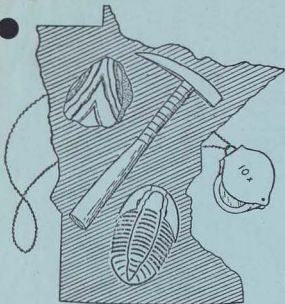


March - April 1970



**Geological Society  
of Minnesota**

# NEWS



**Geological Society of Minnesota**

Marcia Gunville, editor  
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FIRST CLASS

RETURN REQUESTED

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Taken from The Christian Science Monitor

## Earth 3 billion years ago looked like another planet

By David F. Salisbury  
Staff writer of  
The Christian Science Monitor

No large continents . . . no polar ice caps . . . perhaps 20 "micro continents" and many small seas. To visit the earth three billion years ago, the time when scientists think life began, would be like visiting another planet.

Scientists now have pasted together a general outline of the events which they think happened at that time, drawing on the fruits of a scientific revolution in the field of geology, the steadily growing knowledge of the chemistry of living things, and the development of techniques to study microscopic fossils.

The scenario of small continents and seas is the work of Dr. Kevin Burke, a geologist at the State University of New York at Albany.

"At that time there should have been far more shoreline, which is a favored location for the development of life," says the geologist.

More important to life than this, however, was the make-up of the early atmosphere. Geological evidence suggests that this would have been poisonous to animals living today. It appears to have consisted of methane, ammonia, hydrogen, carbon dioxide, and nitrogen.

Such a mixture had characteristics vital to the development of life, scientists feel. Since 1950, laboratory experiments have revealed that the organic chemicals essential to life could form spontaneously. Ultraviolet light from the sun and bolts of lightning should have synthesized amino acids, sugars, and complicated molecules basic to DNA, the master molecule of heredity.

"Organic matter must have rained from the sky, and collected in hollows as a thickening soup. Then, somewhere, somehow, the soup began to go bad and the first organisms crawled out," says Dr. Leslie Orgel of the Salk Institute.

How life began is still a mystery. Dr. Orgel feels that somehow large chemicals must have been produced which could duplicate themselves. From these chemical "missing links" the genetic code was created. It is a problem which "no one really is tackling," he says.

However it began, the first creatures must have been microscopic and single-celled, scientists agree. Initially these living things probably were unable to make the chemicals they needed, says Dr. Lynn Margulis of Boston University. They must have fed on the organic stuff which had been accumulating for millions of years.

The second crucial step was developing the ability to make essential organics out of the common materials at hand. Today some types of bacteria are the only life forms which can make all the chemicals they need.

The closest present-day parallels to that ancient landscape are parts of Yellowstone National Park, says Dr. Margulis. The jewel-colored hot springs there are dyed by millions of bacteria similar to those she thinks ruled the world in times past. The soil itself is stained and formed into bizarre shapes by bacterial action.

It was around that early time that another microscopic revolution took place. Ancient bacteria developed the ability to capture sunlight and convert it into chemical energy. Recently, Dr. Walther Stoeckenius of the University of California at San Francisco worked out the details of a primitive light-capturing system used by a kind of bacteria living today.

The earliest evidence that cells had developed this ability are the "lost cities of the blue-green algae." So Dr. Margulis describes convoluted and minutely layered structures called stromatolites. The earliest of these has been dated as more than 2.8 billion years old, says James W. Schopf of the University of California at Los Angeles.

The ability to capture light had an important side effect. It gave off oxygen, the world's first pollutant. Gradually the whole atmosphere was changed by the activities of the thin, living scum which covered the face of the planet.

It was perhaps this change which led to the development of the larger cells with nuclei, scientists speculate. These cells seem to be assembled from a number of different distinct parts. One of these parts neutralizes oxygen and changes it into a form the cell can use.

The development of these advanced cells appears to have taken place between 1.3 to 1.5 billion years ago, says Dr. Schopf. This set the stage for sexual reproduction which is ultimately to the development of more complex forms of life, made up of millions of cells.

