



THE MINNESOTA GEOLOGIST

OFFICIAL BULLETIN
OF
THE GEOLOGICAL SOCIETY OF MINNESOTA

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"THESE ROCKS, THESE BONES, THESE FOSSIL FORMS AND SHELLS
SHALL YET BE TOUCHED WITH BEAUTY AND REVEAL
THE SECRETS OF THE BOOK OF EARTH TO MAN"

(ALFRED NOYES).

G E O L O G I C A L S O C I E T Y O F M I N N E S O T A

The Society is devoted to the study of GEOLOGY
and MINERALOGY for their cultural value.

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MEETINGS : October to May inclusive, 7:30 P. M. every Monday,
not a holiday, large auditorium, 4th floor, Public Library,
Hennepin Avenue and 10th Street, Minneapolis Minnesota.

FIELD TRIPS : June until September inclusive.

ANNUAL DUES: Residents of Hennepin and Ramsey Counties \$ 3.00
plus \$ 1.00 additional for husband, wife, or dependent family
members ; for students and non-residents, \$ 1.00.

MEMBER

MIDWEST FEDERATION OF GEOLOGICAL SOCIETIES

* Deceased

THIS ISSUE
IS DEDICATED TO THE MEMORY

OF

Alger R Syme

EDITOR OF THIS BULLETIN

AND

PAST PRESIDENT

OF OUR SOCIETY



ALGER R. SYME

1888 1948

Alger R. Syme was born in Windsor, Ont. Canada on October 15, 1898. A year later his family moved to Buffalo N. Y. where he spent his childhood and where he attended school.

He was determined to become a lawyer long before he finished high school, however, his problem was, how to earn enough money to finance his college education, since his parents could not afford to do so. His resourcefulness and long range point of view became evident even then, for the ink was barely dry on his high school diploma when he came to Duluth Minn. via Great Lakes freighter and immediately secured a job with the U. S. Steel Corp. to work in the Chisholm office. At the end of the first year he used his accumulated savings to move his parents and brothers and sister from Buffalo N. Y. to Chisholm Minn. Yes, he had found work for his father, who was an expert carpenter, and his brothers. Three weeks later he was on his way to Ann Arbor, Mich. where he planned to attend law school.

He was so sure that some day he would be a lawyer that he shaped everything to that end, even to the extent of avoiding the sciences in high school. He erroneously felt they would be of no help in practical law. In later years he often wished he had taken more science for it would have added appreciably to his enjoyment of geology. In his high school and college days he also won many honors on debating teams.

He worked his way through college and graduated with honors in 1913. While at college he met Helen J. Croman who was also attending the University of Michigan and just before he graduated they became engaged. He returned to Chisholm, Minn. where he took his bar examinations and began his law practice. He always held a warm spot in his heart for the Chisholm community for the sympathetic understanding, confidence and friendship extended to him during those first struggling years. He had only been practicing law a few months when the city council appointed him city attorney and a few months later he was appointed attorney for the school district, a position he held as long as he lived in Chisholm.

While at Chisholm he often served as Special Judge of the Municipal Court and occasionally as prosecuting attorney. He was once a candidate for State Senator of the 60th district and was elected for the first three days. On the fourth day when the final vote was counted he was defeated by only 136 votes. Over 10,000 votes had been cast.

Early in his professional career he met Mr. Heskett, President of the Montana Dakota Utilities Co. and in 1928 he moved to Minneapolis to accept a position as general attorney for that firm, a position he still held at the time of his death.

He always enjoyed and took an active part in community affairs. It was his opinion that an active member of any organization benefited most and his part in the Geological Society of Minnesota was indeed an active one. His creation of the "Minnesota Geologist" and his able editing for five years did much to strengthen the unity of the Society. He accomplished much toward establishing policies and preserving the autonomy of this Society. His enthusiastic interest in geology was not only genuine, but infectious. Undoubtedly living on the iron range helped to stimulate his interest in geology but it was not until 1930 that he began to pursue the subject to any degree. When extension classes were

made available to the general public Alger Syme was one of the first to take advantage of the opportunity. Since that time he has taken fifteen or sixteen classes in geology or relative subjects.

He was an active director and past-president of the Midwest Federation of Geological Societies, and was also active in the American Federation of Mineralogical Societies. He was chairman of the constitution committee and vice-president of the Geological division of this national organization. In 1947 he was instrumental in framing the Articles of Incorporation for this Federation.

In 1916 he married Helen J. Croman of Mount Clemons, Mich. They have one daughter, Jean Syme King, and three sons, Alger Jr., James and Joseph. Also surviving in addition to his wife and four children are a brother and sister, Chester Syme of Detroit, and Betty Syme of Hibbing and seven grandchildren.

