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# THE MINNESOTA GEOLOGIST

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OFFICIAL BULLETIN  
OF  
THE GEOLOGICAL SOCIETY OF MINNESOTA

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VOL. I

DECEMBER 1944

NO. 8

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C--O--N--T--E--N--T--S

EDITORIALS

PALEOGEOGRAPHIC MAPS

DESCRIPTION  
PRE-CAMBIAN  
EARLY CAMBIAN  
MIDDLE CAMBIAN  
LATE CAMBIAN  
EUROPEAN CAMBIAN

THIS & THAT

ROCK CLASSIFICATION KEY

ICE AGE--MAP

MAIL BAG

GEOLOGICAL SOCIETY OF MINNESOTA

831 SECOND AVE. SO.  
MINNEAPOLIS, MINN.

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The Geological Society of Minnesota is devoted to  
the study of geology and mineralogy for their cul-  
tural value.

OFFICERS

Joseph W. Zalusky, President	Mabel Williams, Director
Charles B. Howard, Vice President & Treasurer	Leone Patricia Knox, Director
Loretta E. Koppen, Secretary	Alger R. Syme, Editor
	Edward P. Burch, Counselor

PAST PRESIDENTS

Edward P. Burch  
Junior F. Hayden  
Alger R. Syme  
Charles H. Preston

Meetings: Our 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 those residing in Hennepin and Ramsey Counties are \$3.00 annually, plus \$1.00 additional for your wife, husband, or dependent family members; for those residing elsewhere, dues are \$1.00 per person.

OUR FIRST YEAR

This is the concluding number of Volume I of this Publication. The first number of Volume II will appear some time in January. This, therefore, marks the close of our first year. Although the tasks have been arduous at times and the work involved much more than is readily apparent, we, nevertheless, feel that the joy we have received from it has amply repaid us for our efforts. Your praise has helped materially, and we appreciate thoroughly your cooperation. Our sincere hope is that you, too, have benefited in some small way.

During the past year, we have gained considerable experience, which we hope to use to advantage. Our last issue was an innovation, edited by a woman and dedicated to the women. This issue is, again, an innovation. The Chinese say that a picture is worth 10,000 words. In recent years, several of the most successful magazines have been built upon this same idea. It seems natural, therefore, to copy it. Accordingly, beginning with this number and continuing in Volume II, we plan to give you more "pictures" and somewhat less reading matter. We contemplate running a series of Paleogeographic Maps, perhaps 2 or 3 with each issue, showing the invasions of the sea upon the North American Continent during most, if not all of the great geologic periods, from Pre-Cambrian to Tertiary. A second series will illustrate the geologic history and development of the Great Lakes. A third series will illustrate simple geologic processes and a fourth series will illustrate fossils of each geologic period. Drawings will be accompanied with a very brief explanation, and in this way, we hope to convey to our readers the concept or idea illustrated. All of these will not appear in each issue, but they will, nevertheless, run more or less concurrently.

We would like to give you those things you want most and your suggestions and comment will be greatly appreciated.

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FINANCING OF BULLETIN

In the course of the year, it requires considerable typing, postage, paper and stencils to publish the Bulletin. This out-of-pocket expense will exceed the sum of \$100.00, which is more than the Society can appropriate from its general funds for that purpose. Last year the Bulletin was supported by voluntary contributions, ranging from \$1.00 to \$5.00. The Directors have decided to adopt the same plan for the ensuing year.

A publication of this kind should serve to hold the membership together by emphasizing their common interest, and by proclaiming the work and high purpose of the Society, add greatly to its prestige. While our Bulletin is probably too new for us to judge accurately whether we are obtaining this result or not, we think the experiment is well worthwhile. If you agree and wish to do your share by giving the Bulletin your support, will you send or hand your contribution to our Treasurer, Mr. Charles E. Howard, 1300 First National Soc Line Building, Minneapolis. Please specify that it is for the "BULLETIN FUND". Thank you very much.

