which are unsuitable for accurate morphological measurement. Thus, although the unit cell dimensions of monoclinic crystals have actually been measured accurately by purely X-ray methods, the beginner might not realize this from "but, no doubt, by suitably choosing reflections, it should be possible to devise methods similar to those described in 13, 4·2". It seems a pity that, after so much trouble has been taken to make the reader familiar with the reciprocal lattice, the tables of correction factors are given in terms of θ instead of sin θ.

In a book of this kind it is extremely difficult to avoid numerical typographical errors, and even three authors have not been sufficient to prevent some from appearing.

These are minor criticisms of a book which is, on the whole, extremely good. The printing and paper are good and the diagrams excellent. Both beginners and experienced crystallographers will find much of value in this book, which is not unreasonably priced.

M. R. Truter

MODERN MINERAL TECHNOLOGY

International Mineral Processing Congress, 1960

Proceedings of a Congress arranged by the Institution of Mining and Metallurgy, held on 6th to 9th April, 1960, at Church House, Westminster, London, S.W.1. Pp. xiii+1118. (London: Institution of Mining and Metallurgy, 1960.) 100*s*.; 14.50 dollars.

THIS volume contains the inaugural address, the fifty-two papers and their discussion at the 1960 International Mineral Processing Congress, the fifth of these meetings to be held since the War. The change of title from 'ore dressing', 'mineral dressing' and 'mineral engineering' still leaves this ebullient engineering science inadequately described. A stroke of genius is needed which will bring its activities in metallurgy, chemical engineering, physical chemistry, electromagnetics, nuclear physics and the rest to a titular focus. As with the previous congresses, held in Britain, France, Germany and Sweden, papers from leading laboratories and industrial operators in many mining countries are roughly grouped—in this case in nine divisions. Detailed review of such a mixed bag is impossible. The work recorded shows that the challenge of industry continues to be met at all levels, from improvement of established processes to creation and development of the new ones required by the insatiable demand of modern civilization for metals, earths and high-purity mineral concentrates.

The first group of five papers deals with comminution, the step in ore treatment in which valuable minerals are exposed for surface attack or detached from the accompanying gangue. New methods of grinding, some with a discipline of statistical mathematics, are described. Papers 6–10 deal with particle dynamics in aqueous media, both under conditions of free fall and of centrifugal acceleration. X-ray scanning of opaque slurries is described. By the aid of these techniques large tonnages of 'pulp'—an aqueous suspension of small particles, mostly less than 20 μ in diameter—are controlled as to size, shape and/or mass into equal-responding fractions. This, coupled with the comminuting processes, is an essential preliminary to concentration (separation of the various mineral species in the ore).

In papers 11–18, fundamental physical chemistry is related to flotation research. Improved methods of micro-auto-radiography are described in connexion with adsorption of tagged reagents to mineral surfaces. Relative rates of reaction in response to surface agents, the mechanisms of complexing, physical stability of sorbed layers and reactions in the zeta zone which surrounds a particle in aqueous suspension are investigated, using ultrasonics, photomicrography and thermochemistry. The transporting role of air is considered, using contact-angle measurement or over-gassed water. The depressive effect of typical accompanying minerals in sphalerite ore undergoing flotation is shown. In the next group of papers (19–23) advances in flotation practice are described and process economics receive some attention.

Interest in the older processes of concentration by gravitational force continues to stimulate research (papers 24–30). Jigging of transparent objects in organic liquids and the study of stratifying action show the value of statistical appraisal in complex problems of dynamics. Dense-media separation finds a novel control valve in the shape of a magnetic field which constrains the ferro-magnetic media at the under-flow end of the separating vessel. Tetrabromo-ethane (specific gravity 2·963) is proposed as a dense separating liquid in place of magnetite or ferro-silicon pulped with water, the usual fluid mixture. Cyclone physics continues on its scientifically turbulent course. In commercial practice it has established its value everywhere, but agreement as to how it works is not yet complete.

Papers 31–38 describe advances in the magnetic, electronic and high-tension electrical treatment of ores. The effect of moisture and surface conditioning on the behaviour of small particles in an electrostatic field promises to extend the use of electrostatic separation by improving control. A novelty is the use of a refracted beam of light to trigger a mechanism by means of which diamonds can be automatically removed from passing gravel. Papers 40–44 are concerned with the chemical processing of galena, scheelite, wolframite, some silicate minerals and uranium ores, and the use of autoclaves to aid solvation. These are followed by the last eight papers (39 and 45–52), which deal with process study, control and testing, fluidized-bed roasting, automatic control, statistical analysis and the observation of concentrating techniques performed mechanically on the stage of a microscope.

Despite the fact that many of these highly technical scripts were written in Russian, Japanese, Italian, German and French, the translation is admirable. The book is excellently produced and well indexed. It bears no signs of the problem which bedevils all important meetings today—so much to do, so little time. The subject-matter covered ranges over wide fields of research and production activity, and leaves me more conscious of what has been left out of his conspectus than of what he has crowded in. The book is essential for workers in the integrated field of mineral technology.

