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# THE MINNESOTA GEOLOGIST

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OFFICIAL BULLETIN  
OF  
THE GEOLOGICAL SOCIETY OF MINNESOTA

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Vol. 11

APRIL 1945

No. 4

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831 SECOND AVENUE SO.  
MINNEAPOLIS 2, MINN.

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THE GEOLOGICAL SOCIETY OF MINNESOTA is devoted to  
the study of GEOLOGY and MINERALOGY for their cul-  
tural value.

O F F I C E R S

Joseph W. Zalusky, President,  
Charles E. Howard, Vice Pres. & Treas.  
Loretta E. Koppen, Secretary  
Chas. E. Preston, Director,

Mabel Williams, Director  
Leona Patricia Knox, Director  
Alger R. Syme, Director & Editor  
Edward P. Burch, Director & Counselor

P A S T   P R E S I D E N T S

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

Meetings: 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., from October to May, inclusive.  
From June until September, inclusive, we have a program of field  
trips. Visitors are very welcome, always.

Dues: For those residing in Hennepin and Ramsey Counties are \$3.00  
annually, plus \$1.00 additional for your wife, husband, or dependent  
family members; for those residing elsewhere, dues are \$1.00 per  
person.

GEOLOGICAL SOCIETY OF MINNESOTA  
831 Second Ave. So.  
Minneapolis 2, Minn.

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NOTICE OF ANNUAL ELECTION

The annual election of Directors will be held at the weekly meeting of April 30, 1945, which is the last meeting of this lecture season. The meeting will be held as usual in the large auditorium on the fourth floor of the Public Library, in Minneapolis. The Society will, at that time, elect four Directors, for a term of two years each. The nominating committee has made the following nominations: Edward F. Burch, Dr. Wesley R. Hiller, Dr. Edward E. Mandell, Charles H. Preston, George A. Eichert, Alger R. Syme, Joseph W. Zalusky. Every member should make particular effort to be present and to vote.

FIELD TRIPS FOR MAY

There will be two field trips during the month of May, as follows:

MAY 13, 1945; TIME: 2:00 o'clock P.M.; PLACE: ST. PAUL BRICKYARD; LEADER: THELMA SNEED. The St. Paul Clay Pit is in the Decorah Shale, of Ordovician Age. Last year this was the best attended trip. Many fine fossils were found. You will miss a fine outing, if you do not attend.  
PURPOSE: to examine a fine section of Decorah Shale and to secure Ordovician fossils. You may find good specimens of, Bryozoans, Brachiopods, Fucoids, Crinoids, Corals, Sponges, Pelecypods, Trilobites, Cephalopods and Gastropods.

MEETING PLACE and DIRECTIONS: Those driving cars, cross on the Wabasha Street Bridge, continue two blocks South then turn right on Fillmore and continue, under the High Bridge, until you reach the Brick Plant- Jcs. Gabel, Supt. If you take the street car, transfer any place on Wabasha to the Hamline Street-car and continue to the end of the line, walk west on Anapolis Street two or three blocks to Sibley Blvd. (dead end), cross the Blvd., walk down the ravine to the clay pit or turn left on Sibley Blvd., walk past the white house, and then down the bank to the pit. Wear boots or rubbers.

MAY 27TH, 1945; PLACE; QUARRY, on the Northern Pacific Ry. right of way, 43rd Ave. N.E. and Marshall Ave., Minneapolis. Take bus from 720 First Ave. North, at twenty minutes after the hour (for Anoka) and get off at Filtration Plant 43rd Ave. N.E., walk east one block, cross the railroad tracks, then south one block. If you drive your car drive out Marshall St. to 43rd Ave. N.E. The purpose is to examine a very fine example of the contact of the Flatteville and the Glenwood, and also the St. Peter sandstone. Leader Alger R. Syme. Meet at the quarry at 2:30 P.M., altho you can come as much earlier as you desire.

IMPORTANT CHANGE IN OUR LECTURE PROGRAM.

