or other parts in which the plant tissue is sufficiently well preserved for sectioning and microscopic examination, the ordinal, or family, or even exact generic relationships may be accurately determined.

Such conditions of preservation have been found in the Cretaceous deposits at Kreischerville, on Staten Island, and a large amount of material from this locality has been collected and subjected to critical examination. Some of the preliminary results thus obtained form the basis of this communication.

The lantern slides show microscopic enlargements of cones of *Protodammara*, sections of the wood of *Brachyphyllum* and other gymnosperms, demonstrating their Araucarineous affinities, and sections of *Pityoreylon* with resin canals, indicating the probable sources of the amber which is abundant in the deposits.

Some Vestigial Characters in the Cone of Pines: Professor E. C. JEFFREY, Harvard University.

Classification of the Genus Panicum: A. S. HITCHCOCK, U. S. Dept. of Agriculture.

In the comprehensive works of Bentham and Hooker (Gen. Pl.) and Engler and Prantl (Pl. Fam.) the large genus *Panicum* was divided into a number of sections, such as *Digitaria, Trichachne, Thrasya, Echinochloa, Hymenachne, Ptychophyllum* and *Eupanicum*. Most of these sections may more conveniently be considered as genera, this division being based upon well-marked characters of both structure and habit. Retaining the name *Panicum* for most of what has been included in the section *Eupanicum*, this genus may again be divided into groups, of which the following are American: *Ramileta, Fasciculata, Prostrata, Agrostoidia, Laxa, Maxima, Brevifolia, Verrucosa, Capillaria, Prolifera, Dichotoma, Parvifolia, Virgata, Diffusa, Divaricata* [Sect. Lasiacis]. These names should not be considered as sectional names. They are merely group names formed from a well-known specific name of each group. *Ptychophyllum* and *Lasiacis* should probably be assigned generic rank. The group *Dichotoma*, which includes about one hundred closely allied species of the southeastern United States, can again be divided into a number of subgroups, the classification being based upon habit, size and pubescence of skelatils, ligner, pubescence of culms, sheaths and blades, and the manner of branching of the fall culms. These groups are: *Depauperata, Laxiflora, Angustifolia, Eudichotoma, Nitida, Lanuginosa, Unciphylla, Eusifolia, Sphærocarpa, Corurnutata, Lancearia, Oligosanthia, Scoparia, Latifolia.*

DUNCAN S. JOHNSON,
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THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

MEETING OF SECTION E—GEOLOGY AND GEOGRAPHY

ON account of the special meeting of the association at Ithaca in July, 1906, at which Section E had a full program of papers and excursions, no effort was made to get papers for the New York meeting of the association. Some fifteen papers, however, were spontaneously offered in addition to the vice-presidential address, and Section E held four sessions during the New York meeting.

At the session for organization held at Schermerhorn Hall, Columbia University, directly after the adjournment of the first general session of the association on December 27, Professor J. B. Woodworth, of Harvard University, was elected a member of the sectional committee for the term of five years, Professor N. M. Fenneman was elected a member of the general committee,

and Professor William H. Hobbs a member of the council of the association. Professor Fenneman was also elected press secretary.

The section, some sixty members being present, passed, with unanimity, a resolution recommending to the council of the association that the annual meeting of the association be held regularly during the summer vacation season. The section also passed a resolution recommending the formation of a seismological committee composed of fellows of the association from the different sections interested in the subject.

At 2 P.M. of the same day Professor William North Rice read his address as retiring vice-president and chairman, his subject being 'The Contributions of America to Geology' (SCIENCE, February 1, 1907). At 3 o'clock the section adjourned in favor of the Geological Society of America, which held its first business session in the same room. The Geological Society continued its sessions on Friday and Saturday in the American Museum of Natural History, and on Monday, likewise at the Museum, Section E resumed its meeting. Two sessions were held, at which the papers described below were read and actively discussed. The attendance at these sessions was highly satisfactory, especially in view of the lateness of the date and of the fact that the Association of American Geographers was holding simultaneous sessions in a neighboring building.

At the business meeting of the sectional committee held on Monday, December 31, Professor Joseph P. Iddings, of Chicago University, was nominated for the office of vice-president of the association and chairman of the section. The resignation of E. O. Hovey as secretary was presented and accepted, and Dr. F. P. Gulliver, of Norwich, Conn., was elected to fill the vacancy for one year thus caused.

The papers, abstracts of which follow, were read in full by their authors on Monday, December 31, at the American Museum of Natural History.