E. J. Pryor

SHORT REVIEWS

Sir Isaac Newton

By Dr. H. D. Anthony. (Life of Science Library, Vol. 39.) Pp. 224+10 plates. (London: Abelard-Schuman, 1960.) 21*s*. net.

TO write a readable account of Newton's life and achievements is a task of very great difficulty, as all who have attempted it will agree. Although Newton's extension in time was considerable (85 years), his extension in space was restricted to the neighbourhood of Woolsthorpe, Cambridge and London. His achievements in astronomy and mechanics are not easy to explain, owing partly to the confusion surrounding his definition of 'mass', a definition which was wrongly translated by the exponents of his mathematical principles of natural philosophy from his day until the present. An exception was Henry Pemberton, one of the young men who received generous help from Newton, and who had the privilege of reading over, with him, the manuscript of his *View of Sir Isaac Newton's Philosophy* (1728). Newton defined mass as a 'measure'—not something which a body had, which 'could' be measured.

Dr. Anthony has succeeded in overcoming these difficulties by giving a more balanced account of Newton, including considerably more detail about his early life and contemporary background, his emergence into public life, his activities at the Mint and his theological writings, than has been usual in former biographies. The explanation of Newtonian dynamics is lightly but clearly outlined, with the exception of a paragraph on the tides, where we are unfortunately told that neap tides occur at full moon. Two minor errors are: "Sir" Robert Boyle (p. 102), and "the American airmen who made the first Trans-Atlantic flight" (p. 41). The author has forgotten two of Newton's countrymen who also voyaged "through strange seas . . . alone".

This is a well-produced book with excellent illustrations. An appendix containing interesting notes on the illustrations, a useful short bibliography and an explanatory list of words used with special meanings in British universities (for example, subsizar), all contribute to making this volume one that can be strongly recommended. G. BURNISTON BROWN

Science in Writing

A Selection of Passages from the Writings of Scientific Authors, with Notes and a Section on the Writing of Scientific Prose. By T. R. Henn. Pp. 248. (London: George G. Harrap and Co., Ltd., 1960.) 20*s*. net.

IT is a pity that so much scientific prose fails to be beautiful. Yet scientists in the past and of to-day have succeeded in writing with mastery. Mr. Henn has chosen examples from the works of several scientists ranging from Pliny to living authors.

These passages are not presented as models to be imitated, but they help to illustrate very cogent suggestions for good writing which Mr. Henn gives in the last part of his book. He feels that these authors have excelled because they have controlled their material so well. This control is derived from sheer knowledge of the facts and a persistent quest for what is relevant until "the whole assumes an ordered and organic pattern".

It is intriguing to see how devices of style are used (consciously or otherwise) and how the personality gleams through the prose. Newton's symmetry of thought, his dignified and authoritative tone are evident. Rayleigh's style, as complete in itself as a Mozart string quartet, would suffer loss were attempts made to amplify or compress it in any way. Darwin develops his argument simply and modestly yet evoking excitement. Allbutt's "sweeping brush-strokes" are a contrast to Duke-Elders's gradual unfolding of ideas. Punctuation is used by Whitehead, Max Born, Hinshelwood and Ricardo to give a limpid flow and abounding clarity. As in 'humane' prose, there an be scope for imagery and rhythm. Contrasted and associated rhythmic sequences can give a breathing quality to prose, so making it more pleasurable to digest. Imagery may provide analogies, may convey shades of meaning; sometimes frankly poetic as in Jacquetta Hawkes's writing.

The book should interest any scientist who wishes to write well. RUXTON VILLET

The Wildbooters

By Fritz Kern. Pp. xi+204. (Edinburgh and London: Oliver and Boyd, Ltd., 1960.) 21*s*. net.

THIS is an English translation, edited by K. J. Narr, of the late Prof. F. Kern's *Der Beginn der Weltgeschichte* (1953). Its thesis is the same as that put forward by Prof. W. J. Sollas in *Ancient Hunters* (1911), that archæology and ethnology can be combined to present "a picture of the early history of mankind" (p. 54). Wildbooters, Kern's word for hunters and collectors, replaces ancient hunters, protolithoid Lower Palæolithic, and instead of Australians (Palæolithic), Eskimo (Magdalenian) and Bushmen (Mesolithic), Ituri Pygmies, Chenchus and Yamanas are chosen to reveal the "essential traits" of man's "basic culture"; but the objections to this thesis remain the same. Archæology is a science, ethnology is not; the cultural stratigraphy of the ethnologist is one thing, that of the archæologist is another; and "reconstructive imagination" is no substitute for factual history. The first six chapters attempt to summarize and synthesize the prehistoric racial and archæological background, the seventh deals with the oldest cultural (ethnological) stratum, the rest describe the economy, religion and social organization of this stratum as deduced from ethnological accounts of their modern survivors.

There are no bibliography, maps or index. *The Wildbooters* provides a stimulating hypothesis of the life of early man, but archæologists and ethnologists will demand more detail, social anthropologists will wonder why so many of his sociological data are drawn from such little-known and inadequately studied tribes, while the general reader will be defeated by the morass of conflicting racial and archæological theories in the first few chapters. G. I. JONES