large portion of the light is polarized by reflection the residue must be more or less completely polarized by refraction, if we are dealing with a singly refracting substance.

(2) Fluorite is doubly refracting with $\alpha=\beta=\gamma$. A single signal would be observed in the refractometer and with one nicol the signal would be always bright while with crossed nicols extinction would occur with complete rotation of the nicols inasmuch as the phasal difference of the two rays equals 0λ.[1]

In view of the writer's observations it seems to him that the difference in polarization phenomena of fluorite and glass can best be explained by including fluorite with the doubly refracting substances with $\alpha=\beta=\gamma$.

NOTES AND NEWS

A CENTURY OLD MINERALOGY. It is pleasing to discover an old book, especially so if it is on science and much more so if on the science of Mineralogy. Old mineralogies have long been relegated to the class of Wedgewood china; this particular one is entitled "INTRODUCTION TO MINERALOGY" and is a first edition copy printed in London, 1819. The author, ROBERT BAKEWELL, needs no introduction to American geologists as his "INTRODUCTION to GEOLOGY" edited in this country by Professor Silliman of Yale reached its third edition by 1839. In view of the fact that its companion, the mineralogy, is unlisted in Dana's System, it seemed fitting to mention this book partly on account of its rarity on college shelves, but chiefly because the book itself, aside from its rarity, is deserving of notice for the happy, philosophical, and vigorous style in which it is written.

Professor Silliman adequately describes Bakewell as a geologist and writer in the following words that prefaced the third American edition of the geology by Bakewell.

> "The author is distinguished by great independence of spirit, which carries him straight to his object, without any servile regard to previous systems. His theoretical views appear to be generally philosophical and just, and some of them are peculiarly happy."

Bakewell's Mineralogy consists of 668 pages and five large wood cut plates of crystal drawings. The five separate books making up the Mineralogy have the following headings: "Theoretical Mineralogy"; "Essential Characters of Earthy Minerals"; "Natural History and Character of Metallic Minerals"; "Combustible Minerals"; "Saline Minerals."

The book holds additional interest as the author was a contemporary of Haüy, Romé d'Isle, Werner, Kirwan, and Jameson; and in the preface Bakewell describes their methods and theories.

In speaking of Kirwan:

> "So little attention was paid to mineralogy as a science in this country, that Mr. Kirwan's 'Elements,' published in 1784 and 1795, was the first regular treatise on the subject in our language entitled to notice."

[1] Iddings, Rock Minerals, p. 139.

He continues:

"On the continent of Europe, there are at present two schools of mineralogy, the German and the French; the founder of the former was the late distinguished professor at Freiberg, Mr. Werner, whose method of instruction has been followed in this country by Mr. Jameson, and fully and ably developed in his 'System of Mineralogy.' "

Of Werner he says:

"The peculiar merit claimed for Werner by his disciples is the invention of a technical language, to convey a correct idea of the external characters and appearances of minerals, such as the color, lustre, form, fracture, etc.; and in the description of minerals, according to the Wernerian method, all the external characters, whether essential or accidental, are most minutely detailed."

"In the system of Haüy, the crystalline structure and chemical composition of minerals are chiefly regarded, and only the most important external characters are noticed."

"Before the time of Werner, it is said mineralogists of different countries had no definite terms by which their description of minerals could be made intelligible to each other; but it may fairly be doubted whether the vagueness complained of in the descriptive language of former mineralogists did not proceed rather from defective or inaccurate observations, than from defective terms. Werner certainly introduced a greater degree of accuracy, in the examination of minerals; this is merit of a higher kind than the invention of new terms, many of which are harsh and obscure. In the German method of describing minerals, the meaning is sometimes almost buried under a heap of terms, which to speak in the language of that school, are 'particularly difficultly intelligible'; added to this, a mineral is often divided into so many species, subspecies, varieties, and kinds, according to the varieties of color, or other accidental qualities, that the learner finds the subject rendered obscure, by the multiplicity and minuteness of the illustrations. The descriptions may be compared to a window in a Gothic cathedral, where so much care has been taken to make the glass-work firm, by compartments and subdivisions of lead and stone, that the use of the window for the admission of light seems to have been forgotten."

Speaking of argentiferous galena, he says:

"Can we say that the lead was forming into silver, but was arrested in its progress, or is the change now taking place? I do not believe it unphilosophical to believe that the vivifying influence of creative energy descends to the deepest recesses of the earth, acting according to laws as regular as those which govern the motion of the planets in the heavens."

Among the various features in the book, Bakewell presents a table based on differences of specific gravity and hardness for the physical determination of (Earthy Minerals.) To justify this use of a physical table of minerals, he says,

"Chemistry and crystallography must form the basis of scientific mineralogy; but for practical use an arrangement according to the physical characters is required, in order to discover to what species any mineral possessing certain of these characters belongs; hence it appears that we should have two systems, one artificial, and the other scientific; the first, to enable us to refer a mineral to any known species, and to ascertain its name; the second, to enable us to class minerals according to their composition and structure, and to refer them to their true situation in the system of natural bodies."

The far reaching and important effect of a well written book is shown in the case of Sir Charles Lyell who attributes his first attraction to Geology to the reading of Bakewell's Geology in his father's library. Charles Darwin in turn names Lyell as the man who first interested him in Natural Science. Bakewell's "Introduction to Mineralogy" equals his "Introduction to Geology."

It is apparent that this type of book on Introductory Mineralogy is the exception in the current science. Mineralogy of all earth sciences has need of able exponents for it is usually clothed in a technical language so mysterious to the average man. Bakewell made a strong plea for mineralogy, when he said:

> "The acquisition of a new science is like the acquisition of a new sense; it enlarges the sphere of our intellectual power, presents Nature under a new aspect, and multiplies the objects of rational enjoyment."

