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It is perhaps as fortunate to have a
desire to study the simple geological
rock formations, as to be born with
great wealth.

Edward P. Burch.

1940.

GEOLOGICAL SOCIETY OF MINNESOTA

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MEETINGS: October to May inclusive, 7:30 P.M. every 2nd and 4th Monday not a holiday, at Ford Hall, University of Minnesota, 17th Ave. S. E. and Washington Avenue. Visitors welcome.

FIELD TRIPS: May until October inclusive.

ANNUAL DUES: Residents in a 50 mile radius of the Twin Cities \$ 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

BULLETIN BOARD

SCHEDULE OF FIELD TRIPS SUMMER 1959.

- June 21 Building stones of Minneapolis buildings.
Leader: Dr. Bert Carlson.
- July 12 Red Wing & vicinity.
Leader: Mrs. Linda Benitt.
- July 25-26 Ortonville Minn.
Leader: Mr. Harris.
- Aug. 9 Picnic at the Kings on the St. Croix.
- Aug. 22-23 Southwest Minn. and northwest Iowa.
Leaders: Mr. Heileman & Mr. Engen.
- Sept. 13 Spring Valley Wis.
Leader: Mr. McJethy.
- Sept. 19-20 North Shore.
Leader: Margaret Paschke.
- Oct. 4 Denham Minn.
Leader: Mr. Koppen.

Unfortunately the two week field trip to Ohio and Indiana had to be cancelled. A number of members were forced to cancel their reservations due to illness, vacation schedules, and circumstances over which they had no control, and the remaining members felt that the expense would be too high to justify chartering a bus and making the trip. A lot of hard work and planning and contacts had been made to make it an outstanding trip, and our sincere thanks go to Mr. Rickert the leader, and those who worked with him on it. We hope that this is only a postponement and that at some future time this trip can be made.

The show and convention of the Midwest Federation of Mineralogical and Geological Societies will be held June 18th, 19th, 20th and 21st, 1959, at the Clark County Fairgrounds in Springfield Ohio. The Miami Valley Mineral and Gem Club is the host and there will be - a banquet, field trips, swap table, editors breakfast, program of speakers and slides, special exhibits, dealers booths, auction, and cafeteria open continuously. Plenty of rooms at hotels and motels, and those of you who attended the convention held several years ago in St. Paul when the Minnesota Mineral Club was host know what to expect.

ROCK SOURCES

<u>Period or system</u>	<u>Rock</u>	<u>Source</u>	<u>Memoranda</u>
Keewatin	Basalt flows	Extrusive	Ely greenstone, a chlorite schist
Soudan	Iron-bearing	Plutonic	Banded cherts, jaspers, and ores of Minnesota
Laurentian	Granite	Intrusive batholith	Saganaga Lake gneiss, schist, and porphyry
Ogishka	Conglomerate	Sedimentary	Mesabi range
Knife Lake	Slate	Sedimentary	Lower Huronian
Giant's Range	Granite	Intrusive	Granite, dolomite, porphyry
Pokegama	Quartzite	Sedimentary	Mesabi Range
Algoman	Granites	Intrusive	Northern part of Minnesota
Algoman	Granite	Batholiths	Underlying most of Minn. except northeastern quarter
Animikie			
Gunflint	Iron-bearing	Plutonic	Gunflint Range
Biwabic	Taconites and cherts	Plutonic	Mesabi Range
Deerwood		Plutonic	Cuyuna Range
Animikie			
Rove	Slate	Sedimentary	Gunflint Range
Virginia	Slate	Sedimentary	Mesabi Range
Carlton	Slate	Sedimentary	Northern Minnesota
Sioux	Quartzite	Sedimentary	Arkosic quartz; hematite and feldspar
Keweenawan			
Conglomerate	Sandstone	Sedimentary	In Lake Superior flows
Red Clastics	Shale	Sedimentary	Eastern Minnesota
Basalt diabase	Basalt flows	Extrusive	Around Lake Superior, Pine City, Taylors Falls
Gabbro	Plagioclase	Intrusive	Duluth to Ontario
Red Rock	Granite-syenite	Intrusive	Duluth to Pigeon River
Logan	Diabase sills	Intrusive	Gunflint & Rove formations
Fond du Lac	Sandstone	Sedimentary	South shore of Lake Superior
Hinckley	Sandstone	Sedimentary	East-central Minnesota
Cambrian	Shales, sand, dolomite	Granite; biogenetic; sea wash	Southeastern Minnesota
Ordovician	Dolomite, sand, shale, limestone	Reworkings; biogenetic, sea wash	Southeastern Minnesota
Devonian	Limestone	Biogenetic; Sea wash	Southeastern Minnesota
Cretaceous	Clay, shale, clay till	Sea wash	Western Minnesota
Pleistocene	Gravel, sand clay, till	Glacial; fluvial	