The following PALEOGEOGRAPHIC MAPS were copied from Schuchert, and illustrate various invasions of the sea upon the North American Continent, excepting the European Map, which is copied from Miller and Schaffer. 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 abysmal depths of the ocean. They were never very deep, probably not 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. These maps show invasions of the sea as follows:

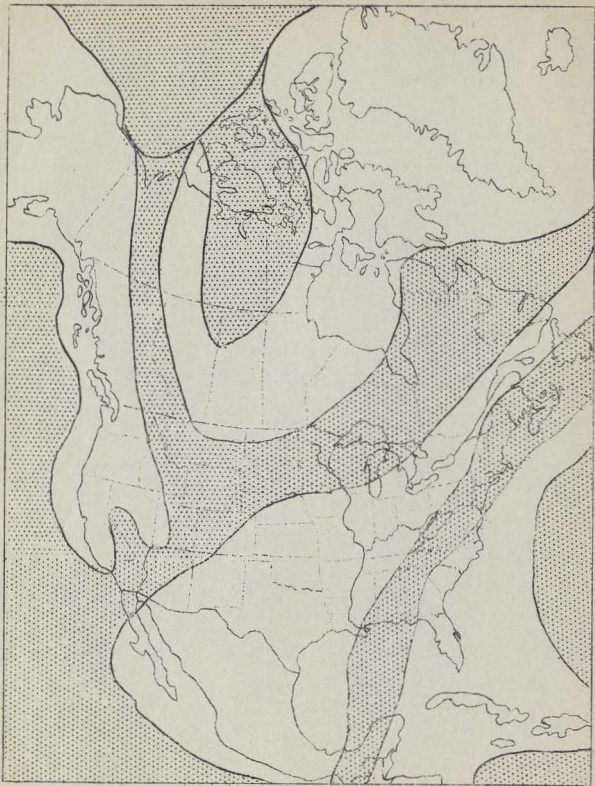
MAP NO. 1, PRE-CAMBRIAN TIME.

MAP NO. 2, EARLY CAMBRIAN TIME.

MAP NO. 3, LATE CAMBRIAN TIME.

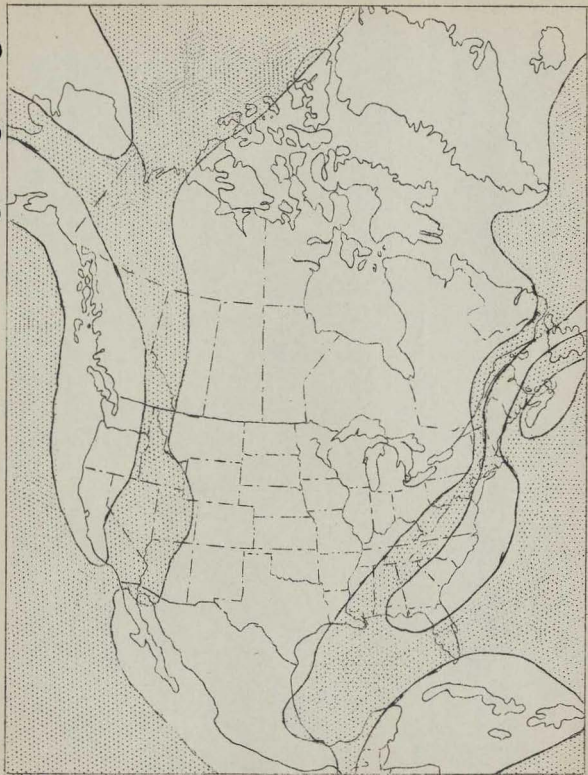
MAP NO. 4, EUROPE DURING CAMBRIAN TIME.

For study of these maps in proper sequence, please refer to your Geologic Column. Most conspicuous feature is the great sea troughs or "Geosynclines" in the Eastern and Western parts, where the Appalachian and Rocky Mountains are now located. These sea troughs persist through many geologic periods. Keep this in mind in studying future Paleogeographic Maps.

