member of the Mineralogical Society of America and was elected Fellow in December, 1925. He was also a member of the New York Mineralogical Club, New York Academy of Sciences, New York Microscopical Society, Brooklyn Institute of Arts and Sciences, Electrical Engineers, and the American Mathematical Society. Being of a mathematical turn of mind he became interested in the optical properties of minerals and the use of the microscope in solving optical problems. He had a clear and logical mind, and his opinions were always timely and constructive. He possessed a kindly and sympathetic disposition, and those who knew him feel a deep personal sorrow in his death.

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

FRANK R. VAN HORN, *Secretary.*

The Mineralogical Society of America held its seventh annual meeting on December 27, 28 and 29, 1926, in conjunction with the Geological Society of America at Madison, Wisconsin, as guests of the University of Wisconsin and the Wisconsin Geological and Natural History Survey. On Monday, December 27, at 2:00 P.M. President W. T. Schaller called the regular annual meeting to order in Room 206, Agricultural Hall. 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 59–68 of Volume 11 (Number 3) of THE AMERICAN MINERALOGIST.

ELECTION OF FELLOWS AND OFFICERS FOR 1927

The Secretary announced that 154 ballots had unanimously been cast for the officers as nominated by the Council. For fellow there was a unanimous vote of 71 votes in the affirmative. All officers and the fellow were declared elected.

The officers elected for 1927 are the following:

President: Austin F. Rogers, Leland Stanford University, California.
Vice-President: George L. English, Rochester, New York.
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 1926–1930: Alexander N. Winchell, University of Wisconsin, Madison, Wisconsin.

The fellow elected follows:

K. K. Landes, Kansas State Geological Survey, Lawrence, Kansas.

The Secretary also announced that the Council by virtue of authority given it by the constitution had elected the following Honorary Life Fellows:

Professor G. Friedel, University of Strassburg, Strassburg, Alsace, France.
Professor Victor Goldschmidt, University of Heidelberg, Heidelberg, Germany.
Professor Paul von Groth, University of Munich, Munich, Germany.
Professor A. Lacroix, Museum of Natural History, Paris, France.
Professor L. J. Spencer, Natural History Museum, South Kensington, London, S.W. 7, England.

REPORT OF THE SECRETARY FOR 1926

To the Council of the Mineralogical Society of America:

The Secretary herewith begs to report that the roll of the Society now comprises 103 fellows and 205 members, a loss of 5 fellows and a gain of 18 members for the year notwithstanding the fact that 14 members have been dropped from the mailing list for non-payment of dues. Four fellows, Dr. Frederick A. Canfield, Colonel Washington A. Roebling, Dr. W. L. Uglow, and J. P. Wintringham, and one member, Charles O. Colton, have died. In addition to the 308 fellows and members, there are also 151 subscribers, a gain of 37 for the year, due largely to subscriptions from libraries and universities many of which are foreign. This is very encouraging and shows that the Journal of the Society is looked upon with increasing favor both nationally and internationally. A total of 459 paid copies of the *Journal* are mailed monthly, an increase of about 50 copies over last year. On account of the generous endowment by Colonel Roebling the financial condition of the Society has been very much improved since the last annual meeting.

Respectfully submitted,

FRANK R. VAN HORN, *Secretary*

REPORT OF THE TREASURER FOR 1926

Owing to the temporary absence of the Treasurer, the report was read by the Secretary. On motion it was accepted and ordered filed. On motion an auditing committee to be composed of non-members of the Council was appointed by the President. This committee consisted of Dr. L. S. Ramsdell and Dr. A. J. Walcott, and later reported to the Secretary that they found the books of the Treasurer correct.

To the Council of the Mineralogical Society of America: Your treasurer herewith submits his annual report for the year ending November 30, 1926:

RECEIPTS

Cash on hand December 1, 1925	$ 293.03	
Dues and subscriptions	1,510.64	
Advertisements	351.00	
Sale of back numbers	250.27	
Interest on bank deposits and endowment	2,294.12	
Miscellaneous	26.31	$4,725.37

DISBURSEMENTS

Printing and distribution of the *Journal*	$1,928.27	
Miscellaneous printing and stationery	36.36	
Postage	41.74	
Miscellaneous	14.39	
	$2,020.76	
BALANCE in Princeton Bank & Trust Company	2,704.61	$4,725.37

Respectfully submitted,
ALEXANDER H. PHILLIPS, *Treasurer*

REPORT OF THE EDITOR FOR 1926

The report was read by the Editor, and on motion it was accepted and ordered filed. It was also moved, seconded and carried that the Editor be highly commended for his work and that he continue the policy of future development as outlined in his report.

