

PROCEEDINGS OF THE FORTIETH ANNUAL MEETING
OF THE MINERALOGICAL SOCIETY OF AMERICA
AT PITTSBURGH, PENNSYLVANIA

C. S. HURLBUT, JR., *Secretary*

The fortieth meeting of the Society was held on November 2-4, 1959 at the Penn-Sheraton Hotel, Pittsburgh, Pennsylvania. The scientific sessions were integrated with those of the Geological Society of America and other affiliated Societies. A total of thirty-five scientific sessions were held; of these two were devoted to mineralogy, two to petrology, one to crystallography and five to geochemistry, at which 107 papers were presented.

The annual luncheon of the Society on November 3 was attended by 234 fellows, members and guests. This exceeded by two the number attending the luncheon in Atlantic City in 1957 and was thus the largest number ever to attend a Society luncheon. Following the luncheon the seventeenth presentation of the Roebling Medal was made to Felix Machatschki and the ninth presentation of the Mineralogical Society of America Award was made to Harry F. W. Taylor.

On the afternoon of November 3 the Society was addressed by the Retiring President, Ralph E. Grim, on the subject, *Some Applications of Clay Mineralogy*. The annual business meeting was held at 4:30 on the afternoon of November 3, at which brief reports were given by the Secretary, Treasurer and Editor. It was voted in response to a motion made by Professor C. W. Wolfe—That the Society spread upon its records an expression of appreciation of the services rendered the Society by Professor C. S. Hurlbut, Jr. during his fifteen years as Secretary.

COUNCIL ACTION

The 1959 Council of the Society met on the afternoon and evening of November 1 for a total of six hours and discussed 23 items of business. Although there were the usual number of items, the time needed to consider them was less than in many years. This was because of the excellence of the reports submitted by the several committees that had been at work throughout the year.

At its first meeting, in November 1958, the 1959 Council appointed a Policy Committee to consider the future financial needs of the Society and to make recommendations to the Council at its Pittsburgh meeting. Council action on certain aspects of this Committee report affects all members and fellows of the Society and is thus given below.

Publication costs of the *American Mineralogist* as well as other Society expenses have been rising continuously during the past decade while dues have remained constant. At present neither the dues of Members and Fellows nor the subscription rate of the *American Mineralogist* is sufficient to meet the publication costs of the journal. Acting on recommendations of the Policy Committee the Council voted the following:

Subscription to the American Mineralogist. That the subscription rate of the *American Mineralogist* be \$10.00 a year beginning in 1961.

Dues of Members and Fellows. That steps be taken to raise the dues of members and fellows to \$8.00 a year.

Student Members. That the dues of members who are students be set at one-half the dues of other members.

Mineralogical Abstracts to Members and Fellows. That, if dues are raised to \$8.00 a year, Mineralogical Abstracts be made available to members and fellows for \$2.00 a year additional. Note. Students paying the reduced rate will pay \$3.00 for Mineralogical Abstracts.

Change in the By-Laws. In order to effect the increase of dues of members and fellows, the Council recommends the following changes in Article II, Sections 1 and 2 of the by-laws:

From

Section 1. The annual dues for members shall be four dollars (\$4) payable in January.

Section 2. No person shall be accepted as a fellow of the Mineralogical Society of America unless he pays dues for the year within three months after notification of his election. The annual dues for fellows shall be five dollars (\$5) payable in January.

To

Section 1. The annual dues for members and fellows shall be eight dollars (\$8) payable in January. Members who are students shall pay one-half the dues of other members.

Section 2. No person shall be accepted as a fellow of the Mineralogical Society of America unless he pays dues for the year within three months after notification of his election.

The Council also recommends the following change in Article II, Section 3 of the by-laws.

From

Section 3. Fellows who have reached the age of seventy years, and who have paid dues for at least thirty (30) years, shall be exempt from further payment of dues.

To

Section 3. Fellows and *members* who have reached the age of seventy years, and who have paid dues for at least thirty (30) years, shall be exempt from further payment of dues.

The Council requests that the general membership of the Society be asked to vote on the above recommended changes in Article II of the by-laws.

International Mineralogical Association. A report was given the Council by Professor C. Frondel, delegate to the International Mineralogical Association Congress held in Zurich, Switzerland August 28-September 4, 1959. A summary of this report was printed in the *American Mineralogist* **44**, 1319 (1959). Another meeting of the International Mineralogical Association is to be held in Copenhagen, Denmark in 1960 during the meetings of the XXI International Geological Congress.

Honorary Fellows. The Council voted that Felix Machatschki, the 1959 recipient of the Roebling Medal, be made an Honorary Fellow.

ACTION BY THE 1960 COUNCIL

The 1960 Council met on November 4, 1959 for three hours and discussed fourteen items of business.

International Mineralogical Association. The Council voted that \$150.00 be paid during 1960 as the Society's dues to the International Mineralogical Association.

Advertising in the American Mineralogist. It was agreed by the Council that it would be desirable to increase the amount of advertising carried in *American Mineralogist* in order to increase the Society's revenue. The Council voted that Martin L. Ehrmann be appointed to carry out this project.

Editor of the American Mineralogist. The Council voted that Lewis S. Ramsdell be appointed Editor of the *American Mineralogist* for the year 1960.

Articles for the Amateur. The 1958 Council appointed Richard H. Jahns to arrange for occasional articles in the *American Mineralogist* of interest to non-professional mineralogists. The 1960 Council voted that Dr. Jahns be authorized to continue with this activity.

Endowment Committee. The Council voted that this committee be reactivated.

Commercial Audit of the Society Books. Upon recommendation of the 1959 Auditing Committee, the Council voted that the Financial Advisory Committee study the possibility of having a commercial firm audit the Society books and make specific recommendations to the Council in November 1960.

Committee Appointments. President Murdoch made the following committee appointments, which were approved by the Council.

1960 COMMITTEES OF THE MINERALOGICAL SOCIETY OF AMERICA

Nominating Committee for Fellows

R. Roy, <i>Chairman</i>	1960-63
C. O. Hutton	1958-60
A. L. Anderson	1958-60
J. L. Kulp	1959-61
E. N. Cameron	1960-63
J. D. H. Donnay	1960-63

Roebbling Medal Committee

J. R. Goldsmith, <i>Chairman</i>
A. F. Buddington
E. Ingerson
T. S. Lovering
G. Tunjell
H. Strunz

Program Committee

B. Mason
H. Winchell

Nomenclature Committee

M. Fleischer, <i>Chairman</i>	1958-60
C. S. Hurlbut	1958-60
J. V. Smith	1959-61
G. Tunnell	1959-61
A. Pabst	1960-62
G. Faust	1960-62

MSA Award Committee

H. Winchell, <i>Chairman</i>
H. F. W. Taylor
J. Verhoogen
W. D. Keller
E. W. Roedder
J. B. Thompson

Financial Advisory Committee

E. P. Henderson, <i>Chairman</i>	1959-61
S. Goldich	1959-60
A. Montgomery	1960-63

Nominating Committee for Officers

V. B. Meen, <i>Chairman</i>
B. Mason
C. L. Christ
J. L. Gilson
L. Staples

Auditing Committee

G. Kullerud, <i>Chairman</i>
A. Van Valkenburg
M. L. Lindberg

Board of Associate Editors

D. J. Fisher	1958-60
G. T. Faust	1958-60
G. W. Brindley	1959-61
A. Pabst	1959-61
E. W. Roedder	1960-62
R. H. Jahns	1960-62

