SCIENCE

A WEEKLY JOURNAL DEVOTED TO THE ADVANCEMENT OF SCIENCE, PUBLISHING THE OFFICIAL NOTICES AND PROCEEDINGS OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

FRIDAY, JANUARY 17, 1902.

CONTENTS:

THE GEOLOGICAL SOCIETY OF AMERICA.

THE fourteenth annual meeting of the Geological Society of America was held in Rochester, N. Y., from Tuesday, December 31, 1901, to Thursday, January 2, 1902. An informal session of the Council, to canvass the ballots for officers and fellows, was held on Monday night, December 30, at the Whitcomb House, the headquarters of the Society. A formal session of the Council was held at 9 o'clock Tuesday morning in Sibley Hall, University of Rochester.

Owing to the unavoidable absence of President Walcott, the meeting was called to order by Professor Newton H. Winchell, shortly after 10 o'clock, in the geological lecture room of the University of Rochester, and the address of welcome and response were postponed until the arrival of the president. The report of the Council and officers having been printed and distributed to the members, its consideration was laid over until Thursday. Professor R. E. Dodge and Dr. E. O. Hovey were then appointed auditing committee. The vote for officers for 1902 was declared as follows:

President, N. H. Winchell, Minneapolis, Minn; *First Vice-President*, S. F. Emmons, Washington, D. C.; *Second Vice-President*, J. C. Branner, Stanford University, Cal.; *Secretary*, H. L. Fairchild, Rochester, N. Y.; *Treasurer*, I. C. White, Morgantown, W. Va.; *Editor*, J. Stanley-Brown,

Washington, D. C.; *Librarian*, H. P. Cushing, Cleveland, O.; *Councillors*, C. W. Hayes, Washington, D. C., J. P. Iddings, Chicago, Ill.

The following were declared elected fellows of the Society:

Ermine Cowles Case, A.B., A.M. (Kansas State University, 1893), M.S. (Cornell Univ., 1895), Ph.D. (Univ. of Chicago, 1896), Instructor in State Normal School, Milwaukee, Wis.; Arthur Gray Leonard, A.B., A.M. (Oberlin), Ph.D. (Johns Hopkins Univ.), Des Moines, Iowa, Assistant State Geologist, Iowa Geological Survey; Charles Hyde Warren, Ph.B. (Yale, 1896), Ph.D. (Yale, 1899), Boston, Mass., Instructor in Geology, Mass. Inst. Technology.

The following memorials were read: George M. Dawson, by Frank D. Adams; Ralph D. Lacoe, prepared by David White, read by the secretary; Theodore G. White, prepared by J. F. Kemp, read by R. E. Dodge.

The following memorials were not read, owing to the absence of the authors: Edward W. Claypole, by Theo. B. Comstock; Joseph Le Conte, by W J McGee.

President Walcott, having meanwhile arrived, took the chair, and the address of welcome was delivered by Dr. Rush Rhees, president of the University of Rochester. He complimented the Society on its work, and the city and University of Rochester on the honor conferred by the meeting of the Society within their confines. He saw no special reason why Rochester should be so favored, but hoped that this meeting would stimulate its citizens to take a deeper interest in higher education. Finally he welcomed the Society most cordially to the University and the city. President Walcott, in responding, offered many reasons why the Society should meet in Rochester, for that city was intimately connected with the early study of geology in this country, and from it have proceeded many eminent members of the Society.

The following scientific papers were then read:

The Ordovician Succession in Eastern Ontario: H. M. Ami, Ottawa, Canada.

This paper dealt with the succession of paleozoic sediments in that portion of the province of Ontario, Canada, which is traversed by the Frontenac axis or ridge of Archæan rocks which crosses the St. Lawrence river between the city of Kingston and Brockville and connects with the great Adirondack massif to the south.

The Frontenac axis divides the Ordovician strata, to the east as well as to the west, into two series, which, though not very distant, geographically speaking, are nevertheless marked by important features.

