



THE MINNESOTA GEOLOGIST

OFFICIAL BULLETIN
OF

THE GEOLOGICAL SOCIETY OF MINNESOTA

Vol V

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NO 5

THEY SAY
THE SOLID EARTH WHEREON WE TREAD

IN TRACTS OF FLUENT HEAT BEGAN,
AND GREW TO SEEMING-RANDOM FORMS,
THE SEEMING PREY OF CYCLIC STORMS,
TILL AT THE LAST AROSE THE MAN.

Tennyson, "In Memoriam"

G E O L O G I C A L S O C I E T Y O F M I N N E S O T A

831 SECOND AVENUE SOUTH
MINNEAPOLIS 2, MINNESOTA

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

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MEMBER

MIDWEST FEDERATION OF GEOLOGICAL SOCIETIES



Foreword

For nearly five years the MINNESOTA GEOLOGIST has flourished and grown under the guidance and capable leadership of our Editor, Alger R. Syme. Now as the Bulletin approaches its fifth birthday we are sorry indeed, to have to report that our Editor while flying to Detroit a month ago, was stricken with a heart attack and had to be flown back to Milwaukee Wis. He is still at Columbia Hospital in Milwaukee but expects to come home soon.

It is with some misgiving and trepidation that your assistant Editor has agreed to assume the responsibility of the September issue, for it is the first time in the past five years that the Bulletin has gone to press without the Editor's personal supervision and handling.

We shall do our very best to make this issue come as close as possible to the high standards established for us and trust that the "CHIEF" will be back in the drivers seat in time to publish the November issue of the Bulletin.

To you, ALGER SYME, a speedy recovery and a pleasant convalescence.

LORETTA E. KOPPEN,

Asst. Editor.

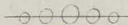
LECTURES : In the spring when the field trip season starts we feel that this is the most perfect time of year. However, after a summer of putting our classroom knowledge to practical use in the field, we again recognize the importance of the fall and winter lecture season. We feel extremely fortunate that Dr. W. C. Bell of the Geology Department at the University of Minnesota has kindly agreed to conduct a series of 17 lectures on Historical Geology beginning Monday evening, October 18, at 7:30 PM in the main auditorium on the 4th floor of the Minneapolis Public Library.

TEXT BOOK : While many of our members have a text book on Historical Geology and know the wealth of enjoyment and appreciation derived from its use, it occurred to us that many of our newer members may not have such a book and would want to secure one before the time of the first lecture. In discussing the matter with Dr. Bell, he informed us that "Historical Geology" by Russell C. Hussey is not only less expensive than most text books on this subject, but that it is very well illustrated and not too technical for the amateur geologist. He also assured us that he plans to adhere very closely to this text in his course of lectures.

SCHLINDER : The course on Invertebrate Paleontology to be given by Dr. W. C. Bell will begin on Wednesday September 29th at 6:20 PM in room 20, Pillsbury Hall (Geology Building), University of Minnesota. Registration for this class must be made before that date. You may register by mail or at Nicholson Hall at the University, or at 690 Northwestern Bank building. This class will be limited to 25.

MR. CLARK D. SCHMIDT : Only recently we learned that Mr. Schmidt, one of our most enthusiastic members has been confined to Veterans Hospital since early last spring. Why not send him a card or letter sometime within the next day or two. And if your schedule permits, stop out and see him during visiting hours. It would mean so much to him. Send his mail to Veterans Hospital, Building 6, Minneapolis 17. Visiting days are Tuesdays, Thursdays, Saturdays and Sundays, and visiting hours are 3:30 to 5:00 PM and 7:00 to 8:30 PM.

IN APPRECIATION : When Daniel Boone was asked if he had ever been lost he replied reflectively, "No, but I was bewildered once for three days". This statement took on a new meaning as I surveyed the innumerable tasks that Mr. Syme has been doing for the Geological Society as well as the Midwest Federation of Geological Societies. How anyone could get all these things done and still work at ones profession as effectively as he has been doing was bewildering indeed. Publishing the Bulletin entails such tasks as assembling and editing material, drafting copies, sometimes over and over, stenciling and mimeographing, plus assembling the copies, stapling, stamping, addressing and mailing. This in addition to working with the field trips committee in getting out notices, acting as legal advisor for the Society and serving as a director are some of the things he has been doing in an unobtrusive manner for a number of years. I wish to take this opportunity to thank our President, Mr. Hal B. McWoody, Mrs. Mary Lupiont, Miss Theodora Holonc, Mr. R. Raschke of the Montana Dakota Utilities Co. and Mr. E. L. Koppen for their cooperation and assistance in carrying out some of these tasks.