Mineralogical Abstracts

L. B. Berry, <i>Chairman</i>
A. Pabst
M. E. Mrose
H. Winchell
K. M. Servos

Advertising

M. L. Ehrmann

Endowment Committee

C. B. Slawson
A. O. Woodford

Representatives

American Geological Institute

Board of Directors:

J. D. Barksdale 1959-60
R. M. Grogan 1960-61

Government Relations Committee:

P. F. Kerr 1959-61

International Mineralogical Association

Representative:

D. J. Fisher

Delegates:

C. S. Hurlbut
C. Frondel
J. Murdoch
A. Pabst
G. Switzer
E. W. Heinrich
R. E. Grim

} Voting
} Alternates

American Association for the Advancement of Science

D. J. Fisher
E. E. Wahlstrom

National Research Council

W. F. Bradley 1960-63

Members of Commissions:

Abstracts —H. Winchell
Data —G. T. Faust
New Minerals—D. McConnell
Museums —G. Switzer

Delegate to XXI International Geological Congress

—J. Murdoch
—R. E. Grim (alternate)

REPORT OF THE SECRETARY

To the Council of the Mineralogical Society of America

ELECTION OF OFFICERS AND FELLOWS

Eight hundred and forty-four ballots were cast in the election of officers, 188 by Fellows and 656 by Members. The officers elected to serve in 1960 are:

President: Joseph Murdoch, University of California at Los Angeles, California.

Vice-President: E. F. Osborn, The Pennsylvania State University, University Park, Pennsylvania.

Secretary: George Switzer, U. S. National Museum, Washington 25, D. C.

Treasurer: Marjorie Hooker, U. S. Geological Survey, Washington 25, D. C.

Councilors: (1960-1962) Julian R. Goldsmith, University of Chicago, Chicago, Illinois
Horace Winchell, Yale University, New Haven, Connecticut

According to the provisions of the Constitution, the following have been elected to fellowship:

Robert Marshall Douglass, Los Alamos Scientific Laboratory, Los Alamos, New Mexico.

Richard Clarkson Erd, U. S. Geological Survey, California.

Gerald Manfred Friedman, Pan American Petroleum Company, Tulsa, Oklahoma.

Erwin Emil Hellner, University of Chicago, Chicago, Illinois.

Vernon James Hurst, Department of Mines, Atlanta, Georgia.

Edward Charles Jonas, The University of Texas, Austin, Texas.

Solomon Kaiman, Mines Branch, Ottawa, Canada.

Donald Richard Lewis, Shell Development Company, Houston, Texas.

Katharine Selden Kniskern Mather, U. S. Army Engineer Waterways Experiment Station, Jackson, Mississippi.

Peter Misch, University of Washington, Seattle, Washington.
 Peter Aubrey Sabine, Geological Survey of Great Britain, London, England.
 Leonard B. Sand, University of Utah, Salt Lake City, Utah.
 Robert Leland Smith, U. S. Geological Survey, Washington, D. C.
 Roland Bliss Snow, U. S. Steel Corporation, Monroeville, Pennsylvania.
 W. Ehrenreich Tröger, University of Freiburg, Germany.
 Tómas Tryggvason, University Research Institute, Reykjavik, Iceland.
 Alexis von Volborth, University of Nevada, Reno, Nevada.
 Marc Bernard Vuagnat, University of Lausanne, Switzerland.
 Donald Edward White, U. S. Geological Survey, Washington, D. C.
 Harold Douglas Wright, Pennsylvania State University, University Park, Pennsylvania.
 E-an Zen, University of North Carolina, Chapel Hill, North Carolina.

MEMBERSHIP STATISTICS

November 1, 1959

	1958	1959	Gain	Loss
Correspondents	3	0	0	3
Honorary Fellows	0	3	4	1
Fellows	360	376	21	5
Members	1,185	1,501	416	100
Subscribers	1,195	1,339	227	83

The above figures show a net gain of 16 fellows, 316 members and 144 subscribers. Considering the four groups together, there is a gain of 476 giving a total of 3219.

The accompanying Membership Chart shows graphically the growth of the Society.

With the exception of the war years 1940-'42 each year has seen an increase over the preceding year in members, fellows and subscribers to the *American Mineralogist* with 1959 showing the greatest increase in a single year.

During 1959, the Society lost through death six fellows: Charles R. Fettke, Pittsburgh, Pennsylvania; Peggy-Kay Hamilton, Bronxville, New York; Charles Mauguin, Thiais, France; James E. Maynard, Syracuse, New York; L. J. Spencer, London, England; Samuel Zerfoss, Washington, D. C.

Respectfully submitted,
 C. S. HURLBUT, JR., *Secretary*

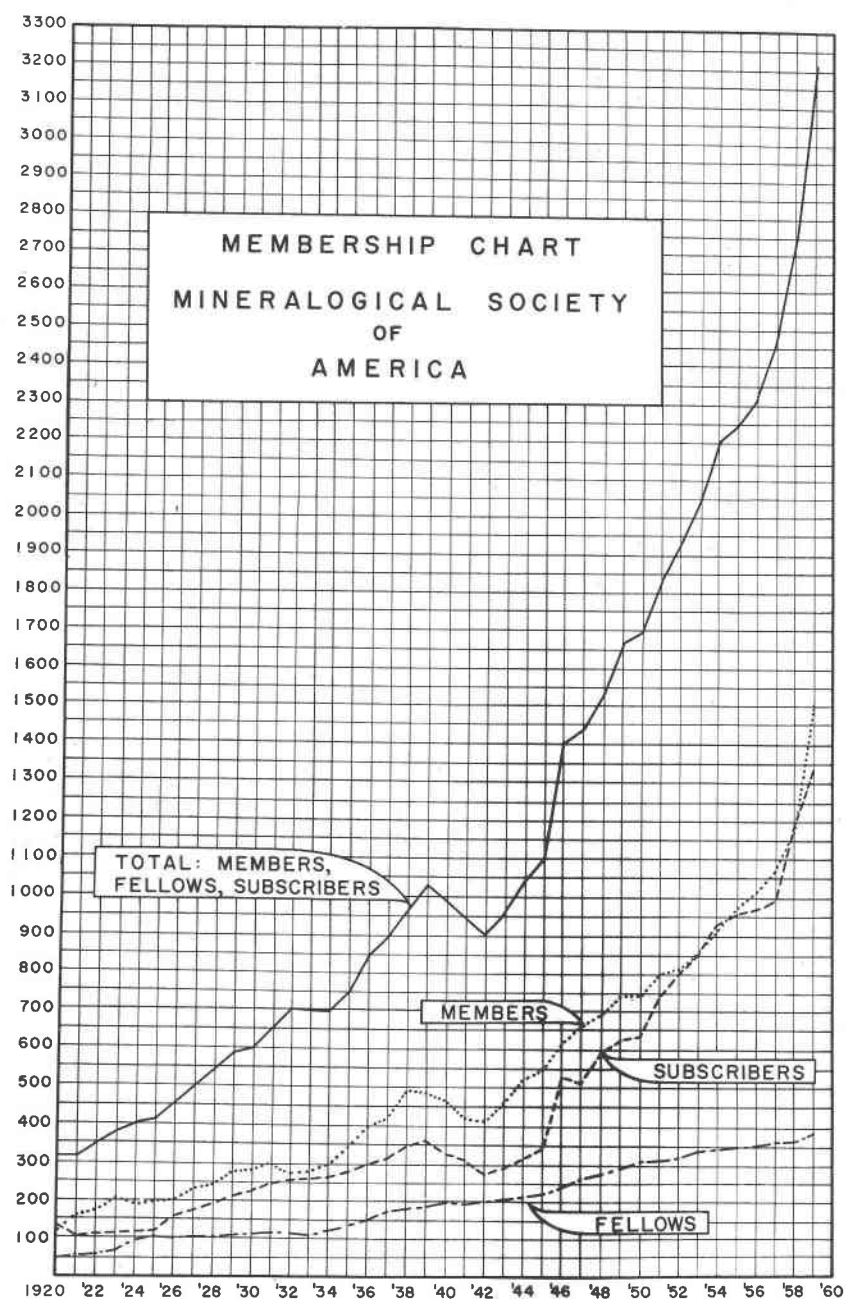
REPORT OF THE TREASURER FOR 1959

To the Council of the Mineralogical Society of America:

Your treasurer submits herewith her report for the fiscal year beginning August 1, 1958, and ending July 31, 1959.

