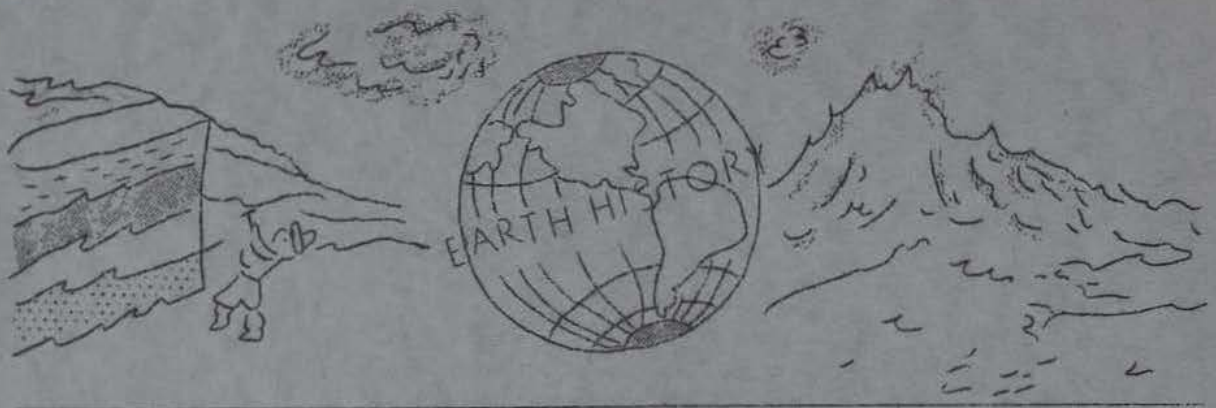

THE MINNESOTA GEOLOGIST

OFFICIAL BULLETIN OF THE GEOLOGICAL SOCIETY OF MINNESOTA

VOL 11 AUGUST 1945 NO 6

contents

GEOLOGICAL SOCIETY OF MINNESOTA

831 SECOND AVENUE SO.
MINNEAPOLIS 2, MINN.

Our Society is devoted to the study of GEOLOGY and MINERALOGY for their cultural value.

OFFICERS

Joseph W. Zalusky, President
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PAST PRESIDENTS

Edward P. Burch
Junior F. Hayden
Alger R. Syme
Charles H. Preston

MEETINGS: OCTOBER to MAY inclusive our Society meets every MONDAY evening, not a holiday, in the large auditorium on the 4th floor of the Public Library at Hennepin Avenue and 10th Street, Minneapolis, Minnesota, at 7:30 o'clock P. M.

JUNE until SEPTEMBER, inclusive, we have a program of field trips. Visitors are very welcome, always.

ANNUAL DUES: Residents of Hennepin and Ramsey Counties $3.00 plus $1.00 additional for your wife, husband, or dependent family members; for those residing elsewhere and students, $1.00.

(1) NEW GREAT LAKES SERIES: We have completed the first series on the History of the Great Lakes, and with this issue begin a new pictorial series. With the first map we show what a relatively small drainage area Lake Superior has and the almost unbelievable number of islands. The second of this series shows the recession of Niagara Falls during the time the white man has known it. We will follow with similar maps and information in subsequent issues although the exact number is, at this time, uncertain. This new series will probably run for six or seven issues. We hope you will find them interesting. The next issue will contain a map which, we are sure, will be a great geological surprise to you. At least it was to us. Watch for it.

(2) MARY LUPIENT has taken hold of her new job as treasurer with enthusiasm and energy. She acts as one experienced in the work, and we are sure she will be an excellent treasurer.

(3) DR. GRUNER will give a course in Mineralogy in the Extension Division at the University beginning next Fall. There will be other courses offered also. Watch for information. If you wish to broaden your knowledge of Geology or Mineralogy, this is an excellent opportunity. It will give you a background for interpreting your reading and lectures.

(4) WILLIAM J. BINGHAM, formerly president of the Mineral and Gem Club, has returned from Army service and has reopened his Lapidary and Gem Shop at 2100 Arcade Street, Saint Paul. He makes a business of grinding and polishing rock specimens and is always anxious to trade. It is sometimes convenient to know where to have work like that done.

(5) MRS. BURCH, and family, have written us stating that they were greatly pleased with the memorial issue and with the plans which have been formulated for preserving his collection of maps, models, and specimens. We will give you more details of the latter in our next issue.

(6) GREAT GEOLOGIST: The lives of some of the men, great in the science of Geology, are not only interesting, but their work in developing and formulating the great principles of this science, now accepted by everyone, is very important. We refer to the principles of sedimentation, erosion, vulcanism etc. We are contemplating running a new series on some of these great men such as Smith, Lyell, Hutton and others. If you would like to have a series on this order, please let us know.

(7) GEOLOGICAL SOCIETIES, are quite numberous in the Rocky Mountain and Pacific Coast areas. Most of them however seem to devote the major portion of their time to collecting mineral and fossil specimens, or to cutting and polishing work. We have found none which, like ours, devote themselves more or less exclusively to the study of GEOLOGY for its cultural value, and in this respect we believe we are unique.

PERSONALS

MRS. CHAS. H. PRESTON was a patient in ABBOTT HOSPITAL recently, but we are glad to report that she is now convalescing nicely at her Lake Minnetonka home. We hope soon to publish another of her delightful poems.

CLARK D. SCHMIDT, is a patient at Veterans Hospital, following an accident.

