

THE GEOLOGICAL SOCIETY OF AMERICA.

The twelfth annual meeting of this society was held in Washington, D. C., beginning on Wednesday, December 27, the large hall in Columbian University being the meeting place. The society was welcomed to Washington by Dr. Grove K. Gilbert, of the United States Geological Survey, and an apt response was made by the president of the society, Prof. Benjamin K. Emerson, of Amherst College.

The secretary reported that there were 230 names upon the membership list, with eight candidates awaiting election. He also reported the society to be in excellent financial condition. The librarian reported that 160 volumes had been bound during the year, and hoped during the ensuing year to complete all the binding that was in arrears.

The necrology included the reading of the following notices: Memorial of Othaniel C. Marsh, by Prof. Charles E. Beecher; Memorial of Oliver Marcy, by Prof. Alja R. Crook; Memorial of Edward Orton, by Dr. Grove K. Gilbert; and Memorial of Sir J. William Dawson, by Prof. Frank D. Adams.

The society then took up the reading of papers; the first of these was "Physiographic Development of the Washington Region," by Nelson H. Darton, of the United States Geological Survey. Prof. William M. Davis, of Cambridge, Mass., followed with a paper on "Physiographic Terminology with Special Reference to Land Forms." The third paper was one by Dr. Edmund O. Hovey, of the American Museum of Natural History, New York city, on "Erosion Forms in the Harney Peak District, Black Hills, South Dakota." He described those peculiar forms that are found in the schists and pegmatites in the Harney Peak district, where he spent a portion of last summer. The paper was illustrated by lantern views. Messrs. George O. Smith and George C. Curtis, of Washington, D. C., and Boston, Mass., presented a joint paper entitled "Camas Land, a Valley Remnant." It was a description of the old valley on the eastern slope of the Cascade Mountains in Washington. A relief model of Camas Land was exhibited. This interesting valley owes its preservation above the circumdenudation to an intrusive sheet of diabase. Two papers by Mr. W. S. Tight, of Granville, Ohio, followed, the first of which was entitled "Topographic Features of Ohio," and was a description of the different sections of the State, with an attempt to show the reasons for the different types. It was fully illustrated with lantern views. His second paper was entitled "Drainage Modifications in Southeastern Ohio," and described the extensive changes in drainage of the region north of the Ohio River and between the lower Muskingum and the lower Scioto. The lower Muskingum, south of Zanesville, was shown to be a composite stream made up of sections of four preglacial streams which crossed the course of the present Muskingum. These four streams, he showed, were united in what is now the Little Hocking basin, and the main line of preglacial drainage extended formerly across the present Hocking River, which was also shown to be composed of sections of several preglacial streams running into the basin of Raccoon Creek and across this basin into the Scioto River below Chillicothe. He also described several of the tributaries of this preglacial river.

Prof. Israel C. Russell, of the University of Michigan, spoke on "Deposits of Calcareous Marl in Michigan." He said that a large number of lakes and swamps in the southern peninsula of Michigan had been found to contain deposits of calcareous marl suitable for the manufacture of Portland cement. This marl he described as being composed in part of shells, but mainly consisting of a chemical precipitate which is still being deposited. The better grades have been found to contain from 80 to 95 per cent of calcium carbonate. The supply of these marls has been found to be practically inexhaustible, and in consequence several large cement works have already been established and others are in contemplation. He predicted that Michigan would be likely to take a leading place in the near future in the Portland cement industry. Dr. Grove K. Gilbert, of the United States Geological Survey, presented a paper on a "Submerged Forest of the Columbia River." He said that the cascades in the Columbia River flow over a natural dam of rock fragments. This dam had been made by a landslide that came from the north not less than 350 years ago, and in the pond were sound stumps of Douglas spruce. He discussed the various explanations that have been proposed, and said that he believed that those presented by Newberry best accorded with the facts. A second paper by Prof. W. M. Davis, entitled "A Recent Fault Scarp in the Lepini Mountains, Italy," was next read. The Lepini Mountain group is a sub-maturely dissected block of Cretaceous strata, forty miles southeast of Rome. A recent movement on the line of a tertiary fault has produced a well-defined scarp in places 100 to 200 feet in height and traceable five miles or more along their northeastern base. This was described somewhat elaborately by Prof. Davis. Mr. Bailey Willis, of the United States Geological Survey, under the title of "Some Coast Migrations, Southern California," described the formations constituting the

Santa Lucia Range of the Coast Ranges and their relations to each other, and indicated the presumable corresponding migrations of the Pacific Coast. The section of coast described extends from Point Sur to Piedras Blancas between Monterey and San Luis Obispo.

