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GEOLOGICAL SOCIETY OF MINNESOTA

831 SECOND AVE. SO.
MINNEAPOLIS 2, MINN.

THIS SOCIETY IS DEVOTED TO THE STUDY OF GEOLOGY AND
MINERALOGY FOR THEIR CULTURAL VALUE.

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MEETINGS: THE SOCIETY MEETS EVERY MONDAY EVENING, NOT A
HOLIDAY, IN THE LARGE AUDITORIUM IN THE MUSEUM, ON THE 4TH
FLOOR OF THE PUBLIC LIBRARY AT HENNEPIN AVENUE AND 10TH
STREET, MINNEAPOLIS, MINNESOTA, AT 7:30 P.M., FROM OCTOBER
TO MAY, INCLUSIVE. FROM JUNE UNTIL SEPTEMBER, INCLUSIVE,
WE HAVE A PROGRAM OF FIELD TRIPS. VISITORS ARE VERY WELCOME,
ALWAYS.

DUES. FOR RESIDENTS OF HENNEPIN AND RAMSEY COUNTIES,
\$3.00 ANNUALLY, PLUS \$1.00 ADDITIONAL FOR WIFE, HUSBAND, OR
DEPENDENT FAMILY MEMBERS; FOR RESIDENTS LIVING OUTSIDE
HENNEPIN AND RAMSEY COUNTIES, \$1.00 PER PERSON.

MRS. LORETTA E. KOPPEN, our Secretary, besides editing the last number, has been doing a great deal of work in the preparation and publication of our BULLETIN, and we are pleased to announce that in appreciation of this work, and anticipation of her continued service, the Directors have appointed her as Assistant Editor of this publication.

THE TRILOBITE really had us guessing. We don't know what the composition was originally called, but one printing referred to it as a "sonnet". Letting our minds wander back to our high school English days, it rather seemed to us that it was not a sonnet. If we recall correctly, a sonnet has 14 lines, of something, possibly iambic verse, or could it be iambic pentameter? Anyway, it has a certain meter and rhyme. Then again, there was something about "hexameter", which we have forgotten. An "ode" is a short poem, we recalled, written to honor some person or event, so why not call it an ode? Or is it just plain "verse"? Or a "poem"? Will some of our good English teachers please tell us whether or not we did wrong?

ILLUSTRATIONS OF TRILOBITES, decorating the Ode, represent important Cambrian Trilobites, drawn from illustrations in Pirsson and Schuckert, and Schuckert and Dunbar.

THE ANNUAL BANQUET, on January 8, according to those who attended, was a real good meeting. Our President supplied the necessary stories, and did a real job of presiding. Many thanks are due to the general Committee, for both the arrangement and the program. The pictures on mountain building and volcanism were excellent. 96 were present. Incidentally, the Bulletin Fund is richer by \$35.16, proceeds of the auction of rock and mineral specimens. Exceptionally interesting specimens were donated by Miss Neerenberg, Mr. Preston, and Mr. Brown. Lillian Paine, of Livingston, Montana, George Rickert, W. P. Hayden, and others. We are very greatly indebted to each and all of them, and appreciate their kindness very much.

MISS HINCHLEY has progressed to the point where she is able to resume her teaching duties again. We all wish her good luck.

ATTENDANCE at our weekly Monday night lectures has been unusually good this year, and so far, it has averaged 92.

FEBRUARY 12th, being a holiday, the Library will be closed, and there will be no meeting of the Society on that date. All subsequent lectures will be set ahead one week.

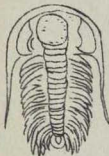
OPTICAL MINERALOGY: Upon request of many in the present class on rock study, DR. JOHN W. GRUNER has agreed to teach a class on this subject, in the University Extension Department next semester, provided the requirements of the Extension Division can be met. This means that there must be a minimum of 20 who will register for the course. Dr. Gruner states, too, that the class will have to be limited to 20, because of the number of microscopes available for use. This course involves the study of rocks and minerals, with the use of thin sections, and the Petrographic Microscope. As most of you know, Dr. Gruner is an international authority on the subject of Mineralogy, and it is a great privilege to be able to take these courses. See the Editor, if you are interested. CLASSES BEGIN ON FEBRUARY 8. ACT NOW!

EDITORS NOTE: This poem was written in 1840, by T. A. Conrad, who was then Paleontologist for the New York State Geological Survey. Note that it is still, 100 years later, scientifically correct. (Contributed by Dr. L.O.Dart).

