PROCEEDINGS OF THE FIFTH ANNUAL MEETING OF THE MINERALOGICAL SOCIETY OF AMERICA

FRANK R. VAN HORN, *Secretary*

The Mineralogical Society of America held its fifth annual meeting at Cornell University, Ithaca, New York, on Wednesday, December 31, 1924 at 9 A.M., in conjunction with the Geological Society of America. Both morning and afternoon sessions were in charge of the President, Dr. Henry S. Washington, who gave his presidential address on "*The Modern Study of Minerals*" at 12:20 P.M., before a joint session of the Mineralogical Society of America and the Geological Society of America. This paper is printed in full in this number.

At 9 A.M. the Society proceeded with the regular order of business. On motion of the Secretary, the reading of the minutes of the last annual meeting was dispensed with in view of the fact that they have been printed on pages 56–69 of Volume 9, (Number 3) of The American Mineralogist.

ELECTION OF OFFICERS AND FELLOWS FOR 1925

The Secretary announced that 128 ballots had been cast for the officers and fellows for 1925, as nominated by the Council. All 128 ballots for officers were in the affirmative. For fellows, there were 57 in the affirmative and one in the negative for certain nominees. All officers and fellows as nominated were declared elected.

The officers elected for 1925 are the following:

President: Arthur S. Eakle, University of California, Berkeley, California.
Vice-president: Herbert P. Whitlock, American Museum of Natural History, New York City.
Secretary: Frank R. Van Horn, Case School of Applied Science, Cleveland, Ohio.
Treasurer: Alexander H. Phillips, Princeton University, Princeton, New Jersey.
Editor: Walter F. Hunt, University of Michigan, Ann Arbor, Michigan.
Councilor, 1924–1928: William F. Foshag, United States National Museum, Washington, D. C.

The list of Fellows elected follows:

Wilbur S. Burbank, United States Geological Survey, Washington, D. C.
Lazard Cahn, Colorado Springs, Colorado.
Francis D. Dodge, Brooklyn, New York.
Ernest E. Fairbanks, United States Bureau of Mines, Reno, Nevada.
James G. Manchester, New York City.
J. J. Runner, Iowa State University, Iowa City, Iowa.
Otto von Schlichten, University of Cincinnati, Cincinnati, Ohio.
Alfred Wandke, Guanajuato, Mexico.
Samuel Weidman, University of Oklahoma, Norman, Oklahoma.
Edward Wigglesworth, Boston Society of Natural History, Boston, Massachusetts.
Joseph P. Wintringham, Brooklyn, New York.

REPORT OF THE SECRETARY FOR 1924

The Secretary reports that the roll of the Society now comprises 97 fellows and 189 members, a gain of 22 fellows and a loss of 10 members for the year. Several members have been dropped on account of non-payment of dues. Two fellows, Dr. E. O. Hovey and Dr. T. L. Watson, have died. In addition to the 286 fellows and members, there are also 111 subscribers, chiefly libraries and colleges, so that there are 397 paid copies of the Journal mailed monthly. It is requested that every effort be used to increase the number of members and subscribers, in order that additional funds may be secured to enlarge the size of the Journal.

Respectfully submitted,
Frank R. Van Horn, *Secretary*

President Washington made a few appropriate remarks on the recent deaths of two fellows, Dr. E. O. Hovey and Dr. T. L. Watson.

REPORT OF THE TREASURER FOR 1924

The report was read by the Treasurer. On motion it was accepted and ordered filed. On motion, an auditing committee was appointed by the President, which consisted of Dr. W. T. Schaller and Prof. E. H. Kraus. This committee later reported to the Secretary that they found the books of the Treasurer correct. In view of the favorable financial balance, the Council has ordered an eight percent increase in the size of the Journal for the ensuing year.

To the Council of the Mineralogical Society of America: The Treasurer herewith submits his annual report for the year ending November 30, 1924.

Receipts

Cash on hand, December 1, 1923	$ 432.78	
Dues and subscriptions	1,258.19	
Advertising	236.60	
Sale of back numbers, etc	85.41	
Sale of Goldschmidt's Methods	21.51	
Illustrations charged to authors	92.56	
Interest on bonds and bank deposits	41.36	
		$2,168.41

Expenditures

Printing Journal	$1,812.43	
Miscellaneous printing	33.10	
Postage	33.01	
Stationery	10.96	
Miscellaneous	27.35	
	$1,916.85	
Balance in the Princeton Bank and Trust Company	251.56	$2,168.41

Respectfully submitted,
Alexander H. Phillips, *Treasurer.*

REPORT OF THE EDITOR FOR 1924

The report was read by the Editor, and on motion it was accepted and ordered filed.

