



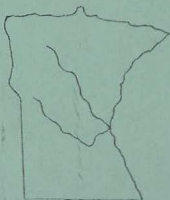
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G E O L O G I C A L S O C I E T Y O F M I N N E S O T A

831 SECOND AVENUE SOUTH
MINNEAPOLIS 2, MINNESOTA

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AND MINERALOGY FOR THEIR CULTURAL VALUE.

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MEMBER

MIDWEST FEDERATION OF GEOLOGICAL SOCIETIES



CONVENTION OF AMERICAN FEDERATION OF MINERALOGICAL SOCIETIES: The first annual convention of the National Association held at Denver, June 13th to 16th, was a great success from every standpoint. The number and quality of the exhibits were excellent. The programs were interesting and entertaining. The attendance was phenomenal and every detail had been perfectly planned and timed. There were over 1200 registered delegates from 45 States. Midwest Federation came close to having the largest attendance. Our own Minnesota Geological Society had 51 members there, and in general the Midwest Federation played a prominent part at the Convention. The noon luncheon on Tuesday was well attended. Talks were given by George C. Anderson, President of the Midwest Federation; Dr. A. H. Goddard of the Detroit Society, Mrs. Loretta E. Koppen, Secretary of the Midwest Federation, and Oscar A. Anderson, President of the Illowa Rockhounds Club. Mrs. Koppen described each step in the publication of a society bulletin, illustrating each with copies and illustrations drawn from the publication of our own bulletin. Her talk was exceptionally well received, and, possibly she will repeat it at the Midwest Federation Convention in Chicago. Mrs. Koppen also addressed a well attended meeting of the geology section on "THE MESABI IRON RANGE". Mrs. Helen Sommers acted as chairman of the meeting.

The convention gave us a fine opportunity to acquire excellent mineral specimens. However, perhaps the greatest benefit of a Convention of this kind is the opportunity to form friendships and acquaintances and to associate with people from all sections of the country, having a common interest, which, indeed, is a great privilege and well worth the effort. The highest praise is due Dr. Ben Hur Wilson, first President of the National Association, and to Dr. Richard M. Pearl, the Convention Chairman, for the splendid work that they did in organizing and conducting the Convention. We now look forward to the 1949 Convention, at Sacramento.

Officers elected for the following year are: Dr. Richard M. Pearl, President; Jack G. Streeter, Pasadena, Executive Vice President, and 1949 Convention Chairman; Alger R. Syme, Vice President, Chairman of Section of Geology; Arthur L. Flagg, Vice President, Phoenix, Chairman of Section of Mineralogy; James C. Montague, Milwaukee, Chairman of Section on Paleontology; Lloyd L. Roberson, Seattle, Vice President, Chairman of Section of Gems and Lapidary; Robert O. Dietrick, Oakland, Vice President, Chairman on Section of Dealers and Publications; Don Major, Tenino, Washington, Secretary and Chester R. Howard, Denver, Treasurer. Your Editor had the honor of incorporating the National Association under the laws of Minnesota, and acting as legal counsel for the Federation.

DENVER FIELD TRIP: 37 Members of our Society took the Bus trip of 3000 miles to Denver. This trip was the most successful Field Trip undertaken by the Society. Those who went have the highest praise for the Trip Leader, Past President, Charles H. Preston. Two days were spent at the Convention, and a most enjoyable time was had viewing the Royal Gorge, Cripple Creek, Rocky Mountain National Park, Estes Park, the Front Range of the Rockies, and many other points of geologic interest. We will give you a more detailed account in our next number.

MIDWEST FEDERATION CONVENTION will be held at the Field Museum in Chicago, August 21, 22 and 23, 1948. A special notice will be sent you on this Convention. If you intend to go, and we hope you all do, please see the Secretary, Mrs. Loretta E. Koppen for further information.

