THE MINNESOTA GEOLOGIST

OFFICIAL BULLETIN

OF

THE GEOLOGICAL SOCIETY OF MINNESOTA

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CONTENTS

GEOLOGICAL SOCIETY OF MINNESOTA

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

"TO BE OR NOT TO BE. This may well be the question the Geological Society is facing unless we, the members, take stock and ask ourselves "What are we doing to keep it alive?".

Did you know that our average attendance at the lectures so far this year is less than half of what it has been in past years in spite of the unseasonably nice weather? It is disheartening to the program committee and the board members - in fact to everyone who has worked in the Society, to have an excellent program arranged and then to find it so poorly attended.

In 1938 a mans dream became a reality. A small group of people interested in the study of earth history were banded together, and a Society was born. The Geological Society of Minnesota was the name chosen. One of the chief objectives was to interest lay people and students in geology and its related subjects.

In that first year there were 20 lecture meetings with an average attendance of 49. There were 43 all day field trips with an average attendance of 23. The lectures and field trips were arranged by the founder, Edward P. Burch.

In 1939 the Society was incorporated and now there were 40 more members. Membership dues were not always sufficient to cover expenses but some of the members made up the deficit. Members were often informed by phone of special events or meetings. Telephoning over a hundred members was no small task. The enthusiasm was contagious. Nearly everyone participated in the program and activities.

Junior F. Hayden, Elmer H. Brown, Charles H. Preston, Alger R. Syme, Mr. and Mrs. Henry Sommers, Elsie Hinchley, Jos. Zalusky, Elmer Koppen, Mr. and Mrs. L. W. King, Hal McWethy, Theo Zickrick, Helene Becker were some of the early pioneers.

Faculty members of the Geology Department of the University of Minnesota have done much to ensure the success of the Society. They have given generously of their time and counsel since the beginning.

Edward Burch, Junior F. Hayden and Alger R. Syme were in no small measure responsible for the growth of the Society. The untiring efforts and virile enthusiasm of these men was hard to equal.

There were and still are, others who have worked diligently to perpetuate the Society and its purpose. The project of installing bronze plaques at various places throughout the state depicting the geology of a particular area was the first such project ever undertaken by an amateur Geological Society anywhere in the United States. We are proud of this, and other Society accomplishments, but we cannot rest on our laurels. It is the responsibility of each and every one of us to do everything possible to keep this organization alive and progressive.

Many factors may be responsible for the apparent lack of interest and the withering attendance at our lecture meetings and field trips. It may be the type of program, or the frequency of our meetings, or the lack of advertising. Should we have more general discussion before or after meetings?

What can you suggest, or what can you do to help? The Board of Directors and your Editors will welcome your help and any suggestions you have to offer.

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We congratulate Dr. Edward H. Mandell on his new appointment as manager of Veterans Hospital in Saginaw Michigan. We wish him every success but we shall miss him and Mrs. Mandell very much.

Mr. Chas. Havill has been appointed a member of the Board and vice president to fill the vacancy created by Dr. Mandells resignation.