On the east side of the axis the normal succession of strata from the Potsdam to the Medina is found, but on the west side of the axis the pre-Cambrian rocks are overlain by the Rideau sandstone, succeeded without stratigraphic break by the Birdseye, Black River and Trenton strata. Fossils, except *Scolithus*, are absent in the Rideau sandstone and the problem of the equivalency of this sandstone was stated.

In the discussion Mr. Bailey Willis considered that the Rideau sandstone is the formational equivalent of the Potsdam, but not its equivalent in age. Professor W. M. Davis considered it pre-Black-river in time, but of unsettled age. Mr. Walcott, emphasizing the shifting character of the deposits around the Adirondacks, suggested that the Rideau was the shore equivalent of the Calciferous (Beekmantown) and Chazy.

Stratigraphic and Faunal Succession in the Hamilton Group of Thedford, Ontario: Hervey W. Shimer and A. W. Grabau, New York, N. Y. Read by Mr. Shimer.

The Thedford Hamilton admits of a three-fold division, closely corresponding to that of the Hamilton of western New York. The limitations of the characteristic

species correspond in a remarkable degree to those observed in western New York. The encrinal limestone is the central member in both localities, and the chief coral zone lies just above this stratum in both. A striking dissimilarity exists between the Hamilton of Thedford and the corresponding horizon (Traverse group) of Alpena, Michigan, the next important outcrop of this formation to the northwest. The difference is shown chiefly in the faunas. The paper was discussed by J. M. Clarke, H. S. Williams and A. W. Grabau.

The Traverse Group of Michigan: AMADEUS W. GRABAU, New York, N. Y.

Two sections, one on Thunder Bay and the other on Little Traverse Bay, show the strongly calcareous facies of the strata, which is most marked in the western section. In both sections the upper limit of the Traverse groups is marked by the St. Clair Black shale, and the lowest portion of the group is a bed of blue clay 80 feet thick. The fauna varies with the rock. The reef character of the limestone strata was discussed. The faunal character of the strata was discussed by Professor H. S. Williams, and the reef structure by Mr. Chas. D. Walcott. The Society then adjourned for lunch, many members availing themselves of the opportunity offered to inspect Ward's Natural History establishment, where a lunch was provided.

The afternoon session was called to order at 2 o'clock. The following papers were read:

The Lower Carboniferous Area in Indiana: T. C. HOPKINS, Syracuse, N. Y.

The Lower Carboniferous strata in west central Indiana undergo quite marked changes along the strike. The outcrops have been traced in detail and represented on the State map. The heavy calcareous deposits of the southern part of the area thin out to the northward and give way to argillaceous and sandy deposits. This transition has an important bearing on the geological history of this region.

The following subdivisions, based on lithologic but not paleontologic features, were discussed. *Kaskaskia, Mitchell, Bedford; Harroddsburg and Knobstone.*

The paper was briefly discussed by W. B. Scott, J. B. Wolf and W. M. Davis. Dr. A. C. Lane discussed the relations of similar beds in Michigan, and raised the question as to the origin of the silica in the beds under consideration, and its value as a horizon marker. He suggested that it might be supplied by volcanic eruptions, even from a distance. Mr. Walcott briefly discussed the economic importance of the limestones of these formations. Brief remarks were also made by Dr. A. F. Foerste, and responded to by Dr. Hopkins.

Geological Horizon of the Kanawha Black Flint: I. C. WHITE, Morgantown, W. Va.