To the Council of The Mineralogical Society of America:

The outstanding event of the year, insofar as its influence affects THE AMERICAN MINERALOGIST, was the generous endowment given the Society last February by the late Colonel Washington A. Roebling. The letter accompanying the gift contained the specific request that the whole or a part of the derived income should be devoted to the improvement of the monthly magazine, which in Mr. Roebling's estimation had been conducted on too narrow a margin.

Shortly after the announcement of this gift the members of the Society were invited to offer suggestions for improving the service of the Journal, now that a somewhat larger revenue was available. Quite a number of replies were received by the Editor. Some stressed the desirability of enlarging the size of the periodical with liberal allowances for cuts and illustrations; others were interested in the publication of a decennial index covering the first ten volumes; to some it seemed highly desirable to print the lists of fellows and members annually and furnish contributors a limited number of free reprints of their articles instead of entire issues as is the present custom; while from still other quarters came a rather persistent demand for replenishing our depleted stock of early issues.

While each of these suggestions has considerable merit, it is quite obvious that the funds available will not permit all of them to be undertaken immediately. The best solution, then, lies in an attempt to meet the most pressing needs first. Some progress has already been made in this direction. It may be stated that the Council is in full accord with a policy looking toward a gradual expansion in the size of the Journal, consistent, of course, with a standard that we have tried to maintain in the past. It may also be said that during the present year the authorities have followed a very liberal policy towards allowances for cuts and illustrations that appeared in the current volume.

Attention, however, should be directed at this time to two requests which I believe are of sufficient importance to warrant careful consideration by the Council before adjournment of the present session. These requests relate to the preparation of a condensed decennial index and the authorization of funds to provide for the reproduction of many of the early issues of the Journal. At the present time our

files of the first five volumes are badly broken and we are unable to supply a single complete set for the years 1916–1920. There can be no question but that there is a growing demand, both here and abroad, for complete sets and if the MINERALOGIST is to properly serve its purpose it would seem that this shortage should be remedied as soon as possible.

In attempting an analysis of the present year we find that the volume for 1926 contains approximately 350 pages of text proper. Last year, due mainly to two special numbers which were largely financed through special appropriations, a somewhat larger volume was issued. But this year we paid our own way and the 350 pages of Volume 11 reveal an increase of 100 pages over the output of two years ago and represents the largest volume published to date that was paid for entirely from our own resources.

As requests have been received from time to time to increase the number of mineral locality articles, a special effort was made this past year to remedy this deficiency. A list of a number of the world's most noted mineral regions was decided upon and authors selected who seemed eminently qualified to discuss the region in question. A number of these foreign locality articles have made their appearance in the current volume—such as the mineral occurrence at Långban, and the description of the minerals from the Kola Peninsula. Issues now in press are continuing this series so that within a few months our readers will be furnished with résumés concerning the minerals from Mt. Vesuvius and Casapalca, Peru.

The current volume contains 57 leading articles or an average of nearly five per month and represents contributions received from 30 univerisities and research bureaus. This number seems to establish a new record and is especially gratifying in that it includes contributions from Sweden, Czechoslovakia and Russia as well as a number from Canada. It is hoped that the number of leading articles may be somewhat increased next year but if this hope is to be realized a larger number of manuscripts must become available. You are earnestly requested, whenever possible, to select THE AMERICAN MINERALOGIST as your medium of publication.

The 57 leading articles of the present year occupied 281 pages of text or about 82% of the total space, while the 8 book reviews, 22 reports of the proceedings of societies, 45 abstracted accounts of new minerals and 63 other items of general interest filled the remaining 61 pages or about 18% of the space of the Journal.

In regard to the future, I believe we are entering a new era and with the increased revenue now available it may be said that the Journal has become firmly established. If our readers will exercise some patience many of their wishes will be realized and if the manuscripts are forthcoming it should not be long before our annual output will fill a volume of approximately 500 pages.

The concluding table of contents summarizes the distribution of subject matter in Volume 11.