Activities

Once again our field trip season is drawing to a close, but what a grand program of field trips we have been carrying out this summer. The credit for planning and arranging goes to Miss Theodora Melone and her field trips committee. We have had ten excellent trips to date, with a proper breathing spell between each of them. Our committee has been fortunate in securing such leaders as Dr. George A. Thiel, Chairman of the Department of Geology of the University of Minnesota, Dr. George M. Schwartz, Director of the Minnesota Geological Survey, and Drs. F. M. Swain, H. E. Wright, W. C. Bell and Lynn Gardiner, all of the Geology department at the University of Minnesota. Dr. E. F. Bean, Wisconsin State Geologist, will conduct our final field trip of the season to Alma Center, Wisconsin on October 10th. Five of our non-professional but qualified members have also lead trips this summer. They are : Mr. Charles Preston, Dr. Mandell, Miss Hinchley, (Mrs.) Linda Bennitt, and (Mrs.) Loretta Koppen. The weather has been superb with but one exception ; that was at Hastings on August 29th when Jupiter Pluvius caught us in a fault. There was no immediate retreat or shelter ; and he did pour down rain. The warm welcome at Apple Acres with the Bennitts as hosts and Mrs. Bennitt in her concise, well illustrated lecture changed all the faults, horsts, and grabens into understandable realities. What a live, eager group of members our leaders have to work with. We take this interest for granted, but our guests are amazed at it. Our average attendance so far this year has been forty four.

And now our Geological Society enters upon it's fall and winter activities. Two excellent field trips remain for our profitable study and enjoyment, and on October 18th Dr. W. C. Bull is to start his series of seventeen lectures on the earth's Geological History. We are thus assured of an excellent program for the winter in which every member, new and old, will wish to participate.

Other activities which I believe we shall wish to push to completion this winter are :

1. Cooperate with the Minneapolis Public Library in the formation and placing therein of a fairly comprehensive exhibit of Minnesota rocks and minerals - Miss Elsie Hinchley, Chairman.
2. Assemble Geological tray exhibits suitable for public school use, Mrs. A. D. Cornies, Chairman.
3. Make a catalogue record for membership use of Burch Library on Geological subjects (this work is practically complete), Miss Lucille Hunter, Chairman.
4. Catalogue the 70 three dimensional models prepared by Mr. Burch and build suitable mountings for a number of these for exhibition purposes, Jos. W. Zelusky, Elmer H. Brown and Dr. L. O. Dart, committee.

Most of our members know of Mr. Symes illness. He will be temporarily incapacitated as our editor-in-chief. Quite needless to say we are missing his active participation in our affairs, and we are looking forward to his speedy recovery. We are fortunate however, in having a Secretary who has the ability and willingness to carry on with the publication of this issue of the Bulletin.

Hats off to Mrs. Koppen.

Hal E. McWethy, President.



CAVES IN LIMESTONE NEAR YELLOWTAIL DAMSITE

WHEN PURE LIMESTONE IS ATTACKED BY PERCOLATING GROUND WATER THE WHOLE ROCK IS SOLUBLE AND NOTHING REMAINS TO FILL THE SPACES WHERE THE STRATA HAS BEEN DISSOLVED. MOST OF THE MINERAL MATTER DEPOSITED IN CAVES IS CALCIUM CARBONATE. IT ASSUMES VARIOUS FORMS, AMONG THEM THE STALACTITES WHICH ARE ATTACHED TO THE ROOF OF THE CAVERN, AND THE STALAGMITES WHICH FORM ON THE FLOOR OF THE CAVERN AND BUILD UPWARD, FORMING MOUNDS AND PYRAMIDS ON THE LIMESTONE FLOOR. STALACTITES ASSUME MANY SHAPES, DETERMINED BY THE MANNER IN WHICH THE WATER TRICKLES OVER THEM AND BY THE AMOUNT OF WATER PRESENT. BEAUTIFUL AND VARIED FORMS FRINGED WITH CRYSTALS OF CALCITE AS SHOWN IN THE PICTURE, CURTAIN-LIKE DRAPERIES HANGING FROM THE ROOFS, GROTESQUE SHAPES THAT RISE FROM THE FLOORS, AND PILLARS ORNAMENTED WITH MANY VARIETIES OF SCULPTURE MAY BE OBSERVED IN THE SAME CAVERN.