- MONDAY, APRIL 23rd, 1945: Edw. F. BURCH, subject, "the GEOLOGY OF CUBA"  
MONDAY, APRIL 30th, 1945: Chas. H. PRESTON, Subject, "GEOLOGY OF THE GRAND CANYON"

JUNIOR HAYDEN, PAST PRESIDENT OF THIS SOCIETY, IS A VERY EFFECTIVE SPEAKER. HE NOT ONLY PROVIDES AN INTERESTING LECTURE, BUT FURNISHES HIS OWN PICTURES, HIS OWN PICTURE MACHINE, AND ALSO PROVIDES HIS OWN "AUDIENCE". HIS LECTURE ON YELLOWSTONE PARK BROKE THE SEASON'S RECORD, WITH AN ATTENDANCE OF 118, AND JUST TO MAKE IT A LITTLE MORE INTERESTING, HE THREW IN 15 MINUTES OF COLORED MOTION PICTURES, A FILM FURNISHED BY THE NORTHERN PACIFIC RAILWAY COMPANY. THIS LECTURE SHOULD BE AN ANNUAL EVENT. OUR THANKS TO MR. HAYDEN AND THE NORTHERN PACIFIC RAILWAY COMPANY.

APRIL WILL CLOSE OUR LECTURE SEASON. WE THINK YOU ALL WILL AGREE THAT IT HAS BEEN ONE OF THE MOST INTERESTING AND PROFITABLE LECTURE SEASONS IN THE HISTORY OF THE SOCIETY. WHEN YOU STOP TO CONSIDER WHAT THE SOCIETY GIVES FOR \$3.00, YOU WONDER WHY WE DON'T HAVE 500 MEMBERS. WELL, ANYWAY, WE FEEL KIND OF SORRY FOR THOSE WHO DON'T TAKE ADVANTAGE OF THIS OPPORTUNITY.

FIELD TRIPS: THE COMMITTEE HAS ARRANGED A PROGRAM OF FIELD TRIPS. AS WE "GO TO PRESS", THE LIST OF PLACES IS TENTATIVE, SO WE CANNOT GIVE YOU THE PROGRAM. YOU WILL RECEIVE THIS LATER, HOWEVER. JUST A WORD TO THOSE WHO HAVE NOT MADE IT A PRACTICE TO ATTEND THE FIELD TRIPS. FIRST AND FOREMOST, YOU WILL FIND AN OPPORTUNITY TO APPLY TO ACTUAL SITUATION IN THE FIELD, SOME OF THE PRINCIPLES YOU HAVE LEARNED DURING THE YEAR, BUT OVER AND BEYOND THAT, YOU WILL FIND IT A FINE OPPORTUNITY TO GET ACQUAINTED WITH THE MEMBERS OF THE SOCIETY IN A WAY THAT YOU CANNOT DO AT THE LECTURES. YOU WILL MAKE NO MISTAKE IF YOU TAKE THE TIME TO ATTEND THE FIELD TRIPS "REGULARLY".

STATISTICS: YOU WILL, NO DOUBT, BE INTERESTED IN SOME STATISTICS FOR THE YEAR SO FAR, AS THEY SHOW THAT OUR SOCIETY IS IN A HEALTHY CONDITION. TO AND INCLUDING THE LECTURE ON APRIL 2ND, WE HAVE HELD 23 MEETINGS. THE LOWEST ATTENDANCE AT ANY MEETING WAS 52; THE HIGHEST, 118. WE HAD AN ATTENDANCE GREATER THAN 80 AT HALF OF THE MEETINGS, AND THE AVERAGE ATTENDANCE FOR ALL MEETINGS WAS 86.30. THE BULLETIN HAS 195 NAMES ON ITS MAILING LIST. THE TREASURER INFORMS US THAT ALL BILLS ARE PAID, AND THAT WE HAVE \$393.16 IN THE TREASURY. SURELY, THIS HAS BEEN A VERY SUCCESSFUL YEAR.

THE BULLETIN HAS ALSO ESTABLISHED A RECORD, FOR BEING MAILED PROMPTLY EACH TIME, ON OR BEFORE THE 15TH OF THE MONTH. ACCORDING TO YOUR COMMENT, ALSO, THE BULLETIN HAS GREATLY IMPROVED IN QUALITY, DURING THE YEAR, AS COMPARED WITH LAST YEAR, WHICH WAS THE FIRST YEAR OF PUBLICATION. THIS ISSUE IS NO. 4 OF VOLUME 11. NO. 5 WILL BE PUBLISHED JUNE 15TH, NO. 6 WILL FOLLOW ON AUGUST 15TH, NO. 7, ON OCTOBER 15TH, NO. 8, THE FINAL NUMBER FOR THE YEAR, ON DECEMBER 15TH. IF YOU HAVE A FRIEND WHOM YOU THINK WOULD BE INTERESTED IN RECEIVING THE BULLETIN, YOU CAN HAVE HIS NAME PLACED ON THE MAILING LIST FOR ONE YEAR, UPON PAYMENT OF \$1.00.