The first comprehensive description of the Kanawha Black Flint was given by W. B. Rogers, and besides this, the works of Stevenson, the Platt Brothers and H. M. Chance were considered as having added most to our knowledge of the details of the Appalachian carboniferous stratigraphy. The name Conemaugh, proposed by Franklin Platt, has, according to W. B. Clark, priority over Elk River series applied to the 'Barren measures' of Rogers, by White. Platt's name was accepted for the beds lying between the Pittsburg coal and the Upper Freeport coal. The position of the Kanawha Black Flint is at the base of the Conemaugh series, though David White places it some 200 feet down in the Allegheny series from paleobotanic evidence. The work of Messrs. Campbell and Mendenhall was reviewed, the speaker disagreeing with their interpretations. The problem was attacked anew by the speaker and from a new standpoint, by tracing the

basal coalbed, and the accompanying Mahoning sandstone, as well as the Red bed series with its included crinoidal limestone, from the Pennsylvania line to West Virginia. The results of this new work were in close agreement with those arrived at by the speaker in previous studies. The speaker concluded with the following corollaries:

A. Some coal beds, limestones and sandstones may be followed for hundreds of miles.

B. Stratigraphy is superior to paleobotany in correlations.

C. Paleobotany should be used merely as an aid to stratigraphy.

The paper brought out a warm discussion, in which Professor Stevenson, Bailey Willis, I. C. White and others participated.

President Walcott read a telegram of greeting from the Cordilleran section of the Society, in session in San Francisco, Cal. On motion of Professor Stevenson a similar greeting was returned.

The next paper read was:

Correlation of the Coal Measures of Maryland: Wm. B. Clark and G. C. Martin, Baltimore, Md. Read by Professor Clark.

The object of this paper was to show the equivalency of the coal seams of Maryland with those of adjacent regions in Pennsylvania and West Virginia. The determination of this equivalency is based not only on the parallelism of lithologic sequence over wide areas, as shown both by the structure of the seams themselves and of the intervening beds, but also on the fossiliferous zones which have been found at numerous points throughout this district. The similarity of the chemical composition in each vein over wide areas is also strikingly shown.

Local names, heretofore used by the Maryland survey, were abandoned, and those used in Pennsylvania and West Virginia were adopted. The paper was discussed by I. C. White, J. J. Stevenson and Bailey Willis.

Areal Distribution of the Potomac Group in Maryland: W. B. Clark and A. Bibbins, Baltimore, Md. Read by W. B. Clark.

The lowest member of the Atlantic coastal plain series is the Potomac group, so named by W J McGee, who considered it a single unit. The age of this group was considered to be Cretaceous by paleobotanists, and Jurassic by Marsh and other vertebrate paleontologists. The authors have described a fourfold division of the Potomac into Patuxent, Arundel, Patapsco and Raritan beds, and indicated the distinctive characters of each. The areal distribution, which varies for the different members, was briefly discussed by the speaker. Marsh found Dinosaur remains in the Arundel, which, with the underlying Patuxent beds, is Jurassic. The plant remains were found in the upper or Raritan beds, and these are cretaceous. The lower members gradually die out northward, the Patuxent and Arundel not occurring in New Jersey, though some of the lower members appear to be present in Pennsylvania. The disappearance is due to a northward transgression of the sea and a consequent overlap of the newer upon the older beds. The paper was briefly discussed by Professors Hopkins and Holmes, and questions answered by Professor Clark.

On some Joint Veins: G. K. Gilbert, Washington, D. C.

A limestone stratum between beds of Cambrian shale from western Utah shows innumerable veinlets of the segregation type. In a small hand specimen passed around, 180 veins were counted. These belong to 22 systems, which are grouped in two groups, the minor of which is aligned

with the dip of the strata (which is from 10 to 15 degrees) and the major group with the strike. They are believed to be formed along joints. The dip joint-veins are normal to the plane of stratification, the strike veins vary from normal to the stratification, to verticality, and appear to have been formed at different periods. The grouping of the joint-veins in two directions appears in all the beds examined. The scale of the jointing is related to that of the bed, which is a thin one.

Professor J. E. Wolf discussed the origin of the jointing by contraction of the rock on loss of water.