A NEW LOCAL ESKER

DR. A. D. CORNEIA AND S. P. BORDEAU, TWO OF OUR MEMBERS, HAVE DISCOVERED AND MAPPED A NEW ESKER, ALMOST WITHIN THE CITY OF MINNEAPOLIS. THEIR REPORT FOLLOWS:

THE ACCOMPANYING MAP INDICATES THE LOCATION OF THIS ESKER. THE LOCATION IS ABOUT A QUARTER OF A MILE WEST OF THE WESTERLY LIMITS OF MINNEAPOLIS, NEAR CEDAR LAKE, IN THE LAKE FOREST DISTRICT. THE EASTERN END OF THE ESKER COMMENCES AT A POINT APPROXIMATELY 1,000 FEET WEST OF THE JUNCTION OF HIGHWAY NO. 17, AND A SHORT ROAD CALLED CEDAR WOOD ROAD. IT THEN TRENDS WESTWARD FOR ABOUT 500 FEET, THEN NORTHWEST FOR AN ADDITIONAL 500 FEET, AND TERMINATES APPROXIMATELY 300 FEET WEST OF THE GREAT NORTHERN RIGHT-OF-WAY.

AN ESKER MAY BE DEFINED AS A SINUOUS OR SNAKE-LIKE RIDGE OF STRATIFIED OR PARTIALLY STRATIFIED GLACIAL DRIFT, USUALLY SUPERIMPOSED ON AN AREA OF GROUND MORAINE. IT REPRESENTS SAND AND GRAVEL, DEPOSITED BY A STREAM, WHICH FLOWED IN A TUNNEL OR ICE-WALLED GORGE, IN OR BENEATH THE ICE, AND WHICH AGGREGATED ITS BED BEFORE IT ISSUED FROM THE ICE FRONT. THIS ESKER CONFORMS TO THIS DEFINITION.

IT IS SUBSTANTIALLY SYMMETRIC IN OUTLINE, AND QUITE UNIFORM IN WIDTH AND HEIGHT. THE HEIGHT VARIES FROM 15 TO 20 FEET. THE SIDES HAVE ASSUMED A DEGREE OF SLOPE, CONFORMABLE WITH THE ANGLE OF REST OF GLACIAL MATERIAL, MAKING ALLOWANCE FOR FURTHER SLOPING, DUE TO EROSION SINCE THE GLACIAL PERIOD. THE RIDGE LIES BETWEEN TWO BOGS OR DRY SWAMPS OF ACCORDANT ELEVATION. THIS SEEMS TO CONFIRM THE FACT THAT THE MATERIAL WAS LAID DOWN BY STREAM, INDEPENDENTLY OF THEMETHOD IN WHICH THE BOGS WERE FORMED, THAT IS, IN A GORGE OR TUNNEL BETWEEN TWO STAGNATED ICE BLOCKS, WHICH WERE RESPONSIBLE FOR THE BOGS.

THE SURROUNDING AREA IS AN AREA OF TERMINAL MORAINE, RATHER THAN GROUND MORAINE, BUT THIS FACT IS NOT THOUGHT TO BE CONTROLLING.

THE RIDGE IS COMPOSED OF PATRICIAN DRIFT, PART OF THE ST. CROIX TERMINAL MORAINE BELT. THE VERY POROUS MATTER OF THE DRIFT IS PROBABLY THE REASON WHY THE SLOPE OF THE RIDGE HAS NOT BEEN MEASURABLY ALTERED FROM THE TIME THE MATERIAL WAS FIRST RELEASED FROM THE ICE. THE POROUS DRIFT ALLOWS VERY LITTLE EROSION DUE TO RAPID SURFACE DRAINAGE, SINCE EVEN HEAVY RAINS ARE IMMEDIATELY SOAKED UP. THE POROUS SOIL ALSO ACCOUNTS FOR THE NOTICEABLE LACK OF TREES ON TOP THE RIDGE AS COMPARED TO THE SIDES. DRAINAGE WATER GRAVITATES SO QUICKLY FROM THE UPPER PART OF THE RIDGE THAT THERE IS NOT SUFFICIENT MOISTURE FOR ACTIVE TREE GROWTH.

AN INTERESTING FEATURE OF THE RIDGE IS THAT BOTH ENDS TERMINATE ON HILLS TWO TO THREE TIMES ITS HEIGHT. THE TOP OF THE HILL AT THE EASTERN TERMINUS IS, FOR EXAMPLE, ABOUT 50 FEET ABOVE THE LEVEL OF THE BOGS. ASSUMING THAT THE FLOW OF THE GLACIAL STREAM WAS TOWARD THE EAST, IT MIGHT BE CONSIDERED THAT THE HILL ON THE EASTERN TERMINAL IS A KAME. THAT IS, THE STREAM AT THE TIME IT AGGRADED ITS BED, WAS ON, OR IN THE ICE AT A SUBSTANTIALLY HIGHER LEVEL THAN NOW, AND POURED OUT OF THE ICE TO DEPOSIT MATERIAL TO FORM THIS HILL. WITH THE MELTING AWAY OF THE ICE BENEATH THE AGGRADED STREAM BED, THE BED MATERIAL SETTLED TO ITS PRESENT LEVEL TO FORM THE RIDGE WITH ITS COMPARATIVE LOWER ELEVATION WITH RESPECT TO THE HILLS AT EITHER END. THE SOMEWHAT ELONGATED SHAPE OF THE EAST HILL, AND ITS CONICAL OUTLINE OR PROFILE, FURTHER SUGGESTS ITS FORMATION AS A KAME.

IT IS SUGGESTED THAT EXAMINATION AND INVESTIGATION OF THIS ESKER, LYING AT OUR FRONT DOOR, SO-TO-SPEAK, OFFERS AN OPPORTUNITY FOR AN EXCELLENT SHORT FIELD TRIP.

