
# THE MINNESOTA GEOLOGIST

## OFFICIAL BULLETIN OF THE GEOLOGICAL SOCIETY OF MINNESOTA

VOL 11 DECEMBER 1945 NO 6

contents

# GEOLOGICAL SOCIETY OF MINNESOTA

631 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
Charles B. Howard, Vice-President
Mary Lupient, Treasurer
Loretta E. Koppen, Sec. & Ass't. Editor
Alger R. Syme, Director & Editor
Mabel E. Williams, Director
Leone Patricia Knox, Director
Chas. H. Preston, Director
George A. Rickert, Director

## FOUNDER

Edward P. Burch

## PAST PRESIDENTS

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 dependant family members; for students and those residing elsewhere, $1.00.

## MIDWEST FEDERATION OF GEOLOGICAL SOCIETIES
Report on 1945 Convention
Joliet, Illinois

About six years ago, there was formed at Chicago, a Society of Geology Societies. It was thought that a great deal of mutual help and assistance could be derived by forming a connecting link between a number of Societies organized to promote the cultural value of geology, mineralogy, and related subjects by an exchange of experiences and by getting together once a year for that purpose. So the Midwest Federation of Geological Societies was formed. The Geological Society of Minnesota became a member last year.

The annual meeting this year was held at Joliet, Illinois on October 13 and 14. The morning session was devoted partly to business and partly to talks on geologic subjects. Your editor spoke on the function and publication of a Society Bulletin illustrating his remarks with examples of articles, pictures, diagrams, and material which have appeared in these pages during the past two years. The president, Mr. Scanlon, told of theprogress of the Society during the past year and of its aims and plans. Meetings were held in one of the auditoriums of the Township Highschool and Junior College at Joliet. This progressive institution has a staff of 36 teachers and instructors who devote their full time to nature study subjects. Mr. Fleener, author and lecturer, formerly Professor of Geology at Northwestern University, at one time headed this department. Mr. Ben Hur Wilson, teacher and author, is the present head. Both have been active in the formation and work of the Federation.

At the business session, the Society decided to hold its next annual meeting in Minneapolis at which time they will be the guests of our Society during a two-day session. At the same time, they honored our Society by unanimously electing your editor president of the Federation for the ensuing year.

The Saturday afternoon session was devoted to a field trip to Sandwich, Illinois where we examined the James Knights Manufacturing Company plant which has been making quartz crystal for radar for army and navy use during the war. We enjoyed an excellent scientific lecture by a member of the firm, who is a national authority on the subject. A maize of electronic equipment and X-Ray machines were explained to us in a way that made it comprehensible to the uninitiated, climxed by witnessing gold and silver plating of quartz crystals, believe it or not.

At the Saturday evening session, your editor also spoke on the subject of "The Construction and Use of Paleogeographic Maps", illustrated with 10 18x24 maps similar to those appearing in the bulletin. Mr. L. H. Longwell of Elmhurst, Illinois showed many colored lantern slides of agates. He has a beautiful collection of colored illustrations and has offered us the use of them at any convenient time. Short talks were given by Dr. Ball, Head of the Department of Geology of Northwestern University, by Mr. Fleener, Past President of the Society, and by Mr. Ben Hur Wilson.

On Sunday, we enjoyed an all day field trip and picnic to Ottawa and Starved Rock, Illinois. At Ottawa, we studied a section of St. Peter sandstone which was not quite as white and pure as our section here, but a very interesting formation, as is ours, and it was exceedingly interesting to compare the two sections. At Starved Rock, we viewed the valley of the Illinois River and a

canyon or two cutting deep into the Lasalle anticline. A large croud of delegates enjoyed the trip and it was very interesting to meet with so many different people from so many different places all united by a common interest.

A large share of these people seemed to be interested in collections of one kind or another, and we brought back with us the thought that our Society might well encourage our members to a much greater extent than we havein the past, in making collections of different items of geologic interest. Some collect fossils, some mineral crystals, some rock specimens, some are lapidaries, etc. One member is said to have one of the finest collections of fossils of Pennsylvania flora extant. Many others have beautiful collections.