The Detrital Flanking Slopes of the Mountains of the Southwest: WILLIAM P. BLAKE, New Haven, Conn.

This paper described the long regular slopes of coarse sand, gravel and boulders bordering high rocky elevations of the mountains of the southwestern portion of the United States, particularly of the Great Basin and the arid region of Arizona, and discussed their origin, age and geological relations. Evidence was given that the detritus of mountain gorges was formerly deposited under water and was spread out by oceanic action so as to form the long smooth flanking slopes with their highest portions from 3,500 to 4,000 feet and the elevation of the country to an equal amount. The grade in slopes of from eighteen to twenty miles in length averages 100 feet to the mile. They have great antiquity, being probably preglacial, and certainly older than the existing drainage, by which they have in part been modified in form and partly destroyed. The study of these slopes throws much light upon problems of Quaternary geology and meteorology.

Professor Blake's paper was discussed by Professors Kemp, Ogilvie and Gill.

Perspective View of the Submarine Canyon of the Hudson River: J. W. SPENCER, Washington, D. C. (Abstract not received.)

Eurypterus Fauna of the Shawangunk Grit: JOHN M. CLARKE, Albany, N. Y.

The Shawangunk grit throughout its extent along its western ridge from Ulster County into the Kittatinny Mountains of New Jersey and on its eastern from Skunnemunk Mountain, Orange County, to Green Pond, New Jersey, had never furnished fossils until the work of the past

season brought them to light. In some of the Orange County exposures it has been found that above the basal conglomerate of the formation through the grit layers for a thickness of about 600 feet there are frequent repetitions of thin, black shale layers, inconstant in extent along the outcrops and in number and most of them bearing the remains of merostome crustaceans of the genera *Eurypterus, Pterygotus, Hughmilleria* and their allies. The fauna must have been an extensive one, as the remains are various and abundant, but the preservation leaves much to be desired, especially in the case of the larger crustaceans, whose surface has afforded opportunity for shearing and consequent deformation or destruction of the part. Yet in some respects the preservation has been remarkably favorable for small individuals, and these shales have afforded the most diminutive examples of these interesting creatures yet brought to light. The presence here of the genus *Hughmilleria,* heretofore known only in the Pittsford shale at the base of the Salina series in Monroe County, is sufficient evidence of the contemporary age of this arenaceous mass. In themselves the fossils are extremely interesting, affording some details of ontogeny not before recorded for these ancient merostomes. It is entirely evident, in the author's opinion, that these crustacean faunules running through the strata for so great a thickness indicate temporary and very changeable brackish water pools over the surface of a rapidly accumulating delta derived from the drainage of the high, folded lands to the northeast, and the deposit laid down in an embayment entirely separated from the salt pans and Dead Sea conditions of central and eastern New York by a barrier lying approximately in the present position of the Helderberg Mountains.

Dr. Clarke's paper was discussed by Professors Grabau, Lane, Ami and Clarke.

Kentucky Rock Asphalt for Common Highways: MALCOLM HART CRUMP, Bowling Green, Ky.

This paper treated Kentucky rock asphalt as to its composition, analysis and probable origin and discussed its geological horizon. The location and amount of available material and its economic uses as a water-proof and dust-proof road-surfacing substance were considered, and experiments as to its use were described. Its durability as shown by tests made on the streets of Bowling Green, Ky., and the results of a recent preliminary inspection by the Office of Public Roads, U. S., were given. The present demand for such material was stated and the cost of mining, crushing and grinding the Kentucky rock ready for use was detailed.

Professor Crump's paper was discussed by Professors A. M. Miller, Ami and Sternberg.

Portheus molossus, Cope, and Other Fishes from the Kansas Chalk: CHARLES H. STERNBERG, Lawrence, Kansas.

This communication described a specimen of *Portheus molossus,* Cope. The paper was illustrated by a photograph in which were shown the tail fins, the upper one 28 inches long, 37 continuous vertebræ with dorsal fin in position as are also the pelvic, so found for the first time after experience of 40 years, exploration of the fossil beds of the west. The author also called attention to the beautiful set of pectoral fins with connecting arches, each three feet long, armed with 60 teeth. The specimen is now the property of the British Museum.

Subaerial Erosion Cliffs and Talus in the Lower Devonic of Michigan: A. W. GRABAU, Columbia University.