SUMMARY STATEMENT

Cash on hand, August 1, 1958		\$ 1,599.14
Total receipts	\$ 40,855.23	
Total disbursements	35,450.46	
Net income (Receipts less disbursements)	\$ 5,404.77	\$ 5,404.77
Total income		\$ 7,003.91



Cash on hand, July 31, 1959		
Riggs National Bank	\$ 1,502.67	
Merrill Lynch, Pierce, Fenner and Smith	428.48	\$ 1,931.15
		<hr/>
Transfer to capital		5,072.76
		<hr/>
Total		\$ 7,003.91
Assets, July 31, 1959		
Cash	\$ 1,931.15	
Capital (Endowment Fund securities and cash)	148,902.50	
Total		\$150,833.65

Financially, the society has completed a year marked by progress in several respects. The figures on income, expenditures, and balances are shown in the tables. The explanatory comments that follow are to provide background information and point out some percentage relationships and trends.

Income and Expense

The effective income of the society this year can be grouped in three categories and was obtained from these sources directly or from activity concerned with them.

Dues	18.2%
Publication program	56.2
Endowment fund	25.6

Dues furnished 18.2 per cent of income, and while no comparison can be made with previous years when income from dues and subscriptions was not reported separately, it is considerably more than that calculated on the basis of membership figures. The receipt of \$1100 more than a normally expectable \$6300 is the direct result of a net gain of 275 members between January and July 1959. Income from various sources in connection with publications amounts to 56.2 per cent. The lower income from sale of reprints, compared to the previous year, is due to the difference in time of invoicing and receipt of payments in relation to fiscal year closing. The income from the sale of indexes is more than twice that received last year. Income recorded under the endowment fund made up the remaining 25.6 per cent and will be discussed separately.

Expenditures can be grouped as follows:

Officers' honoraria and office expense	12.1%
Publication program	85.3
Support of other organizations and miscellaneous	2.6

The largest portion of the publication expense is naturally that of printing and distributing the *American Mineralogist*, amounting this year to \$23,341.19 or about 77 per cent. As a result of the increased cost of our journal, the grant of \$8000 from the Geological Society of America toward its publication now defrays one-third rather than one-half of the cost. The expenditure for postage shows a large increase over last year (44 per cent), resulting from the increases in postal rates, sales of indexes, and membership.

Endowment Fund

Colonel Roebing's original gift of \$45,000 in 1926 formed the nucleus of the endowment fund which has since grown by continual investment of money from the society's operating fund. In November 1958 the Fifty-Plus Committee was initiated privately for the explicit

purpose of increasing the endowment fund by asking a minimum pledge of \$50.00 from individual members, to be contributed over a five-year period. At the close of the fiscal year, \$11,600 had been pledged and \$3719 of this had been received. Voluntary contributions during the same period supplied an additional \$240.50.

The total book value of all securities in the fund at the end of the fiscal year was \$118,956.68. Of this amount, 12.9 per cent was in bonds, 28.7 per cent in preferred stocks, and 58.4 per cent in common stocks. The approximate market value, computed on July 1, 1959, was \$147,944.00. The higher figure of the market value is accounted for entirely by the common stocks, and the good position of the society in this respect can be attributed to the recommendations of the Finance Committee in this direction and the policy of the preceding treasurer to increase the holdings in common stocks. Dividends and interest accruing from the investments amounted to \$6518.42 and accounted for 16 per cent of total income. The yield for the year at book value was 5.48 per cent; at market value, 4.41 per cent. From securities now held an income of \$6850 is estimated for 1959-1960.

To simplify the details of managing the portfolio which now numbers thirty-two securities, a custodian account was opened with Merrill Lynch, Pierce, Fenner, and Smith, Inc. of September 5, 1958.

Mineralogical Abstracts

Beginning with the issue of volume 14, number 1, March 1959, our society assumed joint responsibility with the Mineralogical Society of Great Britain and Ireland for the publication of Mineralogical Abstracts separately from the Mineralogical Magazine. As shown in the statement, the society has made an advance of funds toward initial publication expense. It remains to be seen whether the support of Mineralogical Abstracts will be a recurrent annual expense or whether the venture will become self-supporting in the near future. During the year, the treasurer also acted as agent for the collection and transfer of subscription payments from our members.

I am most fortunate in having the complete cooperation of our Finance Committee and Merrill Lynch, custodian of our securities, and it is a pleasure for me to record here my thanks to Edward P. Henderson, Samuel S. Goldich, and Arthur Montgomery of the committee, and to Stanley Carr of Merrill Lynch, for their competent advice and assistance at all times.

RECEIPTS

Dues

Fellows	\$1,485.40	
Members	5,929.91	\$ 7,415.31

Publications

Geological Society of America grant	8,000.00	
Subscriptions to American Mineralogist	7,609.29	
Sale of reprints	2,698.97	
Sale of back numbers	2,776.21	
Sale of Index, vols. 31-40	707.40	
vols. 21-30	261.00	
vols. 1-20	138.60	
Advertising	746.06	
Miscellaneous	20.02	22,957.55

Endowment Fund

Dividends and interest.....	6,518.42	
Fifty-Plus Committee.....	3,719.00	
Contributions.....	240.50	10,477.92
Exchange credits and collections.....	4.45	4.45
Total receipts.....		\$40,855.23

DISBURSEMENTS

Honoraria

Secretary (August 1, 1957-July 31, 1958).....	\$ 250.00	
Treasurer (August 1, 1957-November 15, 1958).....	322.91	
Editor (July 1, 1958-March 31, 1959).....	562.50	\$ 1,135.41

Office Expense

Clerical assistance (April 1958-July 1959).....	1,434.20	
Printing and stationery.....	979.80	
Supplies.....	70.99	
Certificates of Incorporation (3).....	10.50	
Officers' travel.....	198.26	
Committee expense.....	7.91	
Telephone and telegrams.....	5.95	
Postage.....	438.64	3,146.25

Publications

American Mineralogist (July 1958-June 1959).....	23,341.19	
Reprints.....	3,358.38	
Program and abstracts.....	400.00	
Microtext of out-of-print issues.....	590.86	
Purchase of out-of-print issues.....	88.00	
Postage and express.....	358.67	
National Science Foundation refund on index sales (May 1958-April 1959).....	693.90	
Mineralogical Abstracts (publication advance).....	1,405.38	30,236.38
International Mineralogical Association.....	120.00	
American Geological Institute.....	594.00	714.00
Roebling Medal.....	150.63	
MSA Award certificate.....	7.50	158.13
Refunds.....	42.29	
Checks returned.....	18.00	60.29
Total disbursements.....		\$35,450.46