DISTRIBUTION OF SUBJECT MATTER IN VOLUME 11

Subjects	*Articles*	*Pages*	*Percent of Total*
Original articles	57	281	82.1
Proceedings of societies	22	$27\frac{1}{2}$	
Notes and news	63	14	17.9
Book reviews	8	$3\frac{2}{3}$	
Abstracted accounts of new minerals	45	$15\frac{5}{6}$	
Total of text	195	342	100.0
Illustrations	56		
Covers, advertisements, index		82	
Total		424	

Respectfully submitted,

WALTER F. HUNT, *Editor.*

REPORT OF THE COMMITTEE ON NOMENCLATURE AND CLASSIFICATION OF MINERALS

The report given was from the three members residing in Washington, D. C.—H. S. Washington, E. T. Wherry and W. F. Foshag—and was read by W. T. Schaller. The report was commented upon by E. S. Larsen, A. F. Rogers and T. L. Walker who were also on the committee. It was moved that the report be received and the committee be continued.

REPORT OF THE COMMITTEE ON PRESERVATION OF TYPE MATERIAL

The report was written by W. F. Foshag and read by W. T. Schaller. It was discussed by A. L. Parsons and A. N. Winchell, other members of the committee. It was moved to accept the report and continue the committee.

REPORT OF THE COMMITTEE ON HOLDING INTERNATIONAL MINERALOGICAL CONGRESSES IN COOPERATION WITH INTERNATIONAL GEOLOGICAL CONGRESSES

The report was written by Charles Palache and read by E. S. Larsen, and was discussed by T. L. Walker, another member of the committee. It was stated that several members of our Society had met in Madrid and had recommended to the Council of the International Geological Congress that a Mineralogical Section be formed. This will be acted upon by the Council of the next Congress.

NEW BUSINESS

The endowment fund of $45,000 given to the Society by Colonel Washington A. Roebling of Trenton, New Jersey, and the subsequent death of the donor were officially called to the attention of the Society. It was moved and carried that a committee of three be appointed to draft suitable resolutions to be sent to the family of Colonel Roebling. This committee consists of E. H. Kraus, A. H. Phillips, and R. B. Gage. A copy of these resolutions will be found in this issue.

It was also moved and carried that the Geological Society of America be requested to print advance abstracts of papers to be presented at the annual meeting of the Mineralogical Society, and that our members cooperate in placing such abstracts in the Secretary's hands in sufficient time to conform to the requirement of the Geological Society.

MEMORIAL BIOGRAPHIES

A memorial sketch of F. A. Canfield written by Charles Palache was read by E. S. Larsen. A memorial of Colonel W. A. Roebling was written and read by A. H. Phillips, and a biography of J. P. Wintringham, written by Thos. I. Miller, was read by Frank R. Van Horn. These memorials are printed in full in this issue.

RESOLUTIONS ON THE GIFT OF COLONEL W. A. ROEBLING TO THE MINERALOGICAL SOCIETY OF AMERICA

The record of gifts and benefactions to American educational and scientific institutions is long and impressive. The progress of education and science in America is due in no small measure to the thoughtfulness and generosity of such men as Rockefeller, Carnegie, Harkness, and hundreds of others. While no large sums of money have ever been given for the encouragement and development of the science of mineralogy, gifts of splendid mineral collections to our universities and museums have been a matter of rather frequent occurrence. In this connection we think at once of the gifts of Brush, Morgan, Bement, and many others. While these gifts contributed much to the development of outstanding mineral collections it remained for the late Colonel Washington A. Roebling of Trenton, New Jersey, to recognize the great service that the Mineralogical Society of America is rendering in the advancement of our knowledge of minerals. As a Fellow and former Vice-president of the Society he keenly sensed the financial handicap under which the organization and its official journal, THE AMERICAN MINERALOGIST, were laboring. In order that the Society, through its journal, might increase its effectiveness, in February, 1926, Colonel Roebling generously gave the organization the sum of $45,000.

Since Colonel Roebling, in conveying the gift to Professor A. H. Phillips, Treasurer of the Society, expressed the following wish:

"This gift is unconditional. I wish, however, that the whole, or part of it, be devoted to the publication of the monthly magazine, THE AMERICAN MINERALOGIST, which has been conducted on too narrow a margin."

Therefore, be it resolved:

That the Mineralogical Society of America formally accepts this generous gift of $45,000 of the late Colonel Washington A. Roebling, and

Be it further resolved:

That since the donor has expressed the hope that these funds be largely used for the encouragement of the publication of mineralogical papers through the expansion of THE AMERICAN MINERALOGIST, the Society pledges itself to carry out these wishes, and

Be it further resolved:

That the sincere thanks and deep appreciation of the Society for this splendid gift be conveyed to Colonel Roebling's son, Mr. John A. Roebling, and through him to the members of the Roebling family.

