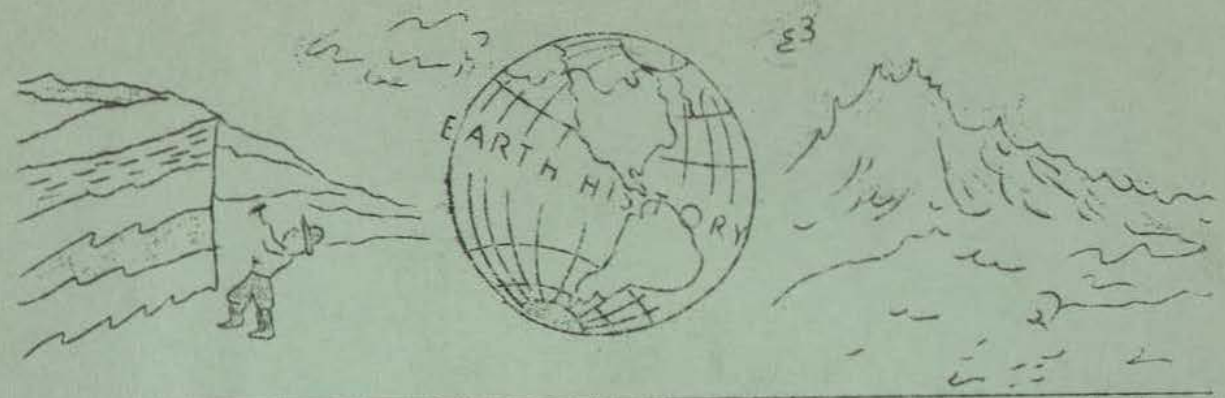


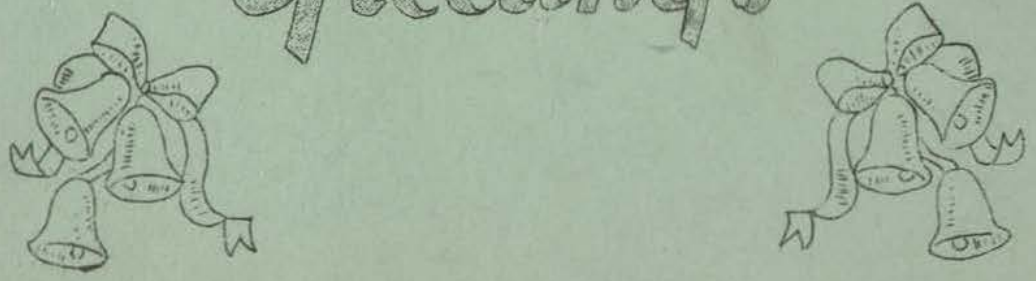
THE MINNESOTA GEOLOGIST

OFFICIAL BULLETIN

OF

THE GEOLOGICAL SOCIETY OF MINNESOTA

VOL. VI DECEMBER 1949 NO. 5



GEOLOGICAL SOCIETY OF MINNESOTA

EDITORS
Loretta E. and E. L. Koppen
3376 Brunswick Ave.,
Minneapolis 16 Minn.

The Society is devoted to the study of GEOLOGY, MINERALOGY, and PALEONTOLOGY for their cultural value.

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MEETINGS : October to May inclusive, 7:45 P. M. every Monday not a holiday, auditorium, Minnesota Museum of Natural History, University of Minnesota, 17th Ave., S. E. and University Avenue. Visitors welcome.

FIELD TRIPS : May until October inclusive.

ANNUAL DUES : Residents of Hennepin and Ramsey counties $ 3.00 plus $ 1.00 additional for husband, wife, or dependent family members ; for students and non-residents, $ 1.00.

MEMBER

MIDWEST FEDERATION OF GEOLOGICAL SOCIETIES

* Deceased

WE WISH YOU A HAPPY HOLIDAY SEASON.

THE EDITORS.