ENDOWMENT FUND

Amount	Security	Cost	Value ¹	Income ²
	<i>Bonds</i>			
6M	Atlantic Coast Line, 4½.....	\$ 5,257.50	\$ 6,000	\$ 270.00
5M	New York Central, 5.....	4,300.00	3,600	250.00
5M	Southern Railway, 5.....	5,743.75	4,800	250.00
		<hr/>	<hr/>	<hr/>
		\$ 15,301.25	\$ 14,400	\$ 770.00

<i>Preferred stocks</i>			
500	Union Pacific, 4.	4,570.25	4,000 200.00
200	Southern California Edison, 4.88.	5,250.00	5,000 244.00
150	Fairbanks Whitney.	4,487.50	3,450 120.00
60	Jones and Laughlin, A5.	4,987.50	5,940 300.00
55	United States Steel, 7.	6,946.20	7,865 385.00
50	Virginia Electric Power, 5.	5,942.50	5,150 250.00
40	Potomac Electric Power, 2.44.	2,000.00	1,960 97.60
	Consolidated Edison, 5.	—	— 37.50 ³
		<hr/>	<hr/>
		\$ 34,183.95	\$ 33,365 \$1,634.10
<i>Common stocks</i>			
350	Potomac Electric Power.	5,066.73	9,100 415.20
261	Kroger Company.	2,034.03	7,569 219.69
249	American Telephone and Telegraph.	11,255.98	19,920 765.68
230	Columbia Gas.	3,764.56	5,060 215.00
200	Greyhound.	2,300.00	4,600 200.00
180	Diana Stores.	2,800.30	3,420 100.00 ⁴
175	Standard Oil of New Jersey.	1,761.65	9,100 393.75
150	Consolidated Denison.	3,096.00	2,250 —
100	Buckeye Steel Castings.	3,800.00	2,800 150.00
100	Columbus and Southern Ohio.	2,087.50	3,400 160.00
100	Pittsburgh and West Virginia.	2,787.50	2,100 —
100	Plymouth Cordage.	4,750.00	4,500 260.00
100	Southern Natural Gas.	3,600.00	3,900 200.00
60	United Fruit.	3,067.50	2,040 135.00
50	Chesapeake and Ohio Railway.	2,368.75	3,600 200.00
50	Phelps Dodge.	1,975.00	3,050 150.00
50	Sinclair Oil.	2,968.75	3,050 150.00
50	Public Service Electric and Gas.	1,586.40	1,950 90.00
50	Spencer Kellogg.	1,258.33	900 40.00
50	Boston Insurance.	1,500.00	1,650 90.00
50	Chase Manhattan Bank.	3,231.25	3,100 30.00 ⁵
30	U. S. Playing Card.	2,411.25	3,120 150.00
		<hr/>	<hr/>
		\$ 69,471.48	\$100,179 \$4,114.32
	Total.	\$118,956.68	\$147,944 \$6,518.42
	Cash balance, Endowment Fund ac-		
	count, Riggs National Bank.	958.50	

¹ Approximate market value, July 1, 1959.² Fiscal year ending July 31, 1959, except where noted.³ Income for 3 quarters. Sold in March 1959.⁴ Income on 100 shares. Additional shares purchased June 1959.⁵ Income for one quarter only. Purchased in March 1959.

Respectfully submitted,
MARJORIE HOOKER, *Treasurer*

REPORT OF THE AUDITING COMMITTEE

To the President of the Mineralogical Society of America:

The Auditing Committee has examined and verified the accounts of the Treasurer of the Mineralogical Society of America for the fiscal year beginning August 1, 1958, and ending July 31, 1959. The securities listed in the Treasurer's report, with all future coupons on the coupon bonds attached, are in the safety deposit box at the 17th and G Street Branch of the Riggs National Bank in Washington, D. C.

Respectfully submitted,
G. KULLERUD
E. W. ROEDDER
M. E. MROSE, *Chairman*

REPORT OF THE EDITOR FOR 1959

The 1959 volume of *The American Mineralogist* contained 1344+vii pages. As shown in the summary, 1237 of these were devoted to articles. This figure represents an increase of nearly 200 pages over Volume 43. There were 75 major and 67 shorter articles, giving a total of 142. The authors represented 26 U. S. educational institutions, 10 government laboratories, 11 industrial laboratories, 15 foreign educational institutions and 8 foreign laboratories, giving a total of 70 institutions. This compares with 37 in 1957 and 54 in 1958. It is evident that we have an international journal.

Seven new minerals were described in detail for the first time in Volume 44. There were 7 book reviews. The very important section on New Mineral Names, so ably conducted by Dr. M. Fleischer, contained 70 entries. The value of these abstracts is greatly enhanced by his critical comments.

As in former years, the Geological Society of America has continued its liberal financial support toward the cost of printing the journal, and we are grateful for this assistance.

With approximately 200 more pages devoted to articles in Volume 44, the backlog of manuscripts has been somewhat reduced. At present, most of the shorter articles appearing under Notes are printed within four months of receipt. The waiting period for major articles has varied from seven to ten months, with the majority appearing within eight months. We hope to be able to get this period down to six months.

The associate editors have been called upon to read many manuscripts, and to make recommendations to the editor and to the authors. Our thanks are extended to these individuals, Robert Garrells, Joseph Murdoch, D. Jerome Fisher, George T. Faust, George W. Brindley and Adolf Pabst. The editor has also called on others to help in evaluating manuscripts, including C. L. Christ, R. M. Denning, H. T. Evans, E. Ingerson, P. F. Kerr, B. Mason, R. S. Mitchell, J. V. Smith, O. F. Tuttle and H. Winchell.

The editor likewise wishes to express his appreciation for the splendid cooperation he receives from the publisher, The George Banta Company, Inc., and for the excellent appearance of the journal.

A summary of the contents of Vol. 44 is given in the following table.

DISTRIBUTION OF SUBJECT MATTER IN VOLUME 44

Subjects	Number	Pages	% of Total
Leading articles.....	75	1,040	78.2
Short articles.....	67	197	14.8
		1,237	93.0
Memorials.....	5	19	
Awards.....	2	9	
Proceedings of the Society.....	1	17	
		— 45	3.45
Book Reviews.....	7	9	
New Mineral Names.....	70	29	
Notes.....	12	9	
		— 47	3.55
Total.....		1,329	100.00
Index, Title Page, Table of Contents....		22	
Grand Total.....		1,351	

Respectfully submitted,
LEWIS S. RAMSDELL, *Editor*

LIST OF FORMER OFFICERS AND MEETING PLACES

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

HONORARY PRESIDENTS

Edward S. Dana	1925-1935
Charles Palache	1949-1954
Edward H. Kraus	1955-

PRESIDENTS

1920	Edward H. Kraus
1921	Charles Palache
1922	Thomas L. Walker
1923	Edgar T. Wherry
1924	Henry S. Washington
1925	Arthur S. Eakle
1926	Waldemar T. Schaller
1927	Austin F. Rogers
1928	Esper S. Larsen
1929	Arthur L. Parsons
1930	Herbert E. Merwin
1931	Alexander H. Phillips
1932	Alexander N. Winchell
1933	Herbert P. Whitlock
1934	John W. Wolff
1935	Clarence S. Ross
1936	William S. Bayley
1937	Norman L. Bowen
1938	Ellis Thomson
1939	Max N. Short
1940	William F. Foshag
1941	Frederick E. Wright
1942	Arthur F. Buddington
1943	John F. Schairer
1944	R. C. Emmons
1945	Kenneth K. Landes
1946	Paul F. Kerr
1947	M. J. Buerger
1948	M. A. Peacock
1949	John W. Gruner
1950	George Tunell
1951	A. Pabst
1952	Michael Fleischer
1953	J. D. H. Donnay
1954	Sterling B. Hendricks
1955	Harry H. Hess
1956	Clifford Frondel
1957	D. Jerome Fisher
1958	George E. Goodspeed
1959	Ralph E. Grim

