Further, serious responsibility may also arise on the points referred to in the above statement of the representatives of the Royal Society.

Again, if the subscriptions are paid at the end and not at the beginning of the first year, it will be necessary to borrow funds, the interest on which will be a charge on the undertaking.

Again, if some countries refuse to form Regional Bureaux or to join in the enterprise, their literature will have to be dealt with by the Central Bureau. The cost of this cannot be estimated until it is definitely known whether the International Catalogue will be universally supported.

It was agreed that in reporting to the various governments and bodies concerned, special stress should be laid on the importance of organizing Regional Bureaux without delay.

The English delegates were requested:

(1) To have the schedules approved by this Committee reprinted and issued as soon as possible.

(2) To prepare an amended estimate of the cost of the Catalogue.

(3) To issue a complete programme based on the proceedings of the two Conferences and of this Committee.

(4) To fully inform all countries whose coöperation is desired.

It was agreed to recommend:

(1) That an International Conference, to arrive at a final decision on all matters concerning the Catalogue, be held at Eastertide, 1900.

(2) That the delegates attending this Conference should be charged with full powers to determine both financial and other questions.

(3) That those chosen to act on the International Council should be delegates to this Conference.

It was agreed—

"That the members of the Committee be requested to endeavor to obtain from their respective Governments authority to place themselves in direct communication with the Royal Society, as the official channel of communication for all further provisional correspondence on the subject of the Catalogue."

HENRY E. ARMSTRONG.
M. FOSTER.
F. KLEIN.
TH. P. KÖPPEN.
H. POINCARÉ.
ARTHUR W. RÜCKER.
B. SCHWALBE.
E. WEISS.

AUGUST 5, 1899.

SECTION E.—GEOLOGY AND GEOGRAPHY OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

THE address of the Chairman, Mr. J. F. Whiteaves on 'The Devonian System in Canada' has already been printed in SCIENCE. The papers presented were as follows:

'The Geology of Columbus and Vicinity,' Edward Orton, Columbus, Ohio.

An informal presentation of the facts in connection with the geology of Columbus and vicinity, designed to suggest points, of special interest to the visiting geologists. One matter to which particular attention was called was the occurrence of bowlders of native copper, derived from the Keewenaw copper region. Blocks of Marquette iron ore have also been sparingly found.

'Glacial phenomena of Central Ohio,' Frank Leverett, Denmark, Ohio.

A general description of the glacial and interglacial formations of Central Ohio, designed, in part, to cover the region in the vicinity of Lancaster, Ohio, to which an excursion was subsequently made.

The formations recognized in the description are:

1. The Illinoisan drift; 2. A soil and weathered zone (Sangamon) formed on

the surface of the latter; 3. A silt deposit, probably of Iowan age, which caps the weathered surface of the Illinoisan drift; 4. The Wisconsin drift with its several moraines. Lobation of the ice sheet in the Scioto basin; direction of striæ, and changes of drainage produced by glaciation are also discussed.

'Lateral Erosion at the Mouth of the Niagara Gorge,' G. Frederick Wright, Oberlin, Ohio.

The results of an accurate survey of the east face of the gorge are given, affording an opportunity to compare the present face of the gorge with that presented in 1854 and furnishing a standard datum for future comparisons. The rate of erosion thus determined seems to favor shorter chronologies for the age of the gorge.

'Age and Development of the Cincinnati Anticline,' August F. Foerste, Dayton, Ohio.

