

PROCEEDINGS OF THE FOURTEENTH ANNUAL MEETING OF THE MINERALOGICAL SOCIETY OF AMERICA AT CHICAGO, ILLINOIS

ALBERT B. PECK, *Acting Secretary.*

The Mineralogical Society of America assembled on December 28 and 29, 1933, for its fourteenth annual meeting in conjunction with the Geological Society of America, at Chicago, Illinois, as guests of the University of Chicago.

The first meeting of the Society was called to order on Thursday, December 28, at 2:15 P.M. in room 202 Eckhart Hall, by Prof. A. N. Winchell, acting as Chairman at the request of the Council, in the absence of the President, Dr. H. P. Whitlock, who was unable to be present.

Prof. Winchell announced that the reading of the minutes of the last meeting would be dispensed with since they had been printed on pages 106-120 of volume 18 of *The American Mineralogist*.

ELECTION OF OFFICERS AND FELLOWS FOR 1934

The Secretary announced that 126 ballots had been cast unanimously for the officers as nominated by the Council. For Fellows a unanimous vote of 62 ballots was cast in the affirmative. All officers and fellows were declared elected.

The Officers elected for 1934 follow:

President: John E. Wolff, Pasadena, California

Vice-President: W. A. Tarr, University of Missouri, Columbia, Missouri

Secretary: Paul F. Kerr, Columbia University, New York City

Treasurer: Waldemar T. Schaller, U. S. Geological Survey, Washington, D. C.

Editor: Walter F. Hunt, University of Michigan, Ann Arbor, Michigan

Councilor for 1934-1937: Edward P. Henderson, U. S. National Museum, Washington, D. C.

The Fellows elected follow:

Dr. William M. Agar, Department of Geology and Mineralogy, Columbia University.

Dr. Tom. F. W. Barth, Geophysical Laboratory, Washington, D. C.

Dr. D. Jerome Fisher, Department of Geology and Mineralogy, University of Chicago.

Forest A. Gonyer, Department of Mineralogy, Harvard University.

A. H. Koschman, U. S. Geological Survey, Washington, D. C.

Dr. Phillip Krieger, Department of Geology and Mineralogy, Columbia University.

Dr. G. F. Loughlin, U. S. Geological Survey, Washington, D. C.

Dr. Hugh F. McKinstry, Hollinger Gold Mines, Timmins, Ontario.

Dr. James E. Maynard, Department of Geology and Mineralogy, Syracuse University.

Dr. Adolph Pabst, Department of Geology and Mineralogy, University of California.

Dr. Martin A. Peacock, Department of Mineralogy, Harvard University.

REPORT OF THE SECRETARY FOR 1933

To the Council and Members of the Mineralogical Society of America:

The Acting Secretary herewith begs to report that the roll of the Society now consists of 115 Fellows and 280 Members in good standing, a loss of two from last year. Five Fellows, C. W. Cook, F. Rinne, V. Goldschmidt, F. R. Van Horn, L. L. Hubbard, and one Member, W. L. McLaren, are known to have been lost through death during the year; the chief loss, from the standpoint of the Society as a whole, was that of our able and enthusiastic Secretary for the past eleven years. There are at present 257 subscribers to the Journal.

Additions			
	Fellows	5	
	Members	40	
	Subscribers	31	76
Losses			
	Fellows	5	
	Members and subscribers	58	63
Net gain			13

A total of about 660 paid copies of *The American Mineralogist* is mailed monthly, which is a gain of about 10 over last year, a not inconsiderable increase in the face of prevailing conditions.

Your Acting Secretary can not refrain from pointing out at this time his belief that no small part of this gain and the good order of the rolls of the Society are due to the efforts given by our late Secretary, as well as those of our Treasurer.

Respectfully submitted,
ALBERT B. PECK, *Acting Secretary*

On motion the report of the Secretary was accepted and ordered filed.

REPORT OF THE TREASURER FOR 1933

To the Council of the Mineralogical Society of America: Your Treasurer submits herewith his annual report for the year beginning December 1, 1932, and ending November 30, 1933.