This memorial is made as a permanent record of our respect and regard for Mr. Syme, and of his faithful devotion to this Society and its general welfare, as well as his love of the subject of geology for its cultural value.

L. E. K.

EULOGY

" His forceful personality, influencing all with whom he came in contact, will live on in the future of our Society, as well as in the Midwest Federation of Geological Societies and the American Federation of Mineralogical Societies. "

Hal E. McWethy.

" The growth of the Minnesota Geological Society is in no small measure due to the untiring efforts and virile enthusiasm of Mr. Alger Syme. His interest in Geology was so warm and infectious that I and many others owe him our gratitude for the pleasures we have enjoyed. To have been his friend is an inspiration I shall long remember".

Edward Mendell.

" As Edward Burch was the founder of this Society, credit must be given Alger Syme for doing more than any one member toward establishing policies and precedents, which are making our Society strong and continuous".

Charles H. Preston.

EULOGY

"One bitter cold Monday night last January as Mr. Sommers and I, after the Geology meeting stood waiting for a street car to take us to the railroad station, Mr. Syme drove by. He stopped, and insisted on driving us to the station, entirely out of his way. That thoughtful, friendly act glows in my memory - a symbol of the spirit that was Mr. Syme"

Helen J. Sommers.

"I can't imagine Alger Syme slighting any old or new friend at any time or any place. In all Geology gatherings and in the homes of our mutual friends, he always gave everyone a most cordial greeting. He enjoyed intellectual conversation, and was always enthusiastic, and his humor was never missing. May I show my appreciation for what he gave to me by trying to pass on similar qualities to other friends".

Leone P. Knox.

"Alger Syme had a long range point of view and was intensely practical. He brought to our attention a facet of Geological activity which was foreign to most of us ----- His publication of the Bulletin was the greatest single act by anyone for the perpetuation of our Society ----- We will miss Mr. Syme's energy and enthusiasm, his easy friendliness and wise counsel, but we will go on to our own destinies so much the better for having known so fine a man"

Junier F. Hayden.

"Mr. Syme, yes Alger, whether your were in tears or just down and out, he was there to pull you out of the depths. We will miss him at all times".

Elsie Hinchley.

"Alger R. Syme gave generously of his many talents in helping guide the Society after the passing of its founder. A notable contribution was his being into being the Society's Bulletin and which he ably edited during the first five years of its existence".

Fred Wunderlich.

"Mr. Syme - quiet, dignified, unassuming, courteous. What a monument to his memory are the copies of the "Minnesota Geologist", which I count among my cherished possessions".

Helene M. Becker.

"Alger's energy and talent were always given unselfishly. We have lost an irreplaceable friend".

• Jos. W. Zelusky.

EDITOR'S NOTE -

With this issue we complete five years of publication. To Alger Syme who brought the Bulletin into being, this publication was a symbol of unity in our Society. The confidence and encouragement shown by you, the members, was to him, sufficient compensation for the many hours of time and energy devoted to this project. His untiring service will live on in the memory of his many friends.

Loretta E. Koppen.

NOTICE

In order to activate and establish an endowment fund which our Constitution already permits, the Board of Directors at their meeting of November 15, 1948 proposed and approved an amendment to the Article authorizing such a fund, viz -

"ENDOWMENT FUND"

"Be it resolved, that an endowment fund is hereby established to be administered by a Board of Trustees consisting of the President, three Past-Presidents, and one other member of the Society. If, for any reason, such three Past-Presidents and the President of the Society, or any of them shall not qualify, then a substitute Trustee shall be elected by the members of the Society. The Society may elect members to the Board of Trustees at any meeting of the Society after two weeks written notice thereof. Each Trustee shall be elected for a term of two years and until a successor shall qualify. Such fund shall consist of all dues paid by Sustaining, Contributing, and Life members and such other funds as may be received as gifts or otherwise. The Trustees shall have custody of such funds and shall manage and use the same for acquiring, arranging, preserving, protecting and showing exhibits, books, models, and specimens, and the support or partial support of the Society's regular publication. Such funds shall not, however, be used for financing lectures or field trips or the usual operating expenses of the Society."

That the underlined conjunctive phrase be deleted and replaced by the phrase "and the support or partial support of such scientific endeavors as the Society shall approve."

The adoption of this change will allow our Society to aid in support of such research efforts as may be approved by our Society.

Below is a ballot for your use in indicating your approval of the proposed change.