On the conclusion of the reading of this paper the society adjourned until the evening, when a special session was held to listen to the presidential address of Prof. Benjamin K. Emerson, of Amherst College, who spoke on the "Tetrahedral Earth and the Zone of the Inter-Continental Seas." This paper, which was illustrated with lantern views, was a very full discussion of the theory advanced by Greene, who has contended that the earth in cooling would be likely to assume the form of a tetrahedron. This novel proposition has, during recent years, created considerable interest and has been widely discussed by many prominent geologists, including the veteran Suess, of Vienna. Prof. Emerson described the various views of the author, as well as those who have discussed his paper, and illustrated with diagrams the various forms that the earth would be likely to assume in its change of form.

Prof. Herman L. Fairchild, of Rochester, N. Y., who is also secretary of the society, presented an exhibition, by lantern slides, of "Beach Structures in Medina Sandstone," the structure of which indicated shallow water and beach deposits. Mr. Harry F. Reid, of Baltimore, presented two papers on glaciers; the first, entitled "Movement of Glaciers," gave the results of several years' observations of the movement of the Forno glacier, with special reference to the vertical component of the movement. He discussed at length in this connection the existence of surfaces of finite shear in glaciers. His second paper was on the "Stratification and Banded Structures of Glaciers." Mr. Reid has been engaged for some time in examining a number of the glaciers in Switzerland, and he has followed the outcrops of the strata from the névé-line practically to the end of the glacier, and his investigation convinced him that the banded structure is the modified appearance of the outcrops. This he discussed somewhat in detail, and further explained why certain glacialists have held divergent views on the subject.

Prof. J. B. Woodworth, of Cambridge, Mass., followed with a paper on the "Glacial Origin of the Older Pleistocene in the Gay Head Cliffs, with a Note on the Fossil Horse of that Section." He described the occurrence of glacial fragments in the boulder bed at the base of the older Pleistocene (Columbia) in the Gay Head section, which confirmed, he thought, the theory of the existence of an ice invasion long antedating the surface moraines of the New England islands. This paper was especially interesting on account of the description of the astragalus of a mammal which he found in the Miocene underlying the boulder bed at Gay Head. This was identified by Prof. H. F. Osborn as belonging to a horse.

A second paper by Prof. Fairchild was on "A Channeled Drumlin," and consisted of a description of a longitudinal hollow (channel?) in a drumlin terminating at the lower end by a transverse cut, which he illustrated by lantern views.

The next paper was by Mr. A. P. Coleman, of Toronto, Canada, and was on a "Distinction Between Upper and Lower Huronian." He described the finding of a band of rock consisting of fine-grained sandstone, chert, or jasper with interbedded iron ore at Michipicoton, on the northeast shore of Lake Superior, which corresponds to the Vermilion and other iron-bearing series west and south of Lake Superior. This band has been traced for 30 or 40 miles, and has been recognized at various points to the west, as far as Rainy Lake, and east to Lake Temagami. Many fragments of this rock were found in the Upper Huronian at Gros Cap and other points as far west as Shoal Lake and east to Lake Temiscaming, a distance of more than 600 miles. It is the most easily determined member of the Lower Huronian, and is of great value as showing the connection between the two parts of the series. It represents a great lapse of time, as is proved by the Shoal Lake conglomerate. Mr. Charles Schuchert, of the United States National Museum, presented a paper on the "Lower Devonian Aspect of the Lower Helderberg and Oriskany Formations." He discussed the Silurian of Murchison and the American equivalents; then passing to the Devonian of Sedgwick and Murchison he pointed out that it has no marked Lower Devonian fauna. He then described the Lower Devonian of Germany, and finally pointed out that the Helderberg fauna was transitional to the Oriskany, and that these constituted the American Lower Devonian. "The Silurian-Devonian Boundary in North America" was the title over which Prof. Henry S. Williams, of Yale University, presented a discussion of the principles to be used in determining the boundary between the two systems—Silurian and Devonian—standard sections of which are on another continent, and then discussed the facts of correlation as bearing on the case. The final paper presented on the second day was on the "Devonian Strata in Colorado," by Arthur C. Spencer, of Washington, D. C. In 1874, the presence of Devon-