As president of the Federation for the ensuing year, we will have two objectives. First, to increase the number of Societies in the Federation, and Second, to facilitate an exchange of information regarding places to be visited for geologic interest, reviews of books of geologic interest, exchange of speakers, and experiences that may be helpful to the member societies. How successful we will be, only time will tell, but the purposes are worthy, and offer a great opportunity for service.

********

## STAUROLITES

The article on staurolites is a "Koppen creation." Mr. Koppen contributed the "fairy story." Mrs. Koppen suggested thepictures of the crystal forms and a description thereof, and drew the pictures.

## OPPORTUNITY

No doubt, many of you have observed a number of bird exhibits and one or two botanical exhibits around town during the hunting season which have made effective window displays. We have the opportunity for making similar displays of geologic interest but so far, no one has stepped forward to volunteer to do it. There is a splendid opportunity for someone to render a real service to the Society by collecting exhibits, providing the necessary display cards, and when it is over, returning the specimens. It needs someone to do the organization work. There is no more effective way of advertising the Society and its work. Is anyone willing to undertake the project?

## STRUCTURAL GEOLOGY

Dr. Schwartz' course on STRUCTURAL GEOLOGY has taken hold with great tenacity and the comment is all exceedingly complimentary to Dr. Schwartz. Your friends are missing a real opportunity to learn in detail about the earth's crust, the variety and form of its structures, and their modes of origin. Don't forget to interest a friend.

## BIRTHDAY

THIS ISSUE of the Bulletin marks the close of our second year of its publication so that with the January issue, we will celebrate our third birthday. We take the liberty of believing that we are improving all the while, but are wide open for suggestions. If you have any thoughts on the matter, please approach the editors.

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 JURASSIC PERIOD

The Jurassic Period is of great importance to those interested in the study of geology. William Smith, an engineer, had a hobby of collecting fossils from the Jurassic rocks as he went about his work in southern England. Over a period of years he collected many fossils and almost accidentally stumbled upon the theories of stratigraphy. He found that he was able to correlate various layers or stratas of rock by the fossils they contained and that he could identify which were younger or older by observing the progressive life development indicated by the fossils. Thus he became the father of modern geology.

In Europe, the Jurassic rocks are exposed at the surface, over large areas. The early students of geology, therefore, found a wealth of material in these rocks and they were the foundation for most of the early work done in geology and mineralogy. We, therefore, owe a debt of gratitude to the Jurassic period.

During Jurassic time, the great land mass of Appalachia off the present eastern coast of the United States completely disappeared. For most of the North American continent, it was a period of erosion. Practically all of the deposition during this period took place in Western United States. Probably the most famous area is the Sunburst Sea which penetrated from the Arctic regions as far as Colorado, just east of the Rocky Mountains. The rocks formed in this sea, in Canada, Montana, and Wyoming, contain much oil and gas.

During Jurassic time, insects developed rapidly; mammals appeared, although they were few. The reptiles were dominant. Dinosaurs were of infinite variety and size, some scarcely a foot long, others 80 feet. Some weighed a few pounds, some 40 tons, but they are found on every continent of the earth in rocks of this age. They are the largest and most powerful animals that ever lived, and the Jurassic was the time of their supremecy.

