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# THE MINNESOTA GEOLOGIST

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OFFICIAL BULLETIN  
OF

THE GEOLOGICAL SOCIETY OF MINNESOTA

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VOL III

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NO. 2

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## CONTENTS

### EDITORIALS

#### PALEOGEOGRAPHIC MAPS

##### TERTIARY

##### Eocene

##### Oligocene

##### Miocene

##### Pliocene

#### OUR MINERALOGY LESSON

#### OUR GEOLOGY LESSON

#### THE BULLETIN BOARD

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

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Edward P. Burch

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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 fam-  
ily members; for students and those residing elsewhere, \$1.00.

**APOLOGY:** Is our face red! In our last number, which was published shortly after our annual Dinner Meeting, we reviewed the program, congratulated everybody—we thought—but inadvertently overlooked the very ones responsible for its success, namely the Program Committee. The redeeming thing about it is that we discovered it ourselves—but alas, too late! We are indeed very sorry as the Committee was one of the most efficient we have had and is certainly deserving of the appreciation of the Society. The Committee was too gracious to call it to our attention and the Editors appreciate that.

**IMPORTANT NOTICE:** Heretofore, we have published the Bulletin monthly for the first five months, once during the summer months, and twice during the months of October, November and December of each year. This schedule is irregular and confusing. It would seem to be much more logical to publish the Bulletin every other month, and after due consideration, the Board of Directors have authorized publication in the alternate months beginning with January of this year. This will enable you to know just when to expect each issue. It will relieve the Editors of some of their burden by allowing more time between issues and will generally, we believe, be more satisfactory all around. Each issue will be mailed on the 15th of the month, or as near to that date as possible. We hope you will like the new schedule.

**DR. SCHWARTZ LECTURES:** On February 18, we held our weekly meeting in Dr. Schwartz' laboratory where he had previously arranged a large number of specimens—some of them extremely bulky and heavy, illustrating rock structures, and a very enjoyable and profitable evening it was. The attendance was 82. This marks the end of this series. We are sure that we express the feelings of everyone when we say that this has been an exceptionally interesting and instructive course as indicated by the average attendance of 61. While Dr. Schwartz had a rather tough assignment, that is to re-state the principles of structural geology and to tailor them to fit our group, he did a masterly job which is reflected in the appreciation of those attending the lectures. The sincere wish of everyone is that we can have Dr. Schwartz give us a course on Economic Geology sometime, preferably next year.

**PALEOGEOGRAPHIC SERIES:** We are nearing the end of the series of Paleogeographic Maps. The maps in this issue mark the end of those on North America. These will be succeeded by a number of more detailed maps on Europe in which we think you will be greatly interested.

**FIELD TRIPS:** Members are already planning to take their geology with them as they journey around the country this summer. Mr. Preston is planning on going to the Grand Canyon again and has invited others to follow him. There is some talk about projecting a trip to Arkansas and possibly one to the Black Hills. If you have any ideas, please speak up. Soon a committee will be working on a schedule for the coming summer. We need trip leaders and ideas. Any volunteers?

**ELECTION OF DIRECTORS:** The annual election of Directors will be held on April 29, the last meeting of the year. Four are to be elected for a two-year term. You will receive a notice of it later, but it might be well to be thinking about it in the meantime. The Directors provide necessary management for the Society. They formulate the programs, policies, and give the Society direction. A good Board of Directors is essential. The reason why our Society has been successful is largely due to the fact that we have had an excellent Board of Directors. Please be present at this meeting to express your choice.

**WELCOME:** Dr. W. C. Bell and Dr. Robert F. Sharp have recently joined the faculty of the Geology Department at the University. Dr. Bell's specialty is Paleontology and Dr. Sharp's is Glaciation. We take this opportunity to welcome each of them and their families and to wish them every success.

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 abyssal 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 of material was not uncommon, in the great sea troughs.