JANUARY 4 ---- In the Museum of Natural History at 4:00 P. M. there will be a showing of three dimensional slide projections in gorgeous natural colors of scenes from our National Parks. They were photographed stereoscopically by means of polarized light and are viewed by means of polaroid spectacles. These slides are shown with the compliments of the Barber Green Co. and are sponsored by Professor E. M. Lambert, head of the Mining Department, and member of the Minnesota Mineral Club.

1950 Bulletin Board

Jan. 9 ---- The Cambrian Rocks of Minnesota. (Cont'd.)
Mr. Robert Berg, Graduate Student in Geology, Univ. of Minn. doing field work on the Cambrian under the sponsorship of the Geological Society of Minnesota.

Jan. 16 --- The Ordovician Rocks of Minnesota.
Dr. W. Charles Bell, Associate Prof. and Curator Geologic Museum, Dept. of Geology, Univ. of Minnesota.

Jan. 23 --- The Ordovician Rocks of Minnesota. (Cont'd.)

Jan. 30 --- The Devonian and Cretaceous Rocks of Minnesota.
Dr. Geo. A. Thiel, Prof. of Geology and Chairman of Geology and Mineralogy, Univ. of Minnesota.

Feb. 6 ---- Making a Geologic Map of Minnesota.
Mr. J. Merle Harris, Instructor in Natural Science, General College of the University of Minnesota.

Feb. 13 --- Glacial Geology of Minnesota.
Dr. Herbert E. Wright Jr., Assistant Professor, Dept. of Geology, University of Minnesota.

Feb. 20 --- Glacial Geology of Minnesota. (Cont'd.)

Feb. 27 --- Making Ice Sheet Maps of Minnesota.
Mr. J. Merle Harris.

Mar. 6 ---- Glacier and Vegetation.
Dr. Wm. S. Cooper, Professor of Botany, Dept. of Botany, University of Minnesota.

Mar. 13 --- Developement of Minnesota Soils and Their Distribution.
Prof. Paul R. McMiller, Prof. of Soils, Univ. of Minn.

EDITORS NOTE : In compliance with the request by many of our members we are publishing the following dedication addresses made at Taylors Falls Minnesota, on October 30, 1949.

INTRODUCTION

H. E. McWethy, President.

This is a meeting of the members and friends of the Geological Society of Minnesota of which I have the honor to be President. This society was founded in 1938 by Edward P. Burch - a retired consulting engineer of Minneapolis. It was organized as a study group - with weekly lectures during the winter and with many field trips during the summer months.

Mr. Burch died in 1945. We meet here today to honor him by dedicating a tablet to his memory. In a broader sense through this marker, and others which may follow, we hope to carry one step further the work which Mr. Burch started - in arousing the laymen's interest in geology.

This location overlooking the falls of the St. Croix has been selected for the erection of the tablet because it is geologically unique and is one of the most picturesque locations to be found in Minnesota. It is fitting, therefore that this first tablet - erected to the memory of our founder ; should be erected here.

The democratic cooperation of the many members and friends of the Society has made possible the erection of this tablet. We are indebted to the Minnesota Department of Highways for the construction of the base for the marker and for help in the selection of the site.

I observe that among the members and friends of the Society who are here today there are a goodly number of the original 1938 and 1939 group. We are most fortunate also to have with us Mr. Burch's wife, his daughter Mrs. Carl T. Schuneman and his sister - Mrs. McWethy, representing his family. Representing the Department of Highways we have one of its engineers who is also one of our members, Mr. Mauritz Westmark. A number of the local people from Taylors Falls and St. Croix Falls have shown an interest in this dedication and we are most appreciative of their presence. Among them are :

Mr. Stanley Folsom - Mayor, Taylors Falls.
Mr. Pomeroy, Mayor, St. Croix Falls.
Mr. Theodore Morovic, Superintendent of Interstate Park.

It is now my privelege to present Mr. Charles H. Preston - one of our directors. Mr. Preston is a Past President of our Society and has been a director continuously since its inception. In the Society's activities thru the years he has worked as closely to Mr. Burch as any other individual. He will address us on the subject "Geological Contributions of Edward P. Burch".