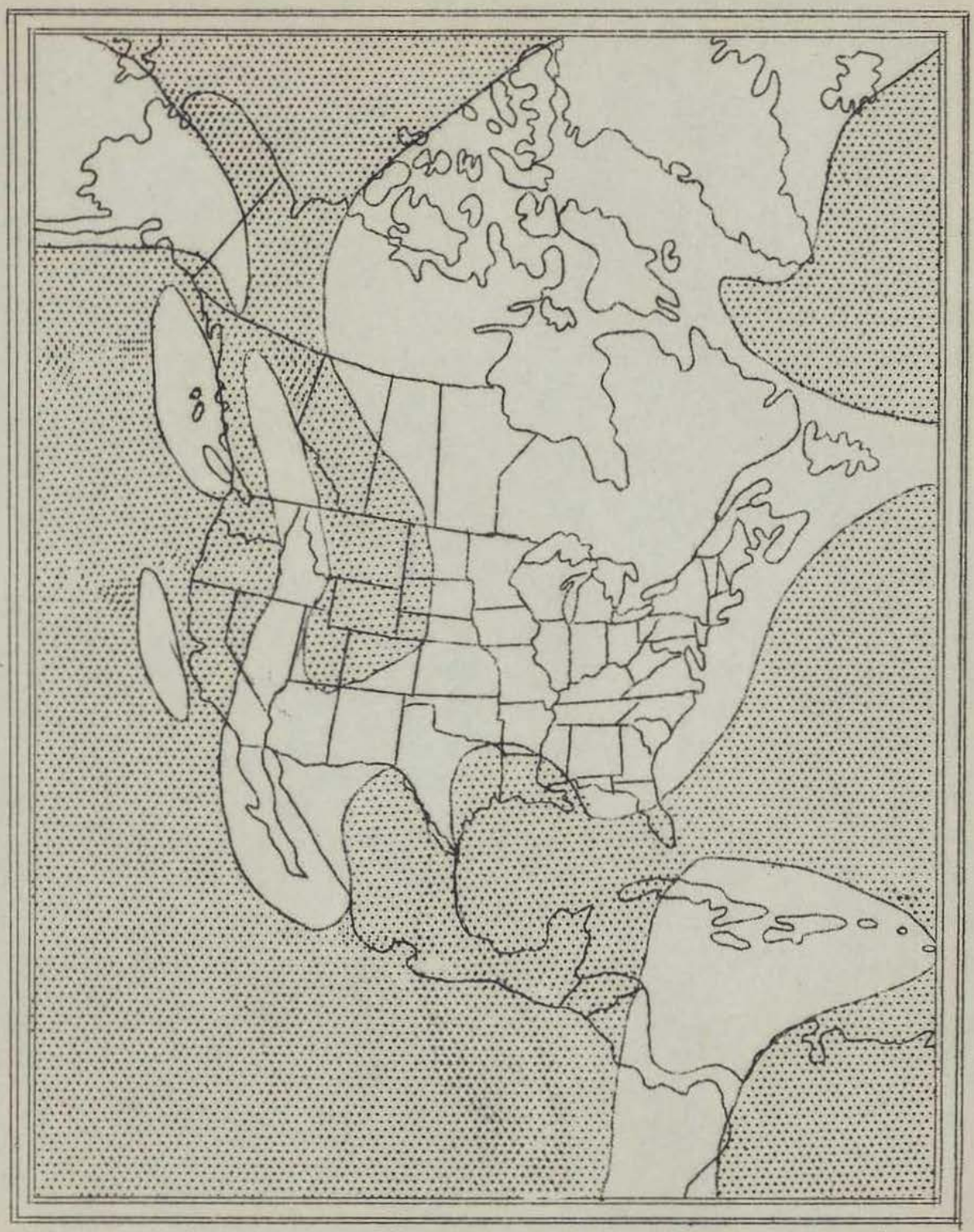
The climate was arid in many places, but must have been variable as there were large and luxuriant swamps which later became extensive coal measures as coal is found in Jurassic formations all over the earth--in Antarctica, Tasmania, Greenland, Iceland, United States, Siberia, China, etc. Perhaps one of the most spectacular exposures of Jurassic rocks is in the Zion Canyon. On the west coast also the period was marked by extensive mountain building disturbances, as indicated by extensive extrusive and intrusive formations there.

(33) JURASSIC- EARLY

(SCHUCHERT, MODIFIED; STIPPLED AREA IS SEA)