#### THE TERTIARY PERIOD

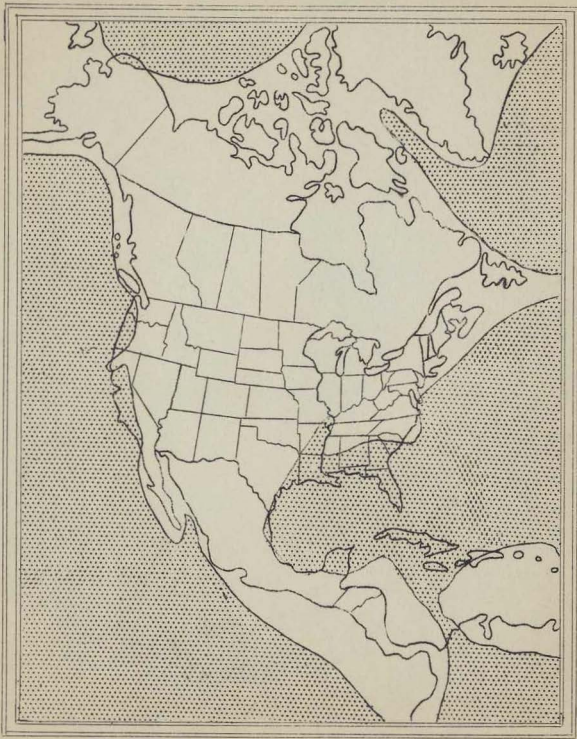
The Tertiary Period marks the beginning of the Cenozoic Era, which brings us closer to the time of man. This period was named at a time when it was thought that all older time was divided into two eras. Later the term Quaternary came into use to represent the youngest and more or less unconsolidated formations. Since Quaternary is not an era of geologic time and since we now recognize more than three eras, the tendency has been to abandon both the term Tertiary and Quaternary and use only the term Cenozoic, which means, recent life, although recent time starts with the Pleistocene continental glaciers, approximately 25,000 years ago.

This period is regarded as the time of dawn of our present animal life. It is therefore a period of immense importance to man. It is sometimes called the age of mammals. On the basis of the progressive change or evolution of the marine shells during this period it is divided as follows; the Eocene, dawn of the recent, the Oligocene, little of the recent, the Miocene, less recent, and the Pliocene, the mere recent.

Except for the embayment of the seas in the Mississippi Valley and submergence of the borders of the continent, North America had very much the same shape and appearance as it has today. In other words our continent had at this time, probably 60 million years ago, assumed its present form. The most pronounced mountain making movements were the evolution of the Cascades and the Sierra Nevada mountains. By the close of the Pliocene, the Sierra Nevadas were elevated to 7,000 feet and they are still going up.

The climate during Tertiary time was much like it is at the present time, the possibly milder, except towards its close. During the Oligocene there was a world wide general climate, which however became considerably cooler in the Miocene.

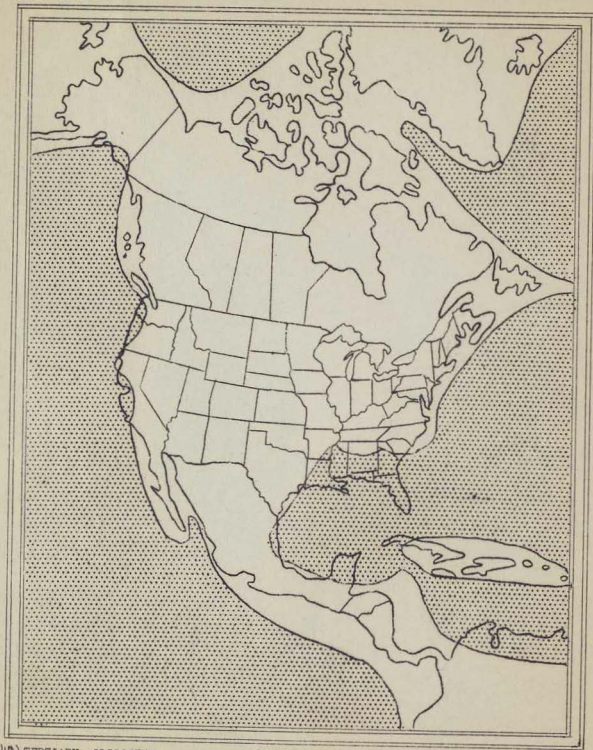
Life in the Tertiary was even more varied than it is today. Mammals became the dominant life. During Eocene Time, mammals made the first adaptation to oceanic life. Plant life became much as it is today. The woody trees and bushes, grasses and cereals originating late in the Cretaceous took full possession of the land in the Miocene, and with their coming began the greater evolution of the herbivorous animals. The advent, however, of the greatest importance to civilization was the rise of mentality. The Tertiary, in a sense therefore, can be regarded as a "Golden Age"