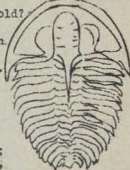
* * * * *

Thou large-eyed mummy of the ancient rocks,
The Niobe of ocean, couldst thou tell
Of thine own times, and of the earthquake shocks
Which tore the ocean-bed where thou didst dwell;
What dream of wild Romance would then compare
With the strange truths thy history might unfold?
How would Geologists confounded, stare
To find their glittering theories were not gold?
Methinks I see thee gazing from the stone
With those great eyes, and smiling as in scorn.
Of notions and of systems which have grown
From relics of the times when thou wert born.
Thou ne'er saw glittering fishes in the deep,
Which now in multiform profusion play,
Nor giant shells, nor monsters such as sweep
Along the surge and dash the ocean spray,
Yes, small in size were most created things
And shells and corallines the chief of these;
No land but islets then, nor trees nor springs,
And no tornado thundered o'er the seas.
But the wild earthquake did the work of death,
And heaped the sand and tore the Naiad's cave.
Race after race resigned their floating breath--
The rocks alone their curious annals save.
And since the trilobites have passed away
The continent has been formed, the mountains grown
In ocean's deepened caves new beings play,
And man now sits on Neptuno's ancient throne.
The race of man shall perish, but the eyes
Of Trilobites eternal be in stone,
And seem to stare about with wild surprise
At changes greater than they yet have known.

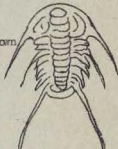
Paradoxides
harlani



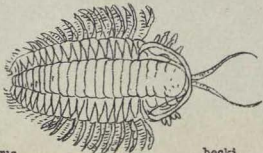
Holmia
bröggeri



Dorypyge
curticeri



Albertella
helena



Triarthrus

becki

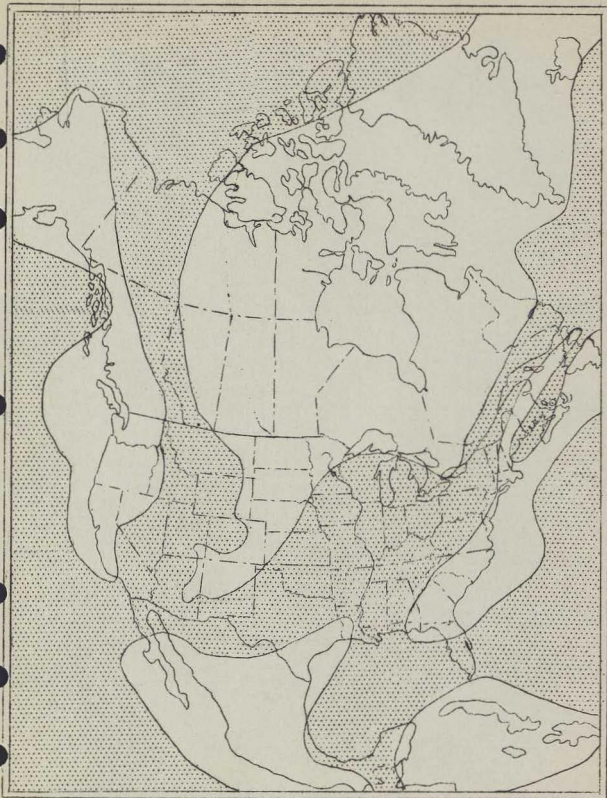
The following paragraph will be repeated with each set of Paleogeographic Maps. These maps, except those of Europe, were copied from Schuchert, as modified by Miller and other authors, and illustrate various invasions of the sea upon the Continent. In past ages, responsive to great forces, the surface of the continents rose, and fell again, many times. When the surface sank below sea level, the sea covered great areas of the land. The processes of erosion continued to wear down the land remaining above sea level, and the resulting material was deposited in the sea, to become sedimentary rock. Thus, large areas of the continent have come, in time, to be covered with great layers of limestone, shale and sandstone. By a study of the area covered by these rocks, geologists have been able to outline, in a general way, the limits of the various invasions by the sea. These seas are known as "Epeiric" and "Epi-Continental" seas. That is, they were seas upon the continent, as distinguished from the abyssal depths of the ocean. They were never very deep, probably not much over 600 feet, yet many thousands of vertical feet of material was collected in many places in these seas, because the weight of the accumulated material caused the floor of the sea to gradually sink, as new material was added. Forty to fifty thousand feet of material was not uncommon, in the great sea troughs.