(Signed) W. T. SCHALLER
A. H. PHILLIPS
R. B. GAGE
E. H. KRAUS, *Chairman*

PRESENTATION OF PAPERS

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

A. N. WINCHELL: *Notes on the Triclinic Pyroxenes.* The "Triclinic Pyroxenes" include several minerals whose formulas and mutual relationships are still uncertain. This group consists of metasilicates of manganese (with or without iron and magnesium) and calcium in which the ratio between manganese and calcium seems to vary from 1 :0 to 1 :1. However these minerals differ too much optically and crystallographically to belong to an isomorphous series in the narrow sense of that term. The correct formula of rhodonite is not $MnSiO_3$, but probably $CaMn_5(SiO_3)_6$.

JOHN T. LONSDALE and W. S. ADKINS: *Euhedral Orthoclase Crystals from Sierra Blanca, Texas.* Near Sierra Blanca in Trans-Pecos, Texas, a dike of feldspar porphyry is exposed cutting Cretaceous limestone. Through disintegration the phenocrysts of the dike are made available to the collector in great abundance. The paper describes the crystal forms found and gives the chemical composition and optical constants of the crystals.

* * *

At 4 P. M. the Society adjourned and met immediately afterward in joint session with the Geological Society before which the presidential address by Dr. W. T. Schaller on, "*Mineral Replacements in Pegmatites*," was given. This paper is printed in full in this number. Following this address papers of mineralogic and petrographic nature were presented, and the joint session adjourned at 5:55 P. M.

On Tuesday, December 28, at 9:15 A. M. President Schaller called the second session of the Society to order and the reading of papers proceeded according to program.

WALDEMAR T. SCHALLER: *The Origin of Texas and New Mexico Polyhalite.* The polyhalite from Texas and New Mexico was probably not formed directly by precipitation from sea water, but is a secondary product resulting from reactions and replacements in an already deposited sea formation of anhydrite and kieserite.

CHARLES PALACHE and L. H. BAUER: *Cahnite, A New Boro-Arsenate of Calcium from Franklin, New Jersey.* Cahnite is the name proposed for a mineral crystallized in tetragonal sphenoids characteristically occurring in interpenetrating twins. The mineral is white and glassy, about 3 in hardness and 3.15 in specific gravity. An excellent prismatic cleavage is taken as the first order prism. Refractive index is about 1.662. The chemical analyses made by Bauer yield results closely corresponding to the formula $4CaO \cdot B_2O_3 \cdot As_2O_5 \cdot 4H_2O$. It is associated with axinite, rhodonite, willemite, hedyphane, friedelite, barite, and datolite in various combinations.

It was named in honor of Mr. Lazard Cahn, of Colorado Springs, who first identified the minute crystals as a distinct mineral.

CHARLES PALACHE and LYMAN W. LEWIS: *Crystallography of Azurite from Tsumeb, Southwest Africa, and the Axial Ratio of Azurite.* This study was made on a collection of over 1500 specimens from the Tsumeb mine, containing azurite crystals or malachite pseudomorphs after azurite. Fifteen habits of azurite and malachite pseudomorphs are described and illustrated. The following axial elements, differing materially from those determined by Schrauf, and used by Dana, Goldschmidt, and Groth, were derived from measurements made on many excellent crystals— $a:b:c=.8565:1:.8841$ $\beta=87°\ 35'$. Comparison with the elements derived by other authors, and additional measurements on azurite from Bisbee, Ariz.; Broken Hill, Australia; Kelly Mine, N. M.; Laurion, Greece; and the original Chessy, France locality corroborates the results obtained on the Tsumeb crystals, and an angle table, calculated for all reported forms, is included.

HARRY BERMAN: *The Optical Properties of Zincite.* An optical study of an exceptionally pure analyzed zincite from Franklin, N. J. A curve is given showing the relation between the index of refraction and the wave length of light, and illustrating the dispersion formula of J. Hartman. The "specific refractive energy" constant for zinc oxide is determined from the observed data, according to the formula of Gladstone and Dale.

