

are soluble to any extent under the conditions of solution employed. This was not the case.

The specific gravity of the olivine was determined to be  $3.46 \pm .02$ .

The indices of refraction were determined by matching  $\alpha$ ,  $\beta$  and  $\gamma$  with mixtures of  $\alpha$ -monochloronaphthalene and methalene iodide in yellow light from a monochromator. Dr. J. H. C. Martens kindly determined the indices of these mixtures on a refractometer in sodium light, obtaining the values 1.6807, 1.7057 and 1.7185. The value of  $\beta$  is a little lower than would be indicated by interpolation in the series of Penfield and Forbes.<sup>3</sup> This may indicate that the rate of increase of  $\beta$  with increasing FeO content is even slower at the magnesium end of the series than is shown by their diagram. The same indication may be seen in their data. As would be expected from its composition the olivine is negative.

Like the mineral from Mt. Bruno, analysis of which has just been quoted, the percentage of FeO is extremely high for a rock-forming olivine.

More extensive details as to methods and results are given in the writer's thesis for a Master's degree which is deposited in the library of Cornell University.

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## NOTES AND NEWS

### "FINGER PRINTS" OF MINERALS

A. N. WINCHELL, *University of Wisconsin*.

Recent developments in our knowledge of X-rays have made it possible to use them in the study of all sorts of solid matter. Truly solid matter consists exclusively of crystals each of which is composed of atoms having a perfectly definite and regular arrangement. These atoms form parallel planes in various positions through the crystal just as the hills of corn planted by machine on a level field form parallel straight lines in several positions across the field. The distance between any two adjacent planes determines the angle at which X-rays are reflected (in phase) by these planes. By exposing a finely powdered crystal to a beam of X-rays reflections can be obtained simultaneously from all the parallel planes in the crystal. These reflections make angles with the incident beam of X-rays which depend directly upon the distances between the planes of atoms. All crystals of the same kind produce reflections which are identical in intensity and positions while two crystals which are not alike produce reflections which are unlike.<sup>1</sup> Accord-

<sup>3</sup> Penfield and Forbes: *Am. Jour. Sci.*, **151**, 134 (1896).

<sup>1</sup> A few exceptions to this rule have been discovered; most of these are easily understood.

ingly, every kind of crystal can be made to produce its own characteristic X-ray pattern or autograph.

Scientists in this country and in Europe have obtained such autographs or "finger prints" and studied them in various ways. So far as known to the writer, no scientist nor institution has attempted to establish a reference collection of standard autographs and the Department of Geology of the University of Wisconsin has undertaken this task.

Such autographs are most valuable as reference standards when they are obtained from substances whose nature and composition are fully known. Therefore, analyzed samples of all kinds of minerals are needed for the establishment of such standards. A very small portion of the material is sufficient—in some cases an autograph can be made from 50 milligrams of mineral.

In order to make it possible to identify X-ray patterns from unknown material it is important to make the collection of autographs from known material as complete as possible. At the present time about 550 autographs have been made, which include only 170 standards, the others being for purposes of identifying unknown minerals, for special problems relating to crystal structure, etc. The Department of Geology of the University of Wisconsin is anxious to obtain analyzed mineral samples to enlarge its collection of standard autographs as rapidly as possible. For this reason an X-ray pattern of such material will be supplied free of charge to any one supplying a sample together with an accurate chemical analysis.

The Department believes that this collection of "finger prints" of minerals will be very useful to mineralogists, geologists, mining engineers, metallurgists, chemists, and many others. In order to make the service as widely useful as possible X-ray patterns on unanalyzed or unknown material will be made at a minimum charge of \$2.00 each.