(41) TERTIARY- EOCENE

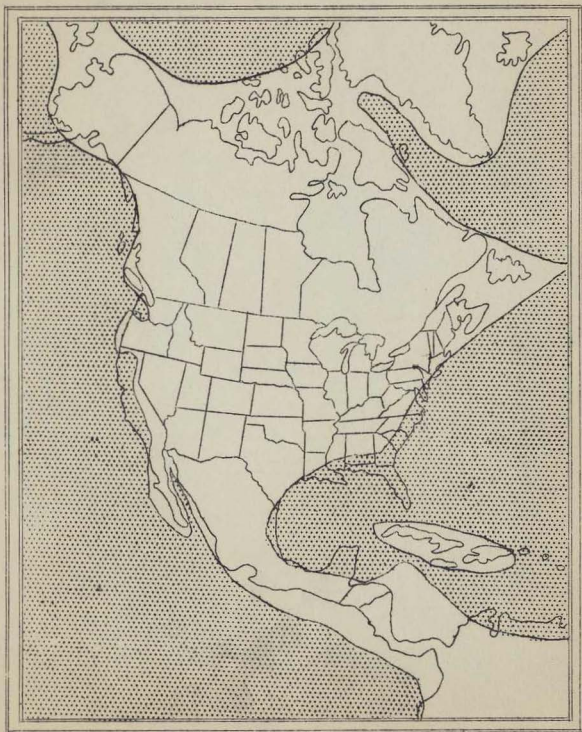
(SCHUCHERT, modified; stippled area is sea)





(42) TERTIARY- OLIGOCENE

(SCHUCHERT, modified; stippled area is sea)



(43) TERTIARY- MIOCENE

(SCHUCHERT modified; stippled area is sea)



(44) TERTIARY- PLIOCENE

(SCHUCHERT, modified; stippled area is sea)



THE BULLETIN BOARD

We have just finished a most interesting and instructive course of 16 lectures by Dr. Geo. M. Schwartz on Structural Geology. Those who have attended these lectures have profited greatly thereby while those who have not attended have really missed something. We still have, however, a very interesting and instructive series of lectures for the balance of the year, to which we invite your attention. We hope you will take advantage of the opportunities thus afforded you.

We are particularly happy to introduce to you Dr. Robert P. Sharp and Dr. W. C. Bell who have recently joined the Geology Department of the University and also to offer a series of four lectures on the general subject of "Petroleum" by Dr. George A. Thiel, Chairman of the Department of Geology, followed by another in the same series by Prof. W. D. Lacabanne of the School of Mines. Dr. Gruner will be with us again March 25.

It is not too late to interest your friends in joining our Society.

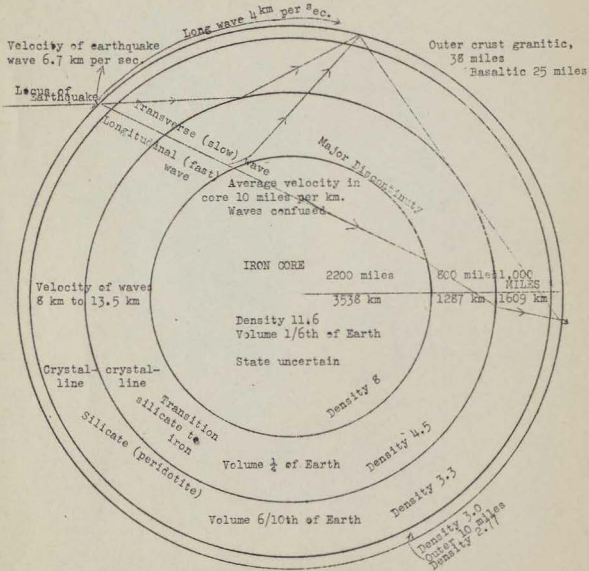
PROGRAM FOR BALANCE OF THE LECTURE SEASON

