NOTES AND NEWS

AN OCCURENCE OF PICKERINGITE IN ALBERTA

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In 1929 the writer made a geological survey of several districts in the Peace River country, Alberta, for the Research Council of Alberta.[1] Some crystalline salts occurring at the junction of the two main branches of the Smoky river in township 77, range 24, west of the 5th meridian, Alberta, were collected. A chemical analysis and optical examination of this material proved the main mineral to be pickeringite. The occurrence of these salts has been known for many years and at different times samples have been sent in for chemical analyses. The fact that they resemble alums has attracted interest in the hope of the discovery of some salt rich in potash.[2]

The salts occur as thin veins and incrustations mixed with clay, along steep slumped banks of the stream valleys where Cretaceous marine shales form the underlying bedrock. Although they occur at several localities, the best known occurrence is that at the junction of the two branches of the Smoky river. They consist of a soft white substance that is readily soluble in water, to which it imparts a bitter astringent taste. Owing to the solubility of the salts, the best collecting time is during the drier summer months. They are formed by decomposition of the marine shales which contain iron sulphides. The shales are generally impervious to water but along steep river valleys the bedrocks become dislodged through slumping. This movement renders the beds more porous, resulting in oxidation of the sulphides and generation of heat. Apparently the water seeping through the loosened material is vaporized and rises in heated condition carrying salts dissolved from the shales and precipitating them at or near the surface as a white incrustation. In the cooler season these vapors often settle in the valley and have been referred to as *bocannes* or *fires*,[3] hence the name, "Smoky river." The heat is frequently sufficient to bake the shales into a brick.

[1] Geology and Water Resources reports of the Peace River and Grande Prairie districts, Alberta: *Research Council of Alberta*, Rept. No. **21,** 1930.

[2] Allan, J. A., *Research Council of Alberta*, Annual Report **1920,** p. 126, and **1921,** p. 39.

[3] Selwyn, R. C., *Geol. Surv. Can.*, Report of Progress for **1875–76,** p. 56.

An analysis made from selected material from Smoky river is given in the following table with others for comparison.

ANALYSES OF PICKERINGITE

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
SO_3	39.92	36.33	36.32	37.28	37.02	38.69	36.87	36.86	36.43	37.3
Al_2O_3	11.90	10.64	12.13	11.85	10.90	11.90	11.64	11.64	13.53	11.9
MgO	6.32	4.79	4.68	4.64	6.75	4.89	4.15	4.18	3.99	4.7
H_2O	41.35	46.06	45.45	46.10	44.95	41.94	46.07	46.13	44.62	46.1
CaO	..	..	0.13	0.31	1.30	0.68	..	..	0.71	..
FeO	..	0.58[a]	0.43[a]	0.03[b]	..	..	..	..	..	..
Fe_2O_3	0.40	..	..	..	..	..	0.26	0.21	..	..
CuO	..	0.02	..	..	..	..	0.18	0.17	..	..
MnO	..	..	..	..	..	..	1.03	1.02	tr	..
K_2O	..	0.23	..	..	..	..	..	..	..	..
HCl	..	..	0.60	..	..	..	..	..	..	..
Cl	..	..	..	0.02	..		..	..	..	..
SiO_2	0.53	..	..	..	..	..	..	..	..	..
Insoluble	..	0.72	..	..	..	1.90	0.22	0.27	..	..
CoO	..	0.06	..	..	..	..	..	..	..	..
NiO	..	0.14	..	..	..	..	..	..	..	..

[a] includes MnO. [b] includes CuO and CoO

1. Smoky River, Alberta. T.77–R.24–W5th.
2. Newport, N. S. Dana, System of Mineralogy, page 953
3. Chili " " " " " "
4. Chili " " " " " "
5. Argentine, R. " " " " " "
6. Colorado " " " " " "

7 & 8. Portland, Connecticut. Shairer & Lawson, *Am. Journal of Science*, vol. **XI**, 301, 1926.

9. Bohemia, *Mineral Abstracts*, vol. **3**, 354, 1927.
10. Calculated percentage of pickeringite as given in Dana's System of Mineralogy.

The magnesian content of the Smoky river specimens and the general physical properties of it are very similar to those given for pickeringite. A sample was sent to Dr. T. L. Walker at the University of Toronto, who compared it with pickeringite from near Tucumari, New Mexico. He expressed the opinion that part at least of the material from Smoky river is identical optically with that from New Mexico.