CONVENTION OF MIDWEST FEDERATION OF GEOLOGICAL SOCIETIES

There is nothing unique or unusual about a convention. But when people from all walks of life, and from many states, meet for a convention and spend one third of their time under a broiling sun hunting for fossils in the strip mines of an Illinois coal company, it would seem that here was an eccentric group to be sure. But wait - let's not be hasty with our conclusions. This group of professional men and women, housewives and students are united by a common interest. Literally speaking, they are interested in examining "The Face of the Earth." For here we have people who can read more on the face of a rock than most folks could discover on the page of a book.

These people, members of an organization known as the Midwest Federation of Geological Societies, met in Chicago on August 21-23 of this year for the annual convention. The Federation, consisting of fifteen Societies, is chiefly interested in Geology, Mineralogy, and Paleontology for it's cultural value. Lapidary work also plays a most important part in this "hobby of hobbies."

The major part of the formalized program was held in the magnificent Chicago Museum of Natural History. It was truly a superb choice on the part of the host Society, the Chicago Rocks and Minerals Society. The Saturday morning session was devoted to a directors meeting, introductions, and a tour through the Museum conducted by Mr. M. Dalwig, deputy director of the Museum. In the afternoon the delegates were privileged to hear an interesting talk on "The Geology of the Chicago Area" by Mrs. Therron Wasson, and an illustrated lecture on "Pre-History and Geology of the Great Colorado Plateau" and "Canyons of the Southwest and Monument Valley" by Mr. Edwin Goff Cooke, well known lecturer and traveler.

On Saturday evening a banquet was served to approximately 125 delegates and guests. Dr. Gilbert Raasch, well known paleontologist, really made the guests "rock conscious" with his talk on "The Grass Roots of the Geological Science." Dr. Ben H. Wilson, Historian and past President of the Midwest Federation gave an interesting report on the annual convention of the National Federation of Mineralogical Societies which was held in Denver last June. Colonel Fain White King, well known traveler and collector, talked briefly on "Fluorites of the Kentucky-Illinois District." Upon the request of Mr. George C. Anderson, presiding officer, Society reports were given by delegates representing ten of the member Societies.

Sundays field trip to the strip mines was highlighted by a picnic lunch furnished by the host Society and a lecture on the "Geology of the Field Trip Area" by our good friend and lecturer, the inimitable Professor Frank L. Fleener. Many stayed over on Monday to attend some of the suggested tours. Everyone agreed that it had been a successful and enjoyable convention.

The new officers elected were as follows : President, Oscar A. Anderson, of the Illowa Rockhound Club. Vice President, Professor E. M. Lambert, of the Minnesota Mineral Club. Secretary, (Mrs.) E. Lillian Mihelcic, of the Michigan Mineralogical Society. Treasurer, Hubert W. Ward, of the Central Iowa Mineral Club. Historian, Dr. Ben H. Wilson, of the Joliet Mineralogists. Directors at large, Henry Aarnes, of the Heart of America Geological Society and Professor Frank L. Fleener of the Joliet Mineralogists. Members of the Council of the American Mineralogical Association, Alger R. Syme of the Geological Society of Minnesota and Ben H. Wilson of the Joliet Mineralogists. Alternate delegates, James O. Montague of the Wisconsin Geological Society and John F. Mihelcic of the Michigan Mineralogical Society.

The convention next year will be held in Davenport Iowa.

Loretta E. Koppen.