Mr. Preston's address will be followed by the dedication of the tablet and the reading of its inscription - by Lawrence W. King. Mr. King has also been a member of this Society since its earliest beginnings and is Chairman of the Committee having charge of the design, manufacture and erection of the tablet.

THE CONTRIBUTION OF MR. E. P. BURCH TO THE GEOLOGICAL SOCIETY

by Chas. H. Preston.

Any account of Mr. Burch's contribution to the Geological Society of Minnesota during its early years would be a history of this Society for that period. Mr. Burch was the Society.

Early in 1938 Mr. Burch found 20 followers who listened to him lecture on the subject of Geology at the Public Library during February and March. During the summer and autumn these 20 followers, several of whom are here today, followed Mr. Burch, tramping over the fields along the St. Croix and its tributaries, along the Mississippi river, along the Minnesota river and in the North Country, to find and identify fossils and to become familiar with the sedimentary rocks of these regions, and above all, to secure inspiration from a study of nature at first hand.

Mr. Burch was a tireless leader, devoting practically his entire time in the interests of his new hobby. He painstakingly prepared data sheets describing in detail the structure of the region to be visited and always, after a picnic lunch, would give a lecture in the open air. The nucleus of this Society was formed in that year, 1938.

Mr. Burch was a consulting electrical engineer of some prominence. When employed by the Twin City Rapid Transit Co., he was in charge of installing the 10,000 horsepower plant at St. Anthony Falls. In Detroit he had been consulting engineer for the Detroit Electric Railway Commission. While there he gathered material for two books which he later published. He also installed the Electric Utility in Stillwater Minn. He earned the right to be listed in "Who's Who in America" while a consulting engineer and was so listed until his death.

He retired from active professional work in 1932 and devoted the next twelve years to travel and acquiring a new hobby, the study of Geology. He took several Geology courses at the University of Minnesota, and later studied at the University of Arizona where the idea occurred to him to interest others in the study of Geology.

About September 1st of 1938 Mr. Burch announced a series of lectures on Geology with special reference to the Geological History of Minnesota, to be given at the Public Library.

These lectures began on September 12th and continued throughout the balance of the year. They were well prepared with the elaborate care always characteristic of Mr. Burch and each lecture was accompanied by an instructive data sheet outlining the subject matter of his lecture. From the original 20 members the group increased to a total of 147 by the end of the year. I well remember Mr. Burch telling me early in the series that if he could interest a group of 50 he would be satisfied. Imagine his elation when the attendance passed that number.

The field trips went on just the same. Every Saturay and every Sunday throughout September and October, and even into November, Mr. Burch lead a group of enthusiasts to points near and far to study and to interpret this formation or that phenomenon. Yes, it got chilly at times but it would take more than temperature changes to cool the enthusiasm of Mr. Burch and his group. A total of 43 week-end trips were made that season. Membership fees were $ 1.00 per family and a charge of 10 cents per person was made on the trips to defray expenses. Membership fees were almost enough to pay for typing and mailing out notices that year, but not quite.

At the end of that first year an attempt was made toward organization. Officers were elected for 1939, and plans were made to incorporate, such incorporation being effected under Minnesota laws before the end of that year. But Mr. Burch continued to be the Society. Junior Hayden became President, officially that is, but Mr. Burch continued to be the leader. I was elected Secretary, but Mr. Burch performed all the duties of the Secretary, except to record the minutes of the meetings. And on more than one occasion Mr. Burch even prepared those minutes in advance of the meetings. A Treasurer was elected but Mr. Burch continued to take responsibility for the finances, preparing the financial reports from time to time under the name of the Treasurer and "digging down" to make up the deficits at the end of the year. A program committee was appointed, but despite its personnel, Mr. Burch was that committee. He just couldn't resist doing all the work of the Society and in taking full responsibility.

Each week he prepared and sent out notices of the meetings including technical data regarding the regions visited or the subject discussed. He was our editor, publisher and mailing clerk.