Professor B. K. Emerson considered that they had all the aspect of torsion joints as produced in glass artificially. He referred to Crosby's theory, according to which an earthquake shock, passing through a stratum in which a slight torsion was induced, would produce the joints of the type described. Gilbert considered Crosby's theory the most plausible, and that the shrinkage theory was not applicable here. Bailey Willis thought that expansion of the rocks may have been a cause in the fracturing. Gilbert emphasized the fact that no apparent cracks existed. N. H. Winchell mentioned similar phenomena in the Minnesota mica schists, which apparently were basic sediments. A. C. Lane recalled joints of similar type but larger scale in the diabase sheet of Nahant, Mass.

Regeneration of Clastic Feldspar: N. H. WINCHELL, Minneapolis, Minn.

The literature was reviewed and the speaker's own observations given. Three phases of alterations of clastic feldspars occur: (1) Decay, (2) secondary enlargement, (3) secondary enlargement but the newly added material extended so as to grow into crevices between the other grains of the rock.

The Society then adjourned.

The evening session of the Society was opened at 8:40 o'clock in the college chapel, Anderson Hall. President Charles D. Walcott delivered the annual address, his subject being: 'The Outlook of the Geologist in America.' He reviewed the work now in progress in this country, and sketched a bright future for American geology.

Second day, Wednesday, January 1, 1902. The Council of the Society met in session at Sibley Hall at 9 o'clock.

The meeting of the Society was called to order at 9:50 by President Walcott. The motion was made that the previously distributed report of the Council be accepted. Carried.

The report of the photograph committee, prepared by N. H. Darton, was read by the secretary. The report was accepted, and the usual appropriation voted.

Professor Dodge presented the report of the auditing committee, stating that the committee had examined the treasurer's accounts and found them correct. The report was accepted. The Council recommended that the name of the western section of the Society be pronounced Cordil-ya'ran, which is the Spanish pronunciation, used in California. The recommendation was adopted.

The Society then proceeded to the reading of papers:

Geology of the Snake River Plains, Idaho: ISRAEL C. RUSSELL, Ann Arbor, Mich.

In the Snake river basin are many old rhyolitic cones covered by lava flows of later origin. The extent and thickness of the Snake river lava and its relation to the Columbia river lava were discussed. There is a decided lack of evidence of fissure eruption in the Snake river area. The distinction between the cinder and lava cones was illustrated, and various types of lava from the flows were shown.

The characteristic ridges on the older lava streams are due to basal compression of folds on the surface of the stream, these folds sometimes being hollow at the top, though compressed below. Lantern views and specimens illustrated these features. Along cracks in the lava streams, parasitic cones are built up and these and numerous other characters of the lava stream were illustrated by lantern views. Where the lava stream has come in contact with a body of water, the base of the sheet expands and becomes cellular, although the character of the lava is glassy from rapid cooling. The sand of the lake or river bottoms into which the lava stream entered is often cemented into the base of the sheet, and gives it a white color.

The canyon of Snake river owes its peculiarities to many of the features discussed. Shoshone falls are due to a cone or mass of hard rhyolite beneath the basalt, discovered by the river. Heavy lava sheets overlie the finely stratified, unconsolidated lake beds exposed in the canyon, which are scarcely altered by the lava. The base of the latter is glassy, with a few steam holes, but at a short distance above, the sheet has its normal granular character. From beneath the lava stream or from a porous layer, numerous powerful springs issue along the side of the canyon below Shoshone falls. These may be called 'canyon springs,' a new term introduced in the classification of springs. In the northern wall of the canyon occur remarkable spring-formed alcoves or side canyons, which widen out amphitheater-like, and have no stream at their head. Powerful springs, issuing from the fine lacustrine beds underlying the lava, undermine the latter and cause recession of the walls. Numerous lantern views were used in illustration of the paper.

Professor Emerson discussed the origin of these lava beds and their surface characters. He pointed out the similarity of many features of these lavas to those of the Hawaiian volcanoes. He compared the base of the Snake river lava, resting on fine lake beds, with that of the Triassic trap of the Connecticut Valley, resting on the Triassic sands.

Professor Wolff discussed the age of the lava flows and cones.

Structure of the Front Range, Northern Rocky Mountains, Montana: Bailey Willis, Washington, D. C.