VICTOR T. ALLEN: *Ionite, a Hydrous Silicate of Aluminum.* The name *Ionite* is proposed for a mineral having the composition $5H_2O \cdot 2Al_2O_3 \cdot 6SiO_2$ and forming an important part of the Ione formation of California. Evidence is given which indicates it is formed from biotite or chlorite by the loss of Mg, Ca, Fe, and alkalies and with corresponding increase in water. Chemical analyses and optical data are given. An explanation for the occurrence of rutile in clays is offered.

CHARLES A. ANDERSON: *Voltaite from Jerome, Arizona.* Crystals of the rare mineral voltaite were sent to the Department of Geological Sciences, University of California, from the upper levels of the United Verde Mine, Jerome, Arizona. They seemingly were formed by sulphur vapors from burning sulphide ore. The paper describes the crystals and includes a chemical analysis. The crystals alter rather quickly on exposure to the air, forming coquimbite and copiapite.

GEORGE L. ENGLISH: *The Scientific Valuation of Minerals.* Proficiency in valuation is of much importance to the curator of minerals in every museum and to every collector who buys minerals. Their scientific appraisal was treated under the following heads: (1) Commercial value. This frequently differs greatly from the scientific value. Among the illustrations noted were gold nuggets, platinum and dioptase. (2) Chemical composition. This is important in minerals of high commercial value, rare-earth minerals and those with several acid radicals or rare radicals. (3) Form. The valuation of simple, complex and distorted crystals and imitative forms was discussed. (4) Miscellaneous characteristics. Theoretically beauty is not a factor in scientific valuation, practically it is of immense importance. Hardness contributes much to the value of abrasives and gems. Size, within certain limits, controls values. (5) Rarity. The law of supply and demand operates inexorably in the valuation of minerals. A table for the valuation of minerals was proposed.

T. L. WALKER and A. L. PARSONS: *Tremolite Crystals from Faraday Township, Ontario.* Crystals of tremolite measuring up to 100×60×76 mm were obtained from the sod and soil overlying a deposit of crystalline limestone in Faraday township, Hastings county, Ontario. Forms present, $a(100)$, $b(010)$, $c(001)$, $m(110)$, $e(130)$, $r(011)$, and $y(132)$ (new). Smaller crystals showed with the reflection goniometer the following additional forms: (150), (210), (410) (new but doubtful), (230) (new), (250) (new). Analysis is given.

T. L. WALKER and A. L. PARSONS: *Stromeyerite from Gowganda, Ontario.* A massive mineral from the Morrison mine in Gowganda is characterized by a metallic lustre, molybdenite blue color, and conchoidal fracture. The analysis shows that it is almost theoretically pure stromeyerite, $Cu_2S \cdot Ag_2S$. This is the first occurrence of this mineral in Gowganda, but it was found in the Cobalt district in the early days.

T. L. WALKER and A. L. PARSONS: *Hexahydrite from Oroville, Washington.* Hexahydrite ($MgSO_4 \cdot 6H_2O$) was found as an alteration product on a deposit of epsomite at Oroville, Washington. The same substance formed when epsomite was exposed to dry air under museum conditions but in a humid atmosphere again regained the water which was lost.

T. L. WALKER and A. L. PARSONS: *Beryl and Associated Minerals from Lyndoch Township, Renfrew County, Ontario.* Crystals of beryl from Lyndoch township, Renfrew county, Ontario exhibit the forms $a(10\bar{1}0)$, $p(10\bar{1}1)$, $s(11\bar{2}1)$, and $c(0001)$ and are almost identical in development with those found on the Urulga river. The analysis agrees well with Penfield's formula for beryl $(R_2^{I} \cdot R^{III})\ O.6BeO \cdot 2Al_2O_3 \cdot 12SiO_2$. The associated minerals are orthoclase, green microcline, albite, white and pale rose quartz, garnet, black tourmaline, columbite, and magnetite.

LEWIS S. RAMSDELL: *X-Ray Data on Some Sulfide Minerals.* X-ray diffraction data indicate that linnaeite (Co_3S_4) is a definite cobalto-cobaltic sulphide, analogous to magnetite, and that polydymite (from Vermilion mine) is distinct from pentlandite. The identity of temiskamite with maucherite is verified, as well as the fact that some so-called cubanite is a mixture of chalcopyrite and pyrite. Analysis of artificial material similar to smaltite shows it to be nearer Co_2As_5 than $CoAs_2$. Artificially prepared pure $PtAs_2$ is identical with sperrylite, and the edge of the unit cube is 5.96 A. U. Stannite is structurally similar to chalcopyrite, with one-half of the Fe replaced by Sn. Excess S in pyrrhotite is accompanied by a decrease in the size of the unit cell and lower density, which indicates a replacement of Fe by S rather than an addition of extra S.