Further optical examination and comparison of the material from Smoky river and New Mexico has been made. Some specimens of the Smoky river samples contain more than one salt but the most of it consists of a colorless fibrous mineral with the properties of pickeringite. The individual crystals are too small to determine many of their precise optical properties. They belong to either the monoclinic or triclinic system. Winchell[4] gives the system as monoclinic with the optical plane parallel to {010} and $Z:c$ equal to 37 degrees. The Smoky river specimens have negative

[4] Elements of Optical Mineralogy, Part 11. New York, **1927.**

elongation and a maximum observed value of 35 degrees extinction. Fragments showing the larger extinction angles also show a faint flash figure indicating that the optical plane is parallel to {010}. The index of refraction for the faster ray in sections parallel to the optic plane is almost equal to 1.479 as determined by the immersion method. The birefringence is weak. The aggregates of very fine elongated crystals are usually not commonly optically orientated. Most of the slender crystals appear to be terminated by a cleavage parallel to {001}. Some of the crystal aggregates, where the individual fibres appear to have common optical orientation, have a common cleavage direction which causes the mineral to break into groups of fibres. This appears to be the same cleavage direction as shown by the individual crystals.

It has not been possible to determine with any degree of certainty what the associated minerals are in the Smoky river specimens. Most of the immersion mounts prepared showed one and sometimes two other minerals that are distinct optically from pickeringite. Similarly the New Mexico material also shows mineral impurity associated with the pickeringite. Many of the fragments consisting of aggregates of needle-like crystals have dark patches or zones when examined under plane polarized light. These are believed to be due to fine particles of clay or a similar substance.

The Smoky river pickeringite is formed by the decomposition of marine shales containing iron sulphides. Dana mentions a similar mode of origin for the occurrence of Newport, Nova Scotia. The Bohemian occurrence is also said to be formed as a weathering product of pyritic shales. In these and other occurrences of similar origin it is very likely that more than one mineral would form giving a mixture of several hydrated sulphates. These are usually so fine grained that the individual properties of them are not well known, consequently it is difficult to determine or differentiate them when they occur as mixtures. Pickeringite, however, appears to be one of the more abundant minerals formed by the above process.

The Council of the Geological Society of America has voted to hold the next annual meeting in Cambridge, Massachusetts, Wednesday to Friday, December 28–30, 1932. The scientific sessions will be held in the buildings of Harvard University and dormitory accommodations will be available on the ground. Arrangements can also be made for hotel accommodations. The Mineralogical Society and Paleontological Society will hold their meetings at the same time.

Mr. Charles D. Campbell of Ann Arbor, Michigan, has been appointed teaching fellow in mineralogy at Stanford University for the year 1932–33.

Two recent publications of the U. S. Geological Survey that are of unusual interest to all mineralogists are Bulletin 832, The Crystal Cavities of the New Jersey Zeolite Region, by Waldemar T. Schaller; and Bulletin 833, Mineralogy of Drill Cores from the Potash Field of New Mexico and Texas, by Waldemar T. Schaller and Edward P. Henderson.

The eleventh meeting of the Mineralogical Society of Southern California was held in the Lecture Hall of Pasadena Public Library on Monday, May 9. Dr. William Morris Davis, professor-emeritus of Harvard University spoke on "Illustrations of the Relations of Geography to History." The sixth field trip, held jointly with the geology classes of Pasadena Junior College on May 7–8, included visits to the mines at Borate, Calico and Barstow, and to the vertebrate fossil beds of that region.

Dr. Henry S. Washington, of the Geophysical Laboratory, Washington, D. C., has been elected an honorary member of the Mineralogical Society of Great Britain and Ireland.

George Frederick Kunz, internationally known mineralogist and gem expert, and vice president of Tiffany & Co., died June 29 in his seventy-sixth year. A memorial summarizing the major events of his long and active career will be published in a later issue of this Journal.

BOOK REVIEW

THE MICROSCOPIC CHARACTERS OF ARTIFICIAL INORGANIC SOLID SUBSTANCES OR ARTIFICIAL MINERALS. ALEXANDER NEWTON WINCHELL, Professor of Mineralogy and Petrology, University of Wisconsin. With a Chapter on the Universal Stage, by Richard Conrad Emmons, Associate Professor of Geology, University of Wisconsin. Second edition. John Wiley and Sons, Inc., 440 Fourth Avenue, *New York*, **1931**, xvii+403 pp. Illustrated. 15×23.5 cm. Price, $5.00.

The appearance of this book marks an important step in the education of the chemical fraternity in the application of the methods developed by mineralogists for the description and identification of crystalline compounds. No one who has had an opportunity to make use of these methods can fail to be impressed with their power and convenience, and the rapidly increasing use of the petrographic microscope in research and industrial laboratories shows that they are appreciated. There has long been a need for a book of tables and synoptic geometrical and optical crystallographic data for crystalline compounds. There is also a need for a text-book of optical crystallography in English that would teach the fundamental principles and main facts, and the methods by which they are applied in the measurement and observation of crystallographic properties.

Winchell's book represents the most complete set of tables and synoptic data for artificial inorganic compounds thus far published and as such will be found very