DR. HILLER: HAS DONATED SEVERAL HUNDRED PAMPHLETS AND BULLETIN, PUBLISHED BY THE UNITED STATES GEOLOGICAL SURVEY ON GEOLOGIC SUBJECTS AND PLACES, IN ALL PARTS OF THE COUNTRY. MANY OF THESE ARE FROM THE LIBRARIES OF DR. STAUFFER AND MR. HANLEY. AS SOON AS WE HAVE TIME TO SORT THESE, AND TO CLASSIFY THEM IN SOME WAY, WE WILL OFFER THEM FOR SALE FOR A NOMINAL CONSIDERATION. PROCEEDS WILL BE USED TO PAY THE EXPENSE OF PUBLISHING "THE MINNESOTA GEOLOGIST". OUR SINCERE THANKS TO DR. HILLER.

OUR ANNUAL ELECTION WILL BE HELD AT THE APRIL 30TH MEETING. WE WILL ELECT FOUR DIRECTORS FOR A TERM OF TWO YEARS EACH. DIRECTORS WHOSE TERMS EXPIRE ARE: JOSEPH W. ZALUSKY, CHARLES H. PRESTON, EDWARD P. BURCH AND ALGER R. SYME. EVERY MEMBER SHOULD ATTEND AND VOTE! DIRECTORS WHO HOLD OVER UNTIL NEXT YEAR ARE: LORETTA E. KOPPEN, LEONE P. KNOX, MABEL WILLIAMS AND CHARLES B. HOWARD.

THE FOLLOWING PARAGRAPH WILL BE REPEATED WITH EACH SET OF PALEO GEOGRAPHIC 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 MISSISSIPPIAN PERIOD

THE ACADIAN DISTURBANCE DURING THE PRECEDING DEVONIAN PERIOD GREATLY ELEVATED THE NORTHERN PART OF APPALACHIA, WHICH LIES TO THE SOUTH OF THE DISTURBANCE. DURING MISSISSIPPIAN TIME, EROSION OF APPALACHIA WAS THUS GREATLY ACCELERATED, AND THE DETRITAL MATERIAL WAS CARRIED INTO THE APPALACHIAN TROUGH FASTER THAN THE LAND SUBSIDED, WITH THE RESULT THAT MISSISSIPPIAN SEDIMENTS IN THE APPALACHIAN REGION NORTH OF PENNSYLVANIA ARE LARGELY LAND DEPOSITS. IN NORTHERN PENNSYLVANIA, WE FIND LARGE DEPOSITS OF VERY RESISTANT CONGLOMERATES. FROM PENNSYLVANIA, SOUTHWARD TO VIRGINIA, THE SEDIMENTS CONSIST LARGELY OF THICK SANDSTONE LAYERS, WITH IMPORTANT SHALE AND SILTSTONE MEMBERS, WHILE SOUTH OF VIRGINIA, THEY CONSIST LARGELY OF LIMESTONES. THIS SEQUENCE OF DEPOSITION IS CHARACTERISTIC, BUT IS HERE ILLUSTRATED ON A VERY GRAND SCALE.

