PROCEEDINGS OF THE SIXTH ANNUAL MEETING OF THE
PALEONTOLOGICAL SOCIETY, HELD AT PHILADEL-
PHIA, PENNSYLVANIA, DECEMBER 29, 30, AND 31, 1914.

R. S. BASSLER, *Secretary*

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SESSION OF TUESDAY, DECEMBER 29

President Henry Fairfield Osborn called the general session of the Society to order at 2 o'clock, December 29, in the library of the Philadelphia Academy of Sciences. After some introductory remarks by the President, the business session of the Society was opened with the reading of the report of the Council by the Secretary.

REPORT OF THE COUNCIL

To the Paleontological Society in Sixth Annual Meeting assembled:

The first meeting of this year's Council was held at Princeton, New Jersey, January 1, 1914, immediately following the adjournment of the Society on that day. Routine business, such as the suggestion of a ticket for the following year and the consideration of new nominations for membership, was considered then; but since this meeting all business of the Society has been arranged by correspondence. A résumé of administration for the Society's sixth year is presented in the following reports of officers.

SECRETARY'S REPORT

To the Council of the Paleontological Society:

Meetings.—The proceedings of the fifth annual meeting of the Society, held at Princeton, New Jersey, December 31, 1913, and January 1, 1914, have been published in volume 25, pages 127-156, of the Bulletin of the Geological Society of America and distributed to the members in March, 1914. Besides this publication, the scientific papers of the Society printed and distributed during the year occupy all of number 3 of volume 25, Bulletin of the Geological Society of America, consisting of twelve articles, totaling 170 pages.

The Council's proposed nomination for officers and announcement that the sixth annual meeting of the Society would occur at Philadelphia, Pennsylvania, at the invitation of the local members, were forwarded to the members on March 10, 1914.

Membership.—During the year the Society has lost by death two of its members—Dr. Theodore M. Gill, of the Smithsonian Institution, who, although interested in paleontology, was best known for his researches on recent animals, particularly fish, and Dr. J. C. Hawver, educator and scientist, of Auburn, California, whose name will always be associated with the celebrated Hawver Cave of El Dorado County, California.

One resignation has occurred during the year and two members have been dropped for non-payment of dues. The 14 candidates elected at

the fifth annual meeting have been placed on the rolls, making the present enrolment 158. Ten candidates are under consideration for election to membership at the present meeting, so that the steady growth of the Society is being maintained.

At this year's election for Fellows of the Geological Society of America, Messrs. E. C. Jeffrey and T. Poole Maynard, of the Paleontological Society, were elected to Fellowship.

Pacific Coast Section.—The fifth annual meeting of the Pacific Coast Section of the Society was held at Stanford University, commencing Friday, April 24, 1914. Fifteen papers, dealing mainly with Vertebrate Paleontology of the West Coast, were read at this meeting. The minutes of the section are printed, pages — to — of this Bulletin.

Respectfully submitted,

R. S. BASSLER,

Secretary.

WASHINGTON, D. C., December 28, 1914.

TREASURER'S REPORT

To the Council of the Paleontological Society:

The Treasurer begs to submit the following report of the finances of the Society for the fiscal year ending December 24, 1914:

RECEIPTS

Cash on hand December 24, 1913.....	\$227.83	
Dues from 64 members.....	192.10	
	<hr/>	\$419.93
		=====

EXPENDITURES

Treasurer's office:		
Postage	\$3.66	
Printing and stationery.....	.34	
	<hr/>	\$4.00
Secretary's office:		
Secretary's allowance.....	\$50.00	
Expenses	39.05	
	<hr/>	89.05
Geological Society of America:		
Share of expenses, Princeton meeting.....	\$10.10	
Separates	38.60	
	<hr/>	48.70
Pacific Coast Section:		
Secretary's expenses.....	\$18.20	18.20
	<hr/>	\$159.95
Balance on hand December 24, 1914.....		259.98
		<hr/>
		\$419.93

Net increase in funds.....	\$32.15
Outstanding dues.....	51.00

Respectfully submitted,

RICHARD SWANN LULL,
Treasurer.

NEW HAVEN, CONNECTICUT, *December 24, 1914.*

APPOINTMENT OF AUDITING COMMITTEE

The appointment of a committee to audit the Treasurer's accounts was next in order and the President selected H. F. Cleland and C. R. Eastman.

ELECTION OF OFFICERS AND MEMBERS

The results of the ballot for officers for 1915 and election of members was the next matter of business and was announced by the Secretary as follows:

OFFICERS FOR 1915

President:

EDWARD O. ULRICH, Washington, D. C.

First Vice-President:

J. C. MERRIAM, Berkeley, Cal.

Second Vice-President:

GILBERT VAN INGEN, Princeton, N. J.