G.S.M. TO HAVE BOOTH AT BROOKDALE SHOW

The G.S.M. has been invited to have a display booth at the Minnesota Mineral Club's Annual Show April 24-25 at the Brookdale Shopping Center. Hours are from 9:30 a.m. - 5:30 p.m. on Saturday and from 12:00 m. - 6 p.m. on Sunday. Traditionally, this is an interesting event. Plan to attend and to see our display.

LAB SESSION SCHEDULED APR. 5

Dr. Jack Brownstein is planning a lab session for the G.S.M. Monday, April 5, at 7:30 p.m. at St. Thomas College. Members will meet in Room 2 or 38 Magnus Hall. The building is situated to the right of the archway, facing Summit Ave., and has a greenhouse attached. It is important to be on time as the group will transfer to another location for a film showing.

WORKSHOP TO BE G.S.M. NEW EVENT

Plans are being made for a new event on the G.S.M. calendar. A one-day workshop for all members, but especially those wishing to enlarge their background on basic geology, is now being organized by the Board of Directors. A number of different topics will be presented by knowledgeable members of the Society.

The day-long workshop will be held on Saturday, May 22, at St. Luke's School, 1065 Summit Ave. (Lexington and Summit) St. Paul. Further announcements will be made at meetings and at the banquet. Call Sr. Joan Kain (225-3000) if you wish more information.

DR. SLOAN SCHEDULED AS U OF M EXTENSION SAMPLER LECTURE

Dr. Robert Sloan will lecture on "How Dinosaurs Became Extinct" as part of the U of M Extension Sampler program. The lecture is part of his regular Spring Quarter Extension course in Historical Geology, but has been selected as one of a special series to give people a taste of University classes. Cost of the single lecture is \$1., and to people over 60 there is no charge. Preregistration is required.

Dr. Sloan's sampler lecture will be held on Tues., May 11, from 6:20 to 8 p.m. at 110 Pillsbury Hall, U of M. Registration may be made by rail to University Sampler, 202 Westbrook Hall, U of M., Mpls., Mn. 55455. or you may register in person between 7:45 a.m. and 4:30 p.m., Monday - Friday. Call 373-3039 for more information.

This would be a good opportunity to hear Dr. Sloan speak. He has agreed to be one of the lecturers on the G.S.M. program next year.

SPRING BANQUET TO CONCLUDE 1975-76 LECTURE SERIES



The 1976 Geological Society of Minnesota Spring Banquet is planned at Fair Oaks Motel, Minneapolis.

The DATE: April 26, 1976. The HOUR: 6:30 P.M.

The ADDRESS: Fair Oaks Motel & Restaurant  
2335 5rd Ave. So., Minneapolis

The COST: \$6.00 per person

The MENU: You may choose - Chicken or Beef



Members are urged to make reservations early. Only paid reservations will be accepted. Reservations must be in by April 19, 1976. Checks should be made payable to the Geological Society of Minnesota and sent to Mrs. Myrtle Fore, 4356 30th Ave. So., Minneapolis, Minn. 55406

The program will be Mr. F. Merle Harris, Professor in General College, University of Minnesota, who will be speaking on Minnesota's State Parks. This talk will serve as an introduction for next fall's lecture series.

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G. S. M. Spring Banquet

Fair Oaks Motel & Restaurant  
2335 5rd Ave. So. Minneapolis  
April 26, 1976 at 6:30 P.M.

Mail to: Mrs. Myrtle Fore  
4356 30th Ave. So.  
Minneapolis, Minn. 55406

Reservations; Name \_\_\_\_\_ (check one) Chicken \_\_\_\_\_ Beef \_\_\_\_\_ Cost \_\_\_\_\_

Name \_\_\_\_\_

Guest \_\_\_\_\_

Totals: \_\_\_\_\_

Your Name \_\_\_\_\_ Address \_\_\_\_\_ Tel.no. \_\_\_\_\_

Zip Code \_\_\_\_\_

Please use reverse side if necessary.

