and especially in America, where the enterprise had its origin, to obtain full profit from its work. If there be any difficulties in the way we should be glad to know of them. It would be of the greatest service to us for us to be informed of any bibliographical need which we can not fill. The system is so elastic that past experience warrants us in saying that no legitimate demand that can be made on a bibliography need remain unfilled.

SOCIETIES AND ACADEMIES.

THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

THE fifty-second annual meeting of the American Association for the Advancement of Science, and the first of the Convocation Week meetings, will be held in Washington, D. C., December 27, 1902, to January 3, 1903. The retiring president is Professor Asaph Hall, U.S.N., and the president elect, President Ira Remsen, Johns Hopkins University. The permanent secretary is Dr. L. O. Howard, Cosmos Club, Washington, D. C., and the local secretary, Dr. Marcus Benjamin, Columbian University, Washington, D. C. President Roosevelt is honorary president of the local committee. The preliminary program with information in regard to hotel headquarters, railway rates, etc., will be found in the issue of SCIENCE for November 21. The following scientific societies will meet at Washington in affiliation with the Association:

The American Anthropological Association will hold its first regular meeting during Convocation Week in affiliation with Section H of the A. A. A. S. President, W J McGee; secretary George A. Dorsey, Field Columbian Museum, Chicago, Ill.

The American Chemical Society will meet on December 29 and 30. President, Ira Remsen; secretary, A. C. Hale, 352A Hancock street, Brooklyn, N. Y.

The American Folk-lore Society will meet in affiliation with Section H of the A. A. A. S. President, George A. Dorsey; vice-presidents, J. Walter Fewkes, James Mooney; secretary, W. W. Newell, Cambridge, Mass.

The American Microscopical Society will hold a meeting on January 1. President, E. A. Birge, Madison, Wis.; secretary, H. B. Ward, University of Nebraska, Lincoln Nebr.

The American Morphological Society will meet on December 30 and 31. President, H. C. Bumpus; vice-president, G. H. Parker; secretary and treasurer, M. M. Metcalf, Woman's College, Baltimore, Md.

The American Philosophical Association will meet on December 30 and 31 and January 1. Secretary, H. N. Gardiner, Northampton, Mass.

The American Physical Society will meet in affiliation with Section B of the A. A. A. S. President, Albert A. Michelson; secretary, Ernest Merritt, Cornell University, Ithaca, N. Y.

The American Physiological Society will meet on December 30 and 31. President, R. H. Chittenden; secretary, F. S. Lee, Columbia University, New York, N. Y.

The American Psychological Association will meet on December 30 and 31 and January 1. President, E. A. Sanford; secretary and treasurer, Livingston Farrand, Columbia University, New York, N. Y.

The American Society of Naturalists will meet on December 30 and 31. President, J. McK. Cattell; vice-presidents, C. D. Walcott, L. O. Howard, D. P. Penhallow; secretary, R. G. Harrison, Johns Hopkins University, Baltimore, Md.

The Association of American Anatomists will meet on December 30 and 31. President, G. S. Huntington; vice-president, D. S. Lamb; secretary and treasurer, G. Carl Huber, University of Michigan, Ann Arbor, Mich.

The Association of Economic Entomologists will meet on December 26 and 27. President, E. P. Felt; secretary, A. L. Quaintance, College Park, Md.

The Astronomical and Astrophysical Society of America will meet during Convocation Week, in affiliation with Section A of the A. A. A. S. President, Simon Newcomb; secretary, George C. Comstock, University of Wisconsin, Madison, Wis.

The Botanical Society of America will meet on December 31 and January 1. President, B. T. Galloway; secretary, D. T. MacDougal, New York City.

The Botanists of the Central and Western States will meet on December 30. Committee in charge of the meeting, John M. Coulter, University of Chicago; D. M. Mottier, University of Indiana, Bloomington, Ind.; Conway MacMillan, University of Minnesota, Minneapolis, Minn.

The Geological Society of America will meet on December 29, 30 and 31. President, N. H. Win-

chell; vice-presidents, S. F. Emmons, J. C. Branner; secretary, H. L. Fairchild, University of Rochester, Rochester, N. Y.

The National Geographic Society will hold a meeting during Convocation Week. President, A. Graham Bell; vice-president, W J McGee; secretary, A. J. Henry, U. S. Weather Bureau, Washington, D. C.

The Naturalists of the Central States will meet on December 30 and 31. Chairman, S. A. Forbes; secretary, C. B. Davenport, University of Chicago, Chicago, Ill.

The Society of American Bacteriologists will meet on December 30 and 31. President, H. W. Conn; vice-president, James Carroll; secretary, E. O. Jordan, University of Chicago, Chicago, Ill.; council, W. H. Welch, Theobald Smith, H. L. Russell, Chester, Pa.

The Society for Plant Morphology and Physiology will meet during Convocation Week. President, V. M. Spalding; vice-president, B. D. Halsted; secretary and treasurer, W. F. Ganong, Smith College, Northampton, Mass.

The Society for the Promotion of Agricultural Science will meet during Convocation Week. President, W. H. Jordan; secretary, F. M. Webster, Urbana, Ill.