Third Vice-President:

F. H. KNOWLTON, Washington, D. C.

Secretary:

R. S. BASSLER, Washington, D. C.

Treasurer:

RICHARD S. LULL, New Haven, Conn.

Editor:

CHARLES R. EASTMAN, New York City

MEMBERS

JUNIUS HENDERSON, University of Colorado, Boulder, Colo.

CHARLES C. MOOK, American Museum of Natural History, New York City.

CHARLES E. RESSER, U. S. National Museum, Washington, D. C.

MERTON Y. WILLIAMS, Geological Survey of Canada, Ottawa, Canada.

ALICE E. WILSON, Victoria Memorial Museum, Ottawa, Canada.

ELECTION OF NEW MEMBERS

The President then called the attention of the Society to five nominations for membership which had been received and indorsed by the Council too late to be placed on this year's printed ballots. The names and a brief statement regarding these proposed members follow.

ALBERT L. BARROWS (M. S., University of California, 1912), Instructor in Department of Zoology, University of California, Berkeley, Cal. Engaged in invertebrate paleontology. Proposed by J. C. Merriam and F. M. Anderson.

JOHN A. GUINTYLLO, Assistant in paleontology, University of California. Proposed by J. C. Merriam and F. M. Anderson.

WINTHROP P. HAYNES (Ph. D., Harvard, 1914), Instructor in Geology, Wellesley College, Wellesley, Massachusetts. Engaged in stratigraphic paleontology. Proposed by P. E. Raymond and H. W. Shimer.

CLARENCE L. MOODY, Student of paleontology, University of California. Engaged in invertebrate paleontology. Proposed by J. C. Merriam and F. M. Anderson.

JORGEN O. NOMLAND (B. S., University of North Dakota, 1910), Graduate Student, University of California. Engaged in invertebrate paleontology. Proposed by J. C. Merriam and F. M. Anderson.

In the discussion that followed the motion to suspend the by-laws in order to elect these members at the present meeting, John M. Clarke asked that the name of Winifred Goldring (M. A., Wellesley College, 1912), assistant in paleontology, New York State Museum, proposed by John M. Clarke and A. W. Grabau, be added to the list. On motion, it was then voted by all members present that these six nominees be elected to membership in the Society.

CHAPTER ON PALEONTOLOGY OF MAN

At the fifth annual meeting the proposition to organize a chapter dealing with the paleontology of man was discussed, but action was deferred and the matter was referred back to the Council. After further consideration, the Council reports that it seems inadvisable to organize such a chapter, because papers dealing with this subject are of general interest to all of the members and should be presented before the Society in general session.

NEW BUSINESS AND ANNOUNCEMENTS

President Osborn then read a communication from J. C. Merriam, who, by previous vote of the Council, had been placed in charge of arrangements for the meeting of the Paleontological Society to be held in Cali-

fornia in August, 1915. Professor Merriam reported that this meeting had been arranged for the first week in August, and that the sessions would occur as follows: The first session will be at the University of California on August 3, the second at Stanford University on August 4, and the remaining sessions at the University of California. Feeling that the most important features of the program should relate to matters of mutual interest to the members of the East and of the extreme West, and considering further that material of the Pacific area might be of especial interest to those visiting California, the Pacific Coast members have arranged for a series of papers on correlation between the paleontologic record of the far West and the standard records of the better known portions of the earth's surface. This series will include a general discussion of paleontologic criteria used in determining time relations between stratigraphic units and several symposia on correlation between the West and other parts of the world.

After some general announcements by the President as to arrangements for the several sectional meetings, and there being no further matters of business, the Society proceeded to the reading of papers of general interest.

PRESENTATION OF GENERAL PAPERS

The first paper of this section, which was presented by the author and illustrated with lantern slides and specimens, brought forth a general discussion of the problem, in which C. A. Davis, Charles Schuchert, E. O. Ulrich, G. R. Wieland, and the author took a prominent part; 15 minutes.

OCCURRENCE OF ALGAL AND BACTERIAL DEPOSITS IN THE ALGONKIAN MOUNTAINS OF MONTANA

BY CHARLES D. WALCOTT

Another paper on fossil algæ was selected for presentation next and was illustrated by the author with lantern slides; 30 minutes.

FOSSIL ALGÆ OF THE ORDOVICIAN IRON ORES OF WABANA, NEWFOUNDLAND

BY GILBERT VAN INGEN

Two papers on the paleontology of man were next in order. The first was presented by the author and was illustrated by lantern slides; 15 minutes.

MIGRATION AND SUCCESSION OF HUMAN TYPES OF THE OLD STONE AGE OF EUROPE

BY HENRY FAIRFIELD OSBORN

Following President Osborn's paper and supplementing it was a demonstration of models of ancient man, which was further illustrated with lantern slides; 15 minutes.