Cliffs fronted by talus heaps of huge limestone blocks were formed in the lower Devonic of Michigan. The cliffs consisted of the Marine calcilutytes and their débris was incorporated in the Dundee calcarenytes. The brecciated limestone of Mackinac Island is a characteristic portion of these early Devonic talus heaps.

Professor Grabau's paper was discussed by Professors Lane, Foerste, A. M. Miller and Foerste.

The Naples Fauna in Michigan: A. W. Grabau, Columbia University.

The occurrence of the strata at the top of the Traverse group with the Goniatite fauna of the Naples horizon was described.

Professor Grabau's paper was discussed by Professors Ami and Bell.

Types of Cross-Bedding and Their Stratigraphic Significance: A. W. Grabau, Columbia University.

Four types of cross-bedding, the subaqueous, or delta, type, the torrential type and the æolian type, were considered. The occurrence of the last two as evidence of continental origin of the formations in which they are found was discussed. The type of cross-bedding of the Pottsville conglomerate bears out the conclusions already reached from its overlap relations, namely, that this formation is of fluvial origin.

Professor Grabau's paper was discussed by Professors A. M. Miller, W. G. Smith, Fairchild, Grabau, Lane, Ami, Fairchild, Grabau, Lane, Hovey, Woodman and Grabau.

The Cumberland Coal Basin, Nova Scotia: J. Edmund Woodman, Dalhousie Univ., Halifax, N. S.

The paper described the Carboniferous and Permian rocks of this basin, especially with reference to the source of material, and the great overlap produced by the New Glasgow conglomerate. From the structure and lithology of the basin, the following conclusions are reached:

(1) That the sediments were laid upon a differentially sinking floor, the shore line a variable one against the Cobequid range to the south, the detritus of the sediments being directly derived from these mountains; (2) conditions favorable to the formation of coal existed over a large part of the area bounded on the north by the outcrop of the Joggins zone of seams, on the east by the Springhill district, on the south by the Cobequid mountains, and on the west by a line down the middle of Chiquecto bay; (3) these conditions became adverse shoreward, because of the violence of wave action, and seaward, through deepening of the water; (4) through the differential sinking of the bottom and shore, beginning during the time of the coal measures and continuing into the Permian, slight in amount in the east and increasing westward, an overlap of the Permian upon the Cobequids has been established, burying the coal horizons over all the southern part of the basin except the east end; (5) the horizons containing the Joggins and Springhill seams extend under the basin, blanketing at a considerable depth, and rising westward, outcropping under the center of Chiquecto bay on the west; (6) this horizon swings eastward at the north, appearing on the shore at the Joggins, and eastward at the south, plunging beneath the Permian overlap before reaching the shore, hence covered at all points on the south side of the basin; (7) it is probable that coal occupies this horizon throughout this area, as indicated by the persistence of the Joggins zone of seams, the abundance of the Springhill coal, and the occurrence of a thick seam at 2,250 feet in a borehole at Fullerton lake, less than half-way from the shore of Chiquecto bay to Springhill; (8) the summit of the Coal Measure should lie against

the Cobequid granite beneath a point slightly south of Apple River; (9) the Apple River borehole and the second hole at Fullerton lake indicate that the fine sediments of the Coal Measures are replaced shoreward by coarse detritus, continuous upward with the New Glasgow conglomerate of the Permian, so that coal, if present in the main portion of the western half of the basin, frays out southwards; (10) that the strata on the shore of Chiquecto bay are such as bring the Coal Measures 1,400 feet nearer the surface than at the first Fullerton Lake borehole, and over 2,000 feet nearer than on the floor of the basin north of Fullerton Lake.

Professor Woodman's paper was discussed by Professors Grabau, Woodman, A. M. Miller, Lane and Woodman.

Charles Willson Peale's Painting. 'The Exhuming of the First American Mastodon': ARTHUR BARNEVELD BIBBINS, Baltimore, Md.

Charles Willson Peale, who was born in Chestertown, Maryland, in 1741, and known as 'the artist of the Revolution' was among the first to interest himself in American vertebrate paleontology. Although very few of his hundreds of paintings deal with this subject, one has lately come to light which vividly portrays his keen and practical interest in this direction. This is a canvas six by five feet, painted in 1823 a few years before the artist's death. It is in a good state of preservation and owned by a direct descendant of Peale. The subject is 'The Exhuming of the First American Mastodon.' Peale is represented as personally supervising the excavation, with other scientific worthies of the day and some members of his family in attendance. Although the figures are small the detail is so perfect that the several personages shown are readily recognizable. An elaborate and ingenious device for ridding the excavation of water is a notable feature.