BULLETIN BOARD

Our FIELD TRIP SCHEDULE for this summer is, we can say without fear of contradiction, the very best one we have ever had, both with respect to the objectives and leadership. The schedule is not quite half completed, and you still have the opportunity of enjoying many fine trips. Following is our schedule for the remainder of the season:

- JULY 25, MISS NOERENBERG'S MINNETONKA ESTATE
Speaker - Dr. Edward H. Mandell
Subject - "The Geology of the State of New York"
- AUGUST 1, FOSSIL HUNT - AFTON and VICINITY
Leader - Prof. Wm. E. Bell
- AUGUST 15, FORD PLANT - GLASS SAND MINES
Leader - Miss Elsie Hinchley
- AUGUST 21, 22, 23 ANNUAL CONVENTION OF MIDWEST FEDERATION OF
GEOLOGICAL SOCIETIES
Field Museum - Chicago
- AUGUST 29, HASTINGS FAULTS and LOCKS
Leader - Mrs. Linda J. Benitt
- SEPTEMBER 11, 12 NORTH SHORE - LAKE SUPERIOR
Leader - Prof. George M. Schwartz
- SEPTEMBER 26, MANKATO AREA - KASOTA STONE, Etc.
Leader - Mrs. Loretta E. Koppen
- OCTOBER 10, ALMA CENTER, WHITE QUARTZITE (Bus Trip)
Leader - E. F. Bean, Ph.D.
Wisconsin State Geologist

So you're marrying an engineer from Mines . . . huh? Well, while you're packing, I'll tell you my story. You see, I married an engineer too . . . geological. Tch, tch, my dear, don't pack those formals and dinner dresses . . . remember? . . . it's an engineer you're "hitchin'." Now, in place of those fancy things, I'd suggest jeans, slacks, and if you're coming to my part of the country, frontier or saddle pants. Oh yes, I was going to tell you my story. I just got so interested in your packing, I clear forgot.

Hey, you won't need all those fancy pots and pans. By this time next year, you'll be so skilled serving dinners, and, I mean everything from soup to nuts, out of one kettle, you won't need all of those anyway. And, my dear, you won't be able to keep them . . . I know. Come moving day, and it comes just like taxes, every month, if it's a choice, which it really isn't, of your fancy pots and pans or the ENGINEER'S HANDBOOK, or the OIL and GAS JOURNAL for the past two months which haven't been read, the handbook and the Journals win. Now, if I were you, I'd take a good old iron skillet (you have no idea how useful they are as threats), by all means a coffee pot, as you'll be making coffee at all hours and an extra pan, and fool those old books right from the start. Too, it will save lots of arguments, tears and your nerves.

You say I'm ramblin' off my story and so I am, but, my dear, after twelve years of backwoods, even you'll ramble when you get to town. Go right ahead and smirk. You think it couldn't happen to you . . . OH SISTER. . . what you've got to learn, and taking a bath in that extra cook kettle is one of the least.

Now let's see . . . twelve, by golly, it's almost thirteen years ago, I tripped, and sometimes I wish I actually had tripped when I went down that aisle, then none of these things would have happened to me, to marry a shining . . . the diploma was anyway. . . geological engineer from Mines. Only 'twas rather hard times for budding geologists, so he was doing geophysics. In fact, our only assets at that time were the shining diploma, two pairs of field pants, an extra shirt and a pair of field boots. After twelve years they haven't changed much. I have a pair of boots now, but the weather being fair, I'm saving them until the snow flies. That's right, grin and smirk. YOUR HUSBAND is going to be different. Say, they have been handing out that line since '65, and it doesn't mean a thing. My husband said all I'd have to do would be to sit and play the piano, which we didn't have then and haven't gotten since. Now isn't that a laugh? Sit and play the piano! 'Bout the only chance to sit you'll get will be to eat or move. Some days eating is rather sketchy and it's a waste of time to sit down and pretend. One thing, tho, you'll always keep your figure . . . or you'd better. One pair of jeans a year will be your allotment and if they wear out, all you'll hear will be this little chant. . . "MY GAUD, THIS YEAR'S JEANS GONE, THIS YEAR'S JEANS GONE. . . MUST HAVE BEEN A BAD BUY. . . MUST HAVE BEEN A BAD BUY. . ."