Along the axis of the Cincinnati anticline, from Stanford in Lincoln County to near Lebanon in Marion County, Kentucky, the Devonian rests on the Ordovician. On the western flank of the anticline the Devonian rests, first on the lowest member of the Silurian (the Clinton) then on the successively higher members, the Niagara, Osgood shale, Laurel limestone, Waldron shale and Louisville limestone. On the eastern flank it rests first upon the Clinton next upon the Osgood shales. The formation of the anticline began previous to the deposition of the Devonian. Its growth was arrested during late Silurian and early Devonian times and a large area above sea level was reduced to a peneplain. On this peneplain the Devonian limestone was subsequently deposited, but unevenly, owing to the inequalities of the peneplain. The Devonian black shale however was deposited over the entire anticline. This formation contains marine fossils at its base and land plants over the anticline region. These are generally believed to be the remains of the earliest land plants. After the deposition of the Devonian the folding continued, the maximum taking place in post-Devonian times. The facts seem to indicate that the anticline was not in existence during Clinton and Osgood times, but that it began in late Silurian to early Devonian time and had its maximum development in post-Devonian time.

'The Silurian-Devonian Boundary in North America,' Henry S. Williams, New Haven Conn.

'The Section at Schoharie, N. Y., John J. Stevenson, New York, N. Y.

'The Geological Results of the Indiana Coal Survey,' George H. Ashley, Indianapolis, Ind.

'The Cape Fear Section in the Coastal Plain,' J. A. Holmes, Chapel Hill, N. C.

'Triassic Coal and Coke of Sonora, Mexico,' E. T. Dumble, Houston, Tex.

'Some Geologic Conditions Favoring Water Power Developments in the South Atlantic Region,' J. A. Holmes, Chapel Hill, N. C.

The 'fall line' between the coastal plain and the Piedmont plateau is the zone where the most favorable geologic conditions for the development of water power are found. In the region of the crystalline schists the lesser geologic boundary lines, separating belts of slates, schists, granites, etc.; shearing lines or zones and fault lines, supply favorable conditions on a smaller scale. Within certain areas of bedded or schistose rocks, variations in the composition and obduracy of the rock masses furnish suitable conditions.

(*a*) '*Paropsonema*: A Peculiar Echinoderm from the Intumescens Fauna, New York.'

(*b*) 'Remarkable Occurrence of Orthoceros in the Oneonta Sandstones of New York.'

(*c*) 'The Squaw Island Water Biscuit, Canandaigua Lake, New York.'

John M. Clarke, Albany, N. Y.

Paropsonema represents an extraordinary type of echinoderm structure. It is believed to be an echinoid. The description was illustrated with drawings.

Extending over several square miles in the Chenango Valley, N. Y., a stratum of Oneonta sandstone occurs, in which are found thousands of *Orthocerata* standing erect and perpendicular to the bedding planes. They are the only truly marine organisms in the sandstone. Specimens were shown.

The so-called 'water biscuit' are probably concretions due to the effect of aquatic vegetation of low order, producing a precipitation of lime from the water. Specimens were shown.

'The Pot Holes of Foster's Flats (now called Niagara Glen) in the Niagara River,' Miss Mary A. Fleming, Buffalo, N. Y.

The discovery of pot holes at Foster's Flats is recorded, together with their location and the general appearance of the surroundings. They occur in large fragments which have fallen from the adjacent cliffs and were apparently formed while the fragments were part of the cliffs.

'A Consideration of the Interpretation of Unusual Events in Geologic Records, Illustrated by Recent Examples,' Frederick W. Simonds, Austin, Tex.

An examination of geologic reports shows that, as a rule, the working geologist devotes too little time to the *interpretation of events*, while recording facts. The value of stratigraphic work is not questioned, but the value of interpretation should not be underestimated. Proper interpretation of unusual events is not only difficult, but an improper interpretation may be exceedingly misleading and be conducive to error in other directions.

'The Pre-Lafayette (Tennessean) Base-level,' W J McGee, Washington, D. C.

The most extensive base-level of the North American continent is that preserved in part as an unconformity beneath the Lafayette formation, and in part as a somewhat dissected surface, extending inland from the margin of the formation. This base-level is the record of a vast period of approximate continental stability, which has been called the Tennessean.