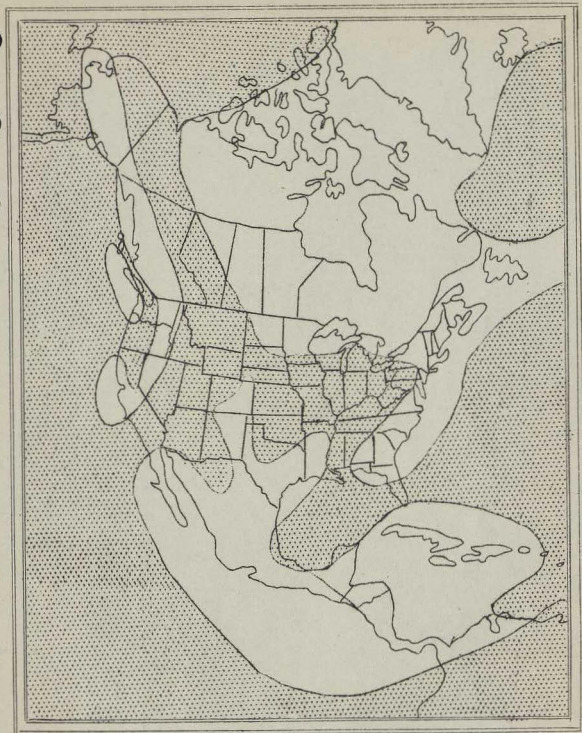
IN THE WEST, THE SEA AGAIN INVADDED FROM THE ARCTIC, LEAVING LARGE DEPOSITS OF LIMESTONE THROUGHOUT THE ROCKY MOUNTAIN AREA, FROM THE GRAND CANYON REGION, NORTH THROUGH MONTANA, ALBERTA, AND INTO THE ARCTIC. THE SEA ALSO INVADDED THE CONTINENT, FROM THE GULF OF MEXICO, UP THE PRESENT MISSISSIPPI VALLEY, SO THAT TODAY, WE FIND MANY FINE EXPOSURES OF THE ROCKS OF THIS PERIOD ALONG THE MISSISSIPPI RIVER, THROUGH MISSOURI, ILLINOIS AND IOWA. THE PERIOD TAKES ITS NAME FROM THIS AREA.

THE FOSHAY TOWER IN MINNEAPOLIS IS A GOOD EXAMPLE OF SO-CALLED INDIANA, OR BEDFORD LIMESTONE, WHICH IS OF MIDDLE MISSISSIPPIAN AGE. THE KEVIN-SUNBURST OIL FIELD IN MONTANA, PRODUCES FROM THE MADISON LIMESTONE, OF EARLY MISSISSIPPIAN AGE, MAMMOTH CAVE, AND MANY OTHERS, IN KENTUCKY AND MISSOURI, ARE CARVED IN MISSISSIPPIAN ROCKS.

FOR A LONG TIME PRECEDING MISSISSIPPIAN TIME, THERE WAS NO IMPORTANT LARGE-SCALE, OROGENIC DISTURBANCE, BUT AT THE CLOSE OF THIS PERIOD, CONSIDERABLE CRUSTAL MOVEMENT BEGAN. THERE WAS A BROAD UPLIFT IN THE INTERIOR OF THE CONTINENT, WITHOUT MOUNTAIN-MAKING EFFECT. THERE WAS THE RISE OF THE COLORADO PLATEAU, THE ANCESTRAL ROCKIES, AND MOUNTAIN-MAKING IN EUROPE ON A BIG SCALE.

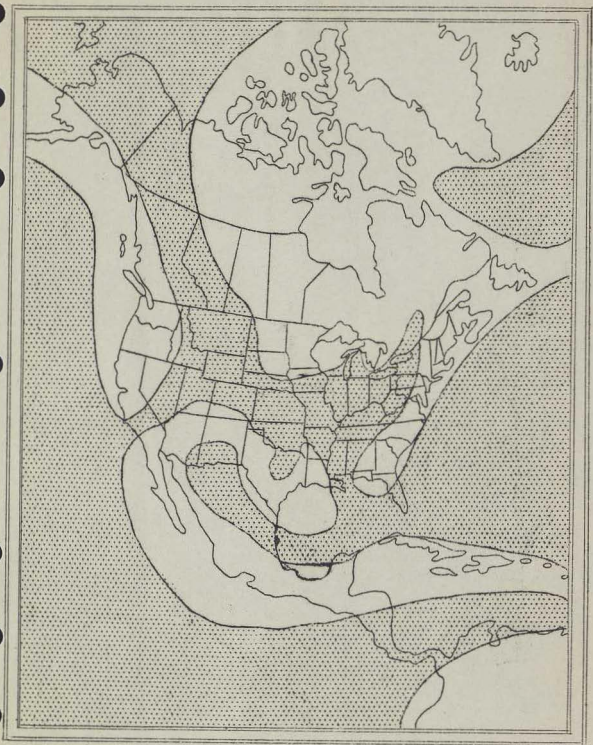
THE CLIMATE SEEMS TO HAVE BEEN UNIVERSALLY MILD, AS FOSSIL CORALS ARE FOUND IN ALASKA. FISH WERE ABUNDANT. AMPHIBIANS BEGAN TO APPEAR. AT LEAST A FEW OF THEIR BONES HAVE BEEN FOUND. THIRTY-NINE SPECIES OF SHELL CRUSHING SHARKS INCREASED DURING THE PERIOD TO TWO HUNDRED EIGHTY-EIGHT. THIS FACT HAS BEEN SUGGESTED AS A REASON FOR THE ALMOST COMPLETE DISAPPEARANCE OF THE TRILOBITES. PLANT LIFE, FOR THE MOST PART, HAS BEEN RATHER POORLY PRESERVED.