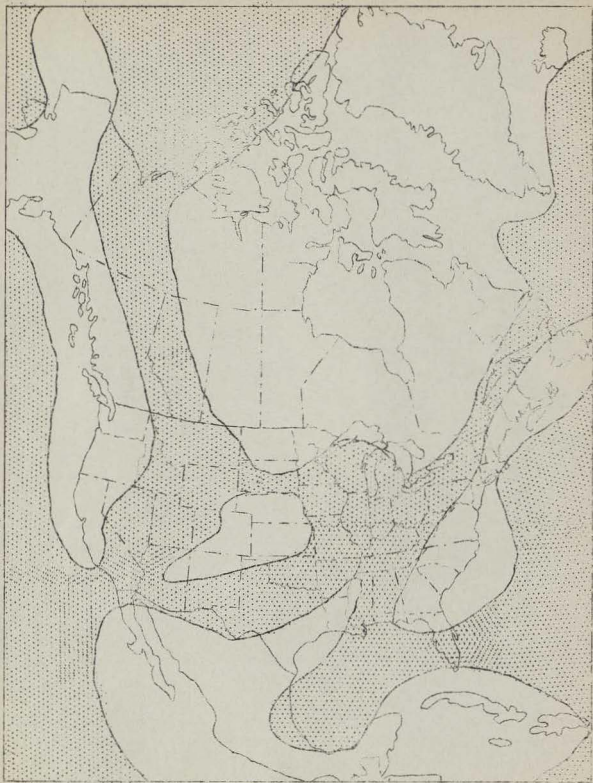


(1) PRE-CAMBRIAN LATE PROTEROZOIC (SCHUCHERT) STIPPLED AREA IS SEA

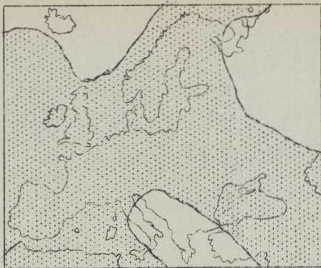




(1) EARLY CAMBRIAN- (SCHUCHERT) STIPPLED AREA IS SEA.



(3) LATE CAMBRIAN, (SCHUCHERT) STIPPLED AREA IS SEA.



(4) EUROPE- CAMBRIAN, (MILLER & SCHAFER)

SUGGESTION: Keep your paleogeographic maps until the series is complete. One good way is to punch the lefthand side and put them into a notebook.

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THIS & THAT

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AGATES: Unless chalcedony is banded, it is not agate. Regardless of appearance to the naked eye, there are thousands of bands to the inch of thickness, and as many as 17,000 to the inch have been counted. The largest agate ever found weighed over two tons. (Desert Magazine)

QUARTZ: A fine single quartz crystal 19 inches long and weighing 44 lbs. was recently found near Denver.

CORUNDUM: Only important U. S. deposit of corundum is near Bozeman, Montana. It is a-critical mineral, used as an abrasive in precision instrument work.

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SUBSCRIPTION TO BULLETIN FUND

TO THE GEOLOGICAL SOCIETY OF MINNESOTA  
831-2nd Ave. So., Minneapolis 2, Minnesota

Gentlemen: I enclose herewith my check for \$ \_\_\_\_\_ to help pay the expense of publishing THE MINNESOTA GEOLOGIST during the year 1945.