ANNUAL FINANCIAL STATEMENT 12-31-74 to 12-31-75

INCOME

Dues	803.00	
Field Trips	54.00	
Banquet	418.00	
Coffee	<u>25.00</u>	
		1300.00

EXPENSES

Bank Costs	3.00	
Membership	61.45	
Program		
Lectures	419.75	
Programs	153.70	
Field Trips	71.82	
Public Service	6.65	
Banquet	428.95	
Misc.Social	6.10	
Displays & Shows	7.00	
Newsletter	<u>225.58</u>	
		<u>1384.00</u>
		84.00

DEFICIT

Balance Checking Account	826.20
Balance Savings Account(1 year @ 6½% ) interest \$149.06	2337.45
Balance Savings Account(90 day @ 5.75%) interest 32.12	<u>567.46</u>
	3731.11

## In Memoriam

The G.S.M. lost one of its old and valued members with the death of Lawrence King on March 16. For many years Mr. King was a leading figure in the activities of our organization. His keen interest in the Society led him to serve in many capacities. He is one of our past presidents, and an organizer of some of the field trips. Years ago he led a trip to the Tetons still remembered by many of our long-time members. This is the area revisited by our group last summer.

One of Lawrence King's lasting contributions is his spearheading of the geologic plaque project, resulting in the many markers now set up around the state. He not only chaired the G.S.M. committee handling this project, but wrote some of the texts which were used. Also memorable were the many fine annual picnics he and Mrs. King hosted at their summer home on the St. Croix River.

Memorial services were held for Mr. King, who was 89 years old, on March 18 at Lakewood Cemetery. He is survived by a son, Ware G. King, of Laramie, Wyo., by 5 grandchildren and 2 great grandchildren. A granddaughter, Mrs. Virgil Jons, lives at 333 Warwick, St. Paul.

### FIELD TRIP SEASON IS COMING

Summer is the time the G.S.M. looks forward to field trips, and Bob Gunville, committee chairman, is busy organizing some stimulating ones. Sign-up sheets are being posted at meetings and at the banquet. These indicate only your interest and do not commit you to going. Your name must be on the list if you wish to be called about arrangements.

TAYLOR'S FALLS In early June Dr. Paul Farnham, St. Thomas College, will lead a one-day trip to the Taylor's Falls area. This beautiful section of the St. Croix River Valley has a special geologic story to tell, and we look forward to hearing it from Dr. Farnham.

SOUTHWESTERN MINNESOTA - PIPESTONE The glacial geology of this part of Minnesota has been studied carefully by Dr. C. L. Matsch, U.M.D., and he has agreed to lead the G.S.M. here on a two-day bus trip in late August or early September. Those of us who went to Southwestern Minnesota with Dr. Matsch in 1973 know that his intimate knowledge of this area and his exciting presentation will give us a memorable learning experience. He has promised to continue his story with further field evidence in new places, and will include stops to see the Pipestone-Sioux Quartzite deposits.

NORTHWOODS AUDUBON CENTER Again this year we will have an opportunity to spend a glorious fall weekend at the Northwoods Audubon Center near Sandstone. On Sept. 25-26 Mike and Jane Link will provide us with food, accommodations, and the story of Pine County's soils and plant life as affected by the area's geology.

UPPER MICHIGAN - Keweenaw Peninsula Bob Gunville is contemplating organizing a three day bus trip to this very interesting area. He would like to know if enough people would like such a trip to make planning and securing a leader worthwhile. Please express your possible desire by putting your name on the sign-up sheet, or call Bob at 574-1421.



# People in the Spotlight

DR. KIRKWOOD BEATFIELD

by Barbara Lundgren

Dr. Samuel Kirkwood, our fall lecturer, was featured in a recent Mpls. Sunday Tribune article. The story, written by Ron Schara, told of Dr. Kirkwood's experiences hunting in Russia. Dr. Kirkwood was in Russia for a year on an exchange program and got involved in a hunting club while there. In talking of his experiences, Dr. Kirkwood mentioned that in Russia "The emphasis is on the hunting, not the shooting. Driving big game is absolutely frowned upon." He also mentioned there are no restrictions on owning a shotgun or ammunition, though both are very expensive. He said the average Soviet citizen can and does go hunting exactly the same as does the U.S. citizen.