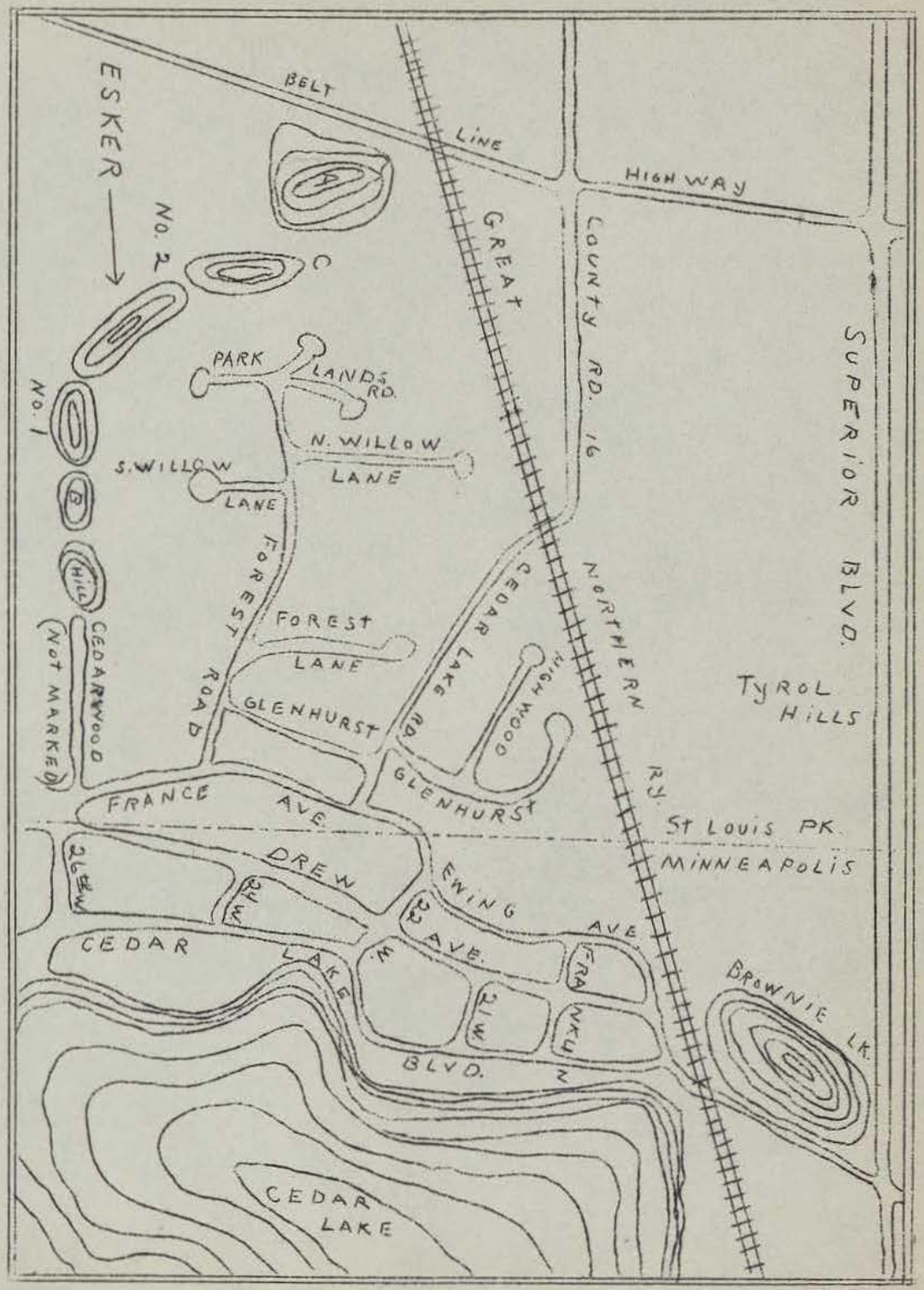
A.D. CORNEIA, M.D.
S.P. BORDEAU

Looking west on esker from point B on map

Looking east on esker from point C on map

Looking west on esker from point B on map

Looking east on esker from point C on map



MAP SHOWING LOCATION OF ESKER

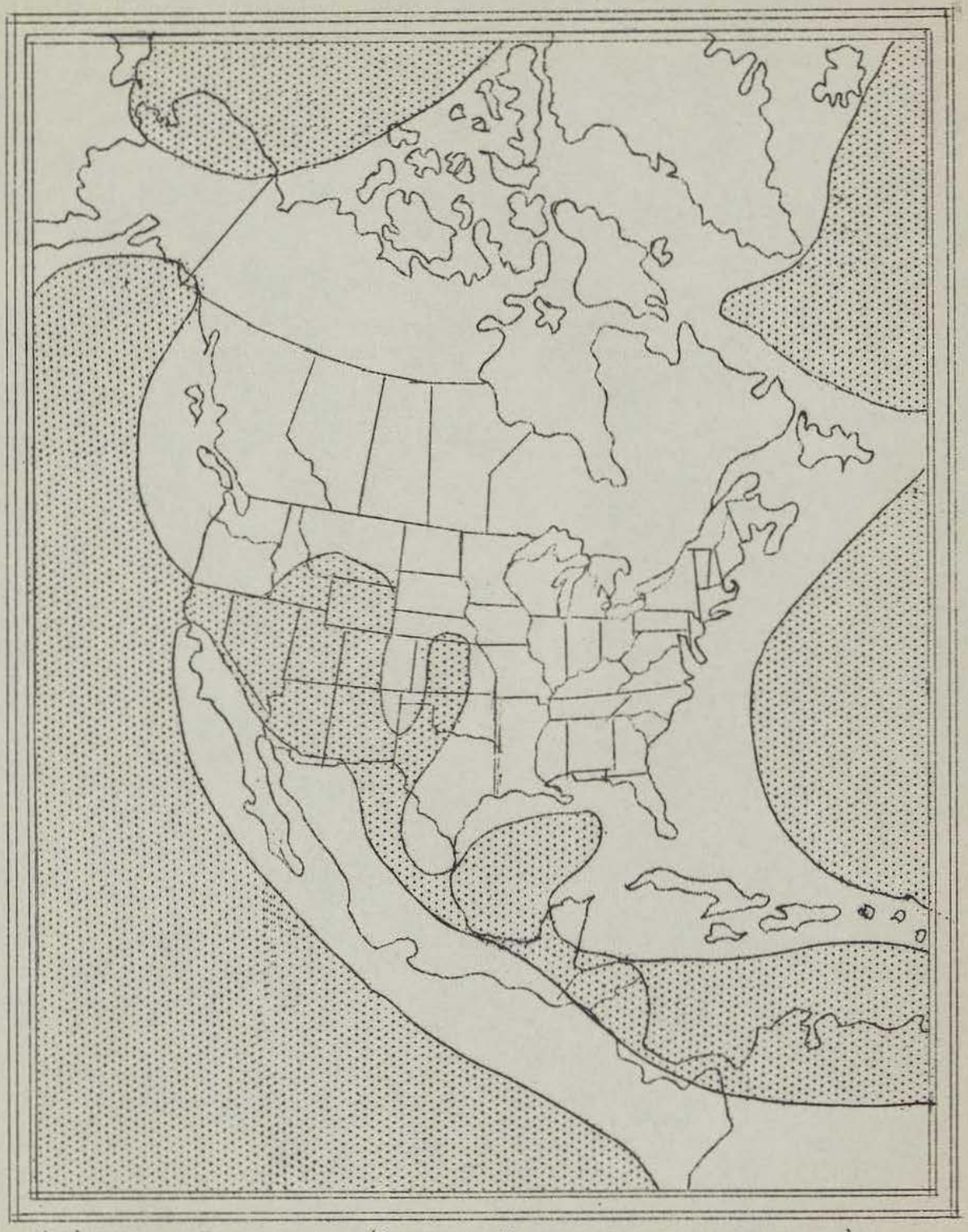
THE FOLLOWING PARAGRAPH WILL BE REPEATED WITH EACH SET OF PALEOGEOGRAPHIC MAPS. THESE MAPS, EXCEPT THOSE OF EUROPE, WERE COPIED FROM SCHUCHERT, AS MODIFIED BY MILLER AND OTHER AUTHORS, AND ILLUSTRATE VARIOUS INVASIONS OF THE SEA UPON THE CONTINENT. IN PAST AGES, RESPONSIVE TO GREAT FORCES, THE SURFACE OF THE CONTINENTS ROSE, AND FELL AGAIN, MANY TIMES. WHEN THE SURFACE SANK BELOW SEA LEVEL, THE SEA COVERED GREAT AREAS OF THE LAND. THE PROCESSES OF EROSION CONTINUED TO WEAR DOWN THE LAND REMAINING ABOVE SEA LEVEL, AND THE RESULTING