W. V. HOWARD: *The Evolution of the Odd-Numbered Elements.* In 1917, W. D. Harkins called attention to the fact that by far the larger proportion of the material which goes to make up the earth consists of the even-numbered elements and that it is only upon the surface that there is more than a very small percentage of odd-numbered elements, mainly sodium, potassium and aluminum. He also pointed out that the elements immediately following these odd-numbered elements, namely magnesium, calcium, and silicon were present in much larger abundance, taking the earth as a whole. Aston's more recent work on isotopes has shown that so far as is known, nearly all odd-numbered elements are made up of one or two isotopes whose mass-numbers differ by one from those of the lowest isotopes of the even-numbered element immediately following. This suggests that by a process of disin-

tegration the lowest isotopes of the even-numbered elements have formed the odd-numbered elements and that one proton and one electron have been given off which have united to form an atom of hydrogen. This hydrogen, in turn, has combined with the oxygen set free owing to the lower valence of the newly formed elements to form water. If this hypothesis can be shown to be valid, it will account for many facts which are difficult to explain at present. Among these are such questions as the source of juvenile waters, the causes of the rise of magmas to the surface and the formation of granitic magmas.

W. A. TARR: *Alternating Deposition of Pyrite and Marcasite.* Pyrite and Marcasite occur in intimate association with each other in a number of localities in Missouri. They may be intergrown and deposited on the same surface or they may be deposited in alternating layers of variable thickness. This association indicates that the range in the physical conditions surrounding deposition, i. e. temperature and character of the depositing solution, is rather narrow. These conditions are discussed for the particular occurrence.

W. A. TARR: *The Sulfide Inclusions of Joplin Calcites.* This paper was read by title.

J. J. RUNNER: *Spherulites in Fossil Wood.* A specimen of silicified wood from the Lakota formation of western South Dakota contains numerous spherical structures composed of radiating needles of quartz and exhibiting a pronounced concentric banding. The structures bear marked resemblances to some sedimentary oolites as well as to the spherulites of igneous rocks.

J. J. RUNNER: *Primary Scapolite in Granite Pegmatites.* Scapolite intergrown with quartz, apatite, and muscovite, and containing minute inclusions of quartz, muscovite, graphite, and calcite occurs within the Harney Peak Granite batholithic mass in the Black Hills of South Dakota. Feldspars are absent in this portion of the rock. The area is well within the granitic core and several miles from the sedimentary border. No inclusions were noted in the vicinity. The scapolite is believed to have been formed as the result of assimilation of limestone xenoliths.

STEPHEN RICHARZ: *Grünerite and Grünerite Rocks of the Lake Superior Region.* The grünerites of the Marquette iron district were analyzed and their optical properties determined. They display the characteristics of grünerite, but chemically and optically they differ considerably from the French material. The percentage of ferrous iron is lower, that of MgO higher. Accordingly, refraction and birefringence are lower. The French grünerite studied by St. Kreutz is intermediate, both in chemical and optical properties. The original rocks from which grünerite must be derived is cherty siderite in Michigan, greenalitic chert in Minnesota. The metamorphism is apparently caused by the adjacent eruptives which are "greenstones" in Marquette district, Duluth gabbro in Mesabi Range. Grünerite represents the highest state of metamorphism, the lower stage forms micas and chlorites. Neither deep-seated nor dynamic metamorphism is required; contact metamorphism alone explains the facts satisfactorily.

* * *

The Society adjourned for lunch at 1 P. M. and at 2:15 P. M. assembled for the third session, and immediately proceeded with the final papers on the program.

EDWARD H. KRAUS: *The Manufacture of Synthetic Rubies and Sapphires.* Artificial rubies and sapphires are now manufactured in large quantities and used extensively for gem and various industrial purposes. The methods of manufacture and various interesting properties of the uncut manufactured material will be described. The location of the principal plants with the estimated daily output will be given.