The Front Range of the northern Rockies consists of a series of limestones, quartzites and silicious argillites somewhat exceeding 9,000 feet in thickness, and gently flexed in a synclinal form. The width of the range is approximately twenty miles from foothill to foothill, and the synclinal structure has practically a corresponding extent. The trend of the range is from northwest to southeast, and the strike of the rocks is essentially parallel to it. The mass is, however, not exactly symmetrical in cross section, the rocks outcropping on the northeastern side comprising probably 3,000 feet of strata lower in the series than the lowest on the western side.

Approached from the east, the margin of this synclinal mass is found to rest discordantly upon black clays and sandstones. These strata appear at some little distance from the range in the Great Plains, dipping deeply southwestward, but where they pass beneath the great limestone and quartzite series they correspond very nearly in attitude with the overlying rocks. The relation of the overlying to the underlying series is, however, that of an overthrust mass. In many places the black shales and sandstones were found to contain Inoceramus and Ostrea characteristic of the Cretaceous. In the overlying rocks Mr. Weller fortunately found fragments of

fossils which have been determined by Mr. Walcott as identical with those discovered by him in the pre-Cambrian Belt formation. Thus the discordance corresponds to an hiatus of all of the Paleozoic and part of the Mesozoic. The plane of overthrust dips gently to the southwest, and is exposed at right angles to its strike throughout a section seven miles in length, which is equivalent to a displacement of that amount. There are interesting details of structure in the overthrust and underthrust masses.

On the western side of the range parallel to the valley of the North Fork of the Flat Head the ancient limestones and quartzites present a bold face, and the stratigraphic relations of rocks found west of the Flat Head valley indicate that this face is a deeply eroded fault scarp of the normal type. The valley of the North Fork of the Flat Head contains lake beds, which are by analogy with similar formations in Montana tentatively referred to the Miocene or Pliocene.

From these data it is inferred that the structural history of the range comprises:

First. Deposition of Cretaceous sediments of very considerable thickness adjacent to a shore not far from the present site of the range and upon a land whose surface consisted of the pre-Cambrian limestones and quartzites.

Second. That in some post-Cretaceous epoch compressive strains resulted in a fold overturned toward the northeast, and ultimately in the development of a corresponding overthrust fault.

Third. That at some later date, probably Miocene, normal faulting resulted in relative uplift of the mass of the front range and downthrow of the mass of the Flat Head valley.

The next paper was a continuation and illustration of the preceding one, numerous lantern views being shown:

Physiography of the Northern Rocky Mountains: BAILEY WILLIS, Washington, D. C.

Professor Coleman discussed the physiography and origin of the structure of the region to the north of that described by Bailey Willis. Professor Davis discussed the structure and physiography of the region described. Mr. Walcott compared the section of pre-Cambrian rocks of the Belt Mountain terrane with that given by Willis in the Northern Rockies, and considered the probability that the entire series involved in the front range is Algonkian.

The Walls of the Colorado Canyon: W. M. DAVIS, Cambridge, Mass.

The general profile of the canyon walls depends on rock structure, and not on a pause in the elevation of the plateaus. The variation of profile from the narrow canyon in the Uinkaret plateau to the wide canyon in the eastern Kaibab is due to variation in the character of the strata. The pattern of spurs and recesses varies with the stage of dissection. The pattern commonly seen in the Red-wall cliffs is repeated in the Tonto cliffs where the latter are much worn. The pattern usually seen in the Tonto is repeated in the Red-wall where it is less worn. Brief mention was made of details connected with the unconformities seen in the canyon walls.

The paper was illustrated by lantern views, and was briefly discussed by Mr. Walcott and others.

The Society then adjourned for the noon recess.

The papers of the afternoon session were:

Rock Basins at the Helen Mine, Michipicoton: A. P. COLEMAN, Toronto, Canada.