VICE-PRESIDENTS

1920	Thomas L. Walker
1921	Waldemar T. Schaller
1922	Frederick A. Canfield
1923	George F. Kunz
1924	Washington A. Roebling
1925	Herbert P. Whitlock
1926	George Vaux, Jr.
1927	George L. English
1928	Lazard Cahn
1929	Edward Wigglesworth
1930	John E. Wolff
1931	William F. Foshag
1932	Joseph L. Gillson
1933	Frank B. Guild
1934	William A. Tarr
1935	Ellis Thomson
1936	Harold L. Alling
1937	H. V. Ellsworth
1938	Kenneth K. Landes
1939	Burnham S. Colburn
1940	Ian Campbell
1941	William J. McCaughey
1942	Martin J. Buerger
1943	John W. Gruner
1944	Harry Berman
1945	George Tunell
1946	S. B. Hendricks
1947	Carl Tolman
1948	Adolf Pabst
1949	J. D. H. Donnay
1950	Ralph E. Grim
1951	Michael Fleischer
1952	J. D. H. Donnay
1953	Sterling B. Hendricks
1954	Harry H. Hess
1955	Clifford Frondel
1956	D. Jerome Fisher
1957	George E. Goodspeed
1958	Ralph E. Grim
1959	Joseph Murdoch

SECRETARIES

1920-1922 Herbert P. Whitlock
1923-1933 Frank R. Van Horn
1933-1934 Albert P. Peck
1934-1944 Paul F. Kerry
1944-1959 C. S. Hurlbut, Jr.
1959- George Switzer

TREASURERS

1920-1923 Albert B. Peck
1924-1929 Alexander H. Phillips
1929-1930 Albert B. Peck
1930-1940 Waldemar T. Schaller
1941-1958 Earl Ingerson
1958- Marjorie Hooker

EDITORS

1920-1921 Edgar T. Wherry
1922-1956 Walter F. Hunt
1957-Lewis S. Ramsdell

COUNCILORS

1920 Arthur S. Eakle, Frank R. Van Horn, Fred E. Wright, Alexander H. Phillips.
1921 Frank R. Van Horn, Fred E. Wright, Alexander H. Phillips, Austin F. Rogers.
1922 Fred E. Wright, Alexander H. Phillips, Austin F. Rogers, Thomas L. Watson.
1923 Alexander H. Phillips, Austin F. Rogers, Thomas L. Watson, Esper S. Larsen.
1924 Austin F. Rogers, Thomas L. Watson, Esper S. Larsen, Arthur L. Parsons.
1925 Thomas L. Watson, Esper S. Larsen, Arthur L. Parsons, William F. Foshag.
1926 Esper S. Larsen, Arthur L. Parsons, William F. Foshag, William A. Tarr.
1927 Arthur L. Parsons, William F. Foshag, William A. Tarr, Alexander N. Winchell.
1928 William F. Foshag, William A. Tarr, Alexander N. Winchell, Ellis Thomson.
1929 William A. Tarr, Alexander N. Winchell, Ellis Thomson, Clarence S. Ross.
1930 Alexander N. Winchell, Ellis Thomson, Clarence S. Ross, Paul F. Kerr.
1931 Ellis Thomson, Clarence S. Ross, Paul F. Kerr, William S. Bayley.
1932 Clarence S. Ross, Paul F. Kerr, William S. Bayley, William M. McCaughey.
1933 Paul F. Kerr, William S. Bayley, William J. McCaughey, Kenneth K. Landes.
1934 William S. Bayley, William J. McCaughey, Kenneth K. Landes, E. P. Henderson.
1935 William J. McCaughey, Kenneth K. Landes, E. P. Henderson, J. F. Schairer.
1936 Kenneth K. Landes, E. P. Henderson, J. F. Schairer, Arthur F. Buddington.
1937 E. P. Henderson, J. F. Schairer, Arthur F. Buddington, Arthur P. Honess.
1938 J. F. Schairer, Arthur F. Buddington, Arthur P. Honess, R. C. Emmons.
1939 Arthur F. Buddington, Arthur P. Honess, R. C. Emmons, Carl Tolman.
1940 Arthur P. Honess, R. C. Emmons, Carl Tolman, D. Jerome Fisher.
1941 R. C. Emmons, Carl Tolman, D. Jerome Fisher, Martin A. Peacock.
1942 Carl Tolman, D. Jerome Fisher, Martin A. Peacock, Adolf Pabst.
1943 D. Jerome Fisher, Martin A. Peacock, Adolf Pabst, C. S. Hurlbut, Jr.
1944 Martin A. Peacock, Adolf Pabst, Michael Fleischer, S. J. Shand.
1945 Adolf Pabst, Michael Fleischer, S. J. Shand, R. E. Grim.
1946 Michael Fleischer, S. J. Shand, R. E. Grim, Joseph Murdoch.
1947 S. J. Shand, R. E. Grim, Joseph Murdoch, H. H. Hess.
1948 R. E. Grim, Joseph Murdoch, H. H. Hess, Clifford Frondel.
1949 Joseph Murdoch, H. H. Hess, Clifford Frondel, Lewis S. Ramsdell.
1950 H. H. Hess, Clifford Frondel, Lewis S. Ramsdell, E. F. Osborn.
1951 Clifford Frondel, Lewis S. Ramsdell, E. F. Osborn, George T. Faust.
1952 Lewis S. Ramsdell, E. F. Olson, George T. Faust, Victor T. Allen.
1953 E. F. Osborn, George T. Faust, Victor T. Allen, C. Osborn Hutton.
1954 George T. Faust, Victor T. Allen, C. Osborn Hutton, Felix Chayes.
1955 Victor T. Allen, C. Osborn Hutton, Felix Chayes, L. G. Berry.

- 1956 C. Osborne Hutton, Felix Chayes, L. G. Berry, C. B. Slawson, A. O. Woodford.
 1957 Felix Chayes, L. G. Berry, C. B. Slawson, A. O. Woodford, S. S. Goldich.
 1958 L. G. Berry, C. B. Slawson, A. O. Woodford, S. S. Goldich, B. H. Mason, R. H. Jahns
 C. Milton.
 1959 S. S. Goldich, B. H. Mason, R. H. Jahns, C. Milton, W. R. Foster, E. W. Nuffield.

Annual Meeting Places

- | | |
|-------------------------------|--------------------------------|
| 1920 Chicago, Illinois | 1940 Austin, Texas |
| 1921 Amherst, Massachusetts | 1941 Boston, Massachusetts |
| 1922 Ann Arbor, Michigan | 1942 No meeting held |
| 1923 Washington, D. C. | 1943 No meeting held |
| 1924 Ithaca, New York | 1944 No meeting held |
| 1925 New Haven, Connecticut | 1945 Pittsburgh, Pennsylvania |
| 1926 Madison, Wisconsin | 1946 Chicago, Illinois |
| 1927 Cleveland, Ohio | 1947 Ottawa, Canada |
| 1928 New York, N. Y. | 1948 New York, N. Y. |
| 1929 Washington, D. C. | 1949 El Paso, Texas |
| 1930 Toronto, Canada | 1950 Washington, D. C. |
| 1931 Tulsa, Oklahoma | 1951 Detroit, Michigan |
| 1932 Cambridge, Massachusetts | 1952 Boston, Massachusetts |
| 1933 Chicago, Illinois | 1953 Toronto, Canada |
| 1934 Rochester, New York | 1954 Los Angeles, California |
| 1935 New York, N. Y. | 1955 New Orleans, Louisiana |
| 1936 Cincinnati, Ohio | 1956 Minneapolis, Minnesota |
| 1937 Washington, D. C. | 1957 Atlantic City, New Jersey |
| 1938 New York, N. Y. | 1958 St. Louis, Missouri |
| 1939 Minneapolis, Minnesota | 1959 Pittsburgh, Pennsylvania |