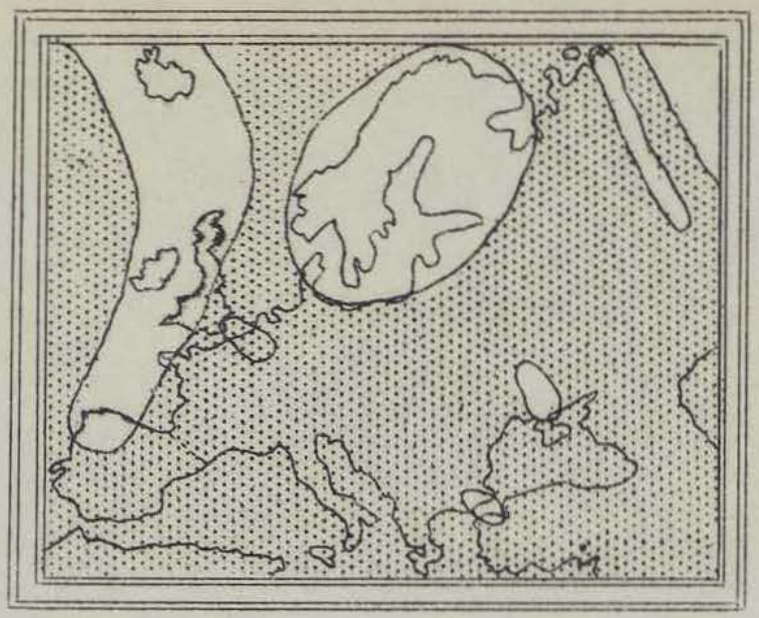
(34) JURASSIC- MIDDLE

(SCHUCHERT, MODIFIED; STIPPLED AREA IS SEA)



(35) JURASSIC- LATE

(SCHUCHERT, MODIFIED BY CRICKMANY AND MILLER)
(STIPPLED AREA IS SEA)



(36) EUROPEAN- JURASSIC (SCHAFFER MODIFIED 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
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 Ave. South
Minneapolis 2, Minnesota

I enclose herewith $1.00 and apply for membership in your Society:

Name _____ (Print) Residence _____ (Print) Phone _____

Business _____ Business Address _____ Phone _____

_____ Signature

_____ Address

A FAIRY'S TEARDROP — By Florence Jansson

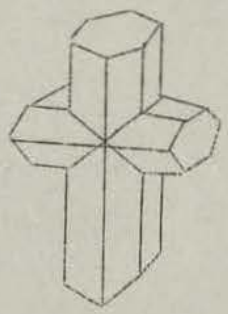
(Reprinted from Pageant Magazine)

Many many years ago, according to a legend of the hills, a fairy queen ruled over Patrick County, Virginia. The country was then known as Fairyland and it rivaled the Garden of Eden for beauty and happiness. One day, however, the enchantment was broken. From the far-away land of dawn, out beyond the sea, came the news that Christ had been crucified. A shudder of horror swept over the elfin company. And then stunned amazement gave way to tears; hundreds, thousands of tears, which fell on the ground and then crystallized into tiny crosses.

Centuries passed and the fairy tears were covered with layer upon layer of rock and soil. But even now, occasionally, in one small mountainous area of Patrick County, one of these fairy stones, as they are called by unimaginative present-day Americans, is found.

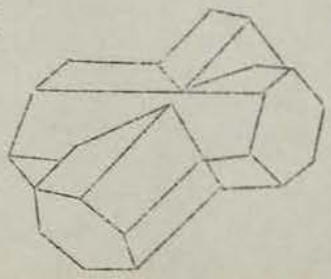
In the rough stone, the strange formation of these little crosses is scarcely noticed, but close examination reveals the faint design. A few deft strokes with a file and the unmistakable form of a cross, teardrop of a fairy of long ago, emerges. Sometimes the cross is Roman, sometimes Maltese. And it is said that the possessor of one of these treasured bits of stone thenceforth leads a charmed life--no harm can come to him and luck and good fortune are mysteriously attracted to him, all through the agency of the tiny fairy cross.

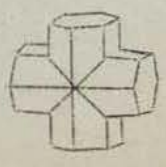
The encyclopedia bluntly defines these little objects as staurolites, from the Greek STAUROS, a cross, and LITHOS, a stone. It goes on matter-of-factly to something about "silicate of alumina," "orthorhombic forms" and "gneisses and schists." But all that, of course, is just the clumsy, geological analysis of a fairy's teardrop.

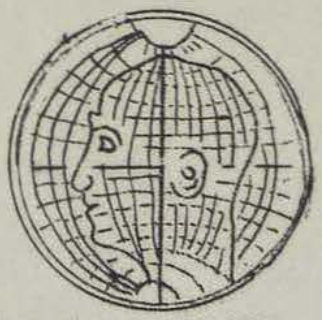


Staurolites are a product of metamorphism, sometimes referred to as a "porphyritic mineral." The crystals are often found in schist or slate, but may be found in gneiss, and are commonly associated with garnet and kyanite.