EDWARD H. KRAUS: *Gem Cutting at Idar-Oberstein.* After a brief discussion of the development of agate cutting in this district, which dates back at least to the fifteenth century, the methods employed today will be described. There are several groups of workers, (a) gem cutters who use primitive sandstone wheels and cut softer minerals including those of the quartz group, (b) lapidaries who use more modern methods and usually cut the harder stones, (c) diamond cutters, (d) engravers, another group specializes in color improvement and have developed methods whereby the color of the raw material may be improved or even changed. Oberstein, being on the railroad, is commonly referred to as the seat of this agate and gem cutting industry. However, the principal center is the adjoining village of Idar.

CHARLES PALACHE and LYMAN W. LEWIS: *A Saw Attachment Adapting Goldschmidt's Model Cutting Machine to the Sawing of Wooden Models.* This attachment consists of a circular saw cutting a very smooth surface, attached to the axis of a one-eighth horse power electric motor. The saw and motor, the former protected by a guard, are mounted on a plate which slides on the runners carrying the cutting knife on the original Goldschmidt plaster-model cutting machine. The wooden block to be cut is held by a screw chuck. The new parts are simply substituted for removable parts of the original machine so that it can still be used for cutting plaster models. The machine permits the cutting of complete models doubly terminated, of simple forms, such as pyramids or the dodecahedron. When the terminations are complex, complete models may be produced provided there is a prism zone. The prism zone is first sawed to the full length of the desired model. One end is then developed and cut off; the other end is then cut with proper adjustment of the ϕ angles and the two ends are then glued together. The results are accurate and satisfactory and the work proceeds more rapidly than with plaster.

WALDEMAR T. SCHALLER: *Kernite, A New Sodium Borate Mineral.* It is colorless, and transparent; cleavage piece from Kern County, California, has the composition of borax but with only $4H_2O$. The formula is, $Na_2O \cdot 2B_2O_3 \cdot 4H_2O$. This hydrate is not known artificially. It is orthorhombic, and has a specific gravity of 1.95, and a mean refractive index of 1.47. It occurs in thick deposits covering large acreage.

AUSTIN F. ROGERS: *Anauxite Crystals from Two Western Localities.* Euhedral crystals of anauxite, $3Al_2O_3 \cdot 10SiO_2 \cdot 8H_2O$, from two localities, one near Jamestown, Tuolumne County, California, the other 35 miles west of Tucson in Pima County, Arizona, are described. The crystals are minute, pseudo-hexagonal, biaxial crystals of thin tabular habit. It is probably orthorhombic. In both localities they occur in cavities of an augite andesite associated with cristobalite paramorphs after tridymite.

AUSTIN F. ROGERS: *A Tabulation of the Thirty-two Crystal Classes.* If Groth's arrangement of the 32 classes is modified by placing the trigonal bipyramidal class after the hexagonal scalenohedral class we have a convenient arrangement in which the order of the classes is only in minor part arbitrary. In the new arrangement, the subgroups of each group appear before the group itself. Another reason for the change is that the trigonal bipyramidal and ditrigonal bipyramidal classes belong to the hexagonal subsystem (or hexagonal system proper if seven systems are used) and not to the trigonal system of Groth, Tutton and others or the trigonal or rhombohedral division or subsystem of the hexagonal system of Dana and others. The symmetry elements of crystals include: axes of 2-fold, 3-fold, 4-fold, and 6-fold symmetry, center of symmetry, plane of symmetry, 4-fold axis-plane, 6-fold axis-plane, and 6-fold axis-center of symmetry. The symmetry relations of crystals are conveniently studied by means of the mathematical theory of groups.

CHESTER B. SLAWSON: *The Frederick Stearns Collection of Gem Minerals.* This paper was read by title.

R. E. LANDON: *Roemerite from California.* Rare sulphate of iron, roemerite, $FeO \cdot Fe_2O_3 \cdot 4SO_3 \cdot 12\text{–}15H_2O$, occurs in abundance at the pyrrhotite deposit at Island Mountain, California. A description of the crystals, chemical analysis and optical properties are given in the paper.

JOSEPH L. GILLSON: *The Granite of Conway, New Hampshire and its Druse Minerals.* A vertical sheet of miarolytic cavities and small pegmatite lenses occur in the granite of Conway, New Hampshire, exposed in the building stone quarry known as the "Redstone Red" at Red Stone, N. H. In the granite away from this sheet of cavities and lenses several of the same minerals occur as deuteric constituents. Thus the relation of deuteric minerals to the minerals of miarolytic cavities and pegmatites is demonstrated in this case. The identity and paragenesis of the deuteric minerals and those found in the druses and pegmatites was determined in order to study the character of the post-consolidation mineralizing solutions. The important features of the minerals are described.