Never again can this Society expect to have the full time services of any person devoted to our group. His energy in that devotion seemed limitless. And yet, it was his inate desire to develop within the Society, those who could give lectures, prepare reports, and make independent studies of selected regions. His ambition was to develop real students among our members. Any mother, in rearing her child must for some years watch that child, administer to its every need, and see that her child is nourished and fed, made comforatble. She is loath to give up responsibilities. This Society was Mr. Burch's child. He devoted the major part of the last few years of his life to its care and development. It was his life. He couldn't bear to trust its care and guidance to inexperienced hands nor trust it to walk alone.

Someone has said that every established institution is but the lengthening shadow of some great man. So our Society is but the lengthening shadow of Edward P. Burch. He finally yielded some its responsibilities to others and let others take some of the leadership. He had so inspired them that they were more than glad to do this.

Mr. Burch died in May 1945. He collapsed on the street in Boston, intent on spending a few hours between trains at the Boston Museum of Natural History.

This event brought to a close the first phase in the history of our Society. The work had to be divided among many, for there was no one member who could devote a major part of his time to its needs. Even before he left us, we had begun to function as an organization through our Board of Directors and appointed committees. We were now obliged to take over and make it truly autonomous. Its principal officers have been in rotation so as to develop new blood every few years. To develop a wider basis of leadership. If he could see us today I'm sure he would be pleased to note this continued interest in the objectives he was trying to accomplish, to spread a more general appreciation of the works of nature as manifested in earth formations, the interesting trips we have enjoyed, the instructive lectures we have had, and indeed, at this meeting here today. For he had long dreamed of establishing markers at spots of Geological interest in the State, where hundreds could stop, read, and learn. However he might have been somewhat disappointed as well as elated. He would have hoped that more of us had made a more intensive study of Geological processes, instead of being content to appreciate their beauties and merely to listen to lectures.

We are here today to pay tribute to that leader. To dedicate this tablet to his memory. To do him honor. In the words of the immortal Lincoln, "It is altogether fitting and proper that we should do this." But it is beyond our power to add to, or detract from the devotion which Mr. Burch gave to the cause for which our Society was founded.

We can best dedicate this tablet to his memory in the only way that Mr. Burch would have wished it, not by gathering here and giving him words of praise, not by featuring Mr. Burch at all.

But by resolving here and now each to do our bit to help perpetuate this Society which he founded. I have long had a belief that God Almighty gave each of us some potential talent which, if cultivated would enable each to excel in some one thing. That thing may be small, it may be great. But some distinctive thing. Each of us can, if he will, do some one thing to help this Society maintain its position as the outstanding amateur Geological Society in America.

To paraphrase the immortal Lincoln once again :

"It is for us rather, to be dedicated to the task of continuing the unfinished work to which he gave his last years of devotion. That we here and now highly resolve that those years shall not have been lived in vain." That we continue to make this institution an instrument for bringing to the public an appreciation of nature as revealed in its topography, an appreciation heretofore enjoyed only by the professionals. So that it may continue as the outstanding Society of America for making Geology a cultural, study as well as a professional study.

In so doing, we can not only incur personal satisfaction, but we can help erect a monument which he would have revered above all else, to the name of Edward P. Burch.

DEDICATION OF GEOLOGICAL MARKER

by Lawrence W. King.

When Mr. Burch undertook the activities which preceded the formation of this Society he did so in a missionary spirit, with a burning desire to convey to others the understanding and appreciation of scenery which he enjoyed. His object was the education of laymen, the presentation of geology as a cultural study. The field trips which he led and the lectures he delivered were for the purpose of developing leaders by whom his program would be continued. To that objective this Society is committed. In meeting here today to dedicate this tablet in his memory it is with the realization that our obligation to him cannot be discharged until we have conveyed to others the contribution he made to us. This tablet, dedicated to him by our presence, is the first payment on that debt which will not be paid in full until other markers have explained this geological paradise, which is Minnesota. The inscription on this, the first of the Geological Highway markers reads as follows :

GEOLOGY OF MINNESOTA

TAYLORS FALLS REGION

About 750 million years ago the Lake Superior region was the scene of tremendous volcanic activity. Of the 500 or more lava flows which issued from great fissures, some reached as far as Taylors Falls. The rocks of the St. Croix gorge at this point are composed of that lava. Many millions of years later, when the Eastern outlet of the Great Lakes was blocked by glacial ice, the St. Croix was one of the outlets of Lake Superior, at which time this gorge was eroded. The abrading action was caused by sand and gravel carried by the great volume of water moving at high velocity. The pot holes in the State Park one-half mile North of this site were formed by similar action.