The mouth of the Baptism River is one of the most beautiful points along the Minnesota coast of Lake Superior and it is fortunate, indeed, that the Department of Conservation has been able to establish a park in this area to preserve this choice bit of shore for public use. This section of the coast has the great Palisades to the southwest and the Little Palisade to the east within the park boundary and is therefore somewhat more rugged than most of the coast.

The Baptism River has its headwaters far to the north and, as it drains about 135 square miles, sufficient water has flowed along its course to carve out a deep valley. The presence of glacial lake clays indicates that the valley existed before the last glaciation. The stream flows over rock ledges for much of its lower course and uneven resistance to erosion has led to the formation of several falls, rapids, and finally the pool at the mouth that is almost enclosed by rock cliffs.

For several miles in each direction from the mouth of the Baptism the coast is faced by almost continuous rock outcrops, mainly of lava flows of different kinds. These belong to the series of Keweenaw flows that extend from Duluth to Grand Portage and also on Keweenaw Point on the south shore of Lake Superior. It should be noted that these flows did not pour out of volcanoes but probably from great fissures located under the present site of Lake Superior.

The Great Palisades is composed of a dense red porphyritic rock apparently part of a very thick lava flow. If examined carefully the rock may be seen to consist of visible grains of quartz and red and white feldspar in a dense groundmass. It is properly called a rhyolite porphyry. The rock is conspicuously jointed, so that wave erosion maintains vertical cliffs, as the fractured blocks above fall in when those below are torn away by the waves.

Examination of the rock along the base of the cliff may be made only by boat. There it is found that the red flow is underlain by dark basalt flows with the usual amygdaloidal tops. Natural archways have been cut along the softer flows so that it is possible to row a boat entirely beneath the rock. Winchell called these "purgatories." Three separate flows may be recognized beneath the west end of the cliff but eastward the dip of the rhyolite brings it down below water level. It should be noted that all the lava flows dip gently toward Lake Superior.

The exposures of red lava flow continue east along the shore from Great Palisades a short distance and then a dark gray diabase intrusive lines the flat beach with a higher abandoned gravelly beach just inland. This diabase has about the same composition as the basalt lava flows but it was intruded into the pre-existing flows and cooled slowly. The diabase in turn gives way to a basalt flow for a short distance and then at a small, sharp point a diabase and granite dike cuts off the basalt flow with diabase continuing east of the dike. Just as the south park boundary basalt again makes up the rock around the small bay, but at the point south of the mouth of the river, the red rhyolite type of flow rock again appears and forms the shore outcrop and Little Palisades Cliff around to Crystal Bay.

The stretch of coast from the Great Palisades to Crystal Bay probably furnishes an excellent display of variation in the kind of rock in the outcrops as will be found along any similar length for the entire Minnesota coast. The lava flows alternate from dark basalts to light red rhyolite and these in turn were invaded by molten material to form dikes and sill-like intrusives.

At the mouth of the Baptism the low cliffs are composed of rhyolite but along the pool a basalt flow extends beneath the red flow and the basalt forms the rock outcrops back beneath the bridge of Highway 61. Three lava flows may be counted just west of the bridge with a diabase dike cutting across the rocks and

the river. For a distance of about 750 feet there occurs a complex of flows and broken rock or breccia with fragments of rhyolite, basalt, amygdaloidal basalt and boulders of anorthosite (feldspar). Mine flows have been counted from the bridge to a point just beyond the old bridge where the outcrops are lacking for a short distance upstream.

Along the south side of the river above the old bridge the bank is composed of conglomerate and shale which is, no doubt, interbedded with the lava flows although the contacts are not exposed. Upstream at a point nearly half a mile northwest of the highway bridge the river swings in a sharp horseshoe bend with high banks of red glacial lake clay. Beyond this bend to the northeast is a small outcrop of flow number 10 counting from the bridge.

The west side of the river is composed of a bluff of diabase with numerous anorthosite inclusions. The east bank has scattered outcrops of basalt flows (No. 11 and 12). From a point just north of the section line between sections 10 and 15, outcrops of lava flows line both banks of the river. It appears that flows 11 and 12 extend parallel to the river for some distance but flows 13 and 14 may be observed lying above 12 on the west side of the pool below the lower falls. The falls here are in three steps, the highest is over the hard portion of flow 13; the middle falls just above is over flow 14; and the upper over flow 15. The total drop is about 60 feet. These falls like those at Gooseberry State Park were formed by the wearing out of the soft amygdaloidal top of a lava flow causing the massive rock of the flow above to fall off developing a cliff.