You look kinda pale . . . not getting cold feet, are you? Say you aren't getting scared? Well, you ought to if you're not. This being an engineer's wife is one tough racket. By the time you have in it as long as I have, you can qualify for a diplomatic post, that is if the U. S. furnishes the money, as you won't accumulate it very fast. Why you'll get so smooth you can look your boss's wife in the face and tell her how charming she looks in her new hat, and gal, you know wimmen's hats. Can't say I know much about them. That pie crust with the egg beater I'm wearing is just the overflow from the last moving day.

Sure times have changed since I was a bride, but none for the better. Sometimes, you know, I don't ever remember being a child, seems like I been doing what I'm doin' ever since I was born. Now when I was a bride twelve years ago, it was typical of what I've had ever since. Quite unfortunately, I was married on the 12th, payday was the 15th, so we had lima beans for the wedding supper.



When you're hungry and its three days to payday, you're young and, I hope, in LOVE, beans are filling.

THE WEDDING WAS LATE. Make a good title for a movie, wouldn't it, or has someone already used it? That's right . . . my own wedding. . . and it was late. And most everything else from this forward, for you, is going to be LATE. If your husband is in geophysics, right at dinner time, show time, party time, or what have you; the trucks all manage to get stuck, the client comes or more likely he stops with the boys for a beer. And you know, he's got to be a good Joe, so 'bout 9 he weaves home . . . sometimes with a bunch of dried flowers in his hands and says . . . "now, Mommy, don't be mad . . . it's like this . . . there was this pore ole widda woman". . . and SISTER . . . that's the END. The food is either slapped on the table or him, and sometimes both! He says it won't happen again . . . cross my heart . . . and the funny thing is, it doesn't . . . not for a couple of days . . . anyway.

Those fancy nighties and panties are going to look pretty hanging on the sage. I can just see the expression on those sheep's faces when they come up and nuzzle, and that pore ole shepsherder . . . yipee-eee.

Say, you're not 'fraid of coyotes, are you? Never saw any? Well, you will. In fact, I'd just about lay you a little money, you'll be living with them before the year's out. They get to be mighty good company, too, when you're sitting around that campfire waiting for "MY MAN." You get awfully good at just "sittin'," and just "waitin'" and just plain "wearyin.'" and you're doing it all alone too. From now on, you're in a class by yourself. You have a ring on your finger, a jigger from the county saying you're entitled to the guy whose name appears below, but you haven't any guy. No siree. . . you have all the disadvantages and none of the advantages of being married . . . What am I saying?

'Bout every two, three months, a lank, hairy looking object steals into your house around midnight or later, cravds in YOUR bed, sticks his cold feet in your back and says . . . "Hi, Mommy." You scream, the neighbors run, and then IF says, "Don't you remember me . . . I'm the guy you married." On flips the light and you stare. . . could it be. . . oh no . . . not that . . . love's blind . . . but could IT be that blind???? Two bars of soap later . . . sure enough. . . there's that big, handsome (?), dashing male . . . only by now . . . after nights of sleeping on the rig floor . . . he's not quite so dashing. . . he's hollow-eyed . . . has a terrific cigarette cough. . . his voice sounds like "Ten Nights in a Barroom" from talking above the rig noise. . . his hair. . . if he still has any. . . is like something you have never seen before. While you're shaking hands and saying how happy you are to meet him again, the phone rings and this is what you hear. "Diamond bit . . . coring . . . making a trip. . . circulate till I get there. . . have you called Halliburton . . . be there in a couple of hours." And out the door he goes. Just as he's off, he remembers you, runs back, takes a pass at your mouth, calls it a kiss and says, "I'll see you next month. . . sure was great to be home tho." If you have any kids, they run and hide when this human dynamo comes in and after it's gone they say, "Mommy, who was that hairy ape?"