IN FAVOR OF THE AMENDMENT -----

AGAINST THE AMENDMENT -----

BULLETIN BOARD

Our Program for this winter is, we can say without fear of contradiction getting off to a good start, both with respect to the subject and the instructor. You still have the opportunity of inviting a friend to enjoy the major part of the lecture program with you. Following is our schedule for the remainder of Dr. Bell's lectures.

LECTURES 1948

DECEMBER 6	VIII	DEVONIAN GEOLOGY
DECEMBER 13	IX	MISSISSIPPIAN GEOLOGY
	1949	
JANUARY 10	X	PENNSYLVANIAN GEOLOGY
JANUARY 17	XI	PERMIAN GEOLOGY
JANUARY 24	XII	TRIASSIC & JURASSIC GEOLOGY
JANUARY 31	XIII	CRETACEOUS GEOLOGY
FEBRUARY 7	XIV	TERTIARY GEOLOGY
FEBRUARY 14	XV	PLEISTOCENE GEOLOGY
FEBRUARY 21	XVI	GEOLOGY OF THE GRAND CANYON OF ARIZONA.
FEBRUARY 28	XVII	GEOLOGY OF THE GRAND CANYON OF ARIZONA. CONT'D.

Editors Note

On September 10, 11 and 12, Dr. George M. Schwartz, Director of the Minn. Geological Survey, conducted the members of the Geological Society of Minnesota on a field trip to the North Shore of Lake Superior. Those who attended the trip were unanimously agreed that one of the highlights of the trip was an evening lecture given by Dr. Schwartz on the Geology and Origin of Lake Superior. We extend our appreciation to Miss Cynthia Gilbert for recording this talk in detail, thereby enabling us to present it to you.

GEOLOGY AND ORIGIN OF LAKE SUPERIOR

Lake Superior is the largest body of fresh water in the world. The water contains only 40 parts per million of dissolved salts. It is also a very cold lake; nearly all of the water is at the temperature of 39.2°F, which is the temperature at which water has its greatest density. The lake is approximately 360 miles long and 160 miles wide at its widest part. It covers about 32,000 square miles. It is 1290 feet deep at the deepest part, which is in Canadian territory. The surface of the lake is 602 feet above sea level, which means that about 680 feet of its depth lies below sea level. This fact is very important in considering the origin of the lake.

There is a very complete section of Pre-Cambrian rocks in this region. All of the great iron mines lie in the Pre-Cambrian formations in this region, which is the greatest iron mining district in the world. The early Keweenaw period is represented by the Ely Greenstone, which is chloritic and is probably about two billion years old. Above the Greenstone are intruded the Laurentian or Saganaga granites. After that a series of sediments were formed, with long time intervals between: these sediments are now slate and iron formations. These were in turn intruded by later granites, to which belong the Giants Range granites. These granites are found around Lake Superior in many districts.

After about half of all known geological time had passed, there was a long period of erosion which exposed all of these rocks at the surface. Finally, there was the deposition of approximately 200 feet of sandstone which can be seen at Nopeming and Grand Portage. These sandstones lie unconformably on the upturned slate, where they were deposited at the beginning of the Keweenaw period, some 800 million years ago.

Then began the period of the pouring out of the great Keweenaw lava flows. The magnitude of these flows is almost beyond imagination. They are extremely thick; at least 50,000 feet of the flows and the intrusions into them can be measured. The Duluth Gabbro alone is about 30,000 feet thick. The total number of flows is yet unknown as they are still being counted. A conservative estimate of not less than 200 to 300 flows are known to exist between Nopeming and Two Island Lodge. There is no point in counting the flows beyond Two Islands, since from there northeastward the series reverses itself. It is to be noted that the flows are not counted as separate flows unless the amygdaloidal layer at the top and also the bottom layer can be found. Thus, the counting of flows involves a great deal of work.

One of the important things about the Keeweenaw flows is that they did not come from volcanoes, but probably from great fissures in the earth's crust. This kind of flow has occurred in historical times in Iceland and in the Columbia River area at an earlier time. We do not see the fissures from which the Keeweenaw flows issued ; but we do believe, and with pretty good evidence, that Lake Superior would seem to be the approximate location of the center of the flows, which have a tremendous extent. The flows are found southward nearly to the Twin Cities ; they are found on Michipicoton Island on the east of the lake ; and they are found on Isle Royale which consists entirely of lava flows.

As the activity of the flows died down, great mountains must have been formed in this region. The reason for supposing this to have happened is that we find sandstone deposits in beds of tremendous thickness - 20,000 feet at least. These sandstones were probably eroded from mountains, and probably also, in part from lava flows. They are believed to be continental sediments rather than marine. With the formation of these sandstones the Keeweenaw period came to an end.