'The Relative Ages of the Maumee Glacial Lake and the Niagara Gorge,' Chas. E. Slocum, Defiance, Ohio.

The time thought necessary for the eroding of the Niagara Gorge has been shortened by recent observers until now 7,000 to 7,500 years is believed to be sufficient. The Ice Age was probably well over before the waters began to erode the gorge. The level of Lake Erie has been little, if any, lowered by the gorge. The Maumee Glacial Lake was well drained before the Niagara River channel was worn, and the ice must have disappeared from the Lake Erie region previous to this—that is to say the Maumee Glacial Lake may have existed several thousand years before the erosion of the Niagara gorge began.

'The Galt Moraine and Associated Drainage,' F. B. Taylor, Fort Wayne, Ind.

In Canada, west of Lake Ontario, extending northeast from Paris, past Galt to Credit Forks, is about fifty miles of moraine, called the Galt moraine, and fragments of two others to the west and east. The Galt moraine in its northern part is on or close to the escarpment which runs north from Hamilton. A large river carried the glacial waters to the southwest along the front of the moraine in its early stages of formation. The bed of this river is well marked. As the ice receded the moraine was deposited, the river changed its course and for a time ran between the ice and the moraine. For several miles the bed is on the brink of the escarpment. Along that part there is no bank on the east side of the bed, but a descent of over 200 feet to the Credit river.

Further down, the river turned to the west, cut a deep channel through the moraine and joined its earlier bed at Eden Mills. In the earlier stages of the moraine the river took a southwest course from Preston past Ayr, but in the last stages a lower course was found through the moraine, longitudinally past Galt and Paris. In most of its course the flow was rapid enough to carry away most of the drift and leave the limestone ledges bare. In the broader portions it deposited cobble stones and gravel. Drumlins cover the northern part of the area in question. Further work will be necessary to show the relation between the moraines and those of western New York or those of the west side of the Ontario peninsula.

'Glacial and Modified Drift in Minneapolis, Minn.,' Warren Upham, St. Paul, Minn.

Red drift from the Lake Superior region is overlapped by bluish drift from the Red River valley and Manitoba. The final melting of the ice sheet laid bare the area occupied by glacial Lake Hamline, just east of Minneapolis, between tract of ice thus flowing from northeast and northwest. In the eastern part of Minneapolis a terminal moraine, consisting mostly of northeastern drift, was formed in the border of the western ice tract. It is evidence that the glacial current from the west pushed back that from the east, near the close of the Ice Age. The sand plain of the Mississippi Valley here was deposited near the front of the ice, when it retreated westward from this moraine, and a wide esker ridge, two miles long, formed at the same time, lies in the southwest part of the city. Frequent banding and intermingling of the red and bluish tills indicate that they were englacial.

'The Ozarkian and its Significance in Theoretic Geology,' Joseph Le Conte, Berkeley, Cal.

The name Ozarkian was coined to commemorate the erosive work in the Ozark Mountain region during a long and important epoch directly preceding the ice invasion of the Quaternary. The Ozarkian is characterized by elevation and erosion, the Glacial by ice accumulation and drift deposits, the Champlain by depression and stratified deposits. During the earth's history there have been certain well defined critical periods, characterized by great and widespread changes in the earth's crust, in its climate, or in its organic forms. They separate the primary divisions or eras of geologic time (Paleozoic, Mesozoic, Cenozoic), and such another era I am convinced is now commencing, which I have called the Psychozoic. The Quaternary period represents the critical or transition period between the Cenozoic and Psychozoic Eras, when man was *introduced*. The Ozarkian is the first epoch of this critical period. Man subsequently became *established* as the dominant factor in the earth's life history and the Psychozoic era began.

'The Discovery of New Invertebrates in the Dinosaur Beds of Wyoming,' Erwin H. Barbour and W. C. Knight, Lincoln, Nebr.