THE ORDOVICIAN PERIOD

The following Paleogeographic Maps show maximum invasions of the sea during the Ordovician Period, as follows: MAP NO. 5, LOWER ORDOVICIAN, MAP NO. 6, MIDDLE ORDOVICIAN, MAP NO. 7, UPPER ORDOVICIAN. MAP NO. 8 shows the combined maximum invasion of Europe during ALL ORDOVICIAN TIME.

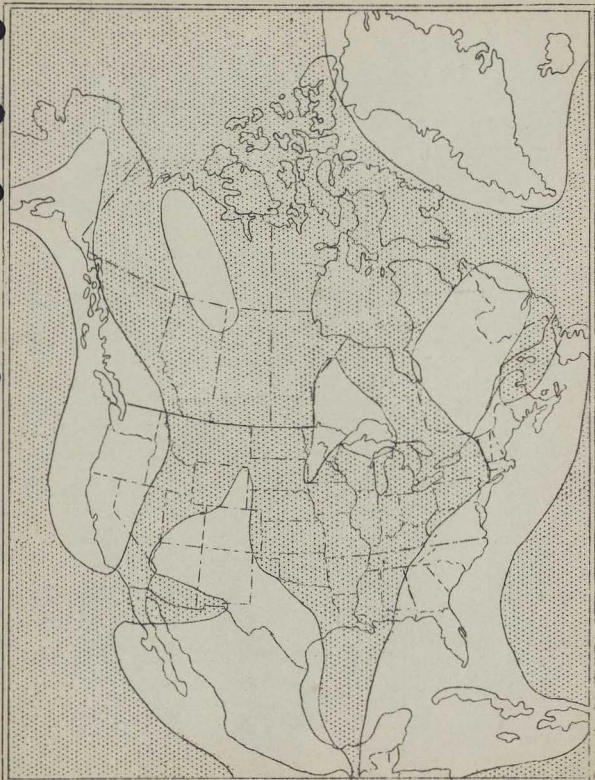
During Ordovician time, there were three distinct cycles of continental submergence. The continent stood but little above sea level, with uplands extending along the margins only. For this reason, it was easy for the rising oceans to spread widely over the land. The first flood was not of great extent, but the other two inundated the continent far more extensively than those of any other period. It was essentially a time of limestone making, and the rocks abound with a profusion of marine invertebrates. Locally, the Onecta Dolomite, Root Valley Sandstone, the Shakopee Dolomite and the St. Peter Sandstone were deposited during Lower Ordovician time, the Glenwood Shale, the Platteville Lime, the Decorah Shale and the Galena Formation during the Middle Ordovician, and the Maquoketa during the Upper Ordovician time. Please note the area of the Twin Cities on the accompanying maps, and the seas in which these various rocks were deposited locally.

The Ordovician period was one of very widespread submergence of the land. Its probable duration was 70,000,000 years. The period is said to have closed, perhaps 500,000,000 years ago. The climate is thought to have been uniformly mild all over the world, as the same species of corals found in Tennessee and New York are found in Baffin Land and Alaska. 2,600 species of animal life of the Middle Ordovician alone, have been identified. An outstanding geologic event of local interest was NELSON'S VOLCANO in Kentucky. Ash from this volcano covered the Twin City Area, as evidenced by a layer of Bentonite, altered volcanic ash, 3 to 4 inches thick, exposed in the Mississippi gorge. Ash from this volcano was spread over an area of 360,000 square miles, and in places is as much as 7 feet thick. In the next number, we will consider Silurian time.

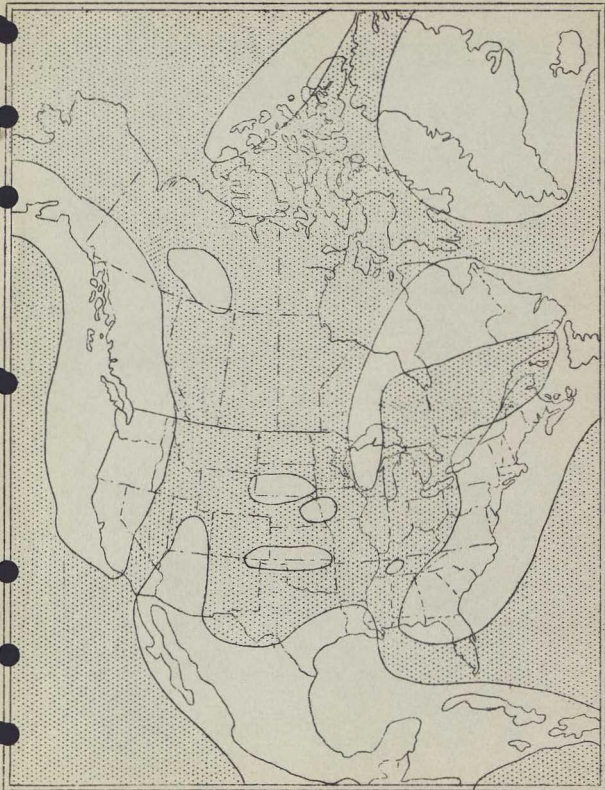


(5) ORDOVICIAN- EARLY.