BULLETIN BOARD

SCHEDULE OF LECTURES

Oct. 6	Geology of the South Central Appalachians	Dr. Bert Carlson
Oct. 13	The Occurrence and Movement of Ground Water	Dr. G. A. Thiel
Oct. 20	Mineralogy	Mr. Henry Lepp
Oct. 27	Mineralogy	Mr. Henry Lepp
Nov. 3	Mineralogy	Mr. Henry Lepp
Nov. 10	Gem Minerals	Mr. Hazen T. Perry
Nov. 17	Puerto Rico in Color	Dr. Merrill Rassweiler
Nov. 24	The Williston Basin	Dr. W. D. Lacabanne
Dec. 1	The Origin of Igneous Rocks	Dr. S. S. Goldich
Dec. 8	The San Juan Country, Southeastern Utah	Mr. Lawrence W. King
Dec. 15	History and Activities of the Minnesota Geological Survey	Dr. George M. Schwartz
Dec. 22 Dec. 29 Jan. 5	No Meetings.	
Jan. 12	Geologic Mapping in the Copper-Nickel Prospect near Ely, Minnesota	Mr. J. Merle Harris
Jan. 19	Louis Agassiz and the Establishment of the Concept of Continental Glaciation	Mr. Henry S. Sommers
Jan. 26	Revision of the Glacial History of Minnesota	Dr. H. E. Wright
Feb. 2	Late Wisconsin Glacial History of the Little Falls Area	Mr. A. F. Schneider
Feb. 9	History and Frost Features in the Eastern Portion of the Alaska Range	Dr. H. E. Wright
Feb. 16	Wildlife Studies on an Arctic Trek	Dr. W. J. Breckenridge
Feb. 23	Glacial Geology and Geomorphology along the Back River, Northeastern Canada	Mr. R. S. Taylor
Mar. 2	The Time Schedule of all Glacial Periods	Mr. Ara P. Rickmire
Mar. 9	The Modern Pattern of Wind and Climate	Dr. John R. Borchert
Mar. 16	Post-Glacial Changes in Climatic Patterns in the Northen Hemisphere	Dr. John R. Borchert
Mar. 23	University Holiday	
Mar. 30	Earthquakes	Dr. Harold Mooney
Apr. 6	Primary Structures in Determining Tops and Bottoms of Folded Sediments	Mr. Peter Miller
Apr. 20	Oceanography	Dean Athelstan Spilhause
Apr. 27	BANQUET: Japan - the Old and the New	Dr. Henry Borow

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Do you check the identity of the minerals that you acquire? This is quite adviseable, especially when carrying on exchanges, because, as you know, many mineral collectors are just amateurs and mistakes in identify are possible.

Once upon a time, to cite a case in point, your writer was trying to secure a specimen of the scarce pink Datolite from the Lake Superior region, and opened up some correspondence with some collectors in that part of the country. Eventually a collector was found who stated that he had some extra pieces that he would be willing to exchange, and I was delighted with the prospect of finally adding the coveted specimen to my collection. In due time the package came, and no time was lost in opening it to view the prize, but what met my eager gaze appeared to be far from my preconceived notion of what a pink Datolite should look like. The specimen was pink, to be sure, with a vivid hue, but, instead of being amorphous, it was decidely crystalline. If the specimen was really Datolite, it evidently represented a most unusual form of that mineral. My first reaction was to test its hardness which proved to be a rather hard 3 instead of plus 5 of Datolite; this proved beyond the shadow of a doubt that someone was mistaken in the identity of the mineral. A few more tests showed the mineral to be Dolomite. Some followup correspondence produced the enlightening fact that the collector had depended upon an old miner for the identification of his minerals.

In our modern mineralogical laboratories more and more stress is being placed on simple tests, especially such as can be applied for the identification of the more common minerals in the field. Determinative Tables for the identification of the more common minerals have been prepared, based upon the distinctive physical features characteristic of the respective minerals. While these tables have definite limitations, and in cases involving the chemical composition of a specimen, one must resort to chemical tests, they are nevertheless advantageous, in that they are simple, more readily applied, and do not require elaborate laboratory equipment. For these reasons, Physical Determination Tables have become very popular and probably now have a wider use, in spite of their limitations than those that involve chemical tests exclusively.

However, students of minerals soon realize that many of the physical properties are not entirely fixed in their character. This fact must be borne in mind at all times. Color, for instance, is an extremely variable property, the same mineral often appearing in a different color in different locations, or at times, even in the same location. Hardness, though, as a rule, more definite, may vary to some extent by the state of aggregation of a mineral, but on the whole it is one of the more definite of the physical properties. Cleavage is less dependable, often hidden by the physical condition of the mineral. Streak probably holds true more often than any of the several properties. Consequently, in making determination of the mineral by means of its physical properties alone, one should have a typical specimen of a sufficient size to show plainly the various properties.

As indicated above, in determinative tables for mineral identification, hardness is one of the primary factors. And yet this hardness of minerals is only relative, being based on the rule-of-thumb methods invented by miners and prospectors many years ago and assembled by F. Mohs of Vienna. However, the well-known Moh's scale of hardness so acquired, seems to serve all ordinary purposes very well, at least, nothing better has been offered to take its place. The hardness scale of Moh's includes the well-known minerals, ten in number, of which Talc, the softest may readily be scratched with a finger-nail; while the Diamond, the hardest, will scratch any other known substance.