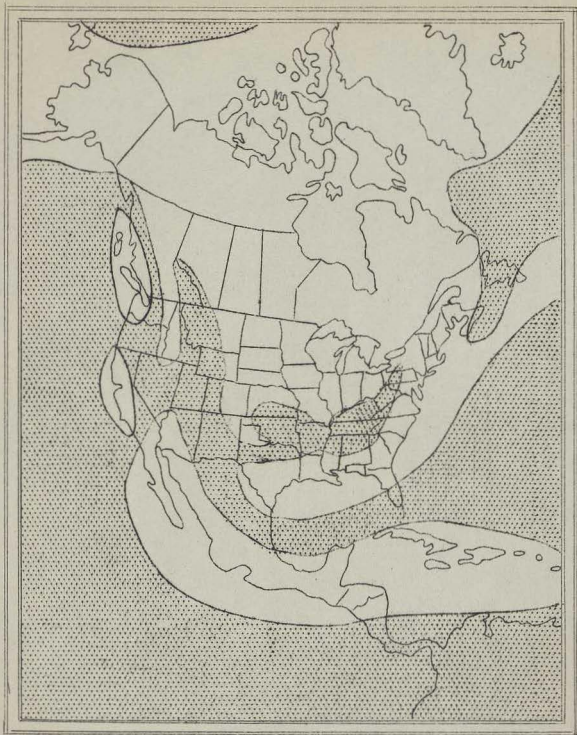
(17) MISSISSIPPIAN- EARLY

(SCHUCHERT, MODIFIED; STIPPLED AREA IS SEA)



(18) MISSISSIPPIAN- MISOLE

(SCHUCHERT, MODIFIED; STIPPLED AREA IS SEA)



(19) MISSISSIPPIAN- LATE (SCHUCHERT, MODIFIED; STIPPLED AREA IS SEA)





(20) EUROPEAN-MISSISSIPPIAN

(MILLER-DELAFFRANT)

#### BULLETIN BOARD

- APRIL 9: SPEAKER, PROFESSOR FRANK F. GROUT; SUBJECT, "THE GEOLOGY OF THE CANADIAN SHIELD";
- APRIL 16: SPEAKER, DR. LAWRENCE M. GOULD, HEAD OF THE DEPARTMENT OF GEOLOGY OF CARLETON COLLEGE; SUBJECT, "GLACIATION OF SOUTHEASTERN MINNESOTA";
- APRIL 23: SPEAKER, PAST PRESIDENT CHARLES H. PRESTON; SUBJECT, "THE GRAND CANYON OF THE COLORADO";
- APRIL 30: SPEAKER, COUNSELLOR EDWARD P. BURCH; SUBJECT, "THE GEOLOGY OF THE BOSTON QUADRANGLE"; (ANNUAL ELECTION OF DIRECTORS)

A O D

#### OUR FIRST FIELD TRIP

MAY 13TH, SUNDAY, 2:00 O'CLOCK P.M.: LEADER, MISS THELMA SNEED; PLACE, ST. PAUL BRICKYARD.

#### THIS AND THAT

A WELL HAS JUST BEEN DRILLED TO RECORD DEPTH BY PHILLIPS PETROLEUM COMPANY IN BRAZOS COUNTY, TEXAS. THE WELL IS NOW PAST 15,242 FEET AND IS STILL DRILLING.