Oh, you're going with your husband? Well, I've tried that too. I'd like to ask your opinion on the plumbing question. Are you one of them that can take it or leave it alone, cause if you go with your husband, nine times out of ten, you're going to leave it alone. It seems to be the people's choice, in most of the towns you'll hit, to leave plumbing strictly alone. Now, I recollect one place. We had modern plumbing to a certain extent. The water was in the front yard and the plumbing in a house in the rear. You hooked on the hose, filled the tub and had a bath. When you got through, you just bailed the water out of the window and it landed on the garden. . . no waste and not a bad arrangement. But you know, I never did figure out how you were supposed to use that other gadget. So we just left the whole business alone. Then another time, we lived just 65 miles from the



corner grocery, and 9¹/₂ miles from the road. We just about lived in town, you might say. We were sitting on a well, and gal, no old hen ever sat on a nest of eggs like we sat on that well. We had it in our hair, teeth, and for meals for almost a year. Now if you ever have the pleasure of sitting on a wildcat, you'll find out one thing in a hurry. If the question ever arises which is the most important. . . and you know, that question comes up about 16 times every day. . . you or the well and its crews. . . you'll soon find out. Wives are a dime a dozen, but crews. . . good ones, are hard to get and harder still to keep. This little ole trailer of ours was quite an improvement over some of the places I'd had. The icebox was a hole in the ground and the bathroom was any place downwind and out of sight of the rig floor. All our water had to be hauled in, and after we got thru with a bucket, even its own mother wouldn't have known it. What did I do to amuse myself? Well, most I just sat around and asked myself questions, and told myself some of the wildest yarns you ever did hear and to this day, I BELIEVE 'EM.

Then, after living on the edge of town for a while, we went up north. No, I don't mean Alaska or the Great Northwest, but if I've got time, I'll tell you 'bout the time we almost did get there. You know, it's the funniest thing, but in this business, there are more places you almost get to and just don't quite do. This was a big town. . . population 249. Only right after we got there, they killed off three, but then with us and the new baby in town. . . we still had 249. And gal, it was there I learned about cesspools and the hard way. Course, I always blamed part of my learning on that downwind arrangement, I had had before. Now, the little man was dashing around the country picking up rocks, and I was working in a grocery store and keeping my ears to the ground. It's funny how much stuff you pick up that way. . . dirt in your ears. . . rocks in your nose. . . occasionally an old cigar butt. . . and on a lucky day, a bit of useful scouting information for your husband. Well, this day had been pretty dull, so I decided to close the store, shut up the cats, gather the eggs and start the wood stove. I did everything I had planned, and one thing I hadn't. I walked on a piece of tin that had no business being walked on, and down into a cesspool I went. And take it from me, you can call a cesspool anything you want, but you still got a cesspool. For a minute, I really was scared and scared in capital letters. Can you imagine the headline. . . PROMINENT (?) ROCK SPRINGS WOMAN MEETS DEATH IN A CESSPOOL? I said to myself. . . only this time I wasn't doing it to pass the time. . . have any of your people ever died in a cesspool. . . and I said no. . . so then I said. . . well, get busy and get yourself out of this mess. . . and do you know. . . I took myself by the neck. . . and here I am. . . sitting and visiting with you.

My land, I didn't see what you put in that last box. But don't bother to open it and show me. This time next year you won't know what's in it either or even just where you left it.

Say, did I hear you mention you were going to East Texas, close to the Arkansas line? OH SISTER! So you're marrying an Engineer.

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From time to time hereafter we will publish a list of all of the writings of various members of the faculty of the Department of Geology and Mineralogy of the University of Minnesota. We do this in the belief that a great number of our leaders enjoy reading what the faculty have written on geologic subjects. Knowing the faculty personally not only makes our reading of their writings more interesting to us, but after you read what they have written, professionally, you feel that you know the authors better. These articles are available in the various libraries.

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FOSSIL EVIDENCE: The composition and structure of the stratified rocks supply much information with regard to the physical conditions of their formation and the geographical changes in the region in which they occur.

From the evidence supplied by fossils, much additional information may be gained about these conditions.

The information to be learnt from the stratified rocks is mainly concerned with the seas which once extended over the present land masses, but no information can be gained from them concerning land areas now buried beneath the sea. From the fossils, however, we can learn much of former lands. For example, there are instances in which the distribution of marine fossils indicates the presence of a former land barrier to migration.

North America and Asia can be shown by the fossil remains of land animals to have been joined across the Bering Strait for long periods. A few of the more interesting examples of the evidence of changes in physical conditions afforded by fossils may be given here.