It was long ago recognized that the spacing of the various minerals in the Moh's hardness scale is not at all proportionate to their relative degree of hardness, the softer members showing a much greater divergence than the harder members do. It makes it more difficult to separate the harder minerals from each other by hardness tests than the softer ones.

The uninitiated looks with wonder at the array of "junk" used by the avera[illegible] mineralogist for the testing of the hardness of minerals. These strange testing materials usually consist of a fragment of common window glass, a copper cent piece, a piece of broken file, an old knife blade, a piece of crystal quartz, and possibly a fragment of carborundum. Strange as this assortment may seem, satisfactory though rough determinations may be obtained. In the absence of more conventional equipment, the finger-nail test will test hardness up to 2.5; the cent piece to 3; the knife blade up to 5.5 to 6; the steel file 6 to 7; and the carborundum up to 9.5. Thus it is readily seen that with some practice the gamut of the hardness scale can be handled with this crude material.

In making a hardness test, the mineral to be tested should be held firmly in one hand, while a point or angle of the mineral or other object of known hardness is brought to bear upon its surface with a firm pressure, while drawing the point across the mineral. Usually a line of white powder appears along the line of abrasion; this should be brushed away and the abraded area examined for evidence of scratching. It should be borne in mind that minerals of the same hardness will scratch each other when tested in this manner, due to the pressure factor. With experience, the approximate hardness of a specimen may be determined by the ease or difficulty with which it is abraded with the above mentioned agen[illegible].

More critical tests of hardness can be obtained by the use of "Hardness Points" such as are put out by Wards Natural Science Establishment. These points are about the size of a small pencil, with small fragments of the minerals of the standard (Moh's) scale mounted in both ends of the metal casings. These are to be preferred in the determination of the hardness of minerals where it is desirable to keep damage to the specimens to a minimum.

Many jewelers posses, in addition to other gem-testing equipment, a set of hardness plates. These plates are made from the typical specimens of the minerals of the standard hardness scale, exclusive of 1 and 10. The plates are about an inch in diameter and polished on the upper surfaces, and conveniently mounted in a folder-like case. Upon these plates small mineral specimens or cut stones may be tested in the usual manner. The polished surface will show very slight scratches and altogether this makes a very convenient and inexpensive hardness-testing device.

For accurate scientific determination of the hardness of a gem, an instrument called a scalerometer is used, in which a weighted diamond point abrades the stone under examination. The hardness is calculated by the depth of the incision made, which is in turn checked by the weight of the material removed. A slighly different principle is developed in another form of this instrument, in which the hardness is estimated from the weight-pressure-required on the point to produce a given effect. Again another form is based on the resistance of the material to be drawn past a fixed point. Such elaborate methods are purely for gemnological laboratory use, and their operation involves such fine detail that the ordinary mineral collector has little concern with them.

Jewelers and gemologists were probably the first to become discontented with the arbitrary and crude vagaries of Moh's scale of hardness and undoubtedly were instrumental in having the matter investigated with the scalerometer. This work was undertaken by Rosiwal in 1896. The results of his findings were both interesting and enlightening, as can be seen from the table of comparisons given below.

COMPARATIVE SCALE

Moh's scale	Mineral	Rosiwal
1	Talc	0.33
2	Gypsum	1.25
3	Calcite	4.50
4	Fluorite	5.00
5	Apatite	6.50
6	Orthoclase	37.00
7	Quartz	120.00
8	Topaz	175.00
9	Corumdum	1000.00
10	Diamond	140000.00

The hardness of a mineral species depends upon its composition and purity, and therefore, may vary within certain limits. For instance, Calcite will vary from the accepted value of 3 for a pure specimen, towards a hardness of 4, as the addition of magnesium carbonate causes the composition to approach that of Dolomite. Such structural features as cleavage and fracture may also influence the results considerably, and should be guarded against with great care. Some minerals show varying hardness, depending upon the direction of the scratch upon the crystal structure. For instance, Kyanite has a hardness of 4 to 5 parallel to the long axis of the crystal, and 6 to 7 crosswise with them. Kraus and Slawson have demonstrated that the Diamond is hardest on the faces of the octahedrons, which, at times, are almost impossible to cut and polish because of this fact.

In the identification of any mineral, hardness alone is not sufficient proof of identity. It must be applied in conjunction with other physical and, on occasion, chemical tests before final judgment is passed.