RESTORATIONS OF PITHECANTHROPUS AND PILTDOWN AND NEANDERTHAL MAN

BY J. H. MC GREGOR

The above two papers brought forth a discussion in which J. M. Clarke and the two authors took part.

There was next read from manuscript by the author and illustrated with lantern slides and panoramic views a paper of general interest on account of its bearing on Upper Cretaceous stratigraphy.

EVIDENCE PROVING THAT THE BELLY RIVER BEDS OF ALBERTA ARE EQUIVALENT TO THE JUDITH RIVER BEDS OF DOG CREEK AND COW ISLAND, MONTANA

BY CHARLES H. STERNBERG

(Abstract)

This paper will be illustrated with lantern slides and several photographs, including a panoramic view of Dog Creek, showing the three distinct horizons of the Eagle sandstone, Clagett shales, and Judith River beds. The slides show the Bear Paw shales on top of the Judith River beds at the head of an eastern branch of Dog Creek called Taffy Creek. In the Bear Paw shales were secured Fort Pierre Ammonites, Baculites, a new Clidastes, and bones of plesiosaurs. Immediately below, in the Judith River beds, we found a typical locality for the vertebrates and made a large collection of Dinosaur, Myledaphus teeth, and vertebræ of Campsosaurus and the footed ischium of Lambe's Stephanosaurus and other Belly River vertebrates. We found Myledaphus teeth in the Eagle sandstones, leaves belonging to Belly River types, as well as numerous shells from the same horizon. We followed the strata down to Cow Island and found the stratigraphy simple, but for the uplift of the strata, everywhere. My work there substantiated Hatcher and Stanton in every particular, as noted in their bulletin of the U. S. Geological Survey.

At 5 o'clock the Society adjourned for the day. In the evening the members assembled to hear the address of the retiring President of the Geological Society of America, and attended the complimentary smoker following this address.

SESSION OF WEDNESDAY, DECEMBER 30

Wednesday morning, at 9.30, the Society was called to order by President Osborn, who asked for the report of the Auditing Committee as the first matter of business. The committee reported that the accounts of the Treasurer were found to be correct; whereupon it was voted that their report be accepted. The chairman next announced that as the symposium, in joint session with the Geological Society of America, would commence at 10.30, the intervening time would be devoted to papers of general interest.

COMPLETION OF PAPERS OF GENERAL INTEREST

The first paper of the morning was then presented by the author and illustrated by lantern slides; 15 minutes. Discussed by J. M. Clarke, A. W. Grabau, and C. J. Sarle, with replies by the author.

SHAWANGUNK FORMATION OF MEDINA AGE

BY CHARLES SCHUCHERT

(Abstract)

The Shawangunk has furnished *Arthropycus harlani* (*A. alleghaniense*) and eurypterids. The formation will be traced from Kingston, New York, to Lewiston, Pennsylvania.

The next paper was transferred to the Paleontological Society from the program of the Geological Society of America and was illustrated by the author with a large drawing showing this splendid section in the colors of the rocks themselves; 10 minutes. Discussed by Charles Schuchert.

PIC D'AURORE SECTION

BY JOHN M. CLARKE

Announcement of an interesting discussion of vertebrate remains in the Pleistocene of New York was then made by the senior author under the following title:

PECCARIES OF THE PLEISTOCENE OF NEW YORK

BY JOHN M. CLARKE AND W. D. MATTHEW

The hour for the symposium having arrived, the Society adjourned to the general lecture hall of the Philadelphia Academy of Sciences,

meeting in joint session with the Geological Society of America. The speakers and titles of their special subjects in the symposium are as follows:

SYMPOSIUM ON THE PASSAGE FROM THE JURASSIC TO THE CRETACEOUS

INTRODUCTION

BY HENRY FAIRFIELD OSBORN

THE MORRISON; AN INITIAL CRETACEOUS FORMATION

BY WILLIS T. LEE

GEOLOGIC EXPOSURES OF THE MORRISON

BY CHARLES C. MOOK

SAUROPODA AND STEGOSAURIA OF THE MORRISON COMPARED WITH THAT OF SOUTH AMERICA, ENGLAND, AND EASTERN AFRICA

BY RICHARD S. LULL

THE PALEOBOTANIC EVIDENCE

BY EDWARD W. BERRY

THE INVERTEBRATE FAUNA OF THE MORRISON

BY T. W. STANTON

With the completion of the symposium, at 1 p. m., the Society adjourned for luncheon, meeting again in general session at 2.30 in the library. There was then presented the presidential address of the retiring President, on the subject,

THE ADDITION AND EVOLUTION OF "CHARACTERS" IN PALEONTOLOGIC PHYLA

BY HENRY FAIRFIELD OSBORN

Following this address, which was illustrated by lantern slides, President Osborn announced that the Society would then meet in two sections for the rest of the program, a vertebrate section to occupy an adjoining room and a section of invertebrate, paleobotanic, and general paleontology to remain in session in the library. The minutes of the first section follow.