MATERIAL WAS DEPOSITED IN THE SEA, TO BECOME SEDIMENTARY ROCK. THUS, LARGE AREAS OF THE CONTINENT HAVE COME, IN TIME, TO BE COVERED WITH GREAT LAYERS OF LIMESTONE, SHALE AND SANDSTONE. BY A STUDY OF THE AREA COVERED BY THESE ROCKS, GEOLOGISTS HAVE BEEN ABLE TO OUTLINE, IN A GENERAL WAY, THE LIMITS OF THE VARIOUS INVASIONS BY THE SEA. THESE SEAS ARE KNOWN AS "EPEIRIC" AND "EPI-CONTINENTAL" SEAS. THAT IS, THEY WERE SEAS UPON THE CONTINENT, AS DISTINGUISHED FROM THE ABYSMAL DEPTHS OF THE OCEAN. THEY WERE NEVER VERY DEEP, PROBABLY NOT MUCH OVER 600 FEET, YET MANY THOUSANDS OF VERTICAL FEET OF MATERIAL WAS COLLECTED IN MANY PLACES IN THESE SEAS, BECAUSE THE WEIGHT OF THE ACCUMULATED MATERIAL CAUSED THE FLOOR OF THE SEA TO GRADUALLY SINK, AS NEW MATERIAL WAS ADDED. FORTY TO FIFTY THOUSAND FEET OF MATERIAL WAS NOT UNCOMMON, IN THE GREAT SEA TROUGHS.