To the Council of the Mineralogical Society of America:

Continued progress can be reported for the year 1924. In fact, in many respects, this year has been the banner year. Never before has the volume been as large or contained as many original articles. The forty-eight leading articles in volume 9 represent contributions from twenty-four Universities and research bureaus. It is interesting to note that papers published this past year came from institutions bordering on the Atlantic to those touching the Pacific, from institutions as far north as the University of Alberta to the University of Arizona to the south; and one article was received from Oxford, England, a striking testimonial of the extensive service rendered by The American Mineralogist in supplying an outlet for mineralogical research.

The current volume, No. 9, contains 245 pages of text proper, which compared with the 232 pages of volume 8, indicates an increase of 13 pages or 5.6 % over 1923. The steady increase which has marked the progress of the Journal during the past few years while not of great magnitude in any single year has, nevertheless, been substantial and consistent. The 245 pages of 1924, when compared with the 150 pages of 1919, indicates more clearly what has been accomplished in this five year period—a gain of 63% in the size of our publication.

This past year the forty-eight original articles occupied 68% of the total space of the Journal, proceedings of societies, notes and book reviews 17%, while the remaining 15% was devoted to abstracts, including discussions of new minerals. There has also been an increase in the number of cuts used as shown by the 61 illustrations compared with 39 of the previous year. While these cuts add considerably to the cost of printing, in many instances the author, or the institution fostering the investigation, was willing to bear the entire cost of these reproductions or a portion thereof, thus reduing the net cost to the Society. This policy seems necessary where numerous cuts are involved in a single article.

The concluding table of contents summarizes the distribution of subject matter in volume 9.

Distribution of Subject Matter in Volume 9

Subject	*Articles*	*Pages*	*% of total*
Original articles	48	166½	68.0
Proceedings of societies	22	32	17.1
Notes and news	49	7	
Book reviews	6	3	
Abstracted accounts of new minerals	23	12½	14.9
Abstracts of mineralogic literature	151	24	
Total of Text	299	245	100.0
Illustrations	61		
Covers, advertisements, index		83	
Total		328	

Respectfully submitted,
Walter F. Hunt, *Editor.*

REPORT OF THE COMMITTEE ON NOMENCLATURE AND CLASSIFICATION OF MINERALS

The work of the Committee was delayed by the death of the chairman, Professor Thomas L. Watson, and the Council voted that Professor Esper S. Larsen be added to the Committee and that Dr. Henry S. Washington assume the duties of chairman. The Committee now consists of H. S. Washington, W. F. Foshag, A. F. Rogers, T. L. Walker, E. T. Wherry, and E. S. Larsen. Dr. Washington reported that he had not been able to secure the various reports from Dr. Watson's assistants, and as a result the final reports on Topic 5, The Numbering of Mineral Species, and Topic 6, The Nomenclature of Isomorphous Groups, were not ready for publication.

A brief preliminary report was made on pronunciation of mineral names, and this report is to be mimeographed and mailed out to the membership during the year. Dr. Washington reported that the Washington, D. C. members had discussed our various reports with Dr. Spencer of England who had suggested an International Committee.

Professor E. H. Kraus moved that a Sub-committee of our Committee on Nomenclature be appointed by its Chairman to cooperate with a similar British committee. This motion was seconded and carried. Dr. W. T. Schaller suggested that the occasion of the next International Geological Congress would also be suitable and proper for a common meeting of the various National Mineralogical Societies which could discuss nomenclature and classification of minerals from an international standpoint. The Mineralogical Society of America may congratulate itself on being the initial sponsor of such a committee which may obtain results of international character.