RECEIPTS

Cash on hand December 1, 1932.....	\$1,355.49	
Dues and subscriptions.....	2,108.02	
Advertisements.....	343.02	
Sale of back numbers.....	134.20	
Interest on endowment.....	2,517.75	
Bank interest.....	6.92	
Authors' refund on separates.....	28.84	
	<hr/>	\$6,494.24

DISBURSEMENTS

Printing and distribution of the Journal (12 issues).....	\$3,372.92
Printing and distribution of separates.....	311.59
To the Editor, Secretary and Treasurer.....	720.00
Postage.....	80.63
Printing and stationery.....	57.19
Refunds on dues.....	47.00
Checks returned.....	28.50
Bank collecting charges.....	3.65
Check tax.....	1.26
Safety deposit box.....	8.25
Clerical help.....	43.07
Bond coupons returned.....	55.00
Telegram.....	0.76
Committee expenses.....	10.79
Roebing Medal fund (Reserved in bank account of So- ciety).....	100.00
	<hr/>
	\$4,840.61
Cash balance November 30, 1933.....	1,653.63

\$6,494.24

The endowment funds of the Society as of November 30, 1933, are the same as a year ago, and consist of:

45 \$1,000 bonds of the City and County of Honolulu, Water Works, 5%, due 1954.....	\$45,000.00
4 Liberty bonds, \$100 each, 4th, 4½%, due 1933-1938.....	400.00
4 \$100 bonds, Great Northern R. R., 5½%, due 1952.....	400.00
2 \$1,000 bonds, Trenton Mort. and Title Guar. Co., 5½%, due 1937.....	2,000.00
2 \$1,000 bonds, Trenton Mort. and Title Guar. Co., 5½%, due 1938.....	2,000.00
1 \$1,000 bond, Denver Gas and Electric Light Co., 5%, due 1951....	1,000.00
	<hr/>
	\$50,800.00

Respectfully submitted,
W. T. SCHALLER, *Treasurer*

It was moved that the Treasurer's Report be accepted and filed.

The Secretary then read the report of the Auditing Committee which consisted of three non-members of the Council and which had been appointed by President Whitlock early in December. The report follows:

Washington, D. C.
December 11, 1933

To the President of the Mineralogical Society of America:

The Auditing Committee has examined and verified the accounts and report of the Treasurer for the fiscal year ending November 30, 1933. The Committee also certifies that the securities listed in the Treasurer's report are in the safety deposit box in the vaults of the American Security and Trust Company of Washington, D. C. All future coupons are intact and are attached to these securities with the following exceptions: Four bonds of the Trenton Mortgage and Title Guaranty Company of a total par value of \$4,000, have been changed to registered bonds (registered both for principal and interest) and the coupons detached and destroyed.

OLIVER BOWLES, *Chairman*
LOUIS W. CURRIER, H. E. MERWIN,

REPORT OF THE EDITOR FOR 1933

To the Council, Fellows and Members of The Mineralogical Society of America:

In times like the present the duties of the Editor are not confined exclusively to the evaluation and proper selection of manuscripts submitted for publication in *The American Mineralogist*, but includes as well the still more difficult task of stretching the limited income so as to obtain therefrom the largest possible returns. In recent months the number of desirable papers that have been accepted has increased steadily. The income, on the other hand, has not kept pace with the demands made upon the Journal. The task therefore has become an extremely trying one, especially this past year, and articles have not appeared quite as promptly as in the past due to the congestion.

It should be kept in mind, also, that an allowance of \$300 for a monthly issue of 1000 copies does not permit the impossible and explains why it is absolutely necessary at times to obtain from authors or institutions financial assistance when the length of a contribution or, more particularly, when the excessive number of illustrations would increase the cost of the paper beyond permissible limits.

These facts are brought to your attention not for the purpose of discouraging the submission of contributions but rather to bring before you certain pertinent facts relating to the financial side of the editorial work which at times enthusiastic contributors are quite likely to overlook. In this connection may I suggest, therefore, that authors keep the number of illustrations within reasonable bounds or be willing to assist in defraying the cost if the number is excessive. The policy of inviting contributions from everyone has not been changed but naturally members and fellows who are loyally supporting the Society are given preference.

A cursory examination of the Journal for the current year will reveal a normal volume of 550 pages, consisting of 12 regular issues of fairly uniform size and averaging approximately 48 pages each. No opportunity was presented this past year for the issuance of an unusually large and attractive special number, but it is hoped that when conditions become more normal this feature will again become a reality from time to time.

Among the noteworthy accomplishments for the year mention might be made of the publication of the Directory of American and Canadian Mineral Collections. The data for these 700 public and private collections, representing the most recent and authentic information obtainable, was collected by Mr. Samuel G. Gordon and made available to our readers in installments running through five successive issues of the Journal. A limited number of reprints of this Directory containing the assembled installments will soon be available and will be sold at 50¢ each as long as the supply lasts.