Dr. F. L. Fleener,
Joliet, Illinois.

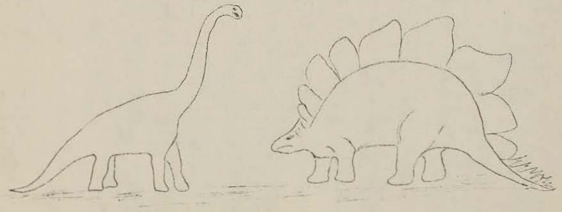
THE DINOSAURS

By A. E. Seaman

The dinosaurs were mighty beasts,
Renowned for bulk and strength :
Their necks were measured by the yard,
Their tails had greater length,
Their heads were small, and
All in all, they were not very wise,
But what they lacked in intellect
They made up for in size.

But while their head held one small brain,
And none too finely wrought,
Their sacrum held a larger one,
And was their seat of thought.
There were ganglia knots along their spine,
Scattered from stem to stern,
While these were only scattered brains,
It gave them a chance to learn.

Such brains were fine to retrospect
For looking o'er the past
But since their forethought was so slight,
The poor beast could not last :
They failed to see the "rocks ahead,"
That round them they might steer,
And so they met the fate of all
Whose brains are in the rear.



THE SOCIETY'S FIELD TRIPS.

The field trips conducted by the Society during the summer, are a laboratory course in geology to round out the lecture program given during fall, winter, and spring months. No matter how well one becomes acquainted with the theory and principles of geology by lecture; the examination and study of the actual conditions in the field always gives a clearer and more easily remembered picture. Besides giving a better understanding of geology in general, a series of field trips correlates the geology and geography of various regions.

Being Minnesotans, we are of course interested in the geology of Minnesota, and these trips give an opportunity to see and learn the geology of various parts of our State. Besides learning something about our State, those who are interested, can collect specimens of rock which are typical of various areas; and last but not least, it gives members a chance to get out doors, meet some very interesting people, and get together at a picnic lunch.

To assay the value and interest of a summers program of field trips, we can choose from any of the past years; but because the summer of 53 has just closed and still is fresh in our minds, let us recall its offerings.

The so called "Long Trip" this year was the Society's first venture into the Eastern part of the country. Traveling three thousand miles in two weeks does not give much time to study the country minutely, but a good idea of geography and geology over the long strip traveled is at least acquired. The first stop of interest was at the coal fields in central Illinois. There is some underground mining in this area, but most of the coal is obtained by stripping the overburden of shale and glacial drift with a huge shovel. Underground mining is resorted to when the overburden is thicker than sixty feet. After stripping the three foot layer of coal is loaded into trucks by power shovel. One of the side-lights of coal mining in this area, is an attempt (which is proving successful) to reclaim the land that has been gone over. As the over-burden is stripped, it is piled over to one side on which the coal has been removed, and the continuous operation makes a series of long ridges about fifteen feet high. In this condition the land is unfit for any use, so that most of the area is now being leveled off by bulldozers and trees and crops are being planted. It seems a lot of work for a seam of coal only three feet thick, but it is being mined, cleaned and ready to ship at about $4 per ton.

Ordinarily we do not think of Illinois as producing oil, but there is a considerable field in the south central part of the State that has produced oil for many years; in fact some areas are nearing depletion, and it is the process of reclaiming more oil from the field that we had a chance to examine. Water is brought into the area from twenty miles away, and after being treated and filtered is pumped at 1500 pounds pressure back into the wells at the border of the field. The water then forces the oil through the rocks toward the center of the field and up through those wells. About another third of the oil in the rock can be expected from this method.

The city of Cairo, Illinois seems to derive most of its fame from the fact that it is in danger of being flooded each year. The city lies on a peninsula at the confluence of the Ohio and Mississippi rivers on a flat piece of land. Twenty miles of leeves have been constructed about the entire town, in fact the main highway from the north is through a tunnel in the leeve and this opening can be closed by a vertical steel door. The main railroad lines are on top of the leeves. Except for a short distance along the Ohio river where the leeve is a concrete wall, all the embankments have been made of earth and are wide enough for a good road on top. Pumping stations are placed at several places about town to take out seepage or any overflow.