Recipients of the Roebling Medal

- | | |
|-----------------------------|----------------------------|
| 1937 Charles Palache | 1950 Norman L. Bowen |
| 1938 Waldemar T. Schaller | 1952 Fred E. Wright |
| 1940 Leonard James Spencer | 1953 William F. Foshag |
| 1941 Esper S. Larsen, Jr. | 1954 Cecil Edgar Tilley |
| 1945 Edward H. Kraus | 1955 Alexander N. Winchell |
| 1946 Clarence S. Ross | 1956 Arthur F. Buddington |
| 1947 Paul Niggli | 1957 Walter F. Hunt |
| 1948 William Lawrence Bragg | 1958 Martin J. Buerger |
| 1949 Herbert E. Merwin | 1959 Felix Machatschki |

Recipients of the Mineralogical Society of America Award

- | | |
|---------------------------|-------------------------|
| 1951 Orville F. Tuttle | 1956 George C. Kennedy |
| 1952 Frederick H. Stewart | 1957 Rustum Roy |
| 1953 L. H. Ahrens | 1958 Charles E. Weaver |
| 1954 Hatten S. Yoder, Jr. | 1959 Harry F. W. Taylor |
| 1955 Julian R. Goldsmith | |

1959 ANNUAL MEETING AT PITTSBURGH, PENNSYLVANIA

The meetings of the following societies were held on November 2-4, 1959.

The Geological Society of America—72nd
 The Paleontological Society—51st
 The Mineralogical Society of America—40th
 Society of Economic Geologists—40th
 The Geochemical Society—4th

The complete program listed titles and abstracts of 323 papers. Of these 145 seemed to be of special interest to members of The Mineralogical Society of America. Authors and titles of these papers are listed below. Since by Council action the abstracts will not be reprinted in *The American Mineralogist*, references are given to the *Bulletin of the Geological Society of America*, Vol. 70, Number 12, Part 2, December 1959, pp. 1559-1706, where the abstracts of all the papers of the various societies are reprinted, arranged alphabetically by authors.

PAPERS OF SPECIAL MINERALOGICAL INTEREST

- V. T. ALLEN, P. M. HURLEY, H. W. FAIRBAIRN, AND W. H. PINSON: *Age of Precambrian igneous rocks of Missouri*. Page 1560.
- VICTOR T. ALLEN AND WM. D. JOHNS: *Clay-mineral environments in New England and eastern Canada*. Page 1560.
- SHIGEO ARAMAKI AND RUSTUM ROY: *Detailed x-ray data on mullites and two new anhydrous aluminosilicates AS(H)-II and high-temperature sillimanite*. Page 1562.
- SHIGEO ARAMAKI AND RUSTUM ROY: *Revision of the Al_2O_3 - SiO_2 diagram*. Page 1563.
- ROY A. BAILEY: *Contact fusion of argillaceous and arkosic sediments by an andesite intrusion, Valles Mountains, New Mexico*. Page 1565.
- H. L. BARNES: *System ZnS - H_2S - H_2O* . Page 1567.
- PAUL B. BARTON, JR., AND PRIESTLEY TOULMIN, III: *Electrum-tarnish method for determining the chemical potential of sulfur in laboratory sulfide systems*. Page 1567.
- PHILIP M. BETHKE AND PAUL B. BARTON, JR.: *Trace-element distribution as an indicator of pressure and temperature of ore deposition*. Page 1569.
- S. A. BILGRAMI AND R. A. HOWIE: *Mineralogy and petrology of a rodingite dike, Hindubagh, Pakistan*. Page 1570.
- GARY MCG. BOONE: *Significance of oscillatory zoning in alkali and plagioclase feldspars in granodiorite from northern Maine*. Page 1571.
- JOHN S. BROWN AND F. G. SNYDER: *Discussion of lead-isotopic data for southeast Missouri*. Page 1575.
- HELEN L. CANNON: *Biogeochemical relations in the Thompson district, Grand County, Utah*. Page 1578.
- R. S. CANNON, JR., A. P. PIERCE, AND J. C. ANTWEILER: *Significance of lead isotopes to problems of ore genesis*. Page 1578.
- E. C. T. CHAO AND MICHAEL FLEISCHER: *Abundance of zirconium in igneous rocks*. Page 1579.
- G. A. CHINNER AND J. F. SCHAIRER: *Join grossularite-pyrope at 1 atmosphere*. Page 1580.
- L. A. CLARK AND G. KULLERUD: *FeS_2 - NiS_2 phase relations*. Page 1580.
- S. P. CLARK, JR., AND G. KULLERUD: *Iron-rich portion of the system Fe-Ni-S*. Page 1581.
- ROBERT G. COLEMAN: *Genesis of jadeite from San Benito County, California*. Page 1583.
- J. T. CUMBERIDGE AND V. A. SAULL: *Some experiments on surface and strain energy in minerals*. Page 1584.

- FRANK DACHILLE, SEYMOUR MERRIN, AND RUSTUM ROY: *Successful application of shear in synthesizing high-pressure forms of several phases*. Page 1584.
- CHARLES LAURENCE DAHL AND MATTHEW P. NACKOWSKI: *Trace ferrides in iron ores from the Iron Springs district, Utah*. Page 1585.
- E. W. C. DECHOW AND M. L. JENSEN: *Sulfur isotopes and the origin of the Heath Steele ore deposits, New Brunswick, Canada*. Page 1586.
- REYNOLDS M. DENNING: *Lamellar structure in a type I diamond*. Page 1587.
- DUNCAN R. DERRY: *Evidence of the origin of Blind River uranium deposits—a progress report*. Page 1587.
- GEORGE DE VORE: *Implications of the compositional adjustments required at crystal surfaces*. Page 1588.
- R. C. DeVRIES: *Multiple twinning in BaTiO₃*. Page 1589.
- JAMES J. DiPIAZZA, ANDREW J. REGIS, AND L. B. SAND: *Formation of zeolites by the alteration of a volcanic glass by alkaline solutions*. Page 1589.
- JOHN B. DROSTE AND GARY R. GATES: *Attapulgit in lacustrine sediments of southern California*. Page 1593.
- DAVID A. DUKE AND FRANK H. HOWD: *Jasperoid and ore deposits in the Tintic and East Tintic mining districts, Utah*. Page 1593.
- JAMES A. DUNNE AND PAUL F. KERR: *Differential thermal analysis of galena and clausthalite*. Page 1594.
- F. D. ECKELMANN AND J. L. KULP: *Lead isotopes and ore deposition in the southeast Missouri lead district*. Page 1595.
- A. E. J. ENGEL: *Review and evaluation of studies of the O¹⁸/O¹⁶ ratio in mineral deposits*. Page 1597.
- EINAR C. ERICKSON: *Geochemistry and lineament tectonics*. Page 1597.
- W. G. ERNST: *Glaucophane stability and the glaucophane schist problem*. Page 1598.
- HANS P. EUGSTER AND NORMAN L. McIVER: *Boron analogues of alkali feldspars and related silicates*. Page 1598.
- HOWARD T. EVANS, JR., AND EDWIN T. McKNIGHT: *New wurtzite polytypes from Joplin, Missouri*. Page 1599.
- H. W. FAIRBAIRN, W. H. PINSON, AND P. M. HURLEY: *Rb-Sr feldspar ages in granitic rocks of Sudbury-Blind River, Ontario, Canada*. Page 1599.
- HENRY FAUL AND HERMAN THOMAS: *Argon ages of the great ash bed from the Ordovician of Alabama and of the bentonite marker in the Chattanooga shale from Tennessee*. Page 1600.
- G. M. FAULRING, W. K. ZWICKER, AND W. D. FORGENG: *Thermal transformation and properties of cryptomelane*. Page 1601.
- MICHAEL FLEISCHER AND E. C. T. CHAO: *Problems in the estimation of abundances of elements in the earth's crust*. Page 1604.
- ROBERT O. FOURNIER: *Mineralization of a portion of the porphyry copper deposit near Ely, Nevada*. Page 1604.
- JULES D. FRIEDMAN: *S³²/S³⁴ isotopic-abundance ratios and genesis of sulfide ore bodies at Summitville and Ellenville, New York*. Page 1606.
- R. M. GARRELS, M. E. THOMPSON, AND R. SIEVER: *Solubility of carbonates in sea water; control by carbonate complexes*. Page 1608.
- SUBRATA GHOSE: *Crystal structure of cummingtonite and Mg-Fe ordering in ferromagnesian amphiboles*. Page 1608.
- ROSS F. GIESE, JR., AND PAUL F. KERR: *Thermal reactions of hydrated sodium tetraborates*. Page 1608.
- J. E. GILL: *Solid diffusion and volatility of sulfides—some experimental results*. Page 1609.
- J. E. GILL: *Solid diffusion and volatility of sulfides—some experimental results*. Page 1609.