In briefly summarizing some of the major points of interest in volume 18 it will be noted that approximately 74% of the entire space of the Journal was devoted to 51 leading articles. In addition 17 shorter papers have appeared under the division of Notes and News thus increasing the total number of published manuscripts to 68. These contributions were received from 74 individuals representing no less than 38 different Universities, research bureaus and technical laboratories. It is also gratifying to record that the list of published articles includes four foreign contributions—two from Canada and one each from Belgium and Japan.

A survey of the titles of papers that have appeared in the current volume will

reveal the usual wide range of subject matter that has characterized the Journal in recent years. While it is impossible to classify all articles accurately as frequently contributions overlap divisional lines, nevertheless it may be of some interest to attempt a general classification of the 51 main contributions. Fifteen articles have been classified as belonging to the division of descriptive mineralogy; eight to chemical mineralogy; seven have stressed optical data; ten have been assigned to structural and five to geometrical crystallography; while petrography, addresses and papers of a miscellaneous character are represented by six contributions. Included in the list are the detailed descriptions of five new minerals—corvusite, rilandite, tilleyite, ammonioborite and colusite.

Also as in the past considerable space has been devoted to book reviews, abstracts of new mineral names, news items and the proceedings of various mineralogical clubs and societies.

As regards the year to come every effort will again be made to issue a volume as large as possible and still keep the expenditures within the assured income. No marked expansion, if any, seems likely from present indications. Also if it is found impossible to cover the entire fields of "mineralogy, crystallography and the allied sciences" it may become necessary in the future to reject certain border-line papers and articles of a non-mineralogical character.

The concluding table of contents summarizes the distribution of subject matter in volume 18.

DISTRIBUTION OF SUBJECT MATTER IN VOLUME 18

<i>Subjects</i>	<i>Articles</i>	<i>Pages</i>	<i>Per cent of Total</i>
Leading articles			
Descriptive mineralogy	15		
Chemical mineralogy	8		
Optical mineralogy	7		
Structural crystallography and mineralography	10		
Geometrical crystallography	5		
Petrography, memorials, etc.	6		
	51	409½	74.2
Proceedings of societies	25	44½	25.8
Notes and news; Short articles	38	86	
Abstracts of new mineral names	17	6½	
Book reviews	7	5½	
Total of text	138	552	100.0
Illustrations	118		
Covers, advertisements, index		114	
Total		666	

Respectfully submitted,
WALTER F. HUNT, *Editor*.

REPORT OF THE COMMITTEE ON NOMENCLATURE
AND CLASSIFICATION OF MINERALS

The Chairman, W. T. Schaller, reported that substantial progress had been made in bringing about agreement with the British Committee as a result of a joint session held with that committee during the meetings of the XVI International Geological Congress last summer; that there were very few points not yet agreed upon; and that as a result of this, the outlook for international agreement was much more hopeful.

It was moved that the committee be continued.

There were no reports from the Representative on the National Research Council or from the Committee on Co-operation with the Secretary of the XVI International Geological Congress along the Lines of Mineralogy and Petrology.

REPORT OF THE COMMITTEE ON THE
WASHINGTON A. ROEBLING MEDAL

The Chairman, E. H. Kraus, reported that \$100 had already been set aside for use of the Committee and that after \$300 had been accumulated, awarding of medals could be initiated.

NEW BUSINESS

There being no new business, H. Berman announced that photostatic copies of crystallographic angle tables of 95 minerals, prepared at Harvard University to supplement those of Goldschmidt, were available at a price of \$2.00. Other tables are expected to be available in the future.

The Secretary announced that the annual luncheon of the Society would be held at the Quadrangle Club, on Friday, December 29, at 12:30 P.M.

MEMORIAL BIOGRAPHIES

Memorial biographies of the five Fellows who have died during the year 1933 were then read as follows:

- C. W. Cook (died Feb. 17, 1933) by W. F. Hunt
- Friedrich Rinne (died Mar. 12, 1933) by J. W. Gruner
- Victor Goldschmidt (died May 8, 1933) by C. Palache
- F. R. Van Horn (died Aug. 1, 1933) by E. H. Kraus
- L. L. Hubbard (died Aug. 3, 1933) by A. C. Lane

With the conclusion of the reading of the biography of Prof. Van Horn, at Dr. Schaller's suggestion the audience rose and stood in silence for a moment in tribute to the memory of the late Secretary.