Former land surfaces are found with tree-stumps in their position of growth with their roots penetrating into a lower stratum of soil, and containing remains of land animals, land shells, insects, leaves, fruits and other plant fossils. Examples are seen in the "submerged forests" around our coasts and in the "dirt-beds" of the Purbeckian strata of Portland, as well as in the "underclays" or soils of the Coal Measures. Ancient lakes can be proved to have existed by the occurrence of marls and limestones containing fresh-water shells, or fine silts containing fossil remains of leaves, fruits and insects. An example in Kent of a fresh-water limestone is the so-called Bethereden Marble, composed almost entirely of the remains of *Cyrena media* and *Paludina (Viviparus) fluviatorum*, two well-known fresh-water fossils.

In North America (Utah, Wyoming, Colorado and New Mexico) lake formations of the older Tertiary have yielded a very important terrestrial and lacustrine fauna and flora. There, deposits are of the highest palaeontological interest on account of the richness of their mammalian remains.

A marine deposit, even in very early geological periods, is clearly indicated when it is found to contain an assemblage of fossils characteristic of the marine deposits of the present day. Organisms such as radiolaria, corals, brachiopods and echinoderms are found today only in the sea, and therefore their presence in sedimentary rocks is a reasonable proof of the marine origin of the latter.

Again, a shore deposit formed in shallow water is clearly indicated when the organisms in such a formation resemble those living today in littoral areas, or when the remains of marine organisms are associated with those of land animals and plants.

When shore-lines can be determined by this means it is possible to infer the distribution of land and sea in former ages.

CLIMATE CHANGES: Fossils also serve to show that various parts of the globe have passed through extraordinary changes in climate.

To give but one example—the climate of southern England during the earlier Tertiary era was probably subtropical, since the assemblage of fossils includes specimens of palms associated with the remains of crocodiles and turtles. In post-Tertiary time the climate must have changed to an Arctic one, as the rocks contain remains of animals which now live in Arctic regions.

THE PRESERVATION OF FOSSILS: Organisms which have hard shells, bones, teeth and scales in the case of animals and the parts of plants consisting of woody

tissues are much more likely to be preserved as fossils than soft-bodied animals, which only rarely leave traces in the rocks.

The skeletons, mainly composed of calcium phosphate, the bony plates of saurians and the scales of fishes are the parts of vertebrates most likely to be preserved in the fossil state.

In most cases, the hard parts of invertebrates consist of calcium carbonate in the form of calcite or aragonite, or in other cases the fossilised parts consist of silica. Some organisms, such as the graptolites and the ostracods, possess parts composed of a resistant, transparent, horny substance known as chitin.

In the case of plants, the essential part of the framework consists of cellulose, a substance which is very durable.

The physical conditions under which organisms live greatly influence their chances of preservation in the fossil state. Plants and animals living in lakes and seas are much more favourably situated than land animals and plants; and since the majority of stratified rocks were deposited as sediments in the sea, marine organisms are much more abundant as fossils than those of fresh water.

Plant and animal remains of land organisms can be preserved only when protected from decay by deposition on lake-bottoms, peat-bogs, river deltas, caverns and, very occasionally, in volcanic deposits. On the floor of a lake there may be preserved a small proportion of the terrestrial flora, such as trunks, leaves, fruits, etc., and fauna, such as insect, bird and vertebrate remains, together with aquatic plants and fresh-water molluscs.

The vast series of lake deposits of western North America associated with accumulations of volcanic ash have furnished numerous fossils of land and fresh-water organisms. On the fine-grained shells there are found fossil insects and fishes together with leaves, fruits and even flowers; and in the sands, clays and tuffs there can be seen the remains of reptiles and mammals. In peat-bogs, animals such as oxen, deer, etc., become entombed and their remains fossilised.

In many limestone districts the caves have yielded remains of the higher forms of land animals; for example, the bonecaves in several parts of Europe have provided fossils of mammals.

It is on the sea-bed, however, where the most favourable conditions for the preservation of the greatest number and variety of fossils are found.

Near the shore-lines, only the more durable organisms which can resist the grinding action of waves and currents are likely to become entombed in the few beds of sand and gravel. But beyond the limits of the littoral deposits, and where the water is still comparatively shallow, masses of sand and mud accumulate in which organic remains become buried and preserved from decay. It is in these areas, where marine life is abundant and varied and where sediments accumulate rapidly, that favourable conditions prevail for fossilisation.