SECTION OF VERTEBRATE PALEONTOLOGY

The section was called to order by President Osborn, chairman, at 3.35, Wednesday afternoon, for the reading of sectional papers. W. D.

Matthew was requested by the chair to act as secretary. The following papers were submitted:

MEGALOCNUS AND OTHER CUBAN GROUND-SLOTHS

BY CARLOS DE LA TORRE AND W. D. MATTHEW

(Abstract)

Four genera of ground-sloths are represented in the Cuban Pleistocene collections made by La Torre, Brown, and Moreno. The largest and most abundant is *Megalocnus* Leidy, of which the complete skeleton has been articulated and mounted. The other genera, *Mesocnus*, *Miocnus*, and *Microcnus*, are smaller animals, the last no larger than a woodchuck. Although well distinguished, they form a related group, their nearest continental allies being *Megalonyx* of Pleistocene North America and *Euchotocops* of Miocene South America. Affinities to the modern tree-sloth *Choloepus* are not to be excluded for the smaller genera.

AFFINITIES OF HYOPSODUS

BY W. D. MATTHEW

(Abstract)

Jaws of *Hyopsodus* are very common in the Eocene, but skulls and skeleton parts are rare. The zoological position of this small mammal has been much questioned. It has been referred by different authors to the Suillines, to the Primates, to the Insectivora. Evidence is now brought forward for its reference to the order Condylarthra.

NEW EVIDENCE OF THE AFFINITIES OF THE MULTITUBERCULATA

BY WALTER GRANGER

(Abstract)

These Mesozoic and early Tertiary mammals have been regarded by some authorities as Marsupials, by others as Monotremes. Additional and more complete skeleton material from the Paleocene of New Mexico indicates that they are not nearly related to either, but are probably entitled to rank as a distinct primary division of the Mammalia, equivalent in evolutionary stage to the Marsupials, but not closely related, and more remote from either Monotremes or Placentals.

The paper was discussed by Messrs. Gidley, Gregory, Osborn, and Matthew.

The meeting then adjourned.

The section reconvened at 9.10 a. m., Thursday, January 31, and the program of sectional papers was continued as follows:

HEADS AND TAILS; A FEW NOTES RELATING TO SAUROPOD DINOSAURS

BY W. J. HOLLAND

(Abstract)

The author announced the discovery of many dinosaur skeletons, some remarkably complete, in the quarries worked by the Carnegie Museum in the Morrison formation of Uinta County, Utah. He presented the evidence for associating with the skeleton of *Brontosaurus* a skull unlike that arbitrarily referred to this genus by Professor Marsh, and much more nearly resembling the skull of *Diplodocus*. The tail of *Brontosaurus* is extended in a long, slender whiplash, as in *Diplodocus*.

The paper was discussed by Messrs. Osborn, Lull, Granger, and Matthew.

Mr. Granger's paper, submitted at the preceding session, was then brought up for further discussion by Professor Osborn, Doctor Matthew, and Mr. Granger.

The next two papers read were:

OBSERVATIONS ON ADAPIDÆ AND OTHER LEMUROIDÆA

BY W. K. GREGORY

OBSERVATIONS ON THE PHYLOGENY OF THE HIGHER PRIMATES

BY W. K. GREGORY

(Abstract)

The author presented certain conclusions from recent researches on living and extinct primates, with the aid of more complete materials than had hitherto been available. The importance of the basicranial characters and their interpretation were discussed and present conclusions stated as to the affinities of the several living and extinct groups.

The papers were discussed by Professor Osborn and Doctor Matthew.

RECONSTRUCTION OF THE SKELETON OF BRACHIOSAURUS

BY W. D. MATTHEW

(Abstract)

The author presented a sketch reconstruction of the skeleton of this genus, the largest known Dinosaur, based on the skeletons in the Field Museum, Chicago, described by E. S. Riggs, and partial descriptions by Professors Branca and Janensch of the skeleton from German East Africa in the Berlin Museum.

FISH FAUNA OF THE CONODONT BED (BASAL GENESEE) AT EIGHTEEN-MILE CREEK, NEW YORK

BY L. HUSSAKOF AND W. L. BRYANT

(Abstract)

The conodont bed is a thin layer of impure limestone at the base of the Genesee at Eighteen-mile Creek, New York. It has a maximum thickness of four or five inches, thins out in either direction, and in some sections is absent altogether. It thus seems to occur in lenticular patches. Conodonts are extremely abundant in it, to which circumstance is due its name.