T. L. GLEDHILL.

NOTE ON THE CONSTITUTION OF CERULEOFIBRITE. The remarkable mineral ceruleofibrite, described by Edw. F. Holden in the May issue of this journal (pp. 80-3) would have according to the structuralists some such formula as:

$$\left.\begin{array}{l}\text{Cl-Cu-O-Cu-O-Cu-O-Cu-O}\\ \text{Cl-Cu-O-Cu-O-Cu-O-Cu-O}\\ \text{Cl-Cu-O-Cu-O-Cu-O-Cu-O}\end{array}\right\}\text{As}=\text{O}+9\text{H}_2\text{O}$$

The fact that the water is given off at a high temperature is not opposed to this view; for in copper compounds water of constitution may be lost far below 100° (e.g. $Cu(OH)_2$), while water of crystallization may require a red heat to drive it out (e.g. $CuSO_4.H_2O$). However, X-ray study of crystals has failed to demonstrate the reality of such structural formulas.

According to the coordinatists, it might be $(OH)_6[Cu_{12}]\ Cl_3AsO_4$ or $Cu_{12}[AsO_4]\ Cl_3(OH)_9$, etc. The choice is extensive and the possibility of still further complicating its formula by multiplying thru by some factor is unlimited. But such arrangements do not tell much about the nature of compounds, nor are they confirmed by X-ray study better than the preceding type.

The simplest way of interpreting the mineral would appear to be as a tri-copper-tri chlor- arsenate with nine molecules of copper oxide plus water, or of *copper hydroxide of crystallization:*

$$Cu_3\ Cl_3\ (AsO_4).9Cu(OH)_2.$$

E. T. W.

As a result of the publication of Professor A. L. Parsons' article on "The preservation of mineral specimens," in the April issue of THE AMERICAN MINERALOGIST, further suggestions have been received from Mr. P. Walther of the Newark Mineralogical Society, who for a number of years was connected with the Natural History Museum at Newcastle-upon-Tyne. To the list of minerals altered by exposure to light three additions may be noted, cinnabarite, chrysoprase and green fluorite. It is suggested that minerals sensitive to light be kept in cases provided with black covers, which can be easily removed when specimens are inspected. It was also observed that copper and iron sulfates when dipped in alcohol and then permitted to dry in a place free from direct sunlight, remained clear for several years. The disintegration of specimens of fossil fish was also arrested by cleaning thoroughly with alcohol and then immersing in a solution of ozokerite and benzene.

Professor P. v. Groth will celebrate his 80th birthday on June 23, 1923. In recognition of his work as investigator, author and editor, the present editor of the

Zeitschrift für Kristallographie, Dr. P. Niggli, is planning a special number (Vol. 58 or 59) of the Zeitschrift in honor of this eminent mineralogist. Manuscripts for this volume which should not exceed three pages in length, should be in the possession of Dr. Niggli, Mineralog.-petrogr. Institut der Eidg. Techn. Hochschule, Zürich, Sonneggstrasse 5, by December 31st, 1922. Also contributions towards defraying the cost of the volume will be gratefully received.

Friends and former students of Professor Victor Goldschmidt are planning a memorial to be presented on his 70th birthday which falls on the 10th of February, 1923. This memorial will also commemorate Dr. Goldschmidt's 35th year as teacher at the University of Heidelberg. Those wishing to participate in honoring this noted crystallographer are asked to send their name and contribution to Dr. Oscar Neff, Karlsruhe, Kriegsstr. 85.

PROCEEDINGS OF SOCIETIES

PHILADELPHIA MINERALOGICAL SOCIETY

Academy of Natural Sciences of Philadelphia, June 8, 1922

A stated meeting of the Philadelphia Mineralogical Society was held on the above date with the president, Mr. Trudell, in the chair. Nineteen members were present.

Mr. John Frankenfield addressed the society on "A MINERALOGICAL TRIP TO VIRGINIA." The localities at Amelia, Natural Bridge, Midvale, Irish Creek, and Luray, were described, and illustrated with many beautiful lantern slides. Specimens of albite, beryl, scorodite, dufrenite, and strengite were exhibited.

Trips to Vanartsdalen's quarry, Jones mine, and quarries in Germantown and Frankford were reported by Messrs. Knabe, Biernbaum, and Oldach.

The president described the following excursions of the society: on May 21st, to the American Museum of Natural History in New York to see the new installation of the Clarence Bement collection of minerals; and on June 4th, to Dover, N. J., to see the magnificent collection of Mr. Frederick Canfield. The serpentine locality at Hoboken was also visited, specimens of brucite, magnesite, and hydromagnesite being obtained. Lantern slides were exhibited of pictures taken on the two occasions.

The secretary announced that Mr. Charles K. Shaw of Chester, Pa. had presented to the Academy the mineral collection of his father, William H. Shaw (1855-1900). The collection is extremely rich in Delaware County amethysts, beryls, garnets, etc., although by no means limited to local minerals. Of exceptional interest are three large amethysts from the Shaw and Esrey quarry, two of which are over a foot in length; and a suite of amethysts from the Morgan Station locality. A selected series of specimens was exhibited. SAMUEL G. GORDON, *Secretary*.

BOOK REVIEW

ESSENTIALS FOR THE MICROSCOPICAL DETERMINATION OF ROCK-FORMING MINERALS AND ROCKS. ALBERT JOHANNSEN. 53 pages, *8vo*, 24 figures, 4 tables. The University of Chicago Press, *Chicago*, 1922.

This book is designed primarily as a *laboratory manual* for students of petrography and should be used in conjunction with the writer's *Manual of Petrographic*