Mammoth Cave, in the eastern part of Kentucky, is a very commercialized National Park; and except for size is much the same as any limestone cavern. The cave is well adorned with calcite in the form of stalactites, stalagmites and rippled sheets against the walls. The cave is in the Appalachian plateau and as one travels the roads which cross it, he is much impressed with the ups and downs and curves as it crosses the deeply dissected eastern part. Closer to the Ridge and Valley Province there is some metamorphism and the group had a chance to visit a large marble quarry. Shales and limestones are in evidence all along the trail, but the bright redleached earth over the entire countryside is what attracts the attention of the visitor first.

Norris dam of 265 foot head and 100,000 KVA is an example of the twenty three dams the Tennessee Valley Authority has constructed on the Tennessee River and some of its tributaries. The generating capacity, at present, of these dams is 2,634,760 acre feet of water. The total impounded lake area is 601,749 acres.

Besides a view of majestic mountains, which average about 5,000 feet in height (the highest point is Mount Mitchell 6,500 feet) and are almost completely covered with trees and vegetation, the Appalachian Mountains give an example of extremely complicated, metamorphosed, folded and faulted rocks of both sedimentary and igneous origin. The mining operations of the Blue Ridge Province are not extensive as compared with Minnesota iron, Utah copper, or Illinois lead, but mica, garnet, pyrrhotite, titanium and tungsten are mined commercially. Coal is of course extensively mined in West Virginia, Maryland and Pennsylvania. Our best grades of coal come from these States with the high grade anthracite coming from Penn.

Industry and United States history are closely packed in the east, and if a person had time there is an endless amount of interesting places to see and study. The group on the long field trip visited a steel mill near Pittsburgh where they saw a series of open hearth furnaces making steel from molten pig iron, steel scrap, and limestone for flux. The steel is run from the furnaces into ladles from which it is poured into tall iron moulds to make ingots. The ingots are again reheated and sent through the rolling mills where giant rollers squeeze the steel into plates, rails and other shapes used by industry.

A visit at the Duncan and Miller glass plant in Washington, Pennsylvania gave the members of the party a chance to see how glass table ware is made and finished, including the composition and reasons for using lead glass for some types of ware and lime glass for others.

The final stop on the long trip was at the quarry and lime processing plant of the Ohio Hydrate Co. in northern Ohio. Here limestone quarrying operations were seen as well as the burning of lime and preparation of other lime products. The quarry also presented an opportunity for collecting some large fossils.

The other summer trips are a one day affair held on Sunday, and must be confined to areas in the vicinity of the Cities. The short trips held this past season are;

May 17	Minnehaha Falls.
May 24	Glacial topography and geology along Minnehaha Creek to Lake Minnetonka.
June 7	Observation of rock strata at Red Wing.
July 12	Society picnic at Lawrence Kings on the St. Croix.
July 25-26	Mesabi Iron Range.
August 9	Taylors Falls.
August 23	St. Cloud granites.
Sept. 13	Rochester Minn. Limestone quarry and iron mines.

To summarize the contributions of the short trips to our knowledge of Minnesota geology:

Exhibit of rock cores from various parts of the State at the core library on the Veterans Hospital Reservation. Shale, limestone, sandstone and gorge of the Mississippi and Minnehaha Creek.

Topography and glacial geology Lake Minnetonka.

Sandstones and fault at Red Wing. This was the only trip that was rained out and it is hoped that we can include this area next summer.

The Giants Range granites, quartzites, slates, iron ore, taconite processing, and greenstones of the Mesabi Range.

River gorge of St. Croix River, pot holes, basalt, conglomerate. St. Croix Falls and dam and red and gray drift.

Different types of granite, basalt dikes, processing of granite for building stone and monuments.

Platteville limestone, fossils, limonite, siderite.

Many specimens of rock and fossils taken home by members on the various trips.

GEOLOGICAL SOCIETY OF MINNESOTA
J. O. Engen, Treasurer
5317 Chowen
Minneapolis 10, Minn.

APPLICATION FOR MEMBERSHIP

NAME: ....

ADDRESS ....

PHONE ....

BUSINESS ....

I ENCLOSE HEREWITH MEMBERSHIP FEE OF $....

Mr. Hal E. McWethy
2174 Doswell Ave.
St. Paul, Minn. 8