PRESENTATION OF PAPERS

There being no further business, at 3:30 P.M. the Society proceeded to the reading of scientific papers. Short abstracts of the papers presented follow:

T. L. WALKER: *The Royal Ontario Museum of Mineralogy*. (a) Exhibition by slides of the general plan of the building and especially of the part devoted to Mineralogy. (b) An account of some new types of museum display suited to mineralogy. (c) The policy of the museum for its extension by collecting from its home field with a view to exchange with other institutions.

CHARLES PALACHE: *Contributions to Crystallography: (a) claudeite; (b) minasragrite; (c) samsonite; (d) native selenium; (e) indium.*

(a) Claudeite is described from two new localities in California and Arizona, and on the basis of excellent crystal measurements, a new axial ratio and an angle table are calculated.

(b) Minasragrite crystals from the original vanadium deposit in Peru are described for the first time, and their monoclinic nature is established and an angle table is calculated.

(c) Samsonite crystals from Andreasberg, the only known locality, are described, new measurements are given, and two new forms established. Previous observations are summarized, and a new axial ratio and angle table calculated from mean values of all observations are presented.

(d) The paper presents the first measurements of natural crystals of selenium and the first actual determination of its unit form. It is rhombohedral but not isomorphous with tellurium.

(e) The crystal form of indium, determined on artificial crystals, is tetragonal.

CHARLES PALACHE: *Crystallography of the Uranium Oxides.* This paper presents a summary of published descriptions of the crystallography of the minerals schoepite, becquerelite, "mineral X," fourmarierite, inathinite, and curite, together with some newly observed data. Elements and angle tables are given for each of them, the choice of position in each case being selected in order to bring into harmony their form relations and analogous cleavages and optical properties. Schoepite, concerning which our knowledge is most complete, is made the basis of the comparison. The elements of becquerelite, fourmarierite and inathinite are transformed from the positions originally chosen for them. The inadequate chemical data for most of the species and the lack of structure studies makes it impossible as yet to explain satisfactorily the form relations of the series.

CHARLES PALACHE: *Pseudobrookite.* A summary of existing data on the crystallography of pseudobrookite is presented. Combining with these data new observations made on the mineral from a new occurrence in Utah, a new unit form and axial elements are chosen and an angle table is calculated.

A. L. PARSONS: *An Unusual Calcite Crystal from Godfrey, Ontario.* A description of a large crystal showing as its dominant form the second order pyramid (8081) (Gdt) and a rough terminal second order pyramid (1011) (Gdt).

A. L. PARSONS: *A Simple and Inexpensive Projection Sheet for Gnomonic and Stereographic Projections.* Description with costs of a projection sheet for projecting ϕ , $\tan \rho$, and $\tan \rho/2$.

AUSTIN F. ROGERS: *Zones as the Basis for the Definition of Crystal Systems.* For other than elementary work axes of reference for defining the crystal systems are not sufficiently accurate. Examples are cited where this is true. A classification into systems based upon four types of zones—hexagonal, tetragonal, orthogonal, and clinogonal—is suggested, which combines simplicity with accuracy. In addition, zone-bundles are used, a zone-bundle being defined as a complex of zones with one face in common. It is further shown that upon this basis only six distinct systems are possible.

R. C. EMMONS AND E. F. WILLIAMS: *A High Index Refractometer*. A crystal of smithsonite is mounted in a hole in a microscope slide in such a way that a small amount of index liquid may be placed around it. The grain is then placed on the universal stage and simply oriented. Rotation from the oriented position in the principal section changes the index of transmitted light until the crystal and liquid agree. A curve gives the index for visible wave lengths of light. The standard universal stage water cell gives temperature control. Indices may be read as high as 1.86.

THEODORE A. DODGE: *Determination of Optic Angle with the Universal Stage*. In 1923 Berek described a procedure to be used with the Leitz universal stage for the determination of the orientation of the optic elements and the size of the optic angle of biaxial minerals in thin section. With the increased use of immersion methods and the introduction of the Emmons universal stage, need has arisen for a more flexible method of determination, the presentation of which is the aim of this paper. Sets of curves in place of the single curve of Berek make the determinations much more simple and give them a wider range of accuracy. The new method is adapted to form an integral part of any universal stage procedure whatever, providing the crystal is to be completely oriented, and is for use with either the Leitz or the Emmons instruments in either thin section or immersion work.