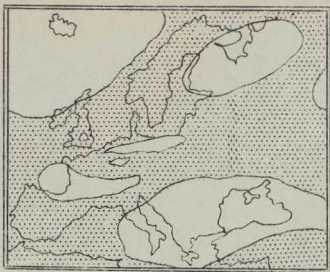
(SCHUCHERT- MODIFIED) STIPPLED AREA IS SEA.



(6) ORDOVICIAN- MIDDLE. (SCHUCHERT- MODIFIED) STIPPLED AREA IS SEA.



(7) ORDOVICIAN- LATE. (SCHUCHERT- MODIFIED) STIPPLED AREA IS SEA.



(8) EUROPEAN ORDOVICIAN
Miller-DeLapparent)

* OUR MAIL BAG *

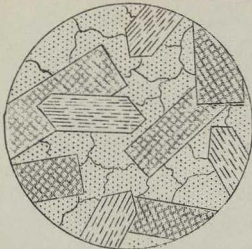
We had so many kind notes penned on the returned cards, enclosed with the notice of the Annual Banquet, that it would be impossible to copy all of them here. A great number express their keen regret at not being able to be present, and practically all of them contained a few words of cheer, and compliments, for the Society. One from Mrs. Sommers is typical,--"The first I have missed. I will attend in spirit."

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MISS HINCHLEY: It was a lovely act for you to send me, "The Geology and Underground Waters of Southern Minnesota" I'm enjoying it so much, and I thank you all from the bottom of my heart. It is so nice to have Dr. Thiel's autograph and that of so many, many others. Who engineered getting all those autographs? Give him a steady job. The Society needs such push. Too bad our members didn't get to see Dr. Dart's excellent job of binding my copy. He's tops. Loretta, where did you find such a cute fitting card? I have pasted it into my book. Heaps of love to all, with my thanks -

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PROF. DANIEL E. and MRS. WILLARD: As the date for the annual get-together and good time draws near, when a lot of good folks (geologists have to be, and are always, good folks) will assemble, I feel impelled to express further the regrets of Mrs. Willard and myself that it seems to be out of the question for us to be there. We will be there in spirit. That consoles somewhat, but does not fully satisfy. Our best greetings to all the good scouts who may be present. I am at present 'submerged' in writing on the Coast Ranges. - - - - - With best wishes that 1945 may prove a banner year for the Society, Very sincerely,

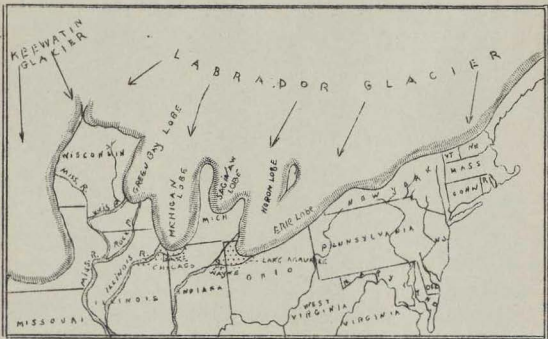


Most of us understand that the molten mass deep in the Earth, which we call "magma", is composed of infinite and various atoms, and that as this mass cools, the atoms combine and arrange themselves in such a way as oftentimes to form definite individual crystals. More generally, however, they form granular masses. These masses are, of course, much more abundant than definite individual crystals. Under proper conditions, most minerals take on the regular internal structure that produces crystals. This internal structure depends largely on the opportunity the atoms and molecules have to arrange themselves in proper order. Whether atoms or molecules form definite crystals, depends largely on the order in which various combinations of atoms and molecules unite, or as is said, "crystallize". When minerals are molten or dissolved, the atoms and molecules roll or slip past each other, but when molten rock mass becomes solid, the minerals settle from the liquid, and crowd together into a rigid body. If they do this in a hit or miss fashion, they produce grains and shapeless masses, which, though crystalline, do not have the appearance of individual crystals. If they have sufficient opportunity to form in definite order, they may produce individual crystals of the particular mineral.