PRESENTATION OF PAPERS

There being no further business, the Society proceeded to the reading of the papers. The papers presented, with short abstracts, follow:

Clarence S. Ross and Earl V. Shannon: *Bentonite and Montmorillonite.* The present study of bentonite, which is a clay-like material of very wide distribution and peculiar physical properties, is based largely on an examination of nearly 300 thin sections and 30 new analyses. It is derived from volcanic ash, that has sometimes been reworked and mixed with detrital matter, but often the volcanic structure is perfectly retained. It is usually made up of varying proportions of volcanic rock, phenocrysts and a very characteristic clay-like mineral of the groundmass, which is a devitrification product of glass. This mineral is found to be montmorillonite to which a new formula has been assigned on the basis of new analyses of pure material from bentonites, pegmatites and the original French montmorillonite. A few bentonites are characterized by another clay-like mineral which is probably identical with the gouge clay called leverrierite by Larsen and Wherry. Many other clay minerals have been studied and information gained of their mineral identity and physical properties. Peculiarities of water content are supposed to be largely an adsorptive phenomena, and this and many of the other unusual physical properties are probably dependent upon the micaceous structure of the mineral, the small cohesion between lamellae, and the ability of water to penetrate between and separate these lamellae.

EDGAR T. WHERRY: *Bentonite as a One Dimensional Colloid.* Crystals may fall simultaneously into size-classes, for example, be of microscopic diameter but colloidal thickness; this is particularly likely to occur when they are formed by some sort of devitrification or development of a meta-colloid. Bentonite and related substances have been shown to result from the alteration of volcanic ash. They exhibit optical and physical properties which indicate that their grains are of visible dimensions in two space-directions, but sub-microscopic and colloidal in the third, perpendicular to the mica-like plates. Their remarkable powers of adsorption are thought to be connected with this dimension relation.

EDGAR T. WHERRY: *A Tabulation of the Aluminum Silicate Minerals* (Abstract read by F. R. Van Horn). A series of aluminum silicate minerals is plotted in a triangular diagram, with alumina and silica at the corners, and water on a medial line, and selection of minerals from the many in the literature made on the basis of their Si:Al ratios falling into the harmonic series N-3. Colloidal, meta-colloidal and crystallized representatives of each ratio are then picked out, and tabulated alongside the diagram, as probably comprising the existent mineral species. Dana's bauxite, schrötterite, and montmorillonite are omitted, but many of his varieties are raised to species rank. Some of the newly created species are apparently of more frequent occurrence than kaolinite. It is hoped that this note will lead to further work on correlating optical and chemical properties in such minerals.

A. N. WINCHELL: *Studies in the Mica Group.* An extensive abstract of this paper is published as a separate article in this number.

A. N. WINCHELL: *A New Theory of the Composition of the Zeolites.* The author has studied the composition of various zeolites by a graphic method which is designed to show whether there is any relation between variations in the soda-lime ratio and the silica-alumina ratio.

From this study it appears that, with a few exceptions which can reasonably be explained as due to secondary changes after formation of the crystals, the zeolites show no evidence of isomorphous replacement under valence-control (so that 2Na replaces Ca, or *vice versa*), but, they are either of fixed composition, like natrolite and mesolite, or they vary in composition exactly as the feldspars do; that is, contrary to the views of all authorities, variation occurs by replacement of Ca by Na (or K) with simultaneous replacement of Al by Si. The isomorphous molecules are composed of the same number of atoms; and the atoms are divisible into three groups, the smallest oxygen atoms, the intermediate Al and Si atoms, and the largest Ca and Na atoms; in all zeolite molecules the oxygen atoms are just twice as numerous as the (Al+Si) atoms, while the number of (Ca+Na) atoms is constant in each part of the zeolite group whose molecules are capable of forming mix-crystals, but differs widely in different parts of the whole group. This theory of the isomorphous relationships of the zeolites can be tested by comparative studies of the composition of zeolites under varying conditions of the solutions surrounding them. If the theory is correct, it can be used to learn something about the nature of solutions in given regions.

ARTHUR S. EAKLE: *Camsellite from California.* Boulders of serpentine on the eastern shore of Bolinas Bay, California, are coated and impregnated with soft, white, minutely fibrous camsellite. Analyses show that camsellite is a silico-borate instead of a simple, hydrous magnesium borate and has the formula, $2(MgO.FeO)(B_2O_3.\ SiO_2)\ H_2O$.

Arthur S. Eakle: *Foshagite, a New Calcium Silicate from Crestmore, California.* Large vesuvianite boulders contained veins of a white, compact, fibrous mineral, which analyses show is a new silicate corresponding to the formula, $H_2Ca_5(SiO_4)_3 \cdot 2H_2O$. The mineral was named foshagite and was found associated with thaumasite in the Wet Weather Quarry of the Riverside Portland Cement Company at Crestmore, California.