The Zoologists of the Central and Western States will meet during Convocation Week. President, C. B. Davenport, University of Chicago.

GEOLOGICAL SOCIETY OF WASHINGTON.

AT the 133d meeting held November 26, 1902, the following papers were presented:

'Some Facts and Theories Bearing on the Accumulation of Petroleum,' by C. W. Hayes. Mr. Hayes pointed out the great diversity in conditions under which petroleum has accumulated in different regions and that conclusions drawn from a study of the Appalachian field are not applicable to the Texas-Louisiana field. The physiography, stratigraphy and structure of the Gulf coastal plain were briefly outlined and the peculiar quaquaversal structure of the Spindletop oil pool was described. Spindletop is regarded as the type of a geologic structure occurring at numerous points in southwestern Louisiana and southeastern Texas. Among the localities at which the same or a similar structure has been detected are the five 'salt islands' of Louisiana, Hackberry Island, Damon Mound, Big Hill and High Island. All of these and others at which sufficient drilling has been done to afford information concerning their structure are found to be quaquaversals. Further, all are composed of essentially the same material, viz: (1) Surface clays and sands, (2) limestone (with clay and sand) in part dolomitic and cavernous and containing native sulphur and petroleum, (3) gypsum, (4) rock salt. The thickness of the salt has in no case been determined, although one drilling penetrated it to a depth of 2,100 feet.

The theory for the explanation of these phenomena was first proposed by Robt. T. Hill. It is that along lines of structural weakness, extending across the Gulf coastal plain in a northeast-southwest direction parallel to the well-known Balcones Fault of central Texas, that saline waters ascended from great depths bringing up the petroleum which is widely disseminated through the coastal plain formations and also depositing the salt and gypsum. In some cases these springs were sealed over by later sedimentary deposits retaining the oil and in others the oil escaped. Some of the difficulties in the way of the theory were pointed out and the conclusion stated that, while suggestive and worthy of careful consideration, the theory can not be accepted in its present form.

'Mountain Growths of the Great Plains,' by Mr. Bailey Willis. Mr. Willis called attention to three local mountain growths lying within the otherwise little-disturbed area of the Great Plains between the Mississippi and the Rocky Mountains, viz., the St. Francis Mountains, Missouri, the Wichita Mountains, Oklahoma, and the Black Hills, South Dakota. Each of these groups of hills represents an eroded uplift less than 100 miles in maximum diameter, of an approximately oval form. The central massif in each case consists, at least in great part, of pre-Cambrian igneous rocks. The uplift of the St. Francis Mountains occurred during late Cambrian time; that of the Wichitas during the late Carboniferous; and that of the Black Hills in the early Tertiary. Undisturbed Cambro-Silurian strata still surround the bases of the St. Francis Mountains, and the Wichitas are

similarly being uncovered of the Red Beds, which are there probably Permian. These two groups thus represent very ancient hills, preserved to us through burial, and exhibiting, as they are now uncovered, topographic features of Cambrian and Carboniferous dates, respectively. Although Silurian and earlier strata surrounding the Wichitas are folded and overthrust, and although there are some evidences of compression in the strata dipping away from the Black Hills, the elevation in these cases, as in that of the St. Francis Mountains, is apparently due rather to vertical than to horizontal stress. Each of the domes appears to stand for the local effect of a vertical movement, such as that which in the Appalachian province has raised the Cretaceous peneplain to the height of the Appalachian Mountains; and the internal structures may be discriminated as effects of earlier deformation. The comparison of the three uplifts brings out the fact that similar effects of vertical movement have been produced at intervals from Cambrian to Tertiary; and the nature of the growths bears interestingly on the problem of the cause of such local upward swelling.

'Stratigraphic Relations of the Red Beds to the Carboniferous and Permian in Northern Texas,' by Geo. I. Adams. This paper reported the results of a reconnaissance made for the purpose of reviewing the mapping done by Mr. Cummins of the Texas Survey. It was found that the limestones of the Albany division, although they thin out northward, extend across the line drawn as the contact between the Carboniferous and the Permian, and are represented in the Clear Fork and Wichita divisions. The approximate limit of the red color is a line diagonal to the strike of the formations and is found to correspond in a general way with the line drawn by Mr. Cummins as separating the Carboniferous and Permian. The vertebrate fossils from the Clear Fork and Wichita divisions which have been referred to Permian, are now known to belong to the Albany which was classed as Carboniferous by the Texas Survey.

'Volcanic Dust from Guatemala,' by J. S. Diller. Mr. J. S. Diller presented specimens of volcanic sand and dust received through the U. S. Weather Bureau and the Chamber of Commerce, San Diego, Cal., from the recent eruption of Santa Maria in Guatemala. The dust is remarkable for its light color and feldspathic character. Ferromagnesian silicates are subordinate and the glass particles are very clear, as in dusts from volcanoes erupting trachytes or rhyolites.

One sample collected October 25 on the deck of the steamer *Luxor* while in the harbor of San Benito, Mexico, sixty miles from the volcano, is uniformly fine sand with particles nearly a millimeter in diameter. The particles are chiefly feldspar, of which only a small part show distinct lamellar twinning. The mineral grains are generally coated with clear vesicular glass.