The Department has on hand at present standard X-ray patterns of the following minerals, but very few of these are from analyzed samples, and analyzed samples will be acceptable whether included in the following list or not: acanthite, actinolite, albite, almandite, amblygonite, analcite, andesine, andradite, anhydrite, ankerite, anorthite, anthophyllite, antigorite, apophyllite, arsenopyrite, asbestos, augite, azurite, barite, bauxite, beryl, biotite, bismuthinite, bornite, boulangerite, bournonite, breithauptite, brucite, cassiterite, celestite, cerargyrite, cerussite, chabazite, chalcocite, chalcopyrite, chlorite, chromite, chrysotile, cinnabar, clinocllore, copper, corundum, covellite, cristobalite, diaspore, embolite, enargite, franklinite, freibergite, gahnite, galena, garnet, gibbsite, glauconite, gmelinite, goethite, graphite, greenalite, grossularite, gypsum, halite, halloysite, harmotome, hausmannite, hematite, heulandite, hornblende, iron, ilmenite, kaolinite, labradorite, laumontite, lepidolite, leverrierite, limonite, linneite, lithiophilite, magnetite, manganite, marcasite, molybdenite, montebasite, muscovite, natrolite, niccolite, oligoclase, orthoclase, petalite, phillipsite, proustite, psilomelane, pyrargyrite, pyrite, pyrolusite, pyromorphite, quartz, realgar, riebeckite, rutile, sal ammoniac, scolecite, siderite, silver, smaltite, smithsonite, sphalerite, spinel, spodumene, stannite, stibnite, stilbite, sulphur, sylvite, tantalite, tennantite, tetrahedrite, thomsonite, titanite, topaz, tourmaline, tremolite, ullmannite, witherite, wurtzite, zinnwaldite.

THE CORRECT MINERALOGICAL NAME FOR  
CUPRIC CHLORIDEEDGAR T. WHERRY, *Washington, D. C.*

In view of the magnitude of the sixth edition of Dana's System of Mineralogy, the percentage of errors in it is almost incredibly small, nevertheless a few do occur. One of these concerns the name for cupric chloride, on page 174, which was copied on line 17, page 19, in the January number of this Journal. The Italian term applied by Scacchi to this mineral was *ericalco*, evidently derived from the Greek *erios*, signifying wool, and *chalcos*, copper. Through overlooking this derivation, and confusion with the other Scacchi name *eritrosidero*, correctly transliterated *erythro-siderite*, Dana made the name for the green mineral containing no calcium "erythrocalcite." The correct English transliteration is clearly *eriochalcite*.

## BOOK REVIEWS

DIE KÜNSTLICHEN EDELSTEINE. Eine zusammenfassende Darstellung ihrer Unterscheidung von dem natürlichen und ihrer Stellung im Handel. Mit je einem Abschnitte über Verfälschungen der Edelsteine und über Perlen. Hermann Michel. 2d edition. VIII+477 pages, 2 colored plates, 180 text figures. Verlag von Wilhelm Diebener, *Leipzig*, 1926. Price 25 Mks.

This is the second edition of Doctor Michel's work on the synthetic gem stones the first having appeared in 1914. There are a number of additions, including a discussion of crystal structure and a new chapter on pearls. The part devoted to the examination of the synthetic stones is considerably enlarged and includes methods devised by the author based on color and luminescent effects.

The book begins with a short discussion of the natural occurrence of gem minerals. The second chapter deals with the synthesis of some of the gem minerals, the summary of the literature of corundum and diamonds being particularly complete. The synthetic production of the corundum gem material has reached enormous proportions; one plant alone is capable of producing five million carats monthly.

The examination of the natural and synthetic stones is taken up in detail. An interesting discussion concerns the determination of the place of origin of natural stones by means of inclusions, luminescence, etc. Burma rubies, for instance, show a lively fluorescence under the various rays, Siam rubies only feebly so.

The new chapter on pearls discusses their origin, culture and imitation, also their examination with the pearl microscope as devised by the author.

The book is well printed on heavy paper, the illustrations are good and the book on the whole is very readable and attractive.

W. F. FOSHAG

TRACHTEN DER KRISTALLE. H. Tertsch. 8 vo. VIII+222 pages, with 58 text figures. Forschungen zur Kristallkunde, No. 1, Gebrüder Borntraeger, *Berlin*, 1926. Price 15 Mks.

This splendid monograph presents a comprehensive survey of the various contributions in the field of crystal habit. The list of papers considered contains 181 entries, most of which are discussed in the text. By his concise and critical