THE PERMIAN PERIOD

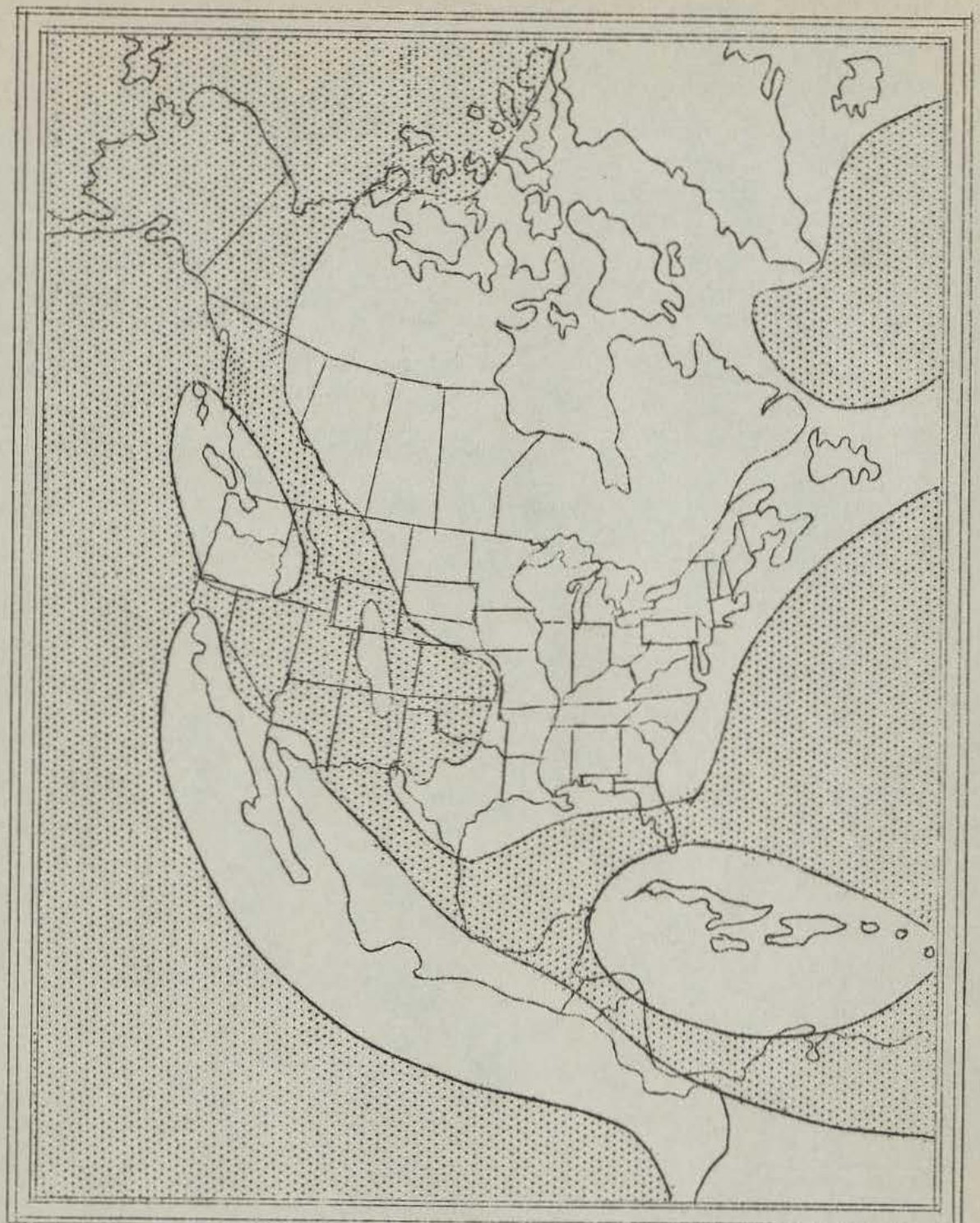
THIS PERIOD OF GEOLOGIC TIME WAS ONE OF THE MOST IMPORTANT AND IS ONE TO BE REMEMBERED BECAUSE IT CLOSED THE PALEOZOIC ERA. IT WAS A PERIOD ALSO OF MARKED AND IMPORTANT CHANGES IN PHYSIOGRAPHY, IN CLIMATE, AND IN FLORA AND FAUNA. IN NORTH AMERICA EXCEPT FOR THE SOUTHERN PART OF THE CORDILLERAN GEOSYNCLINE AND THE SOUTHWESTERN PART OF THE UNITED STATES, THE PERIOD WAS ONE OF EROSION. THE LAND IN EASTERN UNITED STATES HAD STARTED TO RISE IN PENNSYLVANIAN TIME. THIS RISE CONTINUED SO THAT BY THE END OF PERMIAN TIME THE APPALACHIAN MOUNTAINS WERE COMPLETELY FORMED. ALSO THE OUACHITAS AND THE ANCESTRAL ROCKY MOUNTAINS HAD EVOLVED. IN THE EASTERN PART, THE DEFORMATION WAS GREATER THAN AT ANY OTHER TIME AND THE APPALACHIAN MOUNTAINS NOW EXTENDED FROM NEWFOUNDLAND TO ALABAMA, A DISTANCE OF TWO THOUSAND MILES. OTHER MOUNTAINS EXTENDED AN ADDITIONAL THOUSAND MILES ACROSS ARKANSAS, OKLAHOMA, TEXAS, AND MEXICO. AT THE CLOSE OF THE PERIOD THE NORTH AMERICAN CONTINENT WAS COMPLETELY EMERGED AND EVEN GREATER THAN IT IS TODAY. IN EUROPE THE ALPS WERE RE-ELEVATED AND THE URALS IN RUSSIA WERE RISING. THE PERIOD TAKES ITS NAME FROM THE PROVINCE OF PERM IN RUSSIA, WHERE THE ROCKS OF THIS PERIOD WERE FIRST STUDIED BY MURCHISON, WHO GAVE THE PERIOD ITS NAME.

THERE IS MUCH PALEONTOLOGIC AND ZOOLOGIC EVIDENCE TO SHOW THAT BRAZIL WAS, DURING THIS PERIOD, CONNECTED WITH NORTHWESTERN AFRICA, AND AFRICA WITH INDIA AND AUSTRALIA. SUCH GREAT CHANGES IN THE EARTH'S SURFACE RESULTED IN CORRESPONDINGLY GREAT CHANGES IN THE CLIMATE OF THE EARTH. IN THE SOUTHERN HEMISPHERE THERE WAS GREAT CONTINENTAL GLACIATION, THE EVIDENCE OF WHICH STILL REMAINS IN SOUTH AMERICA, AFRICA AND INDIA. WHY GLACIATION WAS SO PRONOUNCED IN THE SOUTHERN AND NOT IN THE NORTHERN HEMISPHERE IS NOT KNOWN. THE CLIMATE WAS EXTREMELY ARRID AND IN SOME PLACES COLD AND VARIED. THESE CLIMACTIC CHANGES RESULTED IN CORRESPONDINGLY GREAT CHANGES IN THE PLANT LIFE OF THE WORLD, AND BECAUSE OF SUCH CHANGES IN THE FLORA, THE FAUNA LIKEWISE WAS GREATLY MODIFIED. DUE TO THE ARRID CLIMATE THERE WAS A MARKED TENDENCY AMONG SOME OF THE SPECIES TO RETURN TO THE SEA AS THEIR HABITAT. BUT DUE TO SUCH CHANGES ALSO, A HARDIER SPECIES OF BOTH PLANT AND ANIMAL LIFE RESULTED, ALTHOUGH MANY SPECIES BECAME EXTINCT. MANY OF THE CORALS AND BRACHIOPODS DIED OUT, AND THE TRILOBITES DISAPPEARED ENTIRELY.