Upstream from the lower falls the river continues over a rocky bed with a high hill of diabase containing anorthosite inclusions on the west side. Along the river flows 16, 17, and 18 are exposed in rapid succession opposite the diabase hill. The High Falls drop about 60 feet over a red rhyolite flow (No. 19) and this rock extends upstream for over a quarter of a mile and beyond the park boundary.

If the Baptism River is followed northward from the park boundary flows 19 and 20 are found within a short distance. At the north line of section 10 a network of red granite dikes cut the flows and a short distance above the river plunges 70 feet over a diabase dike to form Kettle Falls.

A dike is formed by molten material (magma) forcing its way in along a fracture in the pre-existing rock. Often, as at Kettle Falls the attitude is nearly vertical and thus a wall-like mass of very solid rock is formed. The river is ponded above by this rock and is not able to erode the softer rocks but below the dike erosion has cut away the less resistant lava flows up to the dike wall.

Flows 21, 22, and 23 occur immediately above and then outcrops end for some distance upstream. It is safe to say that there are not many places where 23 lava flows may be counted along a stream within a distance of two miles. During low water it is an enjoyable hike for anyone interested in geology.

East of the Baptism River the outcrops continue but it is possible to follow the shore for only a short distance until the big rhyolite flow of the Little Palisades is encountered. A red flow continues a short distance from the Baptism River mouth but is cut abruptly by a diabase dike which trends at right angles to the shore and forms a sharp but small point. To the east a second point projects parallel to it but is composed of basalt flow.

It is estimated that 11 or 12 flows occur along the shore here within a quarter of a mile. They dip beneath the rhyolite of Little Palisades, and the lake in accordance with the prevailing dip all along the north shore. If the south shore of Lake Superior or Keweenaw Point is examined similar lava flows will be found dipping to the north. Lake Superior therefore is a great depression in the rocks, or a syncline, as the geologist would say.

Another interesting point in this area is the high rock hill behind the Olgen Hotel. A trail winds to the top whence a marvelous view of the coast is obtained. After admiring the view and getting back to normal breathing the

explorer will note the excavation of the old Crystal Bay quarry where the anorthosite (feldspar) rock was once quarried, apparently under the impression that it was corundum. The rock on the way up to the tower is the familiar red rhyolite of the palisades but the hill where the quarry is located is composed of diabase with very large masses of anorthosite (practically pure feldspar rock) included within it. The anorthosite has large spots consisting of the mineral olivine with feldspar.

If space permitted other interesting geologic features could be described for the Baptism area but the explorer may take pleasure in finding these without help.

BULLETIN BOARD

FIELD TRIPS

SEPT. 26 - HANLATO AREA

Leaders - Loretta E. Koppen & Dr. L. O. Dart

OCT. 10 - ALMA CENTER & VICINITY

Leader - Dr. E. F. Bean, Wis. State Geologist

HISTORICAL GEOLOGY by DR. W. C. BELL

1948

LECTURES

MONDAY, OCT. 18	I	PRINCIPLES OF HISTORICAL GEOLOGY
MONDAY, OCT. 25	II	PRE-CAMBRIAN GEOLOGY
MONDAY, NOV. 1	III	CAMBRIAN GEOLOGY
MONDAY, NOV. 8	IV	CAMBRIAN GEOLOGY cont'd
MONDAY, NOV. 15	V	ORDOVICIAN GEOLOGY
MONDAY, NOV. 22	VI	ORDOVICIAN GEOLOGY cont'd
MONDAY, NOV. 29	VII	SILURIAN GEOLOGY
MONDAY, DEC. 6	VIII	DEVONIAN GEOLOGY
MONDAY, DEC. 13	IX	MISSISSIPPIAN GEOLOGY

A happy bus-load of geologists and pseudo-geologists, armed with hammers and clad in every kind of costume, set off early in the morning of June 12, to peek for a moment into the geological secrets of the Colorado Front Range. Our President, Mr. McWethy, came to see us off and how longingly he watched the bus pull out.