Arthur S. Eakle: *Note on the Crystallization of Thaumasite.* Glassy granular thaumasite is intimately associated with the foshagite at the Wet Weather Quarry of the Riverside Portland Cement Company at Crestmore, California. Many of the apparent grains are doubly terminated hexagonal prisms which gave good readings on the goniometer.

At 12:15 P.M. the Society adjourned to the auditorium of the Baker Chemical Laboratory for a joint session with the Geological Society, at which President Washington gave his address on, *The Modern Study of Minerals.* At 2:15 P.M. President Washington called the meeting to order in McGraw Hall, and proceeded with the reading of papers.

Edward F. Holden: *The Temperature-Pressure Conditions During the Formation of Smoky Quartz and Amethyst.* Quite precise information concerning the temperature and pressure conditions during the formation of smoky quartz and amethyst is afforded by the abundant and comparatively large liquid-and gas-filled cavities. Contraction bubbles in the water inclusions disappear when the specimen is heated to the temperature of formation. Heating was carried on in a parafine oil bath on a microscope stage. The proportion of liquid and gas phases in CO_2 inclusions indicates the pressure at the time of formation, if the temperature is known. The simultaneous presence, in a fragment, of water and CO_2 inclusions, allows both temperature and pressure to be calculated. Smoky quartz was formed at 110–225 degrees, and less than 100–175 atm.; amethyst at 100–250 degrees and up to 600 atm. pressure. 26 specimens were examined.

T. L. Walker and **A. L. Parsons**: *Evanescent Pink Sodalite or Hackmannite from Bancroft, Ontario.* Sodalite from the original locality described in Greenland was said to show at first a pink color which disappeared rapidly on exposure to daylight. This peculiar property was largely forgotten by mineralogists until a century later Vredenburg called attention to a similar sodalite from Rajputana. Recently the writers discovered the same type of sodalite in the neighborhood of Bancroft, Ontario. The mineral is associated with nephelite, cancrinite, calcite, vesuvianite, essonite and diopside. Freshly broken surfaces are often spotted with the pink mineral. When exposed to direct sunshine, the color usually vanishes in from 10 to 30 seconds. Borgstrom in 1901, described a sodalite of this type from the Kola Peninsula containing 0.39 per cent of sulphur. On account of the evanescent color and sulphur content he regarded it as a new species which he called *hackmannite.*

Paul F. Kerr and **Charles K. Cabeen**: *Electrical Conductivity of Ore Minerals.* The description of an inexpensive electrical conductivity apparatus, equipped with dry-cells and a series of flashlight bulbs, for obtaining the comparative conductivity of ore-minerals. A table of conductivities was given, using common minerals as standards, arranged in convenient form for determinative work.

Edward H. Kraus: *A Computing and Direct Reading Jolly Balance.* By an attachment to the recording Jolly balance described by the author in 1911, the specific gravity can be read directly from the graduated scale. The attachment is extremely simple and makes use of the ratios between corresponding sides in similar triangles. A balance with the new attachment was used to explain the principle involved and the various operations necessary in determining directly the specific gravity.

CHARLES R. FETTKE: *A Calcified Log from the Pittsburgh Coal near Morgantown, West Virginia.* During 1923 a calcified log from the locality given above was obtained. This proved to be of considerable scientific interest on account of the remarkable manner in which the cell structure of the original wood was preserved. Minute details can still be clearly seen with magnifications as high as 200 diameters. Calcite accompanied by a little calcium magnesium carbonate has replaced the woody material, and in places pyrite has replaced the calcite.

LEWIS S. RAMSDELL: *Preliminary Report on the Crystal Structure of Some Metallic Sulfides.* Argentite is usually assumed to be isomorphous with galena. Diffraction patterns made by the powder photograph method from four specimens as well as from artificial Ag_2S are totally different from that of galena. In fact they do not even appear to be cubic. Cinnabar and covellite give patterns which are quite different. Ullmanite has the "pyrite" type of structure with the side of the unit cube about 5.91 A°.