- JULIAN R. GOLDSMITH AND DONALD L. GRAF: *Subsolidus relations in the system $\text{CaCO}_3\text{-MnCO}_3$* . Page 1610.
- D. L. GRAF, A. J. EARDLEY, AND N. F. SHIMP: *Dolomite formation in Lake Bonneville, Utah*. Page 1610.
- JACK GREEN: *Geochemical implications of lunar degassing*. Page 1611.
- J. N. GUNDERSON AND G. M. SCHWARTZ: *Metasomatic veins in the Biwabik iron formation, Minnesota*. Page 1613.
- A. F. HAGNER AND L. G. COLLINS: *Host rock as a source of iron, Ausable Forks magnetite district, New York*. Page 1613.
- D. B. HAWKINS AND RUSTUM ROY: *Structural and compositional controls in artificial weathering*. Page 1615.
- RICHARD A. HEIMLICH: *Structure and petrology of salic plutons in the Deer Lake area, northern Ontario, Canada*. Page 1616.
- E. WM. HEINRICH: *Lithium-tantalum pegmatites of the São João del Rei district, Minas Gerais, Brazil*. Page 1617.
- E. WM. HEINRICH AND CHARLES A. SALOTTI: *Copper-zinc skarn deposits in south-central Colorado*. Page 1617.
- REINHARD W. HOFFMANN AND G. W. BRINDLEY: *Adsorption of organic molecules from aqueous solutions on montmorillonite*. Page 1618.
- HILDEGARD HOSS AND RUSTUM ROY: *Relative stabilities of some zeolites*. Page 1620.
- B. F. HOWELL, JR., AND P. H. LICASTRO: *Dielectric behavior of rocks and mineral*. Page 1621.
- P. M. HURLEY, S. R. HART, W. H. PINSON, AND H. W. FAIRBAIRN: *Authigenic versus detrital illite in sediments*. Page 1622.
- ROBERT M. HUTCHINSON, A^{40}/K^{40} age determinations of rocks associated with north end of Pikes Peak batholith, Jefferson Douglas, and Park counties, Colorado. Page 1622.
- HAROLD L. JAMES: *General features of stable-isotope research, as applied to problems of ore deposits: Introduction*. Page 1623.
- STURAT E. JANNES: *Regional metamorphism, feldspathization, and granitization in eastern Newfoundland*. Page 1623.
- M. L. JENSEN: *Sulfur isotopes and economic geology: A summary*. Page 1624.
- WM. D. JOHNS AND HAYDN H. MURRAY: *Empirical crystallinity index for kaolinite*. Page 1624.
- C. L. JONES: *Potash deposits in the Carlsbad district, southeastern New Mexico*. Page 1625.
- C. L. JONES AND B. M. MADSEN: *Observations on igneous intrusions in Late Permian evaporites, southeastern New Mexico*. Page 1625.
- J. KALLIOKOSKI: *Sphalerite temperatures from the Brunswick and Nigadoo deposits, New Brunswick, Canada*. Page 1626.
- EDWIN F. KOPPE: *Grahamite dikes in the Pittsburgh coal, Washington County, Pennsylvania*. Page 1632.
- FRANK L. KOUCKY, JR.: *Stannite series*. Page 1632.
- G. KULLERUD AND R. A. YUND: *System Ni-S*. Page 1633.
- HENRY LEPP AND SAMUEL S. GOLDICH: *Chemistry and origin of iron formations*. Page 1637.
- A. A. LEVINSON AND R. A. BORUP: *High hafnium zircon from Norway*. Page 1638.
- A. C. LILLY AND D. A. LOWITZ: *Dielectric characteristics of selected layer silicates*. Page 1639.
- MARIE L. LINDBERG AND C. L. CHRIST: *Crystal structures of the isostructural minerals lazulite, scorzalite, and barboselite*. Page 1639.
- LEON E. LONG: *Isotopic ages in the area of the City of New York*. Page 1640.
- J. D. LOVE AND CHARLES MILTON: *Uranium and phosphate in the Green River formation of Wyoming*. Page 1640.
- J. MACCHESNEY AND ARNUL MUAN: *Phase equilibria in the system iron oxide-titanium oxide at low-oxygen pressures*. Page 1641.