Mr. Chas. H. Preston, was our leader. He kept us alert to the structure and formations through which we passed until we reached the river-valley of the Platte, when Mr. Havill took over with group singing. After each stop we shifted seats so that unselfish members were not permanently over the rear axle, and as we scrambled in and out, stumbling over each other's feet or squeezing by some perennial loiterers in the aisle, our knowledge and our liking of each other grew.

On Sunday evening, June 13, we reached Denver, where the American Federation of Mineralogical Societies with it's amazingly beautiful exhibit of minerals was holding it's convention. So breath-takingly lovely were the displays that some of us nearly deserted the geological line and decided to turn mineralogists. However, on Monday morning we started off for Cripple Creek. But alas ; our grand Jefferson bus was valley-bred, and not even the expert Glenn, our much-liked driver, could make it take to mountain ways. All of us had to walk some of the time and some of us all of the time when the grade grew steep and the altitude neared the 10,000' mark. Still both the bus and we made it, though the climbing group grew smaller as panting members scrambled in at each pause of the bus.

Finally we reached the top and there, far below in a deep bowl in the mountains, lay the ghost town of Cripple Creek. The bowl is the phonolite core of an old volcano pierced by a later igneous intrusive, around and threaded through which lie the veins of gold. Under local leadership we circled the edge of the bowl past one abandoned mine after another, each with it's tremendous dump of yellow rock. A few mines are still being worked but for the most part this land, once a wild bonanza gold field, is now a ghost-land.

One last pushing of the bus and we were over the rim of the bowl and off for Canon City, several hours behind in our schedule. This tardiness provided one of the happiest experiences of the trip. While rolling swiftly through the dark foothills, the only light was that thrown by our headlights. Mr. Havill led us in familiar songs. A memorable time, indeed. Tuesday morning we drove over the not-too-steep roads to the Royal Gorge of the Arkansas, a vast cut through the pre-Cambrian complex. How futile seemed our little hammerings in the face of the sons we were looking back across.

Tuesday evening we drove back to Denver to attend a buffalo barbecue and a lecture in the Red Rock Amphitheatre, a triangular slope bounded by towering masses of deep red sandstone, steeply tilted by the upthrust that made the Front Range of the Rockies. The back of the stage is a looming cliff. As we sat before it under the stars it seemed only a Greek tragedy or the calls of the Valkyrie could fit such a setting though indeed the story of it's geologic history held a greater grandeur.

On Wednesday we spent the day in Denver. Many of us went to the museums and others attended the convention, where Mrs. Loretta Koppen spoke on the Mesabi Iron Range. We were proud, not only of her knowledge and her charts, but also to have our Society represented on the program.

Early Thursday morning we started out again. We lingered in Big Thompson Canyon with it's pegmatite exposures in the pre-Cambrian cliffs, then on to beautiful Deer Ridge Chalet. Here came the first split in the party.

Some elected to drive in a mountain-bred bus to the 12,000' Fall River Pass and thought the climax of the trip was the experience of rising above timberline into the land of rock and snow and flowers. The other half took a long ride on mousey burro. They ached with laughter over the burro that lay down to rest under his rider and the other that slid his big cavalier right over his neck into a brook. They voted the burro ride the climax. So everyone was happy.

Saturday morning we reluctantly started for home. As we crossed the long miles eastward Mrs. Linda Bennett took the megaphone at intervals to explain the methods and machinery that were being used to conserve the soil. She changed the landscape we were looking at to a part of a living and progressive America.

At Shakopee we reluctantly said goodbye to Mr. Preston. With him went our deep appreciation for the time, energy and ability spent in arranging this trip. It was a big job beautifully done, even to having local leaders at each side-trip, but his friendliness and bubbling humor, "where never is heard a discouraging word", were best of all. We thank you, Charles H. Preston.



GEOLOGICAL SOCIETY OF MINNESOTA
831 Second Avenue South
Minneapolis 2, Minnesota

APPLICATION FOR MEMBERSHIP

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