Erected by the Geological Society of Minnesota
In memory of its founder, Edward P. Burch
In cooperation with the Department of Highways
State of Minnesota.

○○○○○

THE SEARCH FOR URANIUM

by

W. S. SAVAGE.

Ontario Department of Mines

Part two of a three-part article.

Note : Published by permission of the
Deputy Minister, Ontario Department of Mines.

PROSPECTING FOR RADIOACTIVE MINERALS

"Radioactivity" in minerals is almost entirely confined to those containing uranium or thorium, and all such minerals are radioactive. Of all the other elements only two, potassium and rubidium, are definitely known to be radioactive, and these only to a very slight degree. The world-wide search for uranium is therefore synonymous with prospecting for radioactive minerals. We have briefly reviewed the extraordinary importance of uranium in present-day world economy and have studied the characteristics and mode of occurrence of the most important minerals. We will now sum up more specifically the details that may aid in the visual identification of radioactive minerals and consider the methods used for their detection.

(1) Visual Identification

Pitchblende, the most important primary uranium mineral, may be identified by its black color, metallic appearance, greasy or pitchy lustre, dense massive texture, and exceptional weight, and by its occurrence in the form of veins or stringer systems occupying faults, shear zones, of fractures.

Most of the other primary uranium minerals occur in nests, pockets, or similar aggregates of crystals, usually of small size or extent, sparsely and irregularly scattered through dikes of granite pegmatite.

In general, it may be said that any conspicuously heavy, black or dark-colored minerals discovered in a pegmatite should be tested for possible uranium content. Such minerals may be difficult to distinguish visually from magnetite and ilmenite, but the latter can be readily identified by virtue of their magnetic properties. Greater weight serves to distinguish them from black tourmaline and also from hornblende. Cassiterite (the source mineral of tin) is another black mineral found in association with pegmatites. It is relatively heavy (specific gravity 7) and has a hardness of from 6 to 7, compared with a hardness of from 5 to 6 for uraninite, which has a specific gravity between 8 and 10.

Small amounts of secondary uranium-bearing minerals due to weathering are usually present in connection with primary deposits and on account of the brilliant colors - - vivid shades of bright yellow, orange, and green - - offer a useful guide for prospecting, but their absence does not eliminate the possibility of finding primary uranium minerals.

The decomposition of thorium minerals often produces a brown friable crust, and when they are present in association with uranium minerals this "capping" may mask the bright-colored secondary uranium minerals.

Many of the secondary uranium minerals are strongly fluorescent, and a number of uranium localities have actually been discovered by use of the ultra-violet lamp.

Another characteristic of radioactive minerals, which aids in their identification, is their ability to discolor the minerals surrounding them. The feldspars around a radioactive mineral are generally discolored to a brick-red or brownish color.

Dark-purple fluorite and "smoky" quartz, which are sometimes found in pegmatites and veins of igneous origin, are believed to owe their colors to the radiations from associated radioactive minerals.

A radial fracture pattern created in the feldspar or quartz surrounding a mineral inclusion in a pegmatite is also often a useful indication that the inclusion is a radioactive mineral. This pattern is rather obscure in most cases and requires examination under a hand lens. A cart-wheel fracture pattern is often present, particularly in a brittle mineral such as quartz, with the radioactive inclusion forming the hub.