Until a few years ago no vertebrate remains were known to occur in this bed; but an extensive and very remarkable fish fauna has since been obtained. This includes sharks, Arthrodires, Ptyctodonts, Ichthyodolulites, Dipnoans, and Ganoids. There are four or five new genera and about a dozen new species in the materials. The remains are generally fragmental, but complete dental elements and other plates have been collected. The assemblage constitutes one of the most remarkable Devonian fish faunas known. It will be described and fully illustrated by the authors in a catalogue of the fossil fishes in the Museum of the Buffalo Society of Natural Science, now nearly ready for press.

Discussion by Messrs. Wieland and Burnett Smith.

STRATIGRAPHIC RELATIONS OF THE FOSSIL VERTEBRATE LOCALITIES OF FLORIDA

BY E. H. SELLARDS

(Abstract)

Two principal faunal horizons were considered, the Alachua clays and the Peace Creek beds. The latter have been thought to be intercalated between marine Pliocene strata, but the evidence for this is inconclusive, and there appears to be no reason against regarding the fauna as Pleistocene. The Alachua clays are probably Upper Miocene.

The paper was discussed by Messrs. Osborn, Gidley, and Matthew.

SCALED AMPHIBIA OF THE COAL MEASURES

BY ROY L. MOODIE

The paper was presented and briefly discussed by Doctor Gregory.

This being the last paper on the program, the section then adjourned.

SECTION OF INVERTEBRATE, PALEOBOTANIC, AND GENERAL PALEONTOLOGY

This section was called to order for its first session at 3.30, Wednesday afternoon, with Vice-President Van Ingen presiding. The chairman

announced that, on account of a conflict in the program, the papers of Group B of the Geological Society of America had been transferred to the Paleontological Society for reading.

The first paper of Group B was presented by the author and illustrated by lantern slides; 10 minutes. Discussed by E. O. Ulrich and A. W. Grabau, with replies by the author.

*ALEXANDRIAN ROCKS OF NORTHEASTERN ILLINOIS AND EASTERN
WISCONSIN*

BY T. E. SAVAGE

There was next presented by the author, illustrated by diagrams and lantern slides, a paper transferred from Group A of the Geological Society of America to the Paleontological Society in order that all papers bearing on the black shale problem should be read in succession. The discussion on this paper was postponed until all of those dealing with the subject had been read.

*DIASTROPHIC IMPORTANCE OF THE UNCONFORMITY AT THE BASE OF THE
BEREA SANDSTONE IN OHIO*

BY H. P. CUSHING

The second paper in the black shale discussion was read by the author and illustrated by drawings; 30 minutes.

KINDERHOOKIAN AGE OF THE CHATTANOOGAN SERIES

BY E. O. ULRICH

At 5.30 the Society adjourned for the day. Wednesday evening the members attended the annual dinner with the Fellows of the Geological Society of America at the Hotel Walton.

SESSION OF THURSDAY, DECEMBER 31

Thursday morning the section met at 9, with the completion of the black shale and related papers first on the program. Vice-President Van Ingen presided.

The first paper was presented by the senior author and was illustrated by drawings; 10 minutes.

DEVONIAN OF CENTRAL MISSOURI

BY E. B. BRANSON AND D. K. GREGOR

Next was presented by the author, illustrated by diagram, the following paper of the Paleontological Society's program; 30 minutes.

OLENTANGY SHALE OF CENTRAL OHIO AND ITS STRATIGRAPHIC SIGNIFICANCE

BY A. W. GRABAU

(Abstract)

In its typical localities the Olentangy shale is intimately associated with the Huron shale, this latter representing merely a change in facies, without interruption of stratigraphic continuity. The Olentangy clearly belongs to the Upper Devonian, resting disconformably on limestones of Lower Hamilton age. The shales and limestones now classed as Olentangy in northern Ohio are, however, early Hamilton, and considerably older than the Olentangy. This name should therefore not be used for strata of Hamilton age, but instead the name Prout series is proposed for the northern Ohio deposits of Hamilton age.

This concluded the series of black shale papers and a general discussion followed, in which Messrs. Branson, Cushing, Foerste, Grabau, Kindle, Prosser, Savage, Schuchert, David White, I. C. White, and M. Y. Williams took part.

There was then presented by the author a stratigraphic paper, illustrated by lantern slides and diagrams; 30 minutes. Discussed by Charles Schuchert and Gilbert Van Ingen.

GEOLOGICAL RECONNAISSANCE OF PORTO RICO

BY CHARLES P. BERKEY

The last paper of Group B was presented by the author and illustrated by lantern slides; 15 minutes.

RELATIONS OF CRETACEOUS FORMATIONS TO THE ROCKY MOUNTAINS IN COLORADO AND NEW MEXICO

BY WILLIS T. LEE

By previous arrangement the two sections of the Society met in general session at 12.30, when matters of business relating to the next meeting place, etcetera, were discussed.