PETROLEUM--FURTHEST NORTH: 175 MILES EAST OF POINT BARROW, MOST NORTHERLY TIP OF ALASKA, THE UNITED STATES NAVY WILL THIS MONTH DRILL A FIRST TEST WELL IN NAVY'S 34,000 SQUARE MILES OF OIL RESERVES. AND NOW REVIEW YOUR PALEOGEOGRAPHIC MAPS TO DETERMINE THE AGE OF VARIOUS ROCK STRATA, WHICH MAY BE ENCOUNTERED IN DRILLING AT THIS POINT.

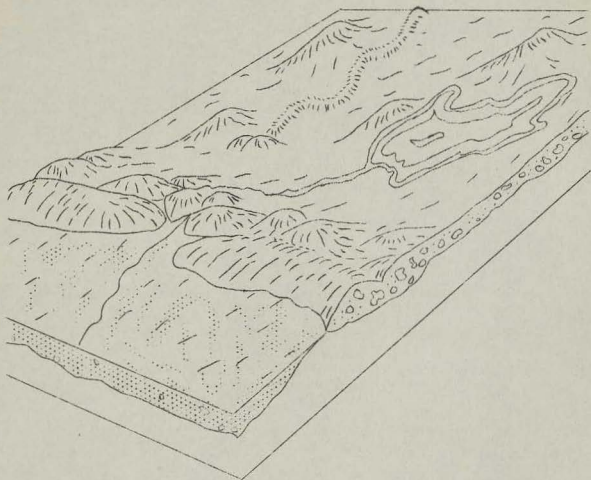
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OUR GEOLOGY LESSON

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THE ABOVE SKETCH IS A DIAGRAM OF AN AREA AFFECTED BY CONTINENTAL GLACIATION. ANSWER THE FOLLOWING QUESTIONS WITH REFERENCE THERETO.

- (A) LABEL EACH TOPOGRAPHICAL FORM, (THERE ARE AT LEAST SEVEN)
  - (B) WHAT IS THE PROBABLE COMPOSITION OF EACH.
  - (C) WHAT PETICULAR FEATURE CHARACTERIZES EACH.
  - (D) IN WHICH DIRECTION DID THE ICE MOVE.
  - (E) IN WHICH DIRECTION DID THE ICE RETREAT.
  - (F) WHAT CLUE TO THE DIRECTION OF THE MOVEMENT OF THE ICE IS INDICATED BY EACH OF THE VARIOUS LAND FORMS.
  - (G) WHAT CHARACTERISTIC DISTINGUISHES GLACIAL PEBBLES FROM WATER-WORN PEBBLES.
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**SILICON** IS THE SECOND MOST ABUNDANT ELEMENT IN THE EARTH'S CRUST, AND YET, FEW OF US KNOW VERY MUCH, IF ANYTHING, ABOUT IT. HAVE YOU EVER SEEN IT? CAN YOU DESCRIBE IT? DO YOU KNOW WHETHER OR NOT IT IS A METAL? IS IT CRYSTALLINE? IS IT MASSIVE? RECENTLY, SILICON HAS BEEN USED AS THE BASIS OF A WHOLE SERIES OF PLASTICS. WE MENTIONED THIS IN THE LAST ISSUE OF THE BULLETIN. THE ARTICLE FROM WHICH WE TOOK THIS REFERENCE, REFERRED TO SILICON AS A METAL. WE QUESTIONED THIS AND DECIDED TO INVESTIGATE. IT THEN OCCURRED TO US THAT MOST OF YOU WOULD LIKE TO KNOW MORE ABOUT THIS STRANGE ELEMENT, SO WE BETOOK OURSELVES TO OUR FRIEND, DR. L. O. DART. IT SEEMED VERY ODD TO US THAT SUCH A COMMON AND ABUNDANT ELEMENT IN THE ROCKS SHOULD BE SO LITTLE KNOWN. WE, THEREFORE, GIVE YOU THE FOLLOWING INFORMATION, WHICH WE SECURED FROM DR. DART, AND HOPE IT WILL BE OF AS MUCH INTEREST TO YOU, AS IT WAS TO US.