(2) Determination by Radioactivity Methods

All minerals containing uranium or thorium or both are radioactive ; that is, they emit energy in the form of spontaneous radioaction and, this may be detedted byfairly simple means. It is not possible, however, to distinguish between the emission from the two elements except by precise laboratory methods. Before the invention of the Geiger counter, the principal aids in determining radioactivity were the photographic plate or film, the gold-leaf electroscope, and the spinthariscope. The Geiger counter is so much more versatile and more sensitive that the other methods have largely fallen into disuse.

One of the simplest means for detecting radiation from minerals is to place the specimens on an ordinary photographic plate or film in a light-tight box and allow it to remain undisturged for from 36 to 48 hours. On developing the negative, any marked radioactive content will be evidenced by a distinct image, or auto-radiograph, of the specimen.

THE GEIGER COUNTER

The Geiger counter is the most useful and practical instrument for prospecting for radioactive minerals. Portable field sets are now available which are simple to operate, sensitive, and reasonably sturdy considering the principles upon which they operate. It is safe to prophesy that the search for uranium ores will continue for many years to come, and for any one engaged actively in prospecting for radioactive minerals, a Geiger counter is an essential piece of equipment. A review of the discoveries of radioactive minerals made during the past three years will show that the Geiger counter played a major role.

Any one intending to use a Geiger counter should know a few simple facts concerning its construction. The Geiger tube, from which the "clicks" heard in the earphone originate, is generally located along the bottom of the case, where it is closest to the ground in normal use. This tube, which is the "brain" of the instrument, has a high voltage applied to it, but there is no flow of current until radiation penetrates the tube. The "clicks"

result from small currents produced in the Geiger tube by radiations, and the number of clicks per minute is directly proportional to the intensity of the radiation. The batteries and radio tubes that accompany the Geiger tube provide the high voltage on which the tube operates and so amplify the small current produced by radioactivity that it can be heard or measured. As the batteries weaken the voltage supplied drops off, and the voltage regulator must be adjusted. When the time comes that the batteries are too weak to provide the required voltage, they must be replaced. It is useful to carry spare tubes for the instrument in the field, and if it ceases to function, the trouble can generally be located by replacing the tubes one at a time. The life of an average Geiger tube is about 100 million counts, and the life, therefore, depends on how often and how long the instrument is exposed to highly radioactive material. It is not good practice to keep the instrument operating longer than necessary in the presence of highly radioactive material.

When properly adjusted, in the absence of strong radioactivity, clicks can be heard in the earphone at the rate of about 5 to 50 per minute. This count is known as the background count, and it results in part from radiations from space and in part from the small amount of radioactivity present in most rocks. It will vary in different localities, but should always be present to some extent if the instrument is functioning properly. If it is not heard, the instrument should be checked for weak batteries or faulty tubes.

The instruments in general use in the field fall generally into two types : a simple machine with earphones to detect the counts from the Geiger tube, and a more elaborate type provided with earphones and a rate meter. Either machine is satisfactory as far as detection of radioactivity is concerned, but the rate meter is very useful for more detailed work because it provides a means of comparing the amount of radioactivity, the clicks in the earphone run together so rapidly that it is not possible to count them.

In prospecting with the Geiger counter, it can be carried in its case over one shoulder with the strap fully extended. In this position it may detect radioactive minerals if present in quantities large enough to be of interest. The earphone is worn at all times, and care must be taken that the knobs for adjusting the instrument are not moved. Care must also be taken that nothing radioactive on the person is in a position where it will affect the the instrument. Many compasses and watches have luminous dials, and these will have a marked effect on the Geiger counter.

If radioactivity is suspected in any area, the case containing the counter should be suspended close to the surface and moved slowly until the radioactive area is outlined.

While examining some radioactive mineral occurrences in Haliburton county for the Ontario Department of Mines last summer, Wolfe and Hogg found that radioactivity is effectively blanketed by from 1 to 2 feet of loosely packed earth. Working with a Geiger counter on the Camray property at Theano point, Lake Superior, two Ontario Government geologists, Satterly and Hewitt, found that although a very high count was registered where pitchblende veinlets were visible in the rock, from 5 to 10 feet away only a low background count was obtained. These limitations should be borne in mind when prospecting with a Geiger counter, and surveys should be carried out in extremely close detail.