In closing the session, the splendid arrangements to make the Society's Philadelphia meeting a pleasant one were also discussed, and the Secre-

tary was authorized to convey the Society's appreciation to the members of the local committee.

At 1 o'clock the Society adjourned for luncheon, to meet again at 2 p. m. in two sections.

The first paper in the afternoon session of the section of invertebrate, paleobotanic, and general paleontology was presented by the author and illustrated by drawings; 15 minutes.

*EVOLUTION OF THE ANTHOZOA AND THE SYSTEMATIC POSITION OF
PALEOZOIC CORALS*

BY T. C. BROWN

(Abstract)

In the development of the zooids of modern Anthozoa a stage is always observed in which there are eight mesenteries present. This condition may persist throughout life, as, for example, in the subclass Alcyonaria; or it may be only transitory, as it is in the subclass Zoantharia.

To the subclass Alcyonaria probably belong those Paleozoic corals that are either without septa or in which the septa probably were not directly related to the internal mesenteric structure of the zooid—Columnaria, Favosites, Syringopora, etcetera.

In the subclass Zoantharia four distinct orders can be recognized, and these orders are distinguished by the number and arrangement of the mesenteries added beyond the primitive number eight. In the Cerianthidea new mesenteries are added at only one point in the periphery of the zooid; in the Zoanthidea they are added at two points; in the Tetracorallidea at four points; in the Actiniidea at many points; generally some multiple of six. The first two of these orders are known only from modern forms; the third is confined to the Paleozoic; the fourth probably begins in the Mesozoic and is dominant at the present time.

The second paper of the afternoon was given by the author and illustrated by lantern slides and diagrams; 15 minutes. Discussed by Charles Schuchert, P. E. Raymond, J. M. Clarke, and A. W. Grabau.

*NEW FACTS BEARING ON THE PALEOZOIC STRATIGRAPHY OF THE REGION
ABOUT THREE FORKS, MONTANA*

BY W. P. HAYNES

(Abstract)

In the various sections studied in the region about Three Forks and the adjacent country to the south, in southwestern Montana, the Jefferson limestone lies in apparent conformity on the Cambrian limestone, without any intervening formations. From Paleozoic evidence all of the Jefferson limestone is regarded as of Devonian age, and it is considered to lie disconformably on the Cambrian limestone in this region.

The presence of intervening strata of different lithological character, containing in some cases fossils of Ordovician and Silurian ages, between the Cambrian limestone and the Jefferson limestone, as noted by various writers, in sections in neighboring regions to the west and southwest, points to a stratigraphic overlap which involves a hiatus in sedimentary record for the region about Three Forks.

The Three Forks formation overlies the Jefferson limestone in this region, but differs greatly in its lithological characters from north to south. In the type region at Three Forks and to the north, along the Missouri River, it consists of seven fairly distinct shale and limestone members, the upper five of which are generally fossiliferous and contain a late Devonian faunule. In the southern sections the formation is chiefly limestone and sparsely fossiliferous. The Three Forks formation is not nearly so widely distributed as the Jefferson limestone or the overlying Madison limestone.

The next paper was given by the senior author and illustrated by lantern slides; 20 minutes. Discussed by R. S. Bassler and E. R. Cumings.

*STUDIES OF THE MORPHOLOGY AND HISTOLOGY OF THE TREPOSTOMATA
(MONTICULIPOROIDS)*

BY E. R. CUMINGS AND J. J. GALLOWAY

(Abstract)

This paper is a minute study of wall structure, with reference to its taxonomic significance; of the exact nature and function of acanthopores in the genus *Dekayia*; of certain peculiar cystlike structures in a number of genera; of communication pores in numerous genera, and of the structure and relationships of the recent sponge genus, *Merlia*.

Then followed a paper presented by the author, with diagram; 20 minutes. Discussed by John M. Clarke, with reply by the author.

HAMILTON GROUP OF NEW YORK

BY A. W. GRABAU

(Abstract)

The various subdivisions originally made by the author for the Hamilton of Eighteen-mile Creek have been correlated with a similar number of subdivisions in central New York by the New York Survey. The validity of this correlation will be considered and the facts suggesting that an error has been made will be given. A new series of names for these subdivisions will be proposed. A brief comparison with the Traverse group of Michigan will be made.

The next paper was read by the author; 15 minutes. Discussed by C. J. Sarle, Charles Schuchert, J. M. Clarke, M. Y. Williams, Charles Prosser, and Henry M. Ami.

A CLASSIFICATION OF AQUEOUS HABITATS

BY MARJORIE O'CONNELL

(Abstract)

An attempt will be made to classify aqueous habitats on the basis of salinity. A table of salinity ranges for the various types will be given, with a discussion and restriction of the terms fresh, brackish, and marine waters. The faunal significance of these habitats will be considered and several illustrations given, with especial attention to the relation between salinity and faunas. The purpose of the study is to obtain a faunal standard for each habitat by which faunas of former periods can be judged and interpreted in terms of habitat.