Two small lakes or ponds, each a quarter of a mile long and two-thirds as wide, just west of the Helen iron mine near

Michipicoton on the north shore of Lake Superior, present very interesting examples of rock basins. Unlike most of the smaller rock basin lakes of Canada, they are not of glacial origin and probably were not even scoured out by the ice, since they are narrowly enclosed by steep, rocky ridges rising about 150 feet to the north and south and 450 feet toward the east. The shape of the valley is somewhat like that of an armchair with its back to the east, the two ponds, called Boyer and Sayers lakes, occupying the narrow seat. They had a depth of from 125 to 150 feet in the beginning, but Boyer lake, the higher one, is now partially pumped out to facilitate mining operations. From Boyer to Sayers lake the fall is 25 feet; and from Sayers to Talbot lake, which is beyond the high rock walls of the valley, there is a drop of 75 feet.

The valley of the two ponds is cut from rocks belonging to the iron range, chiefly siderite and granular silica banded with magnetite or heavily charged with pyrite, and the lowest point of the rim of each consists of silicious siderite containing much pyrite. The side walls of the valley are of greenish schists. The hollowing of the basins must have been due to solution, perhaps of parts of the iron range rocks which had been shattered; and the deposit of the large ore body at the eastern end of Boyer lake, where a high hill, consisting largely of impure siderite, drops steeply down to the basin, probably has a bearing on their formation, the decomposition of pyrite perhaps furnishing the solvent.

The next paper was:

The Effect of the Shore Line on Waves: W. M. Davis, Cambridge, Mass.

The paper was a statement of the transformations of waves as they run in upon shore lines of different forms, with special reference to the refraction of waves on headlands and in bays, and to the formation of surf.

The breaking of waves is not so much due to a retardation by friction of the base of the wave in shallow water, as generally assumed, as to the absence of water in front of the wave near the shore.

The next paper was:

Variation of Geothermal Gradient in Michigan: Alfred C. Lane, Lansing, Mich.

The geothermal gradient in Michigan appears to vary from 1° F. in 107 feet to 1° in 54 feet. Among the different causes of variation, the varying diffusivity of the rocks appears to be important.

Diffusivity varies with the density; the more porous the rock, the smaller the diffusivity. The limestones of Cheboygan have a diffusivity paralleling that of the copper-bearing rocks of Kewenaw Point. The diffusivity of the shales of Michigan is widely at variance with that of the limestones.

The next two papers were presented together and illustrated by lantern views:

Origin and Distribution of the Loess in Northern China and Central Asia: George Frederick Wright, Oberlin, O.

Detailed observations in China, Mongolia, and Turkestan were presented which bear upon the fluvio-glacial theory of the origin of the loess of these regions, and of its distribution by wind or water.

No evidence of glaciation is found where Geikie and Krapotkin assumed it.

The Age of Lake Baikal: George Frederick Wright, Oberlin, Ohio.

The region about Lake Baikal is covered with strata of Tertiary (and possibly Triassic) age, containing coal. These beds are derived from the sediments which were carried by now existing streams into the basin from the surrounding mountains, before the present lake came into existence. At the

estimated rate of erosion the entire lake would be filled in 400,000 years, whereas it is not a quarter full, and probably not one tenth full. The age of Lake Baikal is perhaps 100,000 years or less. That this region was formerly connected with the sea is shown by the species of seal found in Lake Baikal, which are also found in the Caspian sea. Other evidence of recent submergence followed by reelevation exists. A period of increased precipitation caused the freshening of all the waters of the inland lakes of this region.

Professor Scott discussed the importance of æolean action in the formation of stratified beds, referring to those of Santa Cruz in Patagonia, in which vertebrate remains have been found finely preserved.

On Some Anticlinal Folds: T. C. HOPKINS and MARTIN SMALLWOOD, Syracuse, N. Y. Read by Professor Hopkins.

A number of unique folds occur in several small and rather deep ravines in the vicinity of Meadville, Pa. They are of limited extent both vertical and linear, and so far as known occur only in the bottom of the ravines. The relation of the folds to certain land-slip terraces, suggests a cause for these folds which are often asymmetrical.