SILICON, OR SILICIUM, IS FROM THE LATIN WORD "SILEX", MEANING FLINT. ITS CHEMICAL SYMBOL IS Si. IT UNITES FREELY WITH OXYGEN, TO FORM QUARTZ, SiO<sub>2</sub>. IT WAS DISCOVERED IN 1823 BY JENS J. BERSELIUS. AS STATED, NEXT TO OXYGEN, IT IS THE MOST ABUNDANT ELEMENT IN THE EARTH'S CRUST, CONSTITUTING 257 PARTS BY WEIGHT, OF EACH 1,000 PARTS, AND 159 ATOMS OF EACH 1,000 ATOMS, OR 500 PARTS, BY WEIGHT, OF OXYGEN, AND 538 ATOMS PER 1,000. IT IS NONMETALLIC, AND HAS NEVER BEEN FOUND FREE IN NATURE. IT HAS BEEN PREPARED ARTIFICIALLY, AS A DULL, BROWN, AMORPHOUS POWDER, AS SHINING SCALES, WITH METALLIC LUSTRE, RESEMBLING GRAPHITE, AND ALSO, AS DARK GRAY GLOBULES, SOMETIMES SHOWING CRYSTALLIZATION.

SILICON DIOXIDE, SiO<sub>2</sub>, SILICA, IS FOUND PURE, AS QUARTZ, TRIDYMIT, CRYSTOBALITE AND OPAL, IN MANY ROCKS AND SANDS, AND COMBINED WITH VARIOUS BASES, IN ALL SILICATE MINERALS. IT IS FOUND IN THE SKELETONS OF CERTAIN ANIMALS, AS SPONGES, AND IN PLANTS, AS PER EXAMPLE, HORSETAILS, AND AS DIATOMES. IT IS FAR MORE ABUNDANT IN THE SILICATES, SUCH AS ALUMINUM, MAGNESIUM, IRON AND ALKALINE EARTH METALS. IT IS SAID TO HAVE BEEN FOUND ALSO, IN THE SUN, AND IN THE STARS, AND MAY BE IN A FREE STATE THERE.

THE AMORPHOUS POWDER FORM WAS PRODUCED BY THE DECOMPOSITION OF SILICON-HALIDES, OR SILICO-FLUORIDES, BY ALKALI METALS, AND OF SILICA, BY MAGNESIUM, YIELDING AN IMPURE PRODUCT. HOWEVER, IF A SMALL AMOUNT OF MAGNESIA IS ADDED, A PRODUCT 98% PURE IS OBTAINED. THE CRYSTALLINE FORM IS PRODUCED BY HEATING POTASSIUM SILICO-FLUORIDE WITH ALUMINUM, OR BY HEATING SILICON WITH MAGNESIUM, IN THE PRESENCE OF ZINC, OR BY VOLATILIZING THE AMORPHOUS VARIETY IN AN ELECTRIC FURNACE. IT IS ATTACKED RAPIDLY BY FLUORINE, IN ORDINARY TEMPERATURES, AND BY CHLORINE, WHEN HEATED IN A CURRENT OF THAT GAS. WHEN HEATED IN OXYGEN, THERE IS A SLIGHT OXIDATION ON THE SURFACE. BY HEATING, IT COMBINES DIRECTLY WITH MANY METALS, ALTHOUGH SOME METALS WILL DISSOLVE IT. IT WILL DECOMPOSE AMMONIA AT RED HEAT, LIBERATING HYDROGEN, AND YIELDING A COMPOUND CONTAINING SILICON AND NITROGEN. IT PRODUCES MANY NONMETALLIC OXIDES. IT IS SOLUBLE ONLY IN A MIXTURE OF HYDROFLUORIC AND NITRIC ACIDS, OR IN A SOLUTION OF CAUSTIC ALKALI. IN THE LATTER CASE, IT YIELDS HYDROGEN AND SILICATES, A REACTION THAT HAS BEEN UTILIZED FOR LARGE-SCALE PRODUCTION OF GAS, FOR MILITARY BALLOONS. THERE IS ONLY ONE KNOWN OXIDE OF SILICON, WHICH IS THE DIOXIDE, KNOWN AS SILICA, ALTHOUGH SiO has been described. ITS CHEMICAL SYMBOL IS Si, ATOMIC NUMBER 14, ATOMIC WEIGHT 28.06, SPECIFIC GRAVITY, CRYSTALLINE VARIETY 2.49, FUSING POINT 1470° C.—2678° F., AND ITS VALENCE IS 4.