The final paper of the program was given by the author, who illustrated it by drawings.

*NEW SPECIES OF FICUS FROM THE INTERGLACIAL DEPOSITS OF THE
KOOTENAY VALLEY, BRITISH COLUMBIA*

BY ARTHUR HOLLICK

(Abstract)

Fossil plants, if their generic relationships to living plants can be satisfactorily determined, are generally regarded as excellent climatic indices. Remains of a species of *Ficus*, for example, in strata of any geologic age would at once be recognized as good evidence that a tropical or subtropical climate must have prevailed in the locality where the strata are, at the time when they were laid down. The generic identification of fossil leaves can not always be relied on as correct; but well preserved remains of fruit are generally very satisfactory subjects for determination, especially if the generic characters are peculiar or striking. Recently a study was made of a collection of fossil plants, stems, leaves, and fruit from interglacial deposits in the Kootenay Valley, British Columbia, sent for examination and report by the Director of the Canada Geological Survey.

At 4.30 p. m. the Society adjourned.

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CORRESPONDENT DECEASED

E. KOKEN, died November 24, 1912.

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SAMUEL CALVIN, died April 17, 1911.
WILLIAM M. FONTAINE, died April 30, 1913.
THEODORE M. GILL, died September 25, 1914.
ROBERT H. GORDON, died May 10, 1910.
J. C. HAWVER, died May 15, 1914.

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MINUTES OF THE FIFTH ANNUAL MEETING OF THE PACIFIC COAST
SECTION OF THE PALEONTOLOGICAL SOCIETYC. A. WARING, *Secretary*

The fifth annual meeting of the Pacific Coast Section of the Paleontological Society was held in divided session at Stanford University, California, and at Seattle, Washington. The Stanford meeting was held in the Geology Building, on Friday, April 24, 1914; the Seattle meeting was held in Science Hall of the University of Washington, on Friday, May 22, 1914. President J. C. Merriam presided at both meetings.

The relation of the paleontological series of the Pacific coast to that of the Atlantic coast and outside areas, with special reference to methods of correlation of the Triassic, Cretaceous, and Miocene, was suggested as the general topic of discussion for the meeting of the Paleontological Society to be held in San Francisco in 1915. A motion was made and carried ratifying this report as made by Doctor Merriam, chairman of the Program Committee.

ELECTION OF OFFICERS

The following officers were elected for the ensuing year:

President, ROY E. DICKERSON, 114 Burnett Ave., San Francisco.

Vice-President, H. HANNIBAL, Stanford University.

Secretary-Treasurer, E. L. PACKARD, Berkeley, Cal.

It was voted to hold the next meeting at the call of the President.

Following are the programs and abstracts of the papers presented at the two divisions:

PAPERS OF THE STANFORD MEETING

NOTE ON THE CRETACEOUS ECHINODERMS OF CALIFORNIA

BY W. S. W. KEW

RELATIONS OF THE SANTA MARGARITA FORMATION IN THE COALINGA EAST
SIDE FIELD

BY JOHN H. BUCKMAN

(Abstract)

A discussion of evidences of unconformity with the Jacalitos above and Big Blue below.

TENTATIVE CORRELATION TABLE OF THE NEOCENE OF CALIFORNIA

BY BRUCE L. CLARK

FAUNA OF THE LOWER MONTEREY OF CONTRA COSTA COUNTY, CALIFORNIA

BY BRUCE L. CLARK

EXTINCT TOAD FROM RANCHO LA BREA

BY CHARLES L. CAMP

(Abstract)

Amphibian bones from Rancho La Brea show the existence there of a toad closely allied to present-day forms of the Pacific coast.

RODENTS OF RANCHO LA BREA

BY LEE R. DICE

(Abstract)

The rodents found at Rancho La Brea are closely related to the forms living in the same region.

OCCURRENCE OF MAMMAL REMAINS IN THE ASPHALT BEDS OF MC KITTRICK, CALIFORNIA

BY NEILL C. CORNWALL

(Abstract)

In the asphalt deposits of McKittrick certain mammal remains have been found. These seem to indicate that the formation of the asphalt was not later than Lower Pleistocene.

OUTLINE OF THE HISTORY OF THE CASTORIDÆ

BY W. P. TAYLOR

(Abstract)

The beaver family was doubtless derived from Eocene Ischyromyidæ. The genera, *Paramys* (Eocene), *Sciuravus* (Eocene), and *Steneofiber* (Oligocene and Miocene), are near, if not actually, members of the phylogenetic series, of which the genus *Castor* is the latest development. There have been probably at least three beaver intercontinental migrations. The determinations of the age of the Etchegoin formation bears directly on the problem of the first appearance of the genus *Castor*.