\_\_\_\_\_  
(Name)

\_\_\_\_\_  
(Address)



\* KEY FOR A SIMPLE CLASSIFICATION OF ROCKS \*

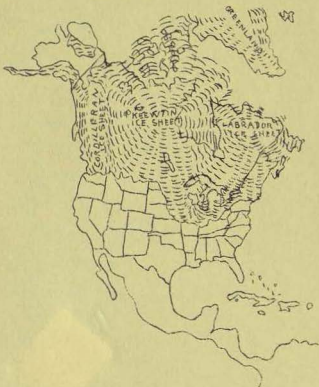
S-E-D-I-M-E-N-T-A-R-Y

- I. Some individual components distinguishable
- A. Components larger than sand
1. Angular
    - a. fragments widely variable, sometimes scratched --TILLITE
    - b. fragments similar --BRECCIA
  2. Rounded --CONGLOMERATE (1)
  3. Shells
    - a. loosely consolidated --COQUINA
    - b. fossils in compact rock --FOSSILIFEROUS LIMESTONE
  4. Plant remains --PEAT
- E. Components sand size
1. Grains and cement effervesce --COLLITE
  2. Grains don't effervesce, cement may effervesce, --SANDSTONE (2)
- II. Individual components indistinguishable
- A. Effervescence in acid
1. Without swelling
    - a. effervesces strongly --LIMESTONE (2)
    - b. effervesces weakly --DOLOMITE
  2. With swelling, effervescence weak --CALCAREOUS SHALE
- E. No effervescence
1. Finely laminated --SHALE (2)
  2. Not finely laminated
    - a. hard (7)
      - (1) light color --CHERT
      - (2) dark color --FLINT
    - b. soft (3-6)
      - (1) streak brown --BOG IRON ORE
      - (2) streak black
        - (a) sub-conchoidal fracture --ANTHRACITE
        - (b) even fracture along bedding, --BITUMINOUS COAL
    - c. very soft (1-2)
      - (1) salty taste --ROCK SALT
      - (1) no taste
        - (a) earthy luster --TRIPOLITE (DIATOMITE)
        - (b) vitreous to pearly luster --GYPSUM

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- (1) Wherever possible a conglomerate should have two qualifying terms: an adjective to indicate the cementing material and the name of the most common pebbles; EXAMPLE, ferruginous quartz conglomerate.
  - (2) Wherever possible an adjective to indicate the cementing material or else a special term should be used; EXAMPLE, calcareous sandstone.