Aside from his rare peek at Soviet hunting, Kirkwood also crossed another barrier. He obtained a pair of Soviet Irish Setters, a breed that has been totally separated from the western breeds of the same dog for more than a century. "The big difference is that the Soviet Irish Setter is still an excellent hunting dog," Kirkwood said. The reason, he said, is that the Russians have maintained both field trials and show ring requirements to have a champion. In the U.S. these are separate.

Dr. Kirkwood said that hunting seasons and limits are set by the Ministry of Agriculture and are rigidly enforced. A hunting license is required and if a hunter lives in Moscow he must join a Club. Dr. Kirkwood felt this was probably for safety reasons, to be sure hunters know how to handle firearms.

2nd St.	1 to 21		1 to 1		
Wash. Ave.		2	3		
3rd St.					
4th St.	4		5	6 7	
5th St.	8	9		10	11
6th St.	14		13		12
				15	
7th St.				16	
			18	17	
8th St.					
9th St.	19				
10th St.			to 20		
St. Henn. Ave.	Nic. Mall	Marquette	2nd Ave.	3rd Ave.	4th Ave.

1. Main Post Office-St. Cloud Gray Granite, Mankato Dolomite
2. Federal Reserve Bank St. Cloud Gray Granite
3. I.B.M. Bldg.-St. Cloud Granites Rockford (St. Cloud) Pink Granite
4. Minneapolis Public Library Rockford (St. Cloud) Pink Granite
5. Federal Courts Building St. Cloud Gray Granite Rockford (St. Cloud) Pink Granite
6. Minn. Dept. of Employment Services Ortonville Granite
7. Public Health Center-Morton Gneiss
8. N.S.P. Building Isle Gray Granite, Mankato Dolomite
9. Power's Dept. Store-Morton Gneiss
10. N.W. Bell Telephone Co. Morton Gneiss, Mankato Dolomite
11. Court House-Milbank Granite
12. Government Center-Milbank Granite
13. Skyway to 1st National Bank Complex Fond du Lac Sandstone
14. Nicollet Mall Bldg.-St. Cloud Red Granite
15. Pillsbury Bldg.-Rockford (St. Cloud) Pink Granite, split field stones
16. North Star Inn Isle Gray Granite, split field stones
17. Baker Bldg.-Morton Gneiss
18. Roanoke Bldg.-Isle Gray Granite
19. Nicollet Arcade-split field stones
20. Westminster Presbyterian Church Platteville Limestone
21. Great Northern Depot Hinckley Sandstone

Reprinted from the North Star, the monthly newsletter received by leaders and other adults in the Minneapolis Council of Camp Fire Girls, ~~continued~~ from the last issue.

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#EXPLORE YOUR ENVIRONMENT#  
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Marcia Gunville

Stones are interesting to look at and some people like to collect them. Builders employ them to construct useful things. Geologists study them to unlock the secrets of the earth's history.

Minnesota rocks are used for all these purposes, and many of the stone facings on the buildings of downtown Minneapolis represent different segments of the past, going back in time almost as far as the planet's beginning. Learning to recognize and appreciate these building stones, and the long period of time they represent, can become much like learning to read a book.

Rocks formed during the first 2½ billion years of Minnesota's history (4.0-1.6 billion years ago) are common on Minneapolis downtown buildings. The Minnesota River Valley rocks and the St. Cloud granites are very old. They were described last month, along with some of the information known about the periods of their formation. This month the story will continue with Minnesota rocks formed at later times.

#### Fond du Lac and Hinckley Sandstones

The next series of building stones are much younger, about 800 million years old. They were formed in eastern Minnesota following a remarkable series of geologic events which earlier had occurred in the Lake Superior region, adjacent to the site these rocks would occupy.

About 1200 million years ago the earth's crust apparently started to pull apart gradually along a narrow belt extending from Lake Superior to as far south as Kansas. Today it appears to some geologists that a slow splitting of the land mass had begun to take place, much like the African continent now is splitting down the African Rift Zone and the sea floor is splitting down the Mid-Atlantic Ridge. For some reason this early movement toward separation did not continue, but it did create some interesting geologic formations.