*CRETACEOUS-EOCENE CONTACT IN THE ATLANTIC AND GULF COASTAL
PLAIN*

BY L. W. STEPHENSON

(Abstract)

The paper emphasizes the fact that the Cretaceous and Eocene deposits of the Atlantic and Gulf Coastal Plain are separated by an unconformity of regional extent. Faunal evidence is offered to show that, in terms of geologic time, this unconformity represents a very great hiatus. The differences exhibited by the faunas on either side of the contact indicate changes greater than those effected through evolutionary development during the time represented by the *Exogyra ponderosa* and *Exogyra costata* zones of the Upper Cretaceous; the differences are also greater than the faunal changes effected between the lowermost Eocene and the Recent, in the same province. The unconformity marks a great diastrophic movement which involved the entire Atlantic and Gulf Coastal Plain.

*IONE FORMATION OF THE SIERRA NEVADA FOOTHILLS, A LOCAL FACIES OF
THE UPPER TEJON-EOCENE*

BY ROY E. DICKERSON

(Abstract)

The Ione, in part at least, is marine and of Tejon-Eocene age. Marine fossils have been found in the upper portion of the Ione formation at Marysville Buttes, Oroville South Table Mountain, Merced Falls, and Ione. Apparently the same faunal zone, the *Siphonalia sutterensis* zone, is represented in all these places.

*STRATIGRAPHIC AND FAUNAL RELATIONS OF THE LATER EOCENE OF THE
PACIFIC COAST*

BY HAROLD HANNIBAL

(Abstract)

Illustrated discussion of the stratigraphic and faunal relations of the Chehalis, Olequa, and Arago formations of Oregon and Washington, and the Tejon and Ione formations of California.

*FAUNA AND RELATIONS OF THE WHITE SHALES OF THE COALINGA
DISTRICT*

BY JOHN H. RUCKMAN

*VERTEBRATE FAUNA IN THE MARINE TERTIARY OF CALIFORNIA; THEIR
SIGNIFICANCE IN DETERMINING THE AGE OF CALIFORNIA TERTIARY
FORMATIONS*

BY J. C. MERRIAM

GEOLOGY OF A PORTION OF THE MC KITTRICK OIL FIELD

BY G. C. GESTER

PAPERS OF THE UNIVERSITY OF WASHINGTON MEETING
*STRATIGRAPHIC AND FAUNAL RELATIONS OF THE LINCOLN FORMATION IN
WASHINGTON*

BY CHARLES E. WEAVER

CRETACEOUS FAUNAS OF THE SANTA ANA MOUNTAINS

BY EARL L. PACKARD

(Abstract)

The Santa Ana Mountains afford a Chico-Cretaceous section of simple structure, yielding a rich invertebrate fauna, which is divisible into four faunal zones. The section may serve as a faunal type section to which other Chico localities may be referred.

*REVIEW OF THE FAUNA OF THE RATTLESNAKE PLIOCENE OF EASTERN
OREGON*

BY JOHN C. MERRIAM

(Abstract)

The Rattlesnake formation of the John Day Valley contains a fauna which has been presumed to be of late Miocene or early Pliocene age. The material known from this formation is very fragmentary and commonly of uncertain occurrence. The paper presents a review of the fauna, with a statement as to the probable age and correlation of the formation.

EOCENE OF THE COWLITZ VALLEY

BY CHARLES E. WEAVER

*FAUNA OF THE SIPHONALIA SUTTERENSIS ZONE IN THE ROSEBURG
QUADRANGLE, OREGON*

BY ROY E. DICKERSON

(Abstract)

A collection made by Mr. Bruce Martin from the Umpqua formation, on the Umpqua River, at the mouth of Little River, contains several forms, such as *Chrysodormus martini*, *Cardium marysvillensis*, *Siphonalia sutterensis*, *Cari-cella stormsiana*, *Surcula davisiana*, and *Venericardia planicosta*, new variety, which are characteristic of the *Siphonalia sutterensis* zone of the Tejon group

of California. The paper presents a fauna obtained from the Umpqua formation and a tentative correlation of the beds containing the fauna with the uppermost Tejon of the California province.

EVOLUTION OF THE PACIFIC COAST MACRIDÆ

BY EARL L. PACKARD

(Abstract)

The genus *Spisula*, represented in the Horsetown beds by *Spisula ashburneri* (Gabb) became dominant in the Middle Miocene, thence gradually declining to the present day. The earliest undoubted mactroid species occurs in the Miocene, reaching its greatest development at the present time. The mulinoid forms appeared suddenly in the early Miocene, spread rapidly, and then quickly disappeared from the region north of Mexico.

CORRELATION OF THE TERTIARY FORMATIONS IN WESTERN WASHINGTON

BY CHARLES E. WEAVER