1946

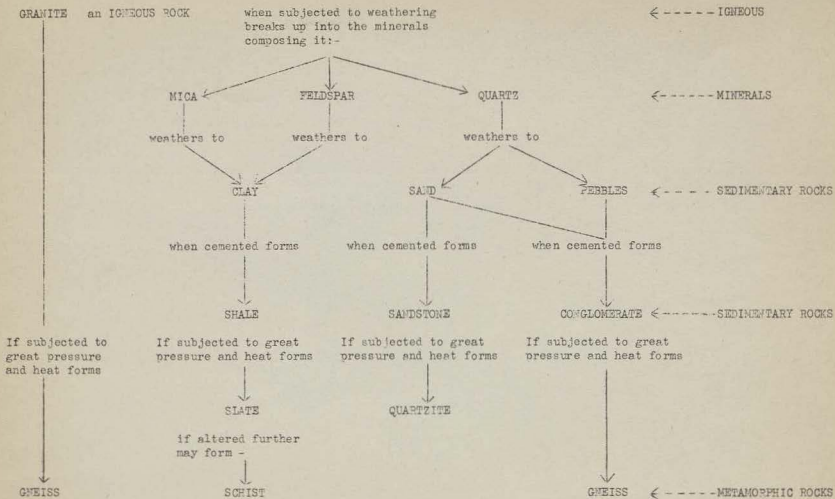
- Feb. 25; "THE WORK OF A LAPIDARY" by Mr. W. J. Bingham
- March 4; "PALEOGEOGRAPHIC MAPS AND THEIR INTERPRETATION" by the Editor followed by a 15-minute movie on the Last Eruption of Mt. Vesuvius supplied by our President and a 30-minute movie on "The Story of Lime" supplied by Mr. Geo. A. Rickert.
- March 11; "YUKON GLACIERS" by Dr. Robert P. Sharp, Department of Geology, U. of M.
- March 18; "CAMBRIAN TRILOBITES" by Dr. W.C. Bell, Department of Geology, U. of M.
- March 25; "THE SECRET OF THE LAYERED MINERALS AND THEIR USES FOR BRICKS AND FACE POWDER" by Dr. John W. Gruner, Department of Geology, U. of M.
- April 1; "ST. ANTHONY FALLS" by Mrs. E. J. Prochaska, followed by a 30-minute showing of wonderful colored photographs of polished agates loaned by Mr. L. H. Longwell of Elmhurst, Illinois.
- April 8; "THE ORIGIN OF PETROLEUM" )
- April 15; "WHERE PETROLEUM IS FOUND" )
- April 22; "HOW PETROLEUM IS FOUND" ) By Dr. George A. Thiel,  
Chairman, Department of  
Geology, U. of M.
- April 29; "GEOGRAPHICAL DISTRIBUTION OF PETROLEUM" )
- May 6; "THE PRODUCTION OF PETROLEUM" by Prof. W. D. Lacabanne, School of Mines,  
U. of M. Also election of Directors on this night.

A GRAPHIC PRESENTATION OF CERTAIN INFORMATION REGARDING THE INTERIOR OF THE EARTH

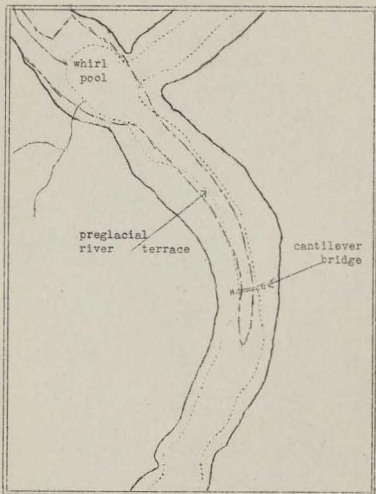
Compiled by George M. Schwartz, Phd.



Density of Earth as a whole is 5.52



This diagram shows how the original igneous rocks are changed into sedimentary and metamorphic rocks by the processes of weathering and sedimentation, and of pressure and heat.



The above is a map of the whirl pool rapids. it shows (a) the great river banks, by unbroken line, (b) the pre-glacial channel, by dot and dash line, and (c) the present river channel, by dotted line. Map is by J.W.Spencer.