COLUMNAR SECTION

Ordovician system

<u>Description</u>	<u>Minnesota formation</u>	<u>Thickness Ave. Max.</u>	<u>Memoranda</u>
Shale	Maquoketa	150 - 275	Waters carrying the materials in the three upper Ordovician formations came from the south and southeast and spread over part of Michigan, Wisconsin, southeastern Minnesota, and South Dakota.
Limestone & dolomite	Galena:		
	Dubuque	30 - 30	
	Stewartville	40 - 60	
	Prosser	<u>135 - 170</u>	
		<u>205 260</u>	
Shale & limestone	Decorah	30 - 30	
Limestone	Platteville	28 - 30	
Shale	Glenwood	2 - 3	
Sandstone	St. Peter	160 - 165	Source of the St. Peter was the pre-Cambrian sandstone along the south margin of the Canadian shield, and probably the Hinckley sandstone.
Shale near base			
Limestone	Shakopee	30 - 50	Waters carrying the Shakopee minerals came from the Arctic and spread to Quebec and Norway; and to the southern and western areas of the United States.
Sandstone	New Richmond	5 - 35	
Dolomite	Onyota	<u>100 - 170</u>	
		<u>135 255</u>	

The axis of the synclinal trough, in which the strata of the Ordovician system lie, extends from the Twin Cities into north-central Iowa, where the syncline gradually widens, flattens and disappears to the south. One or more secondary structures, both regional and local occur east of New Ulm, near Zumbrota, and northeast of Northfield, and west of Belle Plaine.

There is no important stratigraphic break between the Ordovician system and the underlying Cambrian system in the upper Mississippi River valley; nor between the Shakopee beds and the underlying Onyota beds.

Gradational zones exist between formations in which mixtures or reworked materials exist; and in which there may be silt, clay, sand lenses, conglomerates, and iron-cemented layers.

Notice that the Ordovician formations were deposited as a distinctive biochemical, lime-forming group or system.

COLUMNAR SECTION

Ordovician system.

1. Maquoketa shales have their type section at outcrops along the Little Maquoketa River near Dubuque, Iowa. They extend northward to just beyond the Iowa line at Spring Valley, Fillmore County, Minnesota.

2. Galena limestone is subdivided into beds called;

Prosser, light-gray, well-bedded limestone, with cherts, shales, and shaly limestones, and some magnesium. The bed has the same fossils as the Red River beds of northwestern Minnesota, and the Winnipeg quarries.

Stewartville dolomite, the type section at Stewartville in Olmstead County, Minnesota, and extends to Dubuque, Iowa. It is a gray-tan magnesium limestone. Fossils are abundant, particularly the Maclurites gastropods which are similar to those of Manitoba, upper Michigan, Whitewood South Dakota, and the Big Horn of Wyoming.

Dubuque dolomite, with a type section near Dubuque. It is not in Minnesota.

3. Decorah is a shaly, pyritic limestone with its type section at Decorah, Iowa. The formation has greenish shales with calcareous beds, and is usually soft. Near the base are brick-sized, marble-like, crystalline beds. Fossil mollusks and gastropods are plentiful.

Platteville limestone is a light-blue rock, turning to gray or buff where it has been oxidized or impregnated by water. At the base of this limestone, 16 inches below the Decorah, is a 3-inch bentonite ash bed. The lower 3 to 5 feet is a green fossiliferous, clay bed. The main upper layered beds contain fossil bryozoa mollusks, gastropods and pelecypods, and the lower three feet has 3-inch and 5-foot cephalopods. Some of the beds are phosphatic; some with thin layers, separated by clay or magnesium oxide; some are fine-grained and compact, and some are rock mud.