The gradations between crystalline grains and individual crystals, due to the so-called "order of crystallization", can be seen in a magnified thin section of granite, illustrated by the above sketch. The mineral hornblende, is represented in this diagram by fine broken lines, the mineral feldspar, by cross-hatching, and the mineral quartz, by stippling. These minerals crystallize in the following order: first, hornblende, second, feldspar, third, quartz. The atoms and molecules necessary to form hornblende, being first to crystallize, found room and opportunity to develop perfect crystals. Feldspar, following next in the order of crystallization, found less room and opportunity to complete its crystal growth. The diagram shows how the feldspar crystals developed around certain of the hornblende crystals, which were in the path of its development. Quartz, crystallizing last, found little room to develop, and, therefore, did not succeed in forming well-outlined individual crystals. The space was insufficient, and too irregular for the quartz to develop crystals, which therefore formed in irregular grains, between and around the hornblende and feldspar crystals, and became a crystalline or granular mass.

In a few words, this diagram shows how the crystals formed out of the liquid, or plastic mass. The hornblende crystals, having crystallized first, had room to grow, and formed complete crystal shapes, while feldspar and quartz, which crystallized later, not having sufficient room, or no room, to develop their individual crystal shapes, either developed only partially in the available space, or though remaining crystalline, did not develop well-defined, individual crystals at all. "Any questions?"

A.R.S.

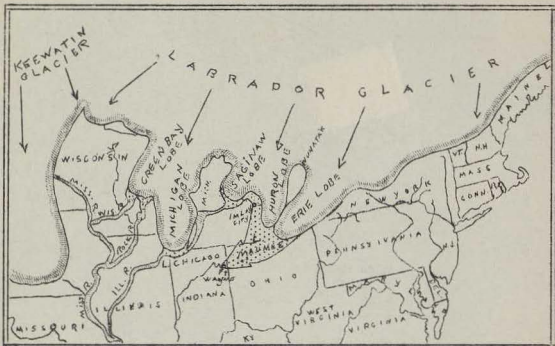


The Great Lakes, other than Superior, are a result of the great continental glacier of Pleistocene time. Their development followed a definite and very interesting pattern, which we hope to outline in a series of sketches. The first one was published in the BULLETIN last month. This showed the total extent of continental glaciation.

The above sketch shows the position of the ice after it had retreated to the immediate region of the Great Lakes. As the retreating ice entered the Great Lakes Basin, the melt waters piled up in front of the ice. This was the beginning of the formation of the Great Lakes.

In the above sketch, note that as the water piled higher, it forced new drainage outlets. The drainage from the area of Minnesota was through the Mississippi. From Wisconsin and Illinois, the water from the melting glacier was drained off through the Rock and Illinois Rivers, into the Mississippi, while the eastern portion drained through the Wabash, into the Mississippi. Note, also, in this sketch the very small beginning of a lake at the tip of Lake Michigan, called Lake Chicago, and another at the western end of Lake Erie, called Lake Maumee. In the second sketch, note how these lakes have grown, how the waters have risen higher, and forced an outlet along the western edge of the ice in Michigan, across the thumb of Michigan, near Saginaw, and south to Lake Chicago. At this time, the entire drainage was ultimately into the Gulf of Mexico.

You may have noticed the great sand dunes near Michigan City, Indiana, and the very flat, sandy country, from Port Huron, Michigan, south to Toledo, Ohio. Both were the results of this geology.



"OUT-OF-TOWN" MEMBERSHIP

If you reside outside of Ramsey or Hennepin Counties, Minnesota, you may become a member of our Society by paying a minimum membership fee of \$1.00 per year. For this, you will receive a membership card, all notices usually sent to members, informing you of activities, meetings, field trips, etc., and also the Society's BULLETIN, which is published 8 times per year. We are anxious to build up our subscription list, and will welcome you to membership. Mail the following application to the Society's office at 831 Second Avenue South, Minneapolis 2, Minnesota, with check or currency for \$1.00.

 "OUT-OF-TOWN" MEMBERSHIP APPLICATION
 GEOLOGICAL SOCIETY OF MINNESOTA
 831 Second Avenue South
 Minneapolis 2, Minnesota

I enclose herewith \$1.00 and apply for membership in your Society:

Name _____ Residence _____ Phone _____
 (Print) (Print)

Business _____ Business Address _____ Phone _____

 Signature

 Address



ALMA BORCHARD
2105 BRYANT AVE. SO.
MINNEAPOLIS, MINN.5

Faint, illegible text, likely the beginning of a letter or a very light print.

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