



THE MINNESOTA GEOLOGIST

OFFICIAL BULLETIN

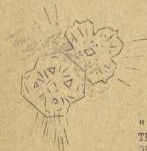
OF

THE GEOLOGICAL SOCIETY OF MINNESOTA

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NO. 2



" WHEN A MAN'S KNOWLEDGE IS NOT IN ORDER,
THE MORE OF IT HE HAS, THE GREATER WILL
BE HIS CONFUSION "

HERBERT SPENCER



GEOLOGICAL SOCIETY OF MINNESOTA

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

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MEETINGS: October to May inclusive, 7:30 P.M. every Tuesday not
a holiday, auditorium, Minnesota Museum of Natural History,
University of Minnesota, 17th Ave. S.E. and University Avenue.
Visitors welcome.

FIELD TRIPS: May until October 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.

AFFILIATE MEMBER

MIDWEST FEDERATION OF MINERALOGICAL AND GEOLOGICAL SOCIETIES
and
THE AMERICAN FEDERATION OF MINERALOGICAL SOCIETIES

* Deceased

NEW MEMBERS - We wish to extend a warm welcome to our new members.

WELCOME ASSISTANCE - We welcome the assistance of President Dr. Bert Carlson and Mrs. Carlson and Secretary Wesley Bondor and Mrs. Bondor who have been helping the editorial staff this past year in getting out the Bulletin and field trip notices.

DIRECTORY - We are planning to publish a membership directory early in 1933. Your cooperation in sending in the necessary information will help us and cut down our work a great deal.

SHUT-INS - Lets remember our shut-ins during this holiday season. Mr. Clark Schmidt at Glen Lake Sanitorium, Mrs. Anna Koldorio, Mrs. Ralph Hollingsworth and Mr. Donald Nelson. If we have overlooked anyone, please call one of the directors or the editors.

LECTURES - The popularity of Dr. Bell's series of illustrated lectures is attested by the fact that the average weekly attendance through Nov. 18 was 89. Dr. Bell is having eminent success in holding the interest of beginners as well as those of our members who are fairly well advanced in the subject. This is no little accomplishment. We extend to Dr. Bell our sincere appreciation and look forward to the second part of this series of lectures.

FIELD TRIPS - Elmer H. Brown has graciously promised to give us a report on last summers field trips in the near future.

Bulletin Board

An invitation to attend this series of lectures is not restricted to members of the Society, but is extended to anyone interested in geology and related sciences.

LECTURE SCHEDULE

DEC. 2	----	IGNEOUS ROCKS	DR. BELL
DEC. 9	----	METAMORPHIC ROCKS	DR. BELL
DEC. 16	----	FIRST ATTEMPTS AT EARTH HISTORY	DR. BELL
JAN. 6	----	AGE OF THE EARTH AND ITS INTERIOR	DR. BELL
JAN. 13	----	EARTH MOVEMENTS	DR. BELL
JAN. 20	----	ORIGIN OF THE EARTH	DR. BELL
JAN. 27	----	MODERN LIFE AND FOSSILIZATION	DR. BELL
FEB. 3	----	SCARCITY OF GEOLOGIC HISTORY	DR. BELL
FEB. 10	----	GEOLOGIC HISTORY OF MINNESOTA	DR. BELL
FEB. 17	----	EVIDENCE OF EVOLUTION	DR. BELL
FEB. 24	----	MECHANICS OF EVOLUTION	DR. BELL
MAR. 3	----	MAN'S EVOLUTION	DR. BELL
MAR. 10	----	MINNESOTA GEOLOGY	DR. BELL
MAR. 17	----	MINNESOTA GEOLOGY	DR. BELL
MAR. 31	----	COLORED SLIDES	LAWRENCE KING
APR. 7	----	MINNESOTA GEOLOGY	DR. BELL
APR. 14	----	LECTURE OR SLIDES	
APR. 21	----	LECTURE OR SLIDES	
APR. 28	----	BANQUET	

AN OPEN LETTER BY DR. BERT R. CARLSON, PRES.

Of course a teacher can never guarantee that each of his students will learn everything included in his lectures. He knows by the law of averages that some will do excellently, the majority will get what he expects, and a few also will learn little or nothing at all.

The board of directors and program committee of our society must work on the same law of averages. They know that they can't guarantee that everybody will learn and remember everything that is brought out in the lectures and the field trips, but by experience they know that the majority will feel well repaid for their time. If attendance and remarks by individuals are an indication of interest and value in the series of lectures planned by Dr. Bell for this year, we can surely promise a worthwhile evening each week.

Except for the professional geologists, geographers and mineralogists of the society, and of whom we are constantly asking for information and help, the majority are interested in geology as a hobby. After a days work in our various occupations, we like to relax and engage in something interesting that does not require too much work. The lecture program for the coming year suits that frame of mind very well.