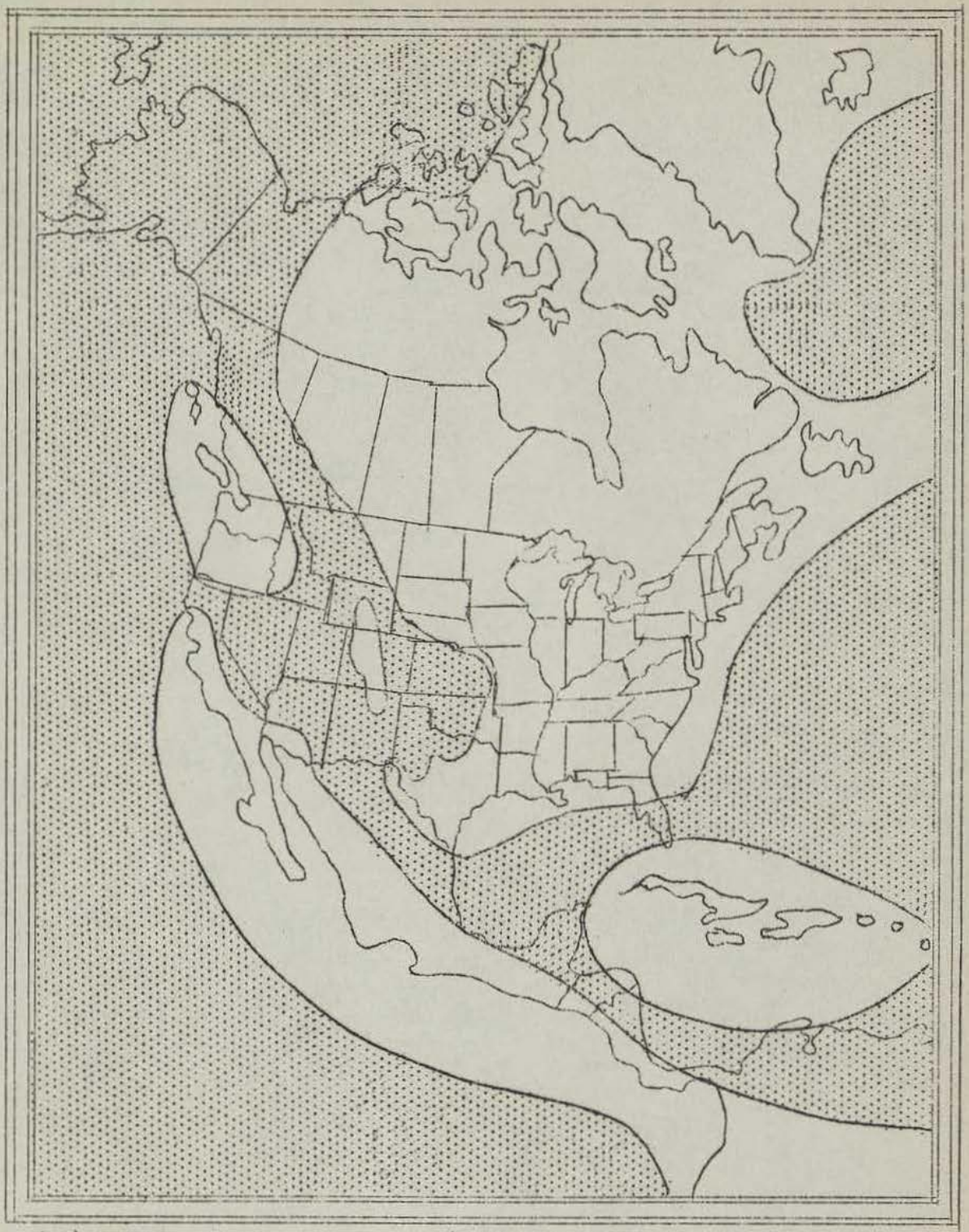
THE PERMIAN STRATA OF SOUTHWESTERN AND WEST CENTRAL UNITED STATES ARE CHARACTERIZED BY THE SO-CALLED "RED BEDS" AND ENORMOUS QUANTITIES OF SALT AND ANHYDRITE. THE SALT BEDS OF KANSAS ARE OF PERMIAN AGE. CARLSBAD CAVERN IS CARVED FROM PERMIAN LIMESTONE. GREAT LAYERS OF PERMIAN ARE EXPOSED IN THE GRAND CANYON AND MONUMENT VALLEY IN ARIZONA.



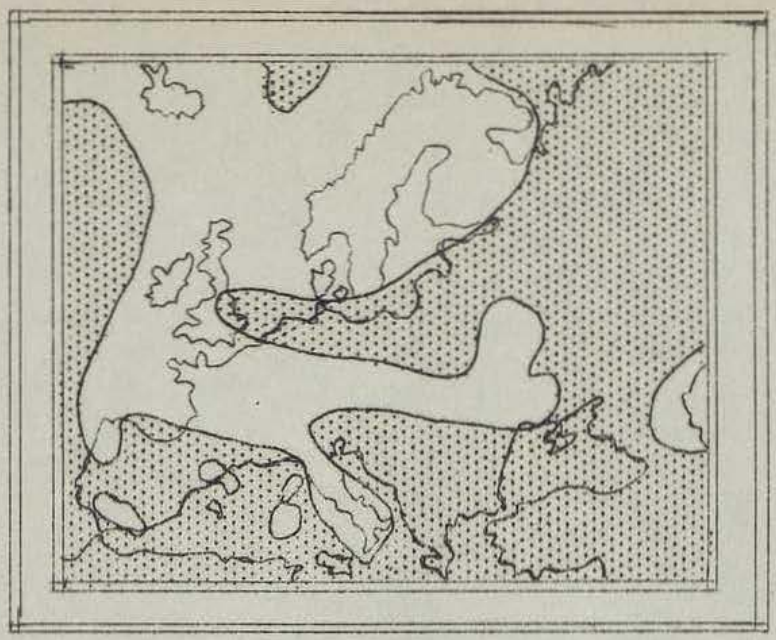
(25) PERMIAN, EARLY (SCHUCHERT, MODIFIED; STIPPLED AREA IS SEA)