During this time lava intermittently erupted from fissures created in the zones of weakness along this narrow belt. Flow piled upon flow until over time, the lava accumulated to a thickness of several thousand feet of basalt. Molten rock materials were intruded into existing rock structures but they did not reach the surface of the land. They slowly cooled deep underground to form the dark gray, crystalline rock called gabbro. At Duluth and along Lake Superior's North Shore we find dark, massive rocks resulting from this period of activity. Sags and folds occurred in the rocks of the crust during this long period of time, and the basin which contains Lake Superior began to form.

As this zone of separation was closing and adjustments to the new situation were made, several movements of the earth's crust took place in the vicinity of eastern Minnesota. Certain areas stood high, others were low. Rivers carrying sediments from high areas deposited these sediments in low areas of East-Central Minnesota, probably in fan-shaped patterns of streams similar to those of deltas. The sands moved along by these streams created series of crossbedded laminations as they were laid down. In some places waves on water left ripples in the sand. These sediments later became cemented into the very hard Fond du Lac and Hinckley sandstones, with crossbedding and ripple marks still found in them today.

These East-Central Minnesota sandstones have been quarried for building purposes. In downtown Minneapolis you can see a fine example of the bright red Fond du Lac Sandstone at the base of the skyway from the Farmers and Mechanics Bank to the First National Bank Complex, crossing Marquette Ave. between 5th and 6th streets. It formerly was the entryway of a building next to the Soo Line Building. The Hinckley Sandstone is used on the upper portion of the Baker Building (7th St. and 2nd Ave. So.). One of the best places to examine the Hinckley Sandstone is on the walls of

the Great Northern Depot, where you can see the crossbedded patterns made by grains of sand as they moved along in running water prior to deposition and hardening into rock.

#### Nankato Dolomite and Platteville Limestone

Later, the North American continent went through an extended period of time when shallow seas repeatedly invaded and retreated from the land mass. At the bottom of these seas sediments accumulated in great thicknesses. Life first appeared on earth in abundance at about this time, and its evolution is recorded in the fossil records contained in these sediments as over time, the continental seas recurred.

At times these seas encroached as far inland as Minnesota where they left deposits of mud, sand and lime. Later these deposits became hardened into the shales, sandstones, limestones and dolomites (similar to limestone but containing some magnesium) found as much of the bedrock of the state.

Some Minnesota rocks formed from these sediments about 500 million years ago have been used on downtown Minneapolis buildings. Dolomite from the Nankato area makes up the yellowish upper portions of the Main Post Office, the Northern States Power Company (4th St. and Nicollet Mall), and the Northwestern Bell Telephone Company (224 S. 5th St.). The Telephone Company Building was built in older and newer sections, and the two periods of weathering have made the dolomite different shades of color. Platteville Limestone has been used for Westminster Presbyterian Church (35 S. 12th St.). This limestone is one of the types of bedrock found in the area of the Twin Cities.

#### Glacial Boulders

One of Minnesota's most recent geologic events, taking place from about 2 million to 10,000 years ago, was the invasion of continental glaciers. These glaciers brought with them boulders, soils, sands and muds from northern areas and deposited them here. Rocks and boulders were smoothed and rounded by being pounded and dragged along their routes. Rounded boulders typical of those transported by glaciers have been broken and cemented into decorative walls of split field stones outside the Nicollet Arcade (920 Nicollet Mall) and between the Pillsbury Building and the North Star Inn (2nd Ave. S. and 6th St.).

#### Nicollet Mall

Minneapolitans are justifiably proud of their downtown Nicollet Mall. Part of the reason it is so pleasing is because some of the attractive Minnesota rocks discussed here have been used to decorate it. You can recognize the St. Cloud Gray Granite on the walls of the bus shelters, and the vertical slabs of Rockville (St. Cloud) Pink Granite made into a display piece in front of Power's Department Store. Some of the same stones that were used on downtown buildings have been placed on the tops of the planters up and down the Mall, picked so their coloring will blend in with their surroundings. And inside the mall of the Midwest Federal Plaza (going between 801 Nicollet Ave. and Marquette Ave.) is a block of stone decorated by a tree carved in relief, the same handsome stone chosen for the entire Government Center Building.

Perhaps you would like to design a field trip through downtown Minneapolis for a close-up look at some of Minnesota's interesting rocks. Use this map and chart to help you set up a route.