However, the series of lectures given in the evenings does not constitute the entire activity of the Society. There is to be a banquet the last of April, some short field trips on week ends during the summer, and a two week trip in July, yet to be planned; so before very long expect to be called on for help on some of these projects.

WHY SHOULD I BE INTERESTED IN GEOLOGY?

As I drive along the Mississippi River near its confluence with the Minnesota, I can't help but observe a thickness of white sandstone overlain by layers of a gray colored rock. Along the St. Croix I notice rocks in layers but of a different composition than those along the Mississippi. At Taylors Falls I notice another kind of rock that is harder and heavier, and in places has had deep round holes bored in it. Around St. Cloud I find a type of rock called granite, which is coarsely crystalline. On the North Shore at Lake Superior I see a rock that is fine grained and dark in color. Then also in many places about the State I see hills of clay and sand sometimes mixed with boulders.

I can't help but be curious about these many different features and I find that the geologist has answers to many of my questions about "What, How, and How Long". Answers to my questions gives me an appreciation of the features of the Earth's surface in other places about the country, so that the geysers in Yellowstone, the canyon of the Colorado, the tall sandstone pinnacles in Monument Valley, or the Lakes in Minnesota have a significance for me and I can enjoy a vacation that much more.

That is why I am interested in geology and I find that my questions are answered at the lectures and on field trips of the Geological Society of Minnesota.

THE PUBLIC REACTS TO GEOLOGY

BY
Reuben Nordberg.

The opportunity given by the State Fair to appreciatively acquaint the public with geology was attested by the considerable interest manifested in the exhibit which The Minnesota Geological Society jointly with Minnesota Geological Survey of the geology department of the University of Minnesota, erected in the 9' by 8' booth in the Educational building at the fair this year. Thanks to the preparatory work of Dr. Schwartz's department, the helpfully cooperative suggestions of Dr. Thiel, and the creative ingenuity of Joseph Zalusky, curator of the Hennepin County Historical Society, a magnet was made which compelled notice, evoked curiosity and questions. For provoking interest from young and old, Mr. Bender's cabinet, showing places on the state map of Minnesota's representative rocks, was primary. For the more astute the geological time-table, an accompaniment of the cabinet, provoked amazement, was revelatory of a new appreciation of geological time, or evoked a problem and, possibly a cosmological disturbance. For attracting adults and evoking their interest, and eliciting their inquiries, the foremost provocative in the exhibit was Edward Burch's model of the twin-cities basin, exposing the topography of the bed rock after removing the drift - a topography of buttes and mesas, creek and river beds, the present hazards of heavy construction. This I found in a storeroom in Nicholson Hall covered with dust and cobwebs. After having cleaned it with a brush, I prevailed on Dr. Carlson to include it in our haul to the fair. It became my talisman. As I proceeded to explain its significance to my auditors it grew upon me delightfully. I must have experienced something of what a teacher incurs in repeatedly presenting an amiable subject. The results of the exhibit command an evaluation of the opportunity given us in making geology understood, and how to tackle it most advantageously.

The contact with the public indicated the great diversity of approach or provocation. Some were certain of a meteor in their field or pasture, which when described, was, in all probability, an erratic; or, of similar occurrence, might be a specimen of ore which should commend the area for exploration. Soils, water levels, sure water supplies, hard or soft water, required depths of drilling, what might be services of the state or university for water and soil analyses, were only a few of the many questions incurred every day. The most arguable question was, why do geologists discourage the discoverability of oil in Minnesota? Many asked if there existed a sponsoring set-up for organizing within a town or community a group for the study of rocks and general geology. Did we have slides, or samples of specimens? Would we arrange for a visiting introducer of geology to an interested group? Several young people from small towns and countryside left me their names for literature which would enable them to follow up the interest provoked by the exhibit. Some visitors came back from time to time, some on different days, some brought specimens on repeated calls which had been mentioned earlier. Some made me the inquirer. Men who had been in Alaska, South Africa, Australia, various mining areas of Canada, superintendents, either as visitors at the fair, or assigned on exhibits. Although, frankly, the assignment proved more arduous than anticipated, every moment was enjoyed, and I'm grateful to the board for the assignment. To those who cooperatively contributed of their time at my request I take the opportunity to commend them for their good work. The availability of commendable assistance from within the society speaks well for its attainment.

COPPER-NICKEL PROSPECT NEAR ELY, MINNESOTA

BY J. MERLE HARRIS.

Editors Note: The following article quotes freely, with the senior author's permission, from a paper entitled, "Geologic Setting of the Copper-Nickel Prospect in the Duluth Gabbro Near Ely, Minnesota," by Drs. G. M. Schwartz and D. N. Davidson. This article was published in Transactions AIME, July, 1952. Included also is some reference to work, as yet unpublished, done during the summer, 1952, by the Minnesota Geological Survey, under the direction of Dr. Schwartz. It is expected that a paper on this recent work will be out soon, after which interested parties may get more detailed information.