They usually occur in well developed prismatic crystals of six sides, characteristically twinned in the form of a cross, some plus-shaped, some x-shaped. Color is reddish brown to black; specific gravity 3.75; hardness 7 to 7½; mineral composition, hydrous iron, aluminum, silicate. Sometimes the iron may be replaced by magnesium or other minerals. They are found in abundance at Little Falls, Minnesota.

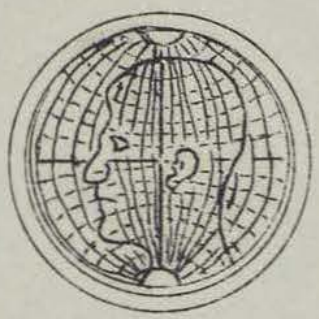




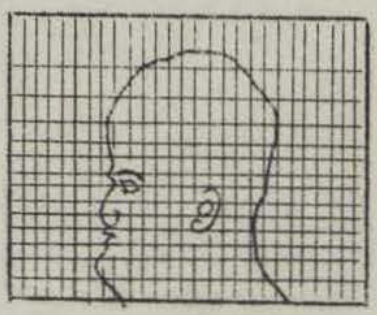


GLOBULAR PROJECTION

ORTHOGRAPHIC PROJECTION



STEREOGRAPHIC PROJECTION



MERCATOR PROJECTION

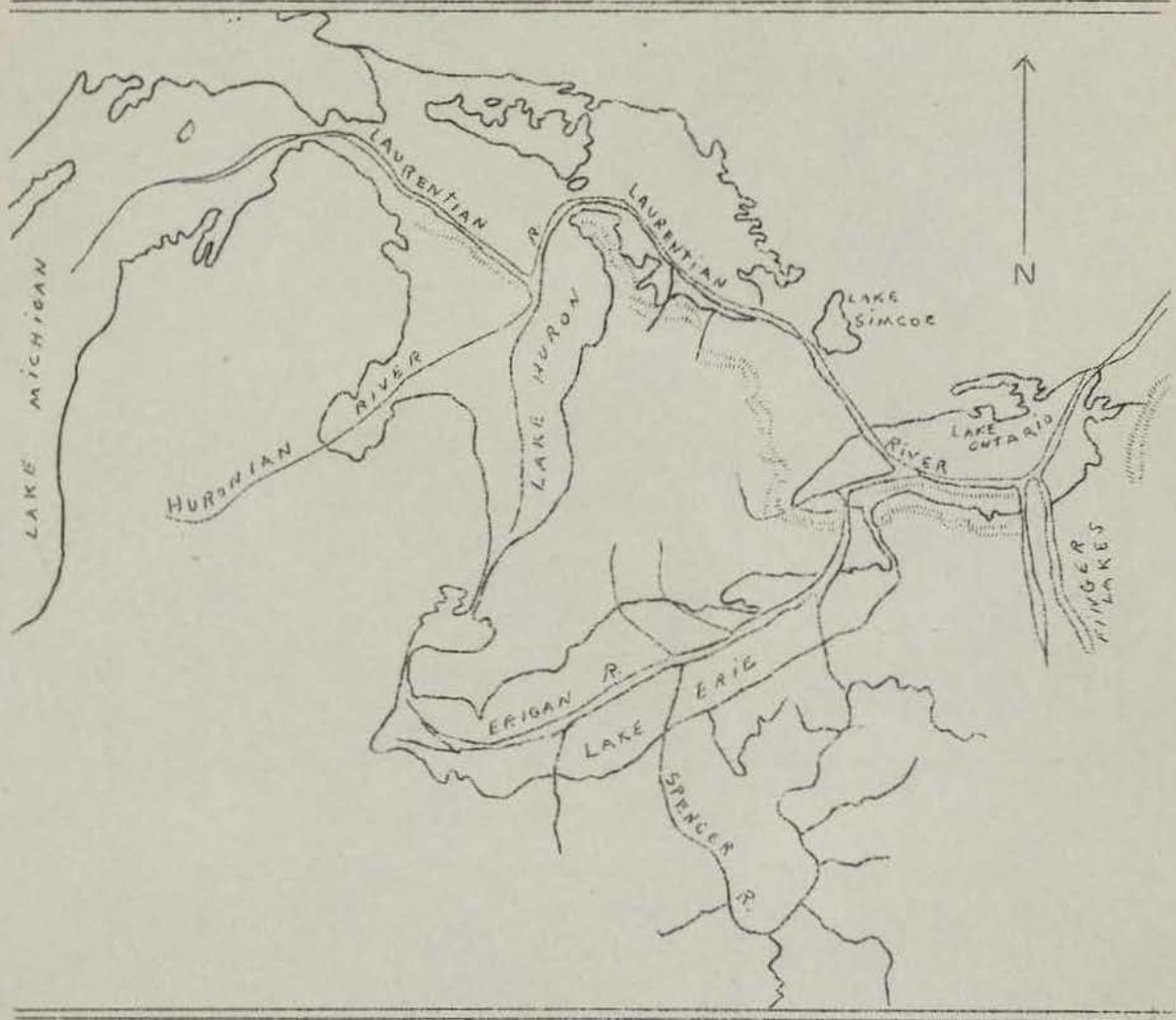
An illustration of the distortion inherent in various systems of map projection. From Publication No. 68, U.S. Coast and Geodetic Survey.