Professor I. C. White referred to similar folds in other portions of Pennsylvania. He considered that gas formed below found an opportunity to escape in the relatively weak bottoms of canyons, causing an upward pushing of the strata. Professor Brigham mentioned the occurrence of similar folds in western New York. Professor Russell recalled folds, in the bottoms of canyons in western Idaho, where the strata are sharply arched. Land-slip terraces occur on both sides, there being thus no unequal pressure. He considered that the downward pressure of the wall rocks of the canyons, and the relief of pressure in the bottom, caused the arching. Professor Stevenson discussed other folds in Pennsylvania. Mr. C. J. Sarle mentioned folds in the Clinton beds at Rochester and other localities.

The following papers were then read by the author:

Distribution of the Internal Heat of the Earth: T. C. CHAMBERLIN, Chicago, Ill.

Has the Rate of Rotation of the Earth Changed Appreciably During Geological History? T. C. CHAMBERLIN, Chicago, Ill.

The papers were a discussion of the mathematical and physical principles involved, and the available experimental data. The geological application to the phenomena of volcanoes, mountain foldings, etc., and to the great questions of physical geology was discussed.

In discussion some remarks were made by Professor Coleman.

The Society then adjourned until the next day.

The annual dinner was served at eight o'clock at the Whitcomb House. President Walcott occupied the head of the table, which was graced by the presence of a number of ladies. The after-dinner speeches touched upon the future policy of the Society and other topics, and contributed largely to the enjoyment of the dinner, which was voted one of the best ever attended by those present.

Third day, Thursday, January 2, 1902. The Council met at 9 o'clock in Sibley Hall. The meeting of the Society was called to order at 10 o'clock, Vice-President Winchell in the chair. Professor Clarke asked for a statement from the secretary concerning the relation of the Society to Section E of the American Association, especially in regard to next winter's meeting in Washington.

The following papers were read:

Use of the terms Linden and Clifton Limestones in Tennessee Geology: Aug. F. Foerste, Dayton, Ohio.

The Lower Helderberg was named in Tennessee from its exposure at Linden, where it is but 12 feet thick, while the maximum thickness is between 75 and 100 feet. Foerste questioned the advisability of naming a formation from the place of its minimum exposure. Faunal and stratigraphic characteristics were given.

Bearing of the Clinton and Osgood Formations on the Age of the Cincinnati Anticline: A. F. Foerste, Dayton, Ohio.

In continuation of former studies the author developed his interpretation of the Cincinnati anticline. The Devonian axis of the anticline was northeast and southwest, while the present axis is north and south. The Clinton strata over the central portion of the anticline are coarse limesands with wave marks and crossbedding, and beds of conglomerates. North and south of this area, the material is a fine lime-mud. The relation of these features to those formerly described was discussed.

J. M. Clarke discussed the subdivision of the Lower Helderberg of Tennessee. The fauna has a Silurian facies. I. C. White called attention to the importance of the Clinton Iron Ore bed, and its extension in Maryland and Pennsylvania. Brief remarks were also made by H. M. Ami and B. K. Emerson.

Notes on the Catalogue of Types in the Geological Department of the American Museum of Natural History: E. O. Hovey, New York.

The paper was an exposition of the great work recently completed at the Museum in the cataloguing of the large number of types and figured specimens in the Museum, and of looking up references for each specimen. Complimentary remarks were made by J. M. Clarke, H. M. Ami, and others.

The New Carboniferous Age of the Union and Riverdale formations in Nova Scotia: H. M. Ami, Ottawa, Ont.

In Colchester county lower Carboniferous beds are thrust over the newer Union and Riverdale beds, which by their fossils are known to be middle Carboniferous. In Pictou county the Lower Carboniferous rest unconformably upon the upturned Eo-Devonian, with which the Union and Riverdale beds were formerly correlated by stratigraphers. The evidence of the overthrust is, however, complete. The Union and Riverdale beds of Nova Scotia are equivalent respectively to the Mispeck and Lancaster formations of New Brunswick.