Those familiar with the geology of northern Minnesota remember that the Duluth gabbro crops out, here and there, over a large crescent-shaped area which begins at Duluth and extends northward and eastward inland and finally emerges on the north shore of Lake Superior near Hovland. Gabbro constitutes the major portion of the rock incorporated in the large, intrusive mass, the Duluth laccolith, or lopolith, as it is more properly called. The upper contact of the lopolith (the inner edge of the crescent) is with the lava flows which are the conspicuous rocks of the North Shore for the greater part of its length. Its base (the outside of the crescent) has a more complicated contact with several different rock types in the course of its approximately 170-mile length. Because of the tremendous thickness of the lopolith, estimated maximum 50,000 feet, only the peripheral contacts with the underlying formations are known. West of Duluth the contact is nearly north-south. For a few miles north of the St. Louis River, the gabbro rests on the lower lava flows. For about 60 miles north of that, the contact is with the Thompson and Virginia slates, etc. and then for a few more miles with the Biwabik Iron Formation of the Mesabi Range. The iron formation pinches out just south of the west arm of Birch Lake, near Babbit, and from here, northeast for about 25 miles the contact is with the Gint's Range granite. Still farther east it makes contact with the Ely Greenstone and other slates and granites.

It is along the contact with the Gint's Range granite that the present interest in copper- and nickel-bearing rocks is centered. Probably the nearest approach of this area to Ely is about 12 miles to the southeast where Highway # 1, between Finland and Ely, crosses the South Kewishwi River. This point may be known to some by the "South Kewishwi River Camp Grounds" on the east side of the highway, or to others by the "Halfway Ranger's Station" of the U. S. Forest Service on the west side. The contact here is somewhere in the river bed and the river follows it both northeast and southwest for considerable distances.

Copper and nickel sulfides had been occasionally found in the gabbro and reported by several geologists in the past. However, the present interest was generated when copper stains on some rubble in a small pit opened in

weathered gabbro along a forest access road was called to the attention of Fred S. Childers, Sr., an Ely prospector, in 1948. He began searching along the river in both directions. His findings, as well as subsequent work, indicate the presence of copper and nickel sulfides in the gabbro near the granite contact. Iron sulfides also occur with those of copper and nickel and in considerably greater quantity. However, the copper and nickel are the chief objects of interest due to their scarcity and price.

Thin sections from several widely scattered outcrops, and some made from a diamond drill core, indicate the sulfides in the following order of abundance: chalcopyrite, cubanite, pyrrhotite, pentlandite and bornite. These occur in gabbros which vary considerably in texture and mineral composition. Probably the most commonly associated mineral is biotite. The thin sections indicate that most of the sulfides are primary constituents of the gabbro. Assay samples commonly run 8 - 10 % iron and generally less than 1% combined copper and nickel, with 2 - 7 times as much copper as nickel. Unless rock contains as much as 1% combined copper and nickel, it is scarcely of ore grade. Obviously, whether or not mining can be profitably done depends to a great extent on the total quantity present, ease of mining operation, nearness to market, etc. Most of the assays thus far obtained have been from surface exposures. Much interest naturally surrounds the question of the depth of the occurrence and the quality at depth. The one diamond drill core reported in the above-mentioned paper showed an assay of 0.36% copper and 0.13% nickel as the average for 104 feet of core length.

The area previously reported on was a narrow band extending for about 5 miles along the contact. At the time of the previous report, the known outcrops were only 10-12 in number and widely scattered. More recent work by various prospectors and by the Minnesota Geological Survey in the summer of 1952 has greatly increased the number of known outcrops and has extended the area at least a mile in either direction without evidence of having exhausted it at either end. The Survey work was carried out by running a network of lines 1/4 mile apart across the contact, or as near it as the South Kewishwi River on Birch Lake would permit. Hand specimens and assay samples were taken wherever sulfides were found. It may be a matter of interest that surveying in this area must be done with the sun-dial compasses, rather than magnetic compasses, because of local magnetic disturbances. The magnetic rocks of the area are of two kinds. Although it was stated earlier that the Mesabi Range pinches out south of Birch Lake, it is nevertheless true that several scattered inclusions of the iron formation are to be found near the contact for several miles. These inclusions, like the taconite at this (east) end of the Mesabi Range are usually highly magnetic. Also portions of the gabbro itself, especially along the contact, contain considerable amounts of magnetite.