THINK OF SOME OF THESE THINGS NEXT TIME YOU PICK UP A PIECE OF QUARTZ, CHERT, AGATE, CHALCEDONY, OR ANY OTHER VARIETY OF QUARTZ.

EDITOR'S NOTE— HOPE WE DIDN'T GARBLE DR. DART'S NOTES TOO MUCH. SO CHARGE THE ERRORS TO THE EDITORS.



THE MAPS IN OUR LAST ISSUE SHOWED HOW THE ICE HAD RETREATED FROM PRACTICALLY ALL OF THE GREAT LAKES, WITH THE EXCEPTION OF ONTARIO, AND PARTS OF SUPERIOR, AND HURON. THE ICE STILL BLOCKED THE NORTHERN OUTLETS.

IN SKETCH NO. 8, THE ICE HAS RETREATED FROM ALL THE GREAT LAKES. NOTE THAT ALL OF THE GREAT LAKES ARE OVERSIZED.

THE VALLEY OF THE HUDSON RIVER AND LAKE CHAMPLAIN ARE RULED TO INDICATE THAT THE SEA HAS FLOODED THIS AREA. IN OTHER WORDS, THE HUDSON RIVER WAS AT SEA LEVEL, AND THE FRESH WATER FROM THE GREAT LAKES DRAINED INTO IT, THROUGH THE MOHAWK, DISCHARGING AT A POINT NEAR ALBANY, AND MOVING ALSO THROUGH LAKE ONTARIO, ALONG THE SOUTHERN BOUNDARY OF THE ICE, INTO THE LAKE CHAMPLAIN AREA.

IN SKETCH NO. 9, NOTE THAT THE ST. LAWRENCE OUTLET IS NOW FREE OF ICE, AND DRAINAGE IS THROUGH THE ST. LAWRENCE. THE CHANNEL IS ENLARGED, HOWEVER, DUE IN PART TO THE GREAT VOLUME OF WATER DRAINING FROM THE GREAT LAKES, AND PARTLY TO THE FACT THAT THE LAND WAS DERESSED BY THE WEIGHT OF THE ICE. IN SKETCH NO. 9, AS IN SKETCH NO. 8, THE RULED AREA REPRESENTS AN INVASION OF THE SEA. IN THE LATTER SKETCH, THE ENTIRE ST. LAWRENCE VALLEY REPRESENTS AN ENCROACHMENT OF THE SEA, SO THAT THE WATERS OF THE GREAT LAKES, IN EFFECT, DISCHARGED INTO SALT WATER AT THE EASTERN END OF LAKE ONTARIO, AT A POINT JUST NORTH OF LAKE HURON.

NOTE, TOO, THAT THE GREAT LAKES NO LONGER DISCHARGED THROUGH THE MOHAWK, NOR THROUGH ANY OF THE RIVERS FLOWING SOUTH, TO ANY CONSIDERABLE EXTENT, AND THAT NORMAL DRAINAGE THROUGH THE ST. LAWRENCE HAS BEEN RE-ESTABLISHED.



"OUT-OF-TOWN" MEMBERSHIP

IF YOU RESIDE OUTSIDE 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 ALL MEETINGS, LECTURES, FIELD TRIPS, ETC., AND THE BULLETIN OF OUR SOCIETY, "THE MINNESOTA GEOLOGIST", WHICH WE PUBLISH EIGHT TIMES DURING THE YEAR.

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

-B-

GEOLOGICAL SOCIETY OF MINNESOTA.

831 SECOND AVE. SOUTH,  
MINNEAPOLIS 2,  
MINNESOTA.

I ENCLOSE \$1.00 AND APPLY FOR MEMBERSHIP IN YOUR SOCIETY:

NAME \_\_\_\_\_ RESIDENCE \_\_\_\_\_ PHONE \_\_\_\_\_

PRINT

PRINT

BUSINESS \_\_\_\_\_ BUSINESS ADDRESS \_\_\_\_\_ PHONE \_\_\_\_\_

SIGNATURE \_\_\_\_\_

ADDRESS \_\_\_\_\_