T. L. WALKER and A. L. PARSONS. *The Characteristics of Primary Calcite in Igneous Rocks.* There are many references in the literature to magmatic or igneous calcite, but no definite physical difference has so far been observed between the supposed high temperature calcite and ordinary calcite. The writers recently found calcite in several localities in crystalline limestone, pegmatite and apatite-calcite vein-dikes that exhibit in a remarkable degree parting parallel to *e*(0112) with polysynthetic twinning. It is thought by the writers that this may be found to be a universal characteristic of high temperature calcite.

RALPH W. G. WYCKOFF and HERBERT E. MERWIN: *The Space Group of Diopside.* The shape and dimensions of the correct unit cell and the corresponding space group for crystals of diopside were investigated using spectrum and Laue photographs. The general manner of atomic arrangement is deduced from this information. No attempt, however, is made to establish the positions of the atoms in this crystal.

RALPH W. G. WYCKOFF, HERBERT E. MERWIN and HENRY S. WASHINGTON: *X-ray Diffraction Measurements upon the Diopside-like Pyroxenes and their Bearing upon the Nature of Augite.* X-ray powder photographs of various pyroxenes structurally isomorphous with diopside have been measured. These data throw light upon the changes in shape and size of the unit cell of this structure, that result from the isomorphous substitution of atoms of one metal for those of another. They further bear directly upon the problem of the nature and position of the alumina and the ferric oxide in augites. Several supposed solid solutions of diopside and enstatite have also been examined.

AUSTIN F. ROGERS: *The Crystallography of Sucrose.* A study of the forms and combinations of over one thousand crystals of sucrose or ordinary sugar. In addition to the known forms,—(100), (001), (101), $(\bar{1}01)$, (110), $(1\bar{1}0)$, $(0\bar{1}1)$, $(1\bar{1}1)$, $(\bar{1}\bar{1}\bar{1})$, and (011), two new forms $(\bar{1}11)$ and (210) are described. The right sphenoid, (011) occurs on some of the crystals in addition to the left sphenoid $(0\bar{1}1)$, which is present on all the crystals. In sucrose crystals with caramel as an impurity (brown "rock candy") the caramel is present only at the left end of the *b*-axis which is polar, (the symmetry of sucrose is A_2).

Austin F. Rogers: *An Interesting and Useful Property of Zones.* The addition or subtraction of the Miller symbols of two faces of a zone taken index by index gives another face of the zone. This fact has been known for some time, but little use apparently has been made of it. It is useful in a number of ways, but especially in constructing orthographic projections.

Austin F. Rogers and R. D. Reed: *A New Type of Sand Calcite Crystals from Monterey County, California.* Sand calcite crystals have recently been found in the Cholame Hills, Monterey County, California. They occur in a white sandstone of Santa Margarita age and consist of about 35 percent calcite and about 65 per cent sand which is largely quartz. Some of the crystals are well developed, though the edges are rounded and the faces somewhat curved. The crystal form is essentially the negative rhombohedron *f* $(02\bar{2}1)$ and the crystals are almost invariably twinned, the twin plane being the rare positive rhombohedron $(20\bar{2}1)$, an exceedingly rare twin-law for the mineral calcite.

W. M. Myers and Albert B. Peck: *A Fulgurite from South Amboy, New Jersey.* (Abstract read by W. F. Hunt). The fulgurite was found in a sand pit but was broken during removal into numerous pieces six inches or less in length. The total length was between nine and eleven feet. It was conical in shape, tapering from a maximum diameter of three inches to a minimum of three sixteenths inch. The color varies from light brown to dull white. The entire surface is coated with partially fused sand grains. A peculiar feature is that for the greater part of its length, the fulgurite is hollow, sometimes being only a thin shell. Petrographic examination shows it to be composed mainly of an isotropic glass with index about that of silica glass. A few needles of mullite are present and some of the quartz grains adhering to the exterior of the fulgurite are partially changed to cristobalite. The glass contains numerous bubble inclusions. These are thought to represent entrapped moisture which was in the sand at the time of fusion or products of the volatilization of silica. Mullite is due to the decomposition or fusion of clay present in the sand.

The last paper was finished at 5:25 P.M. after which Professor E. H. Kraus moved that the thanks of the Society be extended to the local committee, and to the President and Trustees of Cornell University for their kindness and hospitality. This was adopted by a rising vote whereupon the Society adjourned. Fifty-seven fellows and members as well as additional guests and visitors attended the meeting, which was the largest in the history of the Society.