- JOSEPH A. MANDARINO: *Stress-optical study of synthetic ruby*. Page 1642.
- FREDERICK H. MANLEY, JR.: *Hydrofluoric-acid method of disaggregating sandstones*. Page 1642.
- JOSEPH D. MARTINEZ: *Application of the photometer method in determining the crystallographic fabric of quartz in metamorphic quartzites*. Page 1643.
- GERARD V. MIDDLETON: *Chemical composition of sandstones*. Page 1645.
- DONALD S. MILLER: *Colorado Plateau uranium-lead age problem*. Page 1645.
- CHARLES MILTON, MARY E. MROSE, EDWARD C. T. CHAO, AND JOSEPH J. FAHEY: *Norsethite, $\text{BaMg}(\text{CO}_3)_2$, a new mineral from the Green River formation, Wyoming*. Page 1646.
- MARTIN W. MOLLOY AND PAUL F. KERR: *X-ray spectrochemical analysis: an application to certain light elements in clay minerals and volcanic glass*. Page 1646.
- GEORGE W. MOORE: *Alteration of gypsum to form the Capitan limestone of New Mexico and Texas*. Page 1647.
- J. M. MOORE, S. R. HART, C. C. BARNETT, AND P. M. HURLEY: *Potassium-argon ages in northern Manitoba, Canada*. Page 1647.
- MARY E. MROSE AND BLANCA WAPPNER: *New data on the hydrated scandium phosphate minerals: sterrettite, "eggonite", and kolbeckite*. Page 1648.
- V. RAMA MURTHY: *Lead isotopic study of ore and igneous minerals at Butte, Montana*. Page 1649.
- BRUCE W. NELSON: *New bentonite zone from the Pennsylvanian of southwestern Virginia*. Page 1651.
- PHILIP M. ORVILLE: *Ion-exchange reaction between synthetic alkali feldspars and alkali chloride solutions*. Page 1652.
- J. K. OSMOND AND H. J. SAWIN: *Unit-cell dimensions of recent and fossil tooth apatites*. Page 1653.
- URSULA M. OXBURGH, RALPH E. SEGNI, AND HEINRICH D. HOLLAND: *Coprecipitation of strontium with calcium carbonate from aqueous solutions*. Page 1653.
- W. H. PINSON, JR. AND C. C. SCHNETZLER: *Chemical and physical studies of tektites*. Page 1656.
- RICHARD PLILER AND J. A. S. ADAMS: *Distribution of thorium and uranium in the Mancos shale (Cretaceous)*. Page 1656.
- RICHARD PLILER AND J. A. S. ADAMS: *Distribution of thorium and uranium in a Pennsylvanian weathering profile*. Page 1657.
- EDWIN V. POST: *Silica-cemented sandstone as a guide to unoxidized uranium deposits in the southern Black Hills, South Dakota*. Page 1657.
- HERMAN E. ROBERSON: *Tetrahedral aluminum content of montmorillonite*. Page 1661.
- PETER ROBINSON: *Progressive metamorphism in the Otago schist, East Otago, New Zealand*. Page 1662.
- EDWIN ROEDDER: *Fluid inclusions as samples of the ore-forming fluids*. Page 1663.
- ARTHUR W. ROSE: *Trace elements in sulfide minerals from the Central district, New Mexico, and the Bingham district, Utah*. Page 1664.
- P. E. ROSENBERG: *Subsolidus relations on the join $\text{CaMg}(\text{CO}_3)_2\text{-CaFe}(\text{CO}_3)_2$ of the system $\text{CaCO}_3\text{-MgCO}_3\text{-FeCO}_3$* . Page 1664.
- JOHN LANG ROSENFELD: *Contamination-reaction rules*. Page 1665.
- MALCOLM ROSS AND HOWARD T. EVANS, JR.: *Crystal structure of abernathyite*. Page 1666.
- DELLA M. ROY AND RUSTUM ROY: *Tridymite-cristobalite relations and stable solid solutions*. Page 1666.
- C. RUIZ-MENACHO AND RUSTUM ROY: *Zeolite studies. II: Stability of the lithium zeolites*. Page 1666.
- MOTOAKI SATO: *Electrochemical study of oxidation of sulfide minerals at 25° C*. Page 1668.

- J. F. SCHAIRER AND NOBUO MORIMOTO: *Join protoenstatite-diopside-albite in the system forsterite-diopside-silica-albite*. Page 1669.
- CECIL J. SCHNEER: *Proposed rule of crystal habit*. Page 1670.
- W. SCHREYER AND H. S. YODER, JR.: *Stability of Mg-cordierite*. Page 1672.
- RALPH E. SEGNIIT, URSULA M. OXBURGH, AND HEINRICH D. HOLLAND: *Solubility of calcite in water between 100° C. and 200° C*. Page 1673.
- HERBERT R. SHAW: *Phase studies in the Fe-rich carbonates of the Bunker Hill mine, Idaho*. Page 1674.
- RICHARD P. SHELDON: *Geochemistry of uranium in phosphorites and black shales of the Phosphoria formation (Permian)*. Page 1675.
- BRIAN J. SKINNER: *Effect of manganese on the sphalerite geothermometer*. Page 1676.
- J. V. SMITH: *Crystal structure of activated calcium-chabazite*. Page 1678.
- T. W. STERN, L. R. STIEFF, H. KLEMIC, AND M. H. DELEVAUX: *Lead-isotope age studies in Carbon County, Pennsylvania*. Page 1680.
- THOMAS E. STERNBERG, ALFRED G. FISCHER, AND HEINRICH D. HOLLAND: *Strontium content of calcites from the Steinplatte reef complex, Austria*. Page 1681.
- L. R. STIEFF AND T. W. STERN: *New graphical and algebraic methods for the evaluation of discordant lead-uranium ages*. Page 1681.
- E. O. STRAHL: *Relationships between selected minerals, trace elements, and organic constituents of several black shales*. Page 1682.
- VLADIMIR STUBIČAN AND RUSTUM ROY: *Isomorphous substitution and infrared spectra of clays*. Page 1682.
- WILLIAM H. TAUBENECK: *Age of granitic plutons in eastern Oregon*. Page 1685.
- A. K. TEMPLE: *Petrology of the Nemegosenda alkaline complex, Ontario*. Page 1686.
- DAVID TILLES: *Natural variations in isotopic-abundance ratios of silicon*. Page 1688.
- PRIESTLEY TOULMIN, III: *Composition of feldspars and crystallization history of the granite-syenite complex near Salem, Essex County, Massachusetts*. Page 1689.
- ALFRED H. TRUESDELL AND ALICE D. WEEKS: *Relation of the Todillo limestone uranium deposits to Colorado Plateau uranium deposits in sandstone*. Page 1689.
- A. C. TURNOCK: *Stability range of iron chlorite*. Page 1690.
- L. S. WALTER: *Pressure-temperature stability conditions of some reactions in the system lime-magnesia-silica-CO₂*. Page 1692.
- L. S. WALTER AND S. MERRIN: *High-temperature portion of the three-phase solid-liquid-vapor equilibrium curve of the system NaCl-H₂O*. Page 1692.
- MATT WALTON, ALLAN HILLS, AND EDWARD HANSEN: *Mobility of granite in relation to metamorphic facies: I. The Kallador conglomerate, Ontario, Canada*. Page 1693.
- R. K. WANLESS, R. W. BOYLE, AND J. A. LOWDON: *Sulfur-isotope investigation of the gold-quartz deposits of the Yellowknife region*. Page 1694.
- RICHARD F. WARD: *Petrography of some erratics from East Antarctica*. Page 1694.
- COOPER H. WAYMAN: *Measurement of dissociation pressures in hydrous minerals by thermistors*. Page 1695.
- ALICE D. WEEKS AND D. HOYE EARGLE: *Deposition of uranium at Palangana salt dome, Duval County, Texas*. Page 1695.
- DONALD E. WHITE AND HARMON CRAIG: *Isotope geology of the Steamboat Springs area, Nevada*. Page 1696.
- J. F. WHITE AND J. F. CORWIN: *Synthetic chalcidony*. Page 1696.
- E. H. TIMOTHY WHITTEN: *Data density necessary for quantitative modal analysis of a granitic complex*. Page 1697.
- ROBERT J. WILLARD: *Metadiorite from northwestern Maine*. Page 1699.

- HORACE WINCHELL AND ROBERT TILLING: *Regressions of physical constants on the chemical composition of pyroxenes.* Page 1700.
- C. W. WOLFE: *Crystal synthesis by refrigeration.* Page 1701.
- G. A. WOLFF AND J. D. BRODER: *Cleavage and the identification of minerals.* Page 1702.
- GEORGE V. WOOD: *Modal analyses of three "quartzites."* Page 1702.
- R. A. YUND: *System Ni-As-S.* Page 7103.
- EDWARD J. ZELLER, DONALD F. SAUNDERS, AND FREDERICK R. SIEGEL: *Laboratory precipitation of dolomitic carbonate.* Page 1704.
- E-AN ZEN: *Early stages of evaporite deposition.* Page 1704.
- TIBOR ZOLTAI: *Improved classification of silicates.* Page 1706.
- TIBOR ZOLTAI AND M. J. BUERGER: *Relative energies of rings of tetrahedra.* Page 1706.