General Precautions to be Observed in the Field Use of the Geiger Counter

(1) An electric storm may discharge a counter tube or may produce spurious clicks in the amplifying system. Hence, when a thunderstorm approaches, it is recommended that the use of the counter be postponed.

(2) Extra precaution should be taken to keep the counter dry at all times. Most field units have a 500-volt circuit, sometimes greater, and when short-circuited this can cause damage to the counter as well as produce severe shock.

(3) The background count may be thrown off due to the shielding of cosmic rays, by a high building, a thick forest, or a steep cliff. The background count is more or less characteristic of a given set, particularly the tube, and whenever the tube or other parts of the Geiger set are changed or worked upon, the new background count should be ascertained. This background count may vary with the locality, even over relatively short distances, so frequent recheck must be made.

(4) Radioactive dust must be carefully avoided. A small amount of dust that has been allowed to accumulate within the case or other parts of the counter will seriously impair the sensitivity of the counter for gamma rays.

(5) The Geiger counter should not be taken near a plant or mining operations where radioactive minerals are being crushed or treated.

(6) Likewise, the instrument should not be taken underground where radioactive minerals are being mined.

(7) An operator should keep his clothing, especially his boots, free of stray radioactive dust.

(8) As might be expected, the field Geiger counter is a precision instrument and should be protected from rough treatment, dropping, and corrosive vapours. It should not be placed where it may be overheated, such as near a camp fire.

When not in use, or during transportation, the Geiger counter should be provided with a strong, well-padded metal or wood box. Spare parts should be carried in a second box when extensive trips are made. If samples of radioactive ore are carried for check purposes, they must not be allowed in the same box as the counter, and must be carried separately. Prospectors using the Geiger counter should realize that it is a qualitative instrument in the field and that a high count does not necessarily indicate the presence of valuable radioactive mineral. Both uranium and thorium bearing minerals will cause activity in the Geiger tube, but at the present time the Atomic Energy Control Board will purchase only the uranium oxide (U_3O_8) present in the ore. Apart from the contained thorium, which is not at present of commercial value, the uranium itself is often present in minerals in such form that recovery is not practicable. Even where uraninite has been identified in the field, in many cases it was found that other minerals were also present, such as allanite, thorite, etc. The cumulative effect of a large number of such minerals in a pegmatite dike may result in a high Geiger count, though it would not be possible to extract more than a very small percentage of uranium oxide.

NEXT ISSUE : PART 3

IN MEMORIUM

We are saddened by the untimely and accidental death of Mrs. Hazel Prochaska of Hopkins, Minnesota.

Hazel Ahearn Prochaska was born in Minneapolis, on February 2, 1893. A graduate of Central High and the University of Minnesota, she was a teacher and chemist by profession.

She taught at Stanley Hall and was principal of the Pine City High School. It was there she met Edward J. Prochaska, the local druggist and optometrist, and married him on June 19, 1919.

In addition to her duties as homemaker and mother she was very active in many phases of civic life. She was keenly interested in Geology and Mineralogy for their cultural value and was a member of the Geological Society of Minnesota and the Minnesota Mineral Club.

She is survived by her husband, two daughters, Dell Ann and Mrs. Kitty Mae Alcott, one son, Edward Jr., one granddaughter, Tracy Alcott and an aunt Mrs. Kitty Gordon.

It is with the sincere realization of our loss that we shall remember her gracious manner and kindly and understanding personality.

The Society extends its deepest sympathy to her husband and family.

GEOLOGICAL SOCIETY OF MINNESOTA
Mrs. Mary Lupient, Treasurer,
212 Bedford St. S. E.
Minneapolis 14, Minn.

APPLICATION FOR MEMBERSHIP

NAME : .....

ADDRESS : .....

PHONE : .....

BUSINESS : .....

I ENCLOSE HEREWITH MEMBERSHIP FEE OF $ .....

WILMA MONSRUD
5255 DUPONT AVE. N.
MINNEAPOLIS 12, MINN.