Some eight or ten new invertebrates, all apparently fresh water forms, recently discovered in the Dinosaur beds of Wyoming tend to confirm the belief that these beds are of fresh-water origin. The writer also noted about six species of lamellibranchs and gasteropods. Associated with the invertebrates are also crocodilian teeth and bones.

'The Rapid Decline of Geyser Phenomena in the Yellowstone National Park,' Erwin H. Barbour, Lincoln, Nebr.

To those who visit the geyser region frequently the rapid decline of geyser activity seems startling. From superficial observation it seems safe to assume that if the decline of activity noted during the past four years should continue for the next eight or ten years the features which most impress

the geologist will have disappeared. At the mammoth hot springs the activity is not one-tenth that of former times, Minerva Terrace having become extinct (since 1895); the discharge from Pulpit and Jupiter Terraces having greatly declined during the same period and the Narrow Gauge—a fissure vent—and other attractions, having become all but extinct. Roaring Mountain is now silent though steaming. In the Norris Geyser Basin the Black Growler is less active. In the Lower Basin the splendid Fountain Geyser is extinct, with a feeble substitute near by, called the Dewey. The Giant Paint Pots are greatly contracted in size—the pink half being extinct. In the Upper Basin some of the better known as well as many of the lesser geysers are extinct or supposed to be. Among these are the Splendid Geyser and the Beehive Geyser. The Grand Geyser, which used to erupt daily, now erupts irregularly about three times a season. The Cascade, which erupted about every quarter of an hour in 1895 now erupts once a day.

The general impression of frequenters of the Park is that the changes are serious and much more rapid than is generally believed.

'Greatest Area and Thickness of the North American Ice Sheet,' Warren Upham, St. Paul, Minn.

From the overlapping and intermingling of the drift deposits the indications are that the ice sheet at its culmination reached continuously across the continent from New England to British Columbia or southeastern Alaska, interrupted only in its southern part by the projecting ranges of the Rocky Mountains. The conclusions of Dr. G. M. Dawson that the Cordilleran glaciation mainly preceded the glaciation of the Laurentine region and of the great plains stretching westward nearly to the Rocky Mountains, and that the maximum extension of the Laurentide ice sheet was attended by a depression of the Cordilleran region, with a subsequent elevation of about 5,300 feet, is not apparently borne out by the facts. The probabilities seem to be that the Cordilleran and Laurentide ice sheets, having been each accumulated because of high continental altitude much exceeding that of the present time, were confluent along the east side of the Rocky Mountains, a continuous ice sheet at the north extending from the east to the west side of the continent.

In Minnesota and North Dakota observations on each side of the Glacial Lake Agassiz oppose the view of Tyrrell that the Laurentide ice sheet was preceded by a Keewatin ice sheet. Facts in connection with glacial lake deltas and overlapping drift deposits demonstrate contemporaneous glaciation meeting from the northwest and northeast. There is also evidence that the northwestern ice field, belonging to the Keewatin of Tyrrell, pushed back the northeastern ice field, referable to the Laurentide, showing that there the greatest extension of the Keewatin was later. From the northwest and northeast, however, the two ice fields were confluent. This great ice sheet northward, as evidenced by the height of mountain glaciation, attained a maximum thickness of one to two miles nearly across the continent, the thickness being greatest upon the Laurentide highlands.

ARTHUR HOLLICK,
COLUMBIA UNIVERSITY. *Secretary.*

SCIENTIFIC BOOKS.

Catalogus Mammalium tam viventium quam fossilium. By Dr. E. L. TROUESSART. Berlin, R. Friedländer & Sohn. New ed., fasciculus VI., Appendix and Index, 1899, 8° pp. 1265–1469. Price of complete work 66 Marks.

The completion of the great 'Catalogus Mammalium' which Dr. Trouessart has been publishing in parts during the past two years marks an epoch in systematic work in mammals. Previous catalogues, incomplete at best, have been restricted either to living or extinct forms, so that zoologists have been obliged to