J. D. H. DONNEY, G. TUNELL, AND T. F. W. BARTH: *The Various Modes of Attack in Crystallographic Investigation*. The methods of describing crystals found to be most suitable for determinative purposes are not necessarily identical with those aiming at morphological characterization or structural determination. This conclusion has previously received little emphasis, but it need not occasion surprise since the development of an investigative tool is naturally governed by the purpose for which it is intended, and the aims of these three methods are quite distinct. The principal methods in these various lines of attack are reviewed.

The determinative procedure stands entirely apart from the other two and in it some arbitrariness is permitted if it facilitates the attainment of its limited goal.

The experimental basis for morphological investigation is the surface whereas the structural starting point is the interior of the crystal. Admittedly the results of these two methods should agree, but so far their exact relationship is unknown. Hence neither can be discarded in favor of the other under penalty of leaving experimental facts unexpressed, the knowledge of which can be expected to contribute to the elucidation of the relationship in question.

R. C. EMMONS: *Plagioclase Determination by the Modified Universal Stage*. A procedure is recommended, which, in principle is similar to the original procedure of Fedorov, but is facilitated and considerably speeded by the use of the universal stage with five axes of rotation. The procedure leads also to the determination of the feldspar twin laws. An outstanding advantage of the universal stage method lies in the ability to determine almost any plagioclase feldspar grain chosen in a thin section, without searching for one of favorable orientation.

JOHN W. GRUNER: *Relation of Silicate Sheet Structures—a Demonstration with models*. The sheet structures of the micas, brittle micas, chlorites, pyrophyllite, vermiculites, and kaolinities are closely related. They may be thought of as com-

binations of layers of the composition $(\text{Si, Al})_4\text{O}_{10}$ and $(\text{Al, Mg, Fe})_{2-3}\text{OH}_6$ arranged in different orders. With the aid of a few models of these sheets all these structures can easily be built and discussed.

The Society adjourned at 5:30 P.M. to convene at 9 A.M., Friday, December 29.

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Prof. T. L. Walker called the second session to order at 9:15 A.M. on Friday, December 29, and the reading of papers continued.

G. TUNELL AND C. J. KSANDA: *The Relation of x-ray Goniometer Data to Reflection Goniometer Measurements on Sylvanite*. A crystal of sylvanite from Cripple Creek, Colorado, was studied by means of the Weissenberg x-ray goniometer. Rotation and Weissenberg photographs of the equator and first and second layer-lines made possible a rigorous determination of the appropriate unit cell; also the space lattice, and the twin law. The systematic extinctions on the Weissenberg films of sylvanite limit the space-groups possible for it to two space-groups the extinctions of which are identical. The same crystal was measured on a Goldschmidt reflection goniometer and the measurements and observations with it complete the determination of the space group and confirm the twin law.

C. S. HURLBURT, JR., AND F. A. GONYER: *A New Group of Phosphates*. From the pegmatitic knots in the granite near Hillside, Arizona, comes new a group of phosphates. The principal mineral is found in four separated localities within a radius of ten miles. This mineral is a salt of the acid, $\text{H}_3\text{P}_2\text{O}_9$ hitherto not found in nature. At one locality this principal mineral has been altered to produce seven others. The optical properties of all the minerals are given, together with the chemical analyses and crystal descriptions of some of them.

W. A. TARR: *A Study of the Linnaeite Group of Sulphides*. The linnaeite group of cobalt-nickel-copper-iron sulphides includes several minerals—linnaeite, siegenite, carrollite, synchrodymite, polydymite, and beyrichite—to which the general formula R_3S_4 or $\text{RS}_2''\text{S}_3$ ($\text{R}=\text{Co, Ni, Fe, Cu}$ and $\text{R}''=\text{Co, Ni, Fe, Cu}$ and $\text{R}'''=\text{Co, Ni, Fe}$) has been given. A study of the best analyses available was made and the most probable formula was deduced. Other relationships were pointed out.

CHARLES PALACHE: *Minerals from Topaz Mountain, Utah*. This is an account of the new collections from the well-known locality which added to the paragenetic series of minerals the four species pseudobrookite, beryl, fluorite, and calcite. The pseudobrookite yielded crystallographic data leading to a new axial ratio for this rare mineral.

CHESTER B. SLAWSON: *Sussexite from Iron County, Michigan*. Prior to 1929 no borates had been recognized as associates of the ores of the iron ranges of the Lake Superior District. Since that date seamanite and magnesio-sussexite, both new species, have been reported from northern Michigan. Sussexite is shown to be closely associated with seamanite. A study of the minerals of this area may reveal other minerals of this type and give further evidence of hydrothermal activity in this area as has been suggested by Gruner.