(26) PERMIAN, MIDDLE (SCHUCHERT, MODIFIED; STIPPLED AREA IS SEA)



(26) PERMIAN, MIDDLE (SCHUCHERT, MODIFIED; STIPPLED AREA IS SEA)



(28) EUROPEAN-PERMIAN (F.X.SCHAFFER, BY MILLER)

"OUT-OF-TOWN" MEMBERSHIP

IF YOU RESIDE OUTSIDE OF RAMSEY AND HENNEPIN COUNTIES, MINNESOTA, YOU MAY BECOME A MEMBER OF OUR SOCIETY BY PAYMENT OF THE ANNUAL MEMBERSHIP FEE OF $1.00.

YOU WILL RECEIVE A MEMBERSHIP CARD, ALL NOTICES OF OUR ACTIVITIES, INCLUDING MEETINGS, LECTURES, FIELD TRIPS, ETC., AND THE BULLETIN OF OUR SOCIETY, THE MINNESOTA GEOLOGIST WHICH IS PUBLISHED EIGHT TIMES DURING THE YEAR.

MAIL THE FOLLOWING APPLICATION TO THE SOCIETY'S OFFICE WITH CHECK OR CURRENCY FOR $1.00.

"OUT-OF-TOWN" MEMBERSHIP APPLICATION
GEOLOGICAL SOCIETY OF MINNESOTA
831 SECOND AVE. SOUTH,
MINNEAPOLIS 2, MINNESOTA

I ENCLOSE HEREWITH $1.00 AND APPLY FOR MEMBERSHIP IN YOUR SOCIETY;

NAME_____ RESIDENCE_____ PHONE_____
(PRINT) (PRINT)

BUSINESS_____ BUSINESS ADDRESS_____ PHONE_____

_____ _____
SIGNATURE ADDRESS

THE GRAVEL PIT

THE NEIGHBORS, BY GEORGE CLARK

"WHY SAVE SILLY OLD ROCKS? CAN'T YOU COLLECT SOMETHING SENSIBLE, LIKE OLD STREETCAR TRANSFERS?

GEORGE RICKERT SAYS THAT THERE IS GOLD IN THE HILLS OF WISCONSIN NEAR MT. HOREB. HE IS QUITE SURE OF IT BECAUSE HE LOST A GOLD WATCH CHAIN THERE ONE DAY WHEN HE WAS LOOKING FOR FOSSILS. BETTER HAVE ANOTHER FIELD TRIP SOME OPEN DATE, GEORGE.

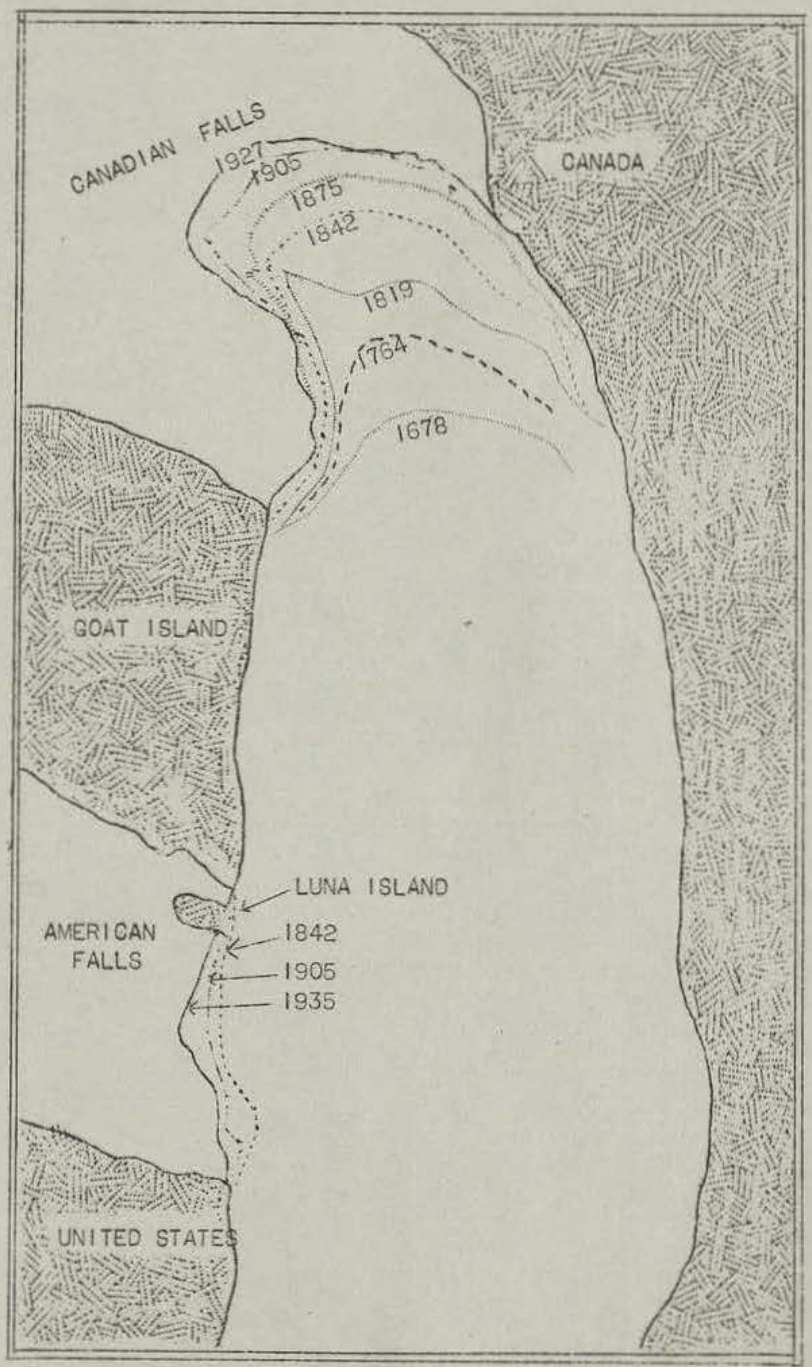
MANKATO APPARENTLY NEEDS A GEOLOGICAL SOCIETY ---- BADLY. WE CLIPPED THE FOLLOWING FROM A MANKATO NEWSPAPER:

> "HE EXPLAINED THAT THE CITY OF MANKATO HAD A PRE-HISTORIC STANDING HAVING BEEN THE LOCATION OF GLACIERS WHICH CAME DOWN FROM THE NORTH CENTURIES AGO AND FORMED QUANTITIES OF STONE IN THE AREA."

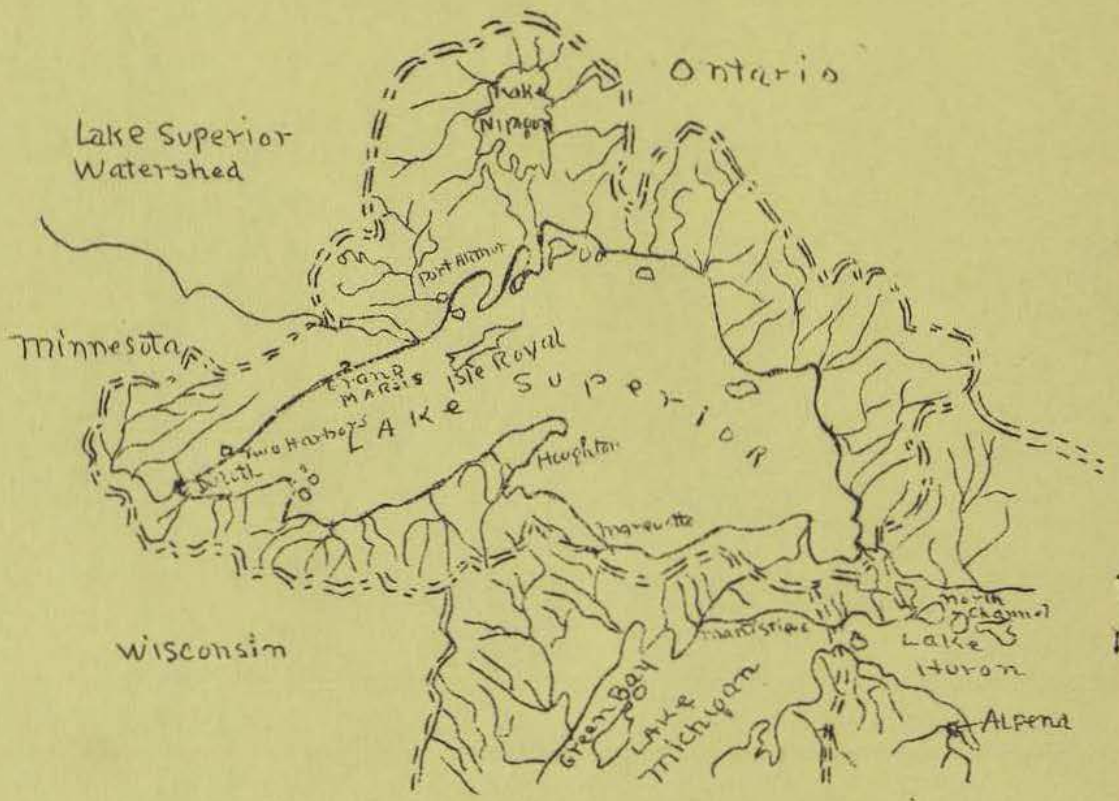
HE: "I ASSUME THAT I AM ONLY A LITTLE PEBBLE ON THE BEACH OF YOUR LIFE."
SHE: "YES, BUT YOUR CHANCES MIGHT BE BETTER IF YOU WERE A LITTLE BOULDER."

DURING THE FIRST PART OF JULY, DR. DART COULD HAVE BEEN OBSERVED, EARLY MOST ANY MORNING, EQUIPED WITH A HOE, STUDYING THE MINERAL, PLANT AND ANIMAL LIFE OF DANA RYDER'S GARDEN. WONDER IF ANYTHING WAS TURNED UP?

-NIAGARA FALLS-



SHOWING THE RECESSION OF NIAGARA FALLS DURING RECORDED TIME



THE STARTLING THING ABOUT LAKE SUPERIOR IS THAT ITS DRAINAGE AREA IS SO SMALL. THIS IS ILLUSTRATED BY THE ABOVE DIAGRAM. THERE IS A SURPRISINGLY LARGE NUMBER OF ISLANDS. THERE ARE ALL TOLD 781 ISLANDS, OF WHICH 293 ARE IN THE UNITED STATES AND 488 IN CANADIAN WATERS.
(THE DOUBLE LINE REPRESENTS THE LIMIT OF THE WATERSHED AREA)