After all this had happened, the syncline of Lake Superior was formed. During the flows, the surface of the earth must have been under compression. Lava does not just flow out ; a force must be present to push it out. After the lava had poured out, these stresses must have relaxed, and the whole region settled to form the great Lake Superior syncline. This basin dips in more steeply on the southern part than on the northern shore ; in the Michigan copper district the dip is from 35 degrees to 75 degrees. On the north shore the average dip is about 15 degrees. This syncline formed at the end of the Keeweenaw period some 600 million years ago.

This settling is a good explanation of how the syncline was formed, but it does not explain the presence of the lake today. What happened after that ? Here we got lost. Very little is known about what happened in this part of the country after the Keeweenaw, because in most of the Lake Superior area there are no rocks dating from the Cambrian on. We can say that the basin was probably filled, that it probably did not exist as a basin for the most part until the present. If it was filled, something had to happen since that time to scoop it out again. In spite of the size of the basin, the most reasonable explanation is that it was scooped out by glaciers. Unfortunately, we do not know much about the earlier glaciations in this area, which is quite far north. From the areas farther south we know that there were at least five considerable invasions of the ice ; and in all probability there were many more up here. The rock which filled the basin was undoubtedly softer ; and each time the ice moved down, it scoured out this softer rock. One glaciation in this area we are quite sure of ; at about the same time that the Grantsburg lobe pushed out farther south, the Superior lobe swept slowly down through the basin here. Furthermore, we can tell something about the direction in which the ice moved from the striations it left on the rocks. Along most of the north shore the striations are parallel to the lake shore. Near Duluth they begin to fan out, as the ice spread in other directions. The glacier traveled as far west as Lake Mille Lacs, where we find a terminal moraine.

The glacier left many moraines at its outer edges when it retreated ; and there is a great deal of rock in these moraines. A very probable source for all of the material in the moraines is the softer rock filling the Lake Superior syncline, which was scooped out by the glacier and dropped elsewhere. Thus, the glaciation theory of the clearing of the syncline also explains the origin of the moraine material. There are other possible theories also, but this is perhaps the most likely. We know that the basin could not have been formed by water erosion, since 680 feet of it lies below sea level, and water does not flow up hill.

However, another possible explanation is that this area may have been much higher at one time, which would make erosion more likely. Ice can move material up hill if there is enough pressure back of it to keep it moving forward. Of the two theories, glaciation is the simplest.

The question arises, did a lake necessarily exist in the basin since it was formed. Perhaps the water evaporated, leaving a dry basin. In this case, the basin need not have been filled with sediments at all, and we would not need to explain a scooping out of materials. However, the evaporation of Lake Superior is very low because of the cold climate, which has supposedly existed here for a long time. Careful formulas have been worked out for the evaporation in relation to the temperature and wind by Mr. Adolph Meyer consulting engineer. According to these formulas, the evaporation rate would not have been great enough to dry the basin. The low temperature makes for a relatively high humidity, which lowers evaporation. Also, the lake itself is at a low temperature.

During the glacial period, the lake extended much farther inland than it does at present, as old beach lines show. We find many cliffs with old beaches at their base. From these beach levels we find that the former elevation of the lake was 500 feet above the present level. At Duluth old beaches are found 550 feet above the present level of the lake. At one or more stages in the past the lake overflowed into the St. Croix and then drained into the Mississippi River at Prescott. That is why we have the great St. Croix valley existing today.

There has also been a tremendous amount of faulting in this area. The trouble is that there is no way of dating most of it. The whole of Lake Superior has been tilted, as have the other Great Lakes. One probable explanation for this tilting is that the whole area was weighed down as the ice moved down from the north. As the ice melted, the southern part of the basin came up. Water drained in, and as the glacier retreated, the land to the north also moved up; but not evenly, because of uneven distribution of ice masses. For that reason, the beach lines are not horizontal. It should be noted also that the beach levels of Lake Agassiz are not level.

We have no evidence, except for some drilling which shows that there are sandstones out under Lake Superior, that the basin was filled with material. However, it must have been a lake, since the basin was below sea level and the evaporation rate was probably low. If a lake had existed there since Keweenaw time, sedimentation must have occurred to fill it up. And if it was filled up, it must have been scooped out since then. Glaciers are the most probable force behind this scooping out of the great syncline of Lake Superior.

GEOLOGICAL SOCIETY OF MINNESOTA

APPLICATION FOR MEMBERSHIP

NAME _____

ADDRESS _____

PHONE _____

BUSINESS _____

I ENCLOSE HEREWITH MEMBERSHIP FEE OF \$ _____

MINNEAPOLIS



WILMA MORNQUD
908 22ND ST EAST
MINNEAPOLIS 4, MINN