KENNETH K. LANDES: *The Beryl-Molybdenite Deposit of Chaffee County, Colorado*. The deposit consists of a quartz vein containing beryl, molybdenite, and minor amounts of sericite, tourmaline, and secondary molybdenite. It is located at the headwaters of Brown's Creek, a tributary of the Arkansas River which drains the south slope of Mt. Antero. The property was worked about 15 years ago and is known as the California mine. Two generations of quartz are present. Molybdenite was the last primary mineral to be deposited. In its general occurrence molybdenite is a fairly persistent mineral, but beryl is rarely found outside of pegmatites. It is suggested that the Chaffee County deposit represents a link between pegmatites and quartz veins.

CARL R. SWARTZLOW: *Two Dimensional Dendrites and their Origin*. Two dimensional dendrites are those that have considerable length and breadth but whose thickness is negligible. Dendrites were grown in the laboratory under simulated natural conditions, both with compounds common in nature and with compounds not reported in the literature as composing dendrites. The most successful experimental dendrites were produced between joint planes and by the effect of surface tension upon evaporating liquids.

LOYD W. FISHER: *Growth of Stalactites*. Stalactites growing in a concrete archway under the Gulf Island Dam, near Lewiston, Maine, have been measured at intervals over a period of two years and rates of growth have been established. These rates of growth are compared with those noted by observers in other localities and under different conditions. Comparisons were also made between stalactites on the up- and down-stream sides of the arch. Conditions of temperature and pressure within the tunnel are considered.

J. F. SCHAIRER AND N. L. BOWEN: *Preliminary Report on the System, $K_2O-Al_2O_3-SiO_2$* . Three ternary compounds have been found in this system—orthoclase, leucite, and kaliophilite. Orthoclase melts incongruently with the formation of leucite. The fields of stability of cristobalite, tridymite, quartz, mullite, corundum, leucite, orthoclase, kaliophilite, and potassium disilicate have been delineated.

A. P. BEAVAN AND J. F. HAWLEY: *Mineralogy and Genesis of the Mayville Iron Ore of Wisconsin*. (Read by Title.) Study of the Mayville oolitic iron ore by chemical, microscopic, and x-ray methods reveals a large number of minerals. The oolites consist of concentric shells of these minerals commonly deposited around nuclei of fossil, mineral or oolitic fragments. Nearly all the phosphorus of the ore (approximately 1.5%) is contained in the oolites, where it is distributed in the harder outermost layers and in some of the softer spheroids within. Chemically, phosphorus is combined with iron, aluminum, and calcium. The matrix is composed essentially of goethite and hematite. Evidence is cited to support four conceptions regarding the genesis of the ore.

H. N. FISK (Introduced by Chas. H. Behre, Jr.): *The Significance of Three Generations of Plagioclase in an Andesite-basalt Flow*. A systematic study was made of oriented thin sections from samples collected at three foot intervals throughout a 150 foot porphyritic andesite-basalt flow from Rogue River Valley, Southwestern Oregon. The evidence of intratelluric and of two later stages of plagioclase and the

criteria for the recognition of these three stages are presented. The type and mineral associations illustrate fractional crystallization, reaction between the solids and fluid to effect, by successive stages, an enrichment of the residual liquid in iron, sodium, and silicon oxides, and an impoverishment of the liquid in calcium, magnesium, and aluminum oxides. The evidence upon which these generalizations rests is chiefly petrographic.

DUNCAN STEWART, JR.: *The Petrography of the Beacon Sandstone of South Victoria Land*. Fifty-two specimens of sedimentary rocks from the Beacon sandstone formation of South Victoria Land, Antarctica, collected by the Byrd, National Antarctic, and Terra Nova expeditions have been examined qualitatively and quantitatively with the petrographic microscope, and two analyses have been added to those previously recorded. Arkoses are noted in Mount Fridtjof Nansen, Queen Maude Mountains, which extends the known occurrence of the type many miles to the eastward of the Beardmore Glacier area studied by the British. The derivation of the mineral constituents and the conditions under which deposition took place varied considerably.

LINCOLN DRYDEN (Introduced by E. B. Mathews): *Statistical Correlation of Heavy Mineral Suites*. Several recent improvements in the technique and theory of heavy mineral analysis make possible an increased accuracy of work. The percentages obtained can be accepted with confidence and can be used in correlation of samples. Correlation by heavy minerals has heretofore remained a matter of personal opinion. Two sets of data can be correlated statistically by well known formulae. A coefficient of correlation between any two sets can be transformed into the "coefficient of determination." By the use of the different values of this coefficient "correlation by heavy minerals" is given a numerical value expressing the percentage of elements common to the sets.