Another condition, however, is essential for the accumulation of thick masses of fossiliferous strata. This is the continued subsidence of the areas where such sediments are being laid down.

If the rate of subsidence were approximately equal to the rate of deposition, then the accumulation of thick masses of fossiliferous strata could easily be explained.

The above conditions of sedimentation and fossilisation account for the general absence of abyssal deposits from the stratified rocks.

METHODS OF FOSSILISATION: The principal ways in which organic remains have become fossilised may be briefly summarised as follows: (a) Preservation of the original substance.

In rare cases the organism may be preserved intact, as, for example, the carcasses of mammoths in Siberia. As a general rule, the soft parts of organisms are decomposed and only the hard or resistant structures are preserved.

(b) The original substance of the organism is destroyed and a mould or a cast is formed.

A mould is produced when a fossil has impressed its external form upon the sediment in which it became embedded and has subsequently been dissolved by percolating water, such as often happens in the case of shells composed of aragonite.

A cast is formed when such a mould becomes filled with some deposit. Internal casts of foraminifera are found containing a silicate of potassium, aluminum and iron (glauconite). The shells of foraminifera often become filled with this mineral, and, on solution in percolating water, casts of the original organisms are found. These casts accumulate on the sea-bed as "green-sands" or "green-muds." Such deposits are most characteristically found in the "Green-sands" of the Cretaceous System. (c) The replacement of the original form and structure by the substitution of some other material.

The material of the plant or animal is removed in solution particle by particle, and as each particle is dissolved a particle of the substitute is deposited in its place. For example, the cellulose of the cells and vessels of wood may be replaced particle by particle by silica.

This substitution of mineral matter for organic matter is a gradual process and is often so complete and thorough that the microscopic structure of the plant or animal is perfectly preserved. (d) Carbonisation. In plants and animals with skeletons of chitin, such as the graptolites, the original substance may become carbonised. The decomposition of the organic substance results in the loss of oxygen and nitrogen, with a corresponding increase in the percentage of carbon.

PALAEONTOLOGICAL VALUE OF FOSSILS: As the most favourable conditions for the preservation of organic remains are found on the sea-bed, marine fossils are much more abundant than others and are of much greater value to the geologist. Foraminifera, radiolaria and sponges, which have frameworks of calcium carbonate or silica, are found in sedimentary rocks of all ages and also have a wide geographical distribution. Corals are found throughout the Palaeozoic, Mesozoic and Tertiary eras and are particularly important in the Silurian, Carboniferous, Jurassic and Cretaceous periods.

Echinoderms include animals with a framework built up of plates, and therefore are mostly found as fragmentary bodies. These plates, or ossicles, are common in Mesozoic and Tertiary rocks. Brachiopods are animals living in bivalve shells usually composed of calcite, and are most numerous in the Palaeozoic and Mesozoic eras, though some genera have a very long range in geological time. For example, *Terebratula* ranges from the Devonian to Recent times, *Rhynchonella* and *Lingula* are found from the Palaeozoic era to the Tertiary. The marine molluscs, including the lamellibranchs, gastropods and cephalopods, possess in most genera a hard, durable shell capable of protecting the organism in all depths of water, and are therefore abundantly preserved in the fossil state. They range throughout geological time and are most useful in correlating different formations and in the interpretation of geological history. Lamellibranchs are many in numbers and genera throughout geological time.

Gastropods, though found in the Palaeozoic era, are more typical of the Mesozoic and Tertiary eras.

Cephalopods have a similar long range in time and have proved particularly useful in marking definite palaeontological zones in the Cretaceous period.

As a general rule, it is found that the simpler the structure of an organism the less susceptible it is to outside conditions, and as a result it is likely to remain unaffected by such conditions for long periods of geological time and over vast geographical areas. Land organisms, which have little chance of fossilisation, can seldom be used for purposes of correlation.

A striking exception is found in Europe and North America. In the upper Cretaceous rocks of Westphalia in Europe, and in the Laramie group of strata in western North America, many dicotyledons are found associated with cyads and ferns—a varied and rich flora of the highest value to geologists.

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