Origin of the Faunas of the Marcellus Limestones of New York: John M. Clarke, Albany, N. Y.

The Marcellus fauna is characteristically a bituminous mud fauna. Two prominent limestone beds, the Goniatite and Stafford limestones, carry, the one an upper Onondaga fauna, and the other a lower Hamilton fauna. The former makes its appearance near the meridian of Rochester, and extends eastward, rising relatively higher and higher in the bituminous shales. The other ends at the same meridian and thickens westward. The fauna of the Goniatite limestone (fauna of *Agoniatites expansus*) represents an eastward migration of the upper Onondaga fauna, which had persisted in the west, while the bituminous mud fauna had already become established in the east. The Stafford limestone fauna is a prenuncial Hamilton fauna, which persisted for a time and then was overwhelmed again. The Onondaga and Hamilton faunas appear to have come from the northwest, while the bituminous mud fauna of the typical Marcellus shales came from the southwest.

In discussion, brief remarks were made by I. C. White, A. P. Brigham and A. W. Grabau.

In the absence of the authors the following papers were read by title:

Notes on Mts. Hood and Adams and their Glaciers: H. F. REID.

Keewatin and Laurentide Ice Sheets in Minnesota: A. H. ELFTMAN.

Devonian Interval in the Ozarks: C. R. KEYES.

Devonian Fish-Fauna of Iowa: C. R. EASTMAN.

Geological Section in Northern Alaska, along the 152d Meridian: FRANK C. SCHRADER.

Notes on the Geology of Southeastern Alaska: ALFRED H. BROOKS.

Geology of the Virgilina Copper District in Virginia and North Carolina: THOMAS L. WATSON.

Cuttyhunk Island: F. P. GULLIVER.

The Mohokea caldera on Hawaii: C. H. HITCHCOCK.

A resolution of thanks to the president and trustees of the University of Rochester and to the professor of geology, the secretary of the Society, was offered by Professor Emerson, and after some remarks by Professor Coleman was unanimously adopted. After some closing remarks by the vice-president, the Society adjourned until December, 1902.

A large proportion of the fellows remained in Rochester to attend the evening reception given by President and Mrs. Rush Rhees, of the University of Rochester. The afternoon was devoted to short excursions to the Genesee gorge and other localities about Rochester, and to an inspection of the establishments of Ward's Natural Science Bureau, the Bausch and Lomb Optical Company, etc.

AMADEUS W. GRABAU.
COLUMBIA UNIVERSITY,
DEPARTMENT OF GEOLOGY.

FORESTRY IN NEW YORK STATE.

THE New York State School of Forestry, located at the New York Land Grant College, with its laboratories in the form of trained man in this department in the Adirondacks, is discovering that the difficulties which have attended so generally the promotion of pure science in our colleges and schools, during the past generation and earlier, are not necessarily evaded or lessened when the question becomes one of promotion of applied science and the utilization of scientific method directly in the promotion of the highest interests of the State and of its people.

New York was the first of the States of the Union to provide, on a suitable working scale, for the introduction of the art of forestry into this country by systematic and scientific instruction in a technical college, purely and professionally devoted to that work. It established the 'College of Forestry' as a department of the State college, Cornell University, authorized the purchase of a large tract of forested land, gave directions that the work should be done under the supervision of an expert, scientific and practically trained forester, and conferred ample authority upon the College of Forestry, its director and the university board of trustees, to establish and permanently sustain the college and its work. The primary purpose of the college was the education of professionally trained foresters. This provision was made in 1898 and was at once put into operation. Land was purchased—outside the State Reservation and thus not subject to the constitutional limitations affecting that reservation—and work promptly begun.

Hardly had this long-needed and immensely important enterprise been inaugurated by the appointment of Director Fernow, the most experienced, professionally trained man in this department in the country, and the schedule of work and