If we wish to study major units of structure, such as ocean basins, continents, and mountain ranges, a good map is necessary. The spherical surface of the earth cannot be mapped on a flat sheet of paper without distortion of some kind. The only way in which the earth's surface can be represented correctly is by making a map upon the surface of a globe. The habit of using a globe, therefore, cannot be too strongly endorsed.

Many of our general ideas about the shape and size of continents, the trend of mountain ranges, and the position of ocean basins, are based on the Mercator maps of early school days. This type of map has many good qualities, especially regarding compass directions, but distortion increased rapidly toward the poles. On such a map, Greenland shows larger than South America, but on a globe, South America is nine times larger than Greenland. Evidently, Mercator maps should be used with a full understanding of their defects.

During the Spanish-American War, use of a polyconic map of the North Pacific resulted in distances along the Asiatic coast being distorted to double their true amount.

A striking illustration of the distortion inherent in various systems of projection is shown above. A man's head has been drawn on a globular projection of a hemisphere. The distortions in the other three figures are solely the result of the projection used. (Nevin's Structural Geology)




Prior to the last glacial period, there were no Great Lakes as their immediate history dates from the retreat of the last continental ice sheet. It is thought that prior thereto, a great river system occupied the basins of the several lakes. Above is pictured this river system as it might have been. We have copied it from a drawing by J. W. Spencer, author of "Evolution of the Falls of Niagara" who has made a profound study of the physical history of the Great Lakes. Everything considered, it seems a very logical deduction. Please note that the river in the basin of Lake Huron flows north and is not connected with the river occupying the basin of Lake Erie, which flows northeast. This seemed to us to be an interesting map and we hope you find it so too.

# LAST MINUTE FLASHES !!

Heretofore, we have met the additional expense of publishing this Bulletin by appealing to our members for contributions for that purpose, and you have responded very generously. Last year we raised part of the cost by the sale of sets of Winchell. This seemed to work out very well.

Through the generosity and good will of Dr. D. E. Willard, who is a member of our Society, we are able to offer you his book on "The Story of the North Star State" at the very reasonable price of $1.50 per copy. Or to put it another way, if you will contribute $1.50 to the cost of the Bulletin, we will send you free a copy of Dr. Willard's book, which is the geological story of our State.

This book originally sold for $2.50. It is very well printed on excellent paper and well bound. It is written for the general public in a manner that they will appreciate. It contains 157 illustrations and is highly spoken of by the profession. It makes an excellent gift for Christmas. When this lot is sold, the book will be out of print. These books can be purchased at the weekly meeting of the Society, or you can mail your order and check and we will mail you the book.

******

We have also secured a number of black fibre board covers in which you may bind your Bulletins. We are selling these at wholesale cost--25¢. They are for sale at the meetings or you can order by mail, in which event add 5¢ for postage.

THE EDITORS