It is clear that sub-surface exploration, presumably by core drilling, as well as more surface work are needed before any adequate appraisal of the possibilities of this deposit can be made. Present work does suggest, however, that its least potential is that of a fairly sizeable, low-grade reserve. Even this has aroused the interest of the mining companies inasmuch as there are very few copper-nickel prospects anywhere in the country.

EASTERN FEDERATION CONVENTION

by

H. T. PERRY.

On October 9-10-11, the Eastern Federation of Mineralogical and Lapidary Societies held their second annual convention and mineral and gem exhibition at the Essex House in Newark N. J. Although organized just two years ago, much enthusiasm for knowledge of the earth sciences has been generated throughout the East. There were some 400 registrations and several hundreds of visitors.

The exhibition was well planned and artistically arranged, featuring chiefly minerals and gems from Eastern localities. Special displays included the worlds largest star sapphire, The Star of Queensland, 733 carats, and a 1318 carat carved sapphire head of Lincoln.

Capacity audiences attended program lectures. These were given by Leland Quick, Editor of the Lapidary Journal, on "The Second Stone Age". Dr. Frederick Pough, formerly curator of the American Museum of Natural History, spoke on the "Complete Mineral Cabinet". Commander John Sinkankas delivered an address on "Crystal Structure and its Effects upon the Process of Gem Cutting". Probably the greatest interest to our local society was the lecture delivered by Dr. V. E. Means, Director of the Royal Ontario Museum of Mineralogy and Geology, who spoke about his expedition in July 1950 to the newly discovered Chubb Crater, located 60 miles from Hudson Strait in the Province of Quebec. He stated that his expedition proved that Chubb Crater was of meteoric rather than volcanic origin and that it was of post glacial age. He estimated that some 5000 million tons of granite bedrock were excavated by the explosion. This produced a circular depression in the Earth (now filled with water) some 11,000 ft. in diameter, five times larger than Meteor Crater in Arizona. The banks formed of granite fragments rise 300 to 500 feet higher than the surrounding country. At distances of $\frac{1}{2}$ mile and 1 mile from the rim of the lake, ridges of jointed granite were produced by the explosion. These ridges rise as ripples in the bed-rock. Dr. Means stated however, that no actual fragments of the meteor itself were found. His lecture was illustrated with fine colored motion pictures of this desolate area.

The convention program was completed with an all day field trip to the Buckhoost Dump at the famous Franklin N. J. mineral locality. Here, some 44 different minerals can be found, more than in any other one place in the world. Many of these minerals are highly fluorescent. It was a beautiful fall day with the trees in full autumn color. Some 500 automobiles participated in the trip making it the largest field trip ever held in the United States. In the evening, everyone turned homeward with sacks overflowing with specimen material.

Annual Federation Conventions give us all an exceptional opportunity to meet and exchange information and opinions with others in all walks of life who also are seeking answers to some of the mysteries of Nature. One cannot help but be impressed with the rapid growth of interest in the many Earth Sciences.

In Memoriam

Edward W. Hawley, one of our most enthusiastic and energetic members passed away on Sunday, November 23rd after a brief illness.

Mr. Hawley was known nationally for his familiarity with parliamentary law, which he began to study at Harvard university as a necessary part of his specialty, corporation law.

He briefed new members of the Minnesota state legislature on the rules of parliamentary procedure for a number of years.

Years ago, after careful study, he discovered some 65 principles upon which he said all parliamentary rulings are based. His fascination with the subject led to a correspondence with Gen. Henry Robert, author of Robert's Rules of Order, who died shortly before a scheduled rendezvous with his admirer.

Mr. Hawley first was elected to the Minneapolis council in 1908. He served until 1916 and again 1921 to 1929. For some years before he filed for the post, he attended every council meeting to familiarize himself with council techniques and the makeup of the body.

A Greek and Latin scholar, he wrote Greek poetry as a hobby and translated poetry from any one of a number of languages into another. He also wrote the Greek inscription for a medal given to Charles Lindbergh. He was also well informed on Indian language and history.

Mr. Hawley was an ardent advocate of physical fitness and memory training. As a youth, he was a star pitcher on the Harvard and University of Minnesota law school baseball teams before the turn of the century and a top tennis player. Until shortly before his death he kept trim by jogging a block each day the weather permitted and by rowing his boat on Lake Minnetonka, sometimes 10 or 12 miles.

He liked to recite long passages of the Constitution which he knew verbatim at 15.

He was skilled in mathematics and astronomy and gave a series of talks to the Astronomy Club.

His interest in geology is of long standing and his enthusiasm and interest never waned. Inclement weather nor illness rarely kept him from attending the society's lectures or field trips.

Mr. Hawley will long be remembered for his amiable and friendly personality coupled with his eagerness to learn and be well informed.

The Society has lost a good friend and staunch supporter.



Mrs. Marian S. Stehen
500 Ridgewood Ave.
Minneapolis 4, Minn.