A. E. ALEXANDER: *Some Interesting Heavy Minerals from the Sediments Collected on the Continental Shelf off Northeastern United States*. As a result of the study of several hundred samples from the continental shelf from Cape Cod to Maryland, thirty-six heavy minerals were identified. Correlation of these from north to south showed several important differences. However, since the crystalline areas of New England, New York, New Jersey, and Maryland, are generally somewhat similar, it is to be expected that the mineralogy of the shelf samples from these various stations would be in general similar. Only a few minerals could be classed as diagnostic. Andalusite and weakly pleochroic hypersthene are most characteristic of the northern lines, while on the New Jersey and Maryland lines, a salmon colored garnet and strongly pleochroic hypersthene are very diagnostic. The best graded profiles were found to exist off Cape Cod, the grade sizes here corresponding most closely with the bottom profiles where equilibrium had been most nearly established. Evidence of this is given by the average grade sizes as taken from the Nauset Cape Cod line.

J. J. RUNNER: *The Association of Certain Igneous and Sedimentary Amphibolites*. Several workers in the Black Hills pre-Cambrian rocks have noted a remarkable coincidence in occurrence of amphibolites derived from basic intrusives with others derived from impure carbonate rocks. Recent studies in this region have revealed further examples of this phenomenon, together with a close association of these

rocks with ferruginous quartz veins. There are many thousands of feet of pre-Cambrian in which igneous amphibolite and quartz veins are lacking, but much of the greatest development of the basic intrusives is in the horizons of calcareous rocks. Various explanations for this association are suggested with the emphasis laid upon the possible effect of calcareous beds in localizing the intrusives by causing their precipitation. The silica of the accompanying quartz veins is believed to be derived from the igneous rocks at the time of consolidation.

D. JEROME FISHER: *Coal Composition*. Each of the layers in banded coal belongs to a rock series; i.e., each is in general microscopically heterogeneous and varies fairly regularly as traced through the different ranks. The organic constitution of each of these may be described in terms of microscopically homogeneous units, tentatively regarded as organic mineral series, as indicated in the table.

Popular Terms	Terms for Coal Petrographers		
	Rock Series Terms	Mineral Series Terms ¹	
		Essential	Accessory
Bright Coal	Vitrain	Vitrite ²	Resins, Fusite, etc.
	Clarain	Vitrite Cuticular matter Exine material ³	Fusite Resins Durite minor ⁴
Dull Coal	Durain	Durite	Exine material Cuticular matter Algal material Fusite Resins Vitrite
Coal Charcoal	Fusain	Fusite	Resins rare (Inorganic Minerals)

¹ These terms represent series; species may be designated as semi-bituminous durite, anthracite fusite (metafusite), etc.

² To be Germanized as "vitreit."

³ All three of these are not essential in all clarains.

⁴ Use duro-clarain or claro-durain where percentages of durite are 5 to 10 and 10 to 25 respectively. Similarly use claro-vitrain or vitro-clarain (if less than 5 per cent durite) where percentages of vitrite are 90 to 95 and 75 to 90 respectively.

Each of the translucent organic mineral series units in the bituminous ranks appears anisotropic in polarized light; the vitrite is uniaxial (probably a strain phenomenon) with optic axis perpendicular to the bedding, contrasting with the undulatory extinction shown by exines and algal remains. Specimens studied to date show

low birefringence and n ranging from 1.76 for low rank bituminous vitrite to 1.87 in semi-bituminous vitrite. Further studies of vitrite are in progress.

CLAYTON G. BALL (Introduced by Ralph L. Grim): *Kaolinite in Illinois Coal*. Petrographic investigations of mineral matter in Illinois coals show that kaolinite is a prominent mineral constituent. It habitually occurs in the narrow, vertical shrinkage cracks common in bands of vitrain (anthraxylon) and in the cellular cavities characteristic of fusain. The optical data, x -ray diffraction patterns, chemical analyses, and dehydration curves on which identification is based, are presented. Since the presence of kaolinite in coal is not widely expressed in the discussion of the composition of coal and its ash-forming constituents, this information is considered important.

At 11:55 A.M. a recess was taken for the annual luncheon, which was held at the Quadrangle Club and at which 45 persons were present.

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Prof. A. H. Phillips called the third session to order at 2:15 P.M. for the conclusion of the reading of papers.