5. St. Peter sandstone is a white quartz with medium-sized grains, cemented with silica, and stained with red iron oxide. Massive in the lower beds, often with case-hardened surfaces, and often with weathered thin-layered beds. Lower layer may be clayey. The type locality is in the old St. Peter River valley at Fort Snelling. It was deposited in salt water seas from the south, on the underlying Shakopee dolomite; but there was a long erosion period of the Shakopee. In northern Illinois the Shakopee was entirely eroded; and the St. Peter is over 300 feet thick, and rests on the Jordan sand. The erosion of the Shakopee in Minnesota was not large, but where the Shakopee is thin, the St. Peter is thick, so that the sum of the two thicknesses is about 295 feet. There are no fossils in pure sandstone, but an occasional fossil of the Platteville is found in a clayey or limey upper bed. At the close of the St. Peter deposition, the sea withdrew and the oncoming Platteville overlapped the St. Peter.

The purity of the St. Peter sand grains is such that, except near the exposed faces or near the shaly base, the sand is readily used by Ford Motor Company at its St. Paul factory for the shatter-proof glass of Ford automobiles.

ROCK FORMATIONS

In the Twin City syncline

<u>Ordovician system</u>	<u>Thickness</u>	<u>Fossils</u>
Galepa limestone	50 feet	Abundant
Decorah shale with limestone layers	80	Abundant
Platteville buff-gray limestone	35	In upper layers
St. Peter white sandstone	165	None
Shakopee calcium-magnesium dolomite	135	Few and poor
<u>Cambrian system</u>		
Jordan coarse sandstone	90 feet	None
St. Lawrence dolomite and sand	160	In lodi shale bed
Franconia micaceous sandstone	85	Few; distributed
Dresbach sandy glauconitic shales	155	Almost none
Hinckley coarse, pink sandstone	220	None
Red clastic red, sandy shales	1000	None

Galena limestone and Decorah shales extend under most of the residence district of St. Paul and west of St. Paul. They outcrop along the bank of the Mississippi River between Mendota and Cherokee Park, St. Paul. Decorah shales outcrop above the river boulevard in St. Paul, and between the Twin City lock and dam and Franklin Avenue in Minneapolis.

Platteville limestone extends as far as one mile north of the northeast city limits in Minneapolis; southeast of White Bear Lake; west to Lake Minnetonka; eastward to within two miles of Hudson; and to a line ten miles south of the 45th parallel of latitude. It outcrops along the Mississippi River gorge from St. Anthony Falls to Fort Snelling and eastward thru St. Paul to Indian Mound Park.

St. Peter sandstone is exposed at Camden Place in north Minneapolis, and in northeast Minneapolis; also along the Mississippi River, below the Platteville limestone, from St. Anthony Falls to Newport.

Shakopee dolomite is well exposed at Shakopee, Savage, Pine Bend, Newport, Hastings, Eggleston, Stillwater, and particularly Burkhart.

Jordan sandstone is well exposed at the town of Jordan; in the river banks above the Hastings pool; and at Stillwater and Eggleston.

St. Lawrence green, glauconitic dolomite is well exposed in the township of St. Lawrence, six miles southwest of Carver, or three miles west of Jordan; also at Hudson, Stillwater and Marine, and up to Taylors Falls.

Franconia sandstone outcrops at Franconia, two miles southwest of Taylors Falls, on the St. Croix River, and near Hudson.

Dresbach sandy shales outcrop at Dresbach on the Mississippi near La Crosse. They rest directly on the Keewenawan lava flows at exposures below the St. Croix Falls hydroelectric station at Taylors Falls, and along the St. Croix River.

Hinckley sandstone outcrops at Hinckley, and in the sandstone quarries along the Kettle River, but underlies all of the southeastern part of Minnesota.

Red Clastic shales are a fresh-water formation derived from the erosion of the southwest side of the Keewenawan lava flows. They are under the Hinckley sandstone and rest on the granite of southeastern Minnesota, but not in western Wisconsin.