I-G-N-E-O-U-S

N L	Cleavage	}	2 cleavages at 90; pink, white; often veined.....	ORTHOCLASE
O I			2 cleavages near 90; striated; white, gray, glassy.....	PLAGIOCLASE
N G	Hard	}	1 perfect cleavage; S.G.-3.5; milky, colorless; E-S.....	TOPAZ
H			Partings; S.G.-4; cuts glass easily; gray, brown, Hex.....	CORUNDUM
M T	Fracture	}	Granular (sugary texture); glassy; green.....	OLIVINE
E			Fine grained; yellowish green.....	EPIDOTE
T C	Fracture	}	Glassy; conchoidal fracture; variously colored.....	QUARTZ
A O				
L L	Fracture	}	Cubic cleavage; salty taste; colorless, white, pink.....	HALITE
L O			Soapy feel; 1 cleavage; pearly luster; white, green.....	TALC
I R	Fracture	}	3 cleavages; flexible; scratched by fingernail.....	CYPSUM
C E			Rhombohedral cleavage; variously colored; S.G.-2.7.....	CALCITE
D	Fracture	}	Rhombohedral cleavage; greenish brown to brown;	
			S.G.-3.8.....	SIDERITE
	Fracture	}	Octahedral cleavage; purple, green, blue, amber, white.....	FLUORITE
			Poor cleavage; H-5; variegated brown and green.....	APATITE
	Fracture	}	1 perfect cleavage yielding elastic sheets.....	MUSCOVITE
			1 perfect cleavage, sheets inelastic; green.....	CHLORITE
	Fracture	}	Fibrous, radiating; brittle; in amygdules.....	ZEOCLITES
	Fracture	}	Soapy feel; very fine grain; H-1.....	TALC
			Smooth feel; earthy; argillaceous odor; plastic.....	KALCLINITE
	Fracture	}	Waxy luster; H-4; green.....	SERPENTINE
			Variegated green and brown; H-5.....	APATITE
	Fracture	}	Green to black; perfect cleavages at 56; silky luster. HORNEBLENDE	
			Green to black; cleavages near 90; dull luster.....	AUGITE
	Fracture	}	Yellow green to dark green; poor cleavage.....	EPIDOTE
			Red, gray, greenish; striated; cleavages near 90.....	PLAGIOCLASE
	Fracture	}	Partings; S.G.-4; cuts glass easily; gray, brown; Hex.....	CORUNDUM
N D	Fracture	}	Yellow green to dark green; dirty green.....	EPIDOTE
O A			Red; glassy; conchoidal fract; equidimensional xls.....	GARNET
N R	Fracture	}	Brown; elongate xls-diamond shaped cross sections.....	STAUROLITE
K			Black hexagonal xls., striated longitudinally.....	TOURMALINE
M E	Fracture	}	Gray, smoky, amethystine; conchoidal fracture; glassy.....	QUARTZ
C T				
A L	Fracture	}	Variegated green and brown; H-5.....	APATITE
L O			Green to black; 1 perfect cleavage; elastic.....	BIOITE
L R	Fracture	}	Green; 1 cleavage; inelastic; somewhat soapy feel.....	CHLORITE
I E			Brown to green; rhombohedral cleavage; S.G.-3.8.....	SIDERITE
C D	Fracture	}	Yellowish brown to black; H-3.5; resinous luster.....	SPHALERITE
	Fracture	}	Green to dark blue gray; soapy feel; platy.....	CHLORITE
			Green; waxy to dull luster; H-4.....	SERPENTINE
	Fracture	}	Variegated brown and green; H-5.....	APATITE
M	Black	---	Streak black Magnetic; H-6.....	MAGNETITE
E			Greasy feel; marks fingers; H-1 to 2.....	GRAPHITE
T	Red	---	Streak red.....	HEMATITE
A			Streak yellow.....	LIMONITE
L L	Yellow	---	Earthy.....	HEMATITE
L			Earthy.....	LIMONITE
I	Gray	---	Metallic; brassy; streak black; crystals are cubes.....	PYRITE
C			Cubic cleavage; S.G.-7.5.....	GALENA
	Fracture	}	1 cleavage; greasy feel; S.G.-2.1.....	GRAPHITE



This map shows the total area covered by the ice in North America at the time of maximum glaciation. Note that the 3 great centers of dispersal are indicated. ( U. S. Geological Survey. )

This is preliminary to our series on the history of the Great Lakes.

It has been variously estimated that the ice was from 1 to 2 miles thick, or even thicker, at the centers of accumulation, and that the volume of water subtracted from the oceans and piled on the continents as snow and ice at the time of maximum accumulation during the glacial period was sufficient to lower sea level as much as 150 feet. Some even estimate it as high as 300 feet.

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\*                      OUR MAIL BAG                      \*

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Dear Mrs. Koppen; ... You did a swell job...I read the number from cover to cover and admired you all the way.

Cordially, (Mrs.)Helen J. Sommers

Dear Mrs. Koppen;...Your choice and arrangement of subject matter, together with your happy phrasing and adroit wording, is a matter for sincere congratulations.

(Mrs.) Ruth L. Preston

Dear Mr. Syme;...Let me take this opportunity to compliment your Society on your very fine publication, "The Minnesota Geologist". I think it is well prepared and edited, and makes very interesting reading,

The Wisconsin Geological Society

Dear Mr. Syme;..It certainly is neatly gotten up and indicates that someone had to use head and hand to get it out in such good shape.

F. S. Shepard

OF A DIFFERENT VEIN IS THIS ONE, HOWEVER: - - -

Sirs;..I trust that your periodical..will not be sent to me in the future-- a sabotage of critically needed War material. H. S. MacDonald.

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