R. C. EMMONS, (introduced by A. N. Winchell): *Immersion Liquids for the Dispersion Method of Mineral Determination.* A set of liquids has been selected to afford the best results when employing variable temperature and variable wavelength illumination in studying the indices of mineral grains in immersion oils. Each liquid has a high temperature coefficient, a high dispersion and, so far as possible, a high boiling point. Mixtures have been avoided in order to insure a constant index for a particular liquid.

CHARLES PALACHE and E. V. SHANNON: *Holdenite, a New Arsenate of Manganese and Zinc from Franklin, New Jersey.* This mineral was found on a slab of massive franklinite in the collection of A. F. Holden at Harvard and was named for him. It occurs in orthorhombic crystals which are tabular parallel to the macropinacoid. It has a pink to red color, and is a very basic arsenate of manganese and zinc with the formula, $12R^{II}O \cdot As_2O_5 \cdot 5H_2O$ in which the R^{II} is principally manganese and zinc in the ratio of nearly 2 :1.

* * *

The last paper was finished at 5:10 P. M. after which it was moved that the thanks of the Society be extended to the local committee, to the authorities of the

University of Wisconsin, and to the Wisconsin Geological and Natural History Survey for their kindness and hospitality. This was seconded and unanimously adopted, after which the Society adjourned. At this meeting three memorial biographies, and thirty-two scientific papers were presented, two being read by title. This was the longest program ever given before the Society. Fifty fellows, members and guests attended the meeting.

The following fellows, members, and visitors registered at the meeting: V. T. Allen, H. L. Alling, W. S. Bayley, E. L. Bruce, Miss Ferga Carmichael, C. W. Cook, A. R. Crook, G. L. English, W. C. English, Miss Erb, C. R. Fettke, D. J. Fisher, A. S. Furcron, J. L. Gillson, T. L. Gledhill, E. P. Henderson, W. F. Hunt, G. L. Knight, E. H. Kraus, K. K. Landes, R. E. Landon, A. C. Lane, E. S. Larsen, J. T. Lonsdale, J. H. C. Martens, E. B. Mathews, P. T. Miller, A. L. Parsons, A. H. Phillips, L. S. Ramsdell, Stephen Richarz, H. Ries, A. F. Rogers, E. P. Rothrick, J. J. Runner, R. L. Rutherford, Edward Sampson, W. T. Schaller, Edward Steidtman, C. H. Stockwell, M. H. Stow, W. A. Tarr, Ellis Thomson, D. W. Trainer, Jr., F. R. Van Horn, Otto von Schlichten, A. J. Walcott, T. L. Walker, L. G. Westgate, A. N. Winchell, M. E. Wing.

HONORARY LIFE FELLOWS OF THE MINERALOGICAL SOCIETY OF AMERICA

Friedel, A., Univ. of Strassburg, Strassburg, Alsace, France.

Goldschmidt, Victor, Univ. of Heidelberg, Heidelberg, Germany.

Groth, Paul, Univ. of Munich, Munich, Germany.

Lacroix, A., Museum of Natural History, Paris, France.

Spencer, L. J., Natural History Museum, South Kensington, London, S. W. 7, England.

FELLOWS OF THE MINERALOGICAL SOCIETY OF AMERICA[1]

(*Indicates charter fellow. †Indicates charter member before election to fellow.)

*Adams, Elliot Q., Pure Science Lab., Nela Park, Cleveland, Ohio.

Alling, Harold L., 901 East Ave., Rochester, N. Y.

†Anderson, Charles, Australian Museum, Sydney, New South Wales, Australia.

*Ashcroft, Fred'k Noel, 1 Egerton Gardens, South Kensington, S. W. 3, London, England. [Life Fellow].

*Bascom, Miss F., Bryn Mawr College, Bryn Mawr, Pa.

*Bayley, William S., Dept. of Geology, Univ. of Illinois, Urbana, Ill.

Bøggild, O. B., Univ. of Copenhagen, Copenhagen, Denmark.

*Bowen, N. L., Geophysical Laboratory, Washington, D. C.

*Bowles, Oliver, U. S. Bureau of Mines, New Brunswick, N. J.

[1] The names and addresses here listed are those on record January 1, 1927. Any omission or correction should be sent to the Secretary, Prof. Frank R. Van Horn, Case School of Applied Science, Cleveland, Ohio.