ian rocks in southwestern Colorado was asserted by the late Dr. F. M. Endlich, and this has recently been confirmed by the observations of a party of the United States Geological Survey under the direction of Dr. Whitman Cross. These observations were described by the author. He said the section when complete is three-fold, consisting of a conglomerate and sandstone at the base, followed by a calcareous shale, and this by a massive limestone containing considerable numbers of invertebrate fossils. The limestone is shown by its outcrops to have covered an area of at least 600 square miles. The sandstone and shale beds are locally absent through non-deposition. Their age is possibly Silurian, though they contain occasional fish remains, which would ordinarily be considered indicative of the Devonian. The silicious series is correlated with the "Parting Quartzite" of central Colorado, and mention was made of further probable equivalency between this series and the supposed Devonian of the Grand Rapids region. This brings out the probability that these formations of the Middle Paleozoic were originally deposited over a very extensive area in the southern Rocky Mountain region.

On December 29, after discussing business matters regarding the appointment of delegates to the Paris Exposition, the society proceeded to the presentation of the following papers:

The first of these was on the "Newark Formation of the Pomperaug Valley, Connecticut," by William H. Hobbs, of Madison, Wis. This paper, which was somewhat lengthy, was of special value from the fact that it gave support to the broad terrane hypothesis regarding the extent of the Newark formation. It showed that an irregular block of the Newark had been depressed below the level of the crystalline gneisses, so as to be protected from the abrasion of the ice of the glacial period. Dr. David White, of the United States Geological Survey, read a paper on the "Relative Ages of the Kanawha and Alleghany Series as Indicated by the Fossil Plants." He said that from an examination of the stratigraphic distribution of the fossil plants of the Kanawha series in southern West Virginia, it appeared that only the upper half of the series contained the common and characteristic elements of the floras of the Alleghany series of northwestern Pennsylvania. The lower half carried a flora which he found distinctly older than any of the floras which occurred above the lowest coal of the Alleghany series. He also presented a brief statement of the stratigraphic changes and conditions of deposition in the Virginian region, as indicated by the distribution of the fossil plants. Mr. Marius R. Campbell, of the United States Geological Survey, under the title of "Stratigraphy of the Pottsville Series in Kentucky," discussed the areal distribution of the conglomerates in the Pottsville series along the western margin of the Appalachian coal field in Kentucky and Tennessee. Three distinct horizons of conglomerates are described which heretofore have been regarded as a single stratum. Attention was called to the unconformity at the base of the series, and the vertical expansion southward was illustrated by numerous sections measured along the margin of the field. The "Jurassic Rocks of S. E. Wyoming" were discussed by Mr. Wilbur C. Knight, of Laramie, Wyoming. He reviewed the early history of the Jurassic investigations in Wyoming, and gave the distribution of both the marine and fresh water beds in that portion lying east of the North Platte River and south of the Fremont and Elkhorn Railroad. He discussed geological sections from several localities, and made reference to the fossil remains found in them. He concluded with some remarks on the grouping of the Rocky Mountain Jurassic beds, showing their correlation with European formations. "The River System of Connecticut" was the title of a second paper presented by Mr. William H. Hobbs, of Madison, Wis., and he showed a carefully prepared map based upon the recent topographical map of Connecticut by the United States Geological Survey, on which it appeared that all the master streams flowed into troughs, which corresponded closely in direction with the fault directions of the Pomperaug Valley system and with two additional closely related directions. From these facts he inferred that the entire area of the State of Connecticut had been deformed by faulting in pretty much the same manner as had been the case in the Pomperaug Valley. Mr. Nelson H. Darton, of the United States Geological Survey, discussed "Mesozoic Stratigraphy of the Black Hills of South Dakota." Another paper of his was on "Tertiary Shore Lines and Deposits in the Black Hills."

The annual election of officers, which took place during the session, resulted as follows:

President, George M. Dawson, Ottawa, Ont.; first vice-president, Charles D. Walcott, Washington, D. C.; second vice-president, N. H. Winchell, Minneapolis, Minn.; secretary, Herman L. Fairchild, Rochester, N. Y.; treasurer, Israel C. White, Morgantown, W. Va.; editor, J. Stanley Brown, Washington, D. C.; librarian, H. P. Cushing, Cleveland, Ohio; and councilors, William B. Clark, Baltimore, Md., and A. C. Lawson, Berkeley, Cal.