Family history has it that the locality was somewhere in Delaware or New Jersey, that the skeleton was first erected in Philadelphia, that the discovery was celebrated by a dinner held beneath it and that the building containing it was ultimately burned. Family history also relates that Peale was induced to undertake the exhuming of the mastodon by Baron von Humboldt, who had visited this country a few years earlier and was the artist's guest.

The Peale family was also among the first in America to encourage the establishment of natural-history museums, for among the records we find that while Humboldt was visiting Charles Willson Peale and while these gentlemen were entertained at a formal 'three-o'clock dinner' by President Monroe, the guests improved their opportunity by asking the president to endeavor to induce Congress to establish a National Museum; also that Peale returned from the interview much elated by the assurances that action would shortly be taken.

In 1813 the artist's son, Rembrandt, started the erection of a Natural History Museum in Baltimore, having previously excited interest in such matters by the exhibition of the skeleton of a mammoth. This building, later known as the 'Old City Hall,' is still standing, and bears the original legend 'Peale's Museum.'

Additional Evidence of Tropical Climate on the Middle Atlantic Coast during the Lower Cretaceous: ARTHUR BARNEVELD BIBBINS, Baltimore, Md.

No better evidence of tropical or subtropical climate is needed than the existence of dinosaurs as a dominant faunal element, if it be presupposed that reptiles as a class have always been as partial to

such climate as they are in our own time.

On the same principle, tropical climate is implied by the domination of the flora of a period by such plants as the cycads; and at least subtropical conditions by such conifers as the Sequoia. All of these warm climate representatives have long been known to have prevailed on the Middle Atlantic Coast during Middle Secondary or Lower Cretaceous time; but during the past year another tropical group has suddenly come to light, viz.: the palms. Mr. E. W. Berry appears to have been the first to detect them in a somewhat doubtful fragment of a frond from the Magothy formation or the Upper Chesapeake Bay. Shortly after, there came to the writer's notice some half dozen fragments of different silicified palm trunks, chiefly from a single neighborhood in the Lower Cretaceous belt, between Baltimore and Washington, suggesting that these fossils are likely to prove, upon systematic search, in other Lower Cretaceous areas to be of scarcely less frequent occurrence than the silicified sequoia and cycad trunks of those areas, thus greatly emphasizing the evidence of the tropical climate of their time.

Geology of Core Bank: Collier Cobb, Chapel Hill, N. C.

The coast from Hatteras southward is rising, not subsiding. As the dunes advance toward the Sound side they depress by their weight the swamp muck in which the trees of that side grow, and these are left exposed on the seaward side when the dunes have passed. This compression of the muck is often mistaken for subsidence of the land. On the land opposite the Core bank successive strata of muck filled with well-rounded blown-sands rise twenty feet above Core Sound at Atlantic. Kitchen-middens, too, mark this line of elevated dunes.

Drum Inlet was opened by a storm on October 17, 1906, and Tertiary shell-rock thrown upon the bank. Numerous Cretaceous fossils, such as the author has already reported from Currituck Bank were found along the entire length of Core Bank, which dates back to Cretaceous time at least. Whalebone Inlet between Core Bank and Portsmouth Island has again been closed.

There is thus no longer any question as to the origin of Core Bank or of Currituck Bank, for they are both essentially parts of the mainland. Currituck Sound was formerly a river that flowed into the old Albemarle or Caroline River before the present Albemarle Sound was formed by the drowning of that valley; and Core Sound was for the greater part of its length a southern tributary of the large river made up of the Pamlico and the Neuse and passing to seaward through the present Ocracoke Inlet. The Albemarle River passed through the present fresh ponds just south of the Kill Devil Hills, and the margin of the continent was some three score miles eastward of its present position.

The following papers were read by title:

The Low-Water Channel of the Mississippi River: Robert Marshall Brown.

Walnut Canyon, Arizona, Section compared With Rocks of Similar Age in the Territory: H. W. Shimer.

Structural Control of Surface Features in the Highlands of the Hudson: Charles P. Berkey.

The Occurrence of Diamonds in North America: George Frederick Kunz.

A Lower-Middle Cambrian Transition Fauna From Braintree, Mass.: H. W. Shimer.

Notes on the Upper Aubrey of Northwestern Arizona: H. W. Shimer.

Edmund Otis Hovey,
Secretary