EDWARD H. WATSON (introduced by W. T. Schaller): *Differentiation in Teschenite Sills at El Mulato, Mexico*. A series of teschenite sills with a maximum thickness of 50 feet occur near the village of El Mulato, State of Tamaulipas, Mexico. They are accompanied by dikes of olivine monchiquite and a plug of ijolite. These intrusions are related to the large bodies of alkali rocks which form the core of the San Carlos Mountains to the south of El Mulato. Some of the titaniferous augite and basic plagioclase of the teschenite sills had crystallized at the time of the intrusion, as shown by their occurrence as phenocrysts in the chilled borders. Petrographic examination fails to show any gravitational differentiation, but during the emplacement of the teschenite cumulo porphyritic aggregates of alkali gabbro were formed. After crystallization of the main portion of the teschenite sills small dikelets as fracture fillings were formed in them. These dikelets are restricted to the coarse central parts of the teschenite sills and are not found in the enclosing country rock of shale. They are composed of the later crystallizing minerals of the teschenite and represent differentiation in place within the sills. The dikelets are of analcite monzonite and alkali bostonite.

R. B. McCORMICK: *Paragonite from Pizzo Forno, Ticino, Switzerland*. "Paragonite" schist containing cyanite and staurolite from the type locality Pizzo Forno, near Faido, Ticino, Switzerland, was analyzed by x -ray, chemical and optical methods. X -ray analysis and optical measurements indicate muscovite and partial chemical analysis shows only 37% of the paragonite molecule present in the micaceous ground mass of the schist.

The reading of the papers was completed at 3:25 P.M. Dr. A. L. Parsons moved that the thanks of the Society be given to the Department of Geology and Mineralogy of the University of Chicago for their enjoyable entertainment and for the excellent provisions made for the meetings.

With no further business to come before it, Prof. Phillips declared the meeting adjourned at 3:30 P.M.

At various times during the sessions of the Society, the following persons registered their attendance. In addition there were many others whose names were not recorded:

A. E. Alexander	W. F. Hunt	W. D. Shipton
W. S. Bayley	C. S. Hurlburt, Jr.	C. B. Slawson
Richard L. Barrett	W. D. Keller	Duncan Stewart, Jr.
H. Berman	Paul F. Kerr	Marcellus H. Stow
Walter Y. Cox	E. H. Kraus	C. R. Swartzlow
M. V. Denny	K. K. Landes	W. A. Tarr
T. A. Dodge	Esper S. Larsen	Mrs. W. A. Tarr
R. C. Emmons	John T. Lonsdale	T. H. Taylor
George T. Faust	Wm. J. McCaughey	E. Thomson
G. W. Field	R. B. McCormick	George Tunell
D. Jerome Fisher	F. S. Miller	T. L. Walker
A. Henry Fretz	E. C. Olson	Elizabeth E. Ward
Iva N. Frinzel	A. L. Parsons	E. H. Watson
Jewel J. Glass	Albert B. Peck	A. N. Winchell
O. R. Grawe	A. H. Phillips	H. Winchell
John W. Gruner	J. J. Runner	John E. Wolff
E. M. Grunnell	J. F. Schairer	Walter J. Yeaton
E. P. Henderson	W. T. Schaller	

LIST OF FORMER OFFICERS AND MEETINGS,
WITH DATES

By recommendation of the Council, a complete list of past officers is printed in the proceedings of the annual meeting of the Society.

HONORARY PRESIDENT for life..... Edward S. Dana, 1925

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1921 Charles Palache	1921 Waldemar T. Schaller
1922 Thomas L. Walker	1922 Frederick A. Canfield
1923 Edgar T. Wherry	1923 George F. Kunz
1924 Henry S. Washington	1924 Washington A. Roebbling
1925 Arthur S. Eakle	1925 Herbert P. Whitlock
1926 Waldemar T. Schaller	1926 George Vaux, Jr.
1927 Austin F. Rogers	1927 George L. English
1928 Esper S. Larsen	1928 Lazard Cahn
1929 Arthur L. Parsons	1929 Edward Wigglesworth
1930 Herbert E. Merwin	1930 John E. Wolff
1931 Alexander H. Phillips	1931 William F. Foshag
1932 Alexander N. Winchell	1932 Joseph L. Gillson
1933 Herbert P. Whitlock	1933 Frank N. Guild
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1923-1933 Frank R. Van Horn	1924-1929 Alexander H. Phillips
1933 Albert B. Peck	1929-1930 Albert B. Peck
	1931- Waldemar T. Schaller