The other sample collected on the deck of the same vessel October 26, 200 miles from the volcano, is much finer, like flour, and composed predominantly of glass particles ranging about .15 mm. in diameter. A chemical examination of the coarser material will soon be made.

ALFRED H. BROOKS,
Secretary.

AMERICAN CHEMICAL SOCIETY, NORTHEASTERN SECTION.

THE regular meeting of the Northeastern Section of the American Chemical Society was held Saturday, November 29, at Room 22 Walker Building, Massachusetts Institute of Technology.

Mr. Francis Fitz Gerald, of the International Graphite Company of Niagara Falls, addressed the society on 'The Acheson Furnace and its Products,' describing the processes and apparatus used by the company in the manufacture of carborundum and graphite.

The following officers for the ensuing year were elected:

President, Augustus H. Gill.
Vice-President, Henry Howard.
Secretary, Arthur M. Comey.
Treasurer, B. F. Davenport.
Executive Committee, R. P. Williams, G. P. Baxter, B. S. Merigold, H. C. Lythgoe, Henry Fay.

Members of the Council, H. P. Talbot, L. P. Kinnicutt, C. L. Parsons.

ARTHUR M. COMEY,
Secretary.

THE NEW ENGLAND ASSOCIATION OF CHEMISTRY TEACHERS.

THE Association held its fifteenth regular —sixth annual—meeting Saturday, November 15, at the Dorchester High School, Boston. The Association holds three regular meetings per year, its membership being drawn from all sections of the United States, but mostly from New England. Visits were made in the forenoon to the New England Gas and Coke Plant and the United States Steel Works at Everett. The principal paper of the afternoon was by Professor Arthur A. Noyes, of the Massachusetts Institute of Technology, on 'The Interpretation of the Usual Scheme of Qualitative Analysis Through the Mass Action Law and the Ionic Theory,' accompanied by experiments. The following officers were elected for the ensuing year:

President, L. G. Smith, Roxbury.
Vice-President, A. S. Perkins, Dorchester.
Secretary, George A. Cowen, West Roxbury.
Treasurer, E. F. Holden, Charlestown.
Executive Committee, George W. Earle, Somerville; Miss Laura P. Patten, Medford; Oliver P. Watts, Waltham.

COLUMBIA UNIVERSITY GEOLOGICAL JOURNAL CLUB.

December 5.—The following papers were reviewed: T. Nelson Dale, 'Bulletin 195 U. S. G. S.,' by Mr. Fred H. Moffit. Mr. Moffit has been Professor Dale's assistant for the past five years and gave much additional information concerning Vermont geology with some interesting problems of which this Bulletin deals. Rudolf Dekeskamp, on the 'Distribution of *Barium* in Rocks and Mineral Springs as Bearing Especially upon the Theory of Lateral Secretion' (*Zeitschrift für Praktische Geologie*, April, 1902), by Professor J. F. Kemp. H. W. SHIMER.

BOSTON SOCIETY OF NATURAL HISTORY.

THE first meeting of the season was held on November 5, 1902. Dr. T. A. Jaggar, Jr., spoke on the 'Possibility of Volcano-Proof Construction.' During the past summer the speaker had investigated the destructive work of Mt. Pelée in the Antilles and described the eruptions there as of a common type in which there are tremendous explosions of steam, hot dust, and stones, but with no good evidence of lava flows. The loss of life is chiefly by the intense heat, by falling of solid bodies, such as stones, by blasts of wind, and by suffocation from causes not clearly defined, but perhaps in some cases by gases. The few survivors of the explosions on Martinique and St. Vincent were in each case sheltered in very tightly constructed rooms which admitted but little outside air, and were protected in some measure by large walls of masonry on the side towards the volcano. A number of lantern slides were shown illustrating the effects of the explosions.

The second paper was by Dr. W. E. Castle, on 'Mendel's Principles of Heredity.' Mendel's work on hybridization was performed about fifty years ago, but until recently his discoveries have gone almost unnoticed. Among the more important of Mendel's discoveries are: (1) The law of dominance, when, for example, the offspring of two parents differing in respect of one character, all resemble one parent, and possess, therefore, the dominant character, that of the other parent being latent or recessive. (2) In place of simple dominance, there may be manifest in the immediate hybrid offspring an intensification of character, or a condition intermediate between the two parents, or the offspring may have a peculiar character of their own. (3) A segregation of characters united in the hybrid takes place in their offspring, so that a certain per cent. of these offspring possess the dominant character alone, a certain per cent. the recessive character alone, while a certain per cent. are again hybrid in nature.

At the meeting of November 19, 1902, Mr. William Lyman Underwood spoke on 'Bird Photography.' A large number of lantern slides of New England birds was shown, most of which were obtained after much painstaking work in northern Maine. Mr. Underwood's observations showed that, in the case of the chickadee and the yellow-bellied sap-

sucker, the male parent alone attends to the cleaning of the nest while it is in use by the fledglings. The methods used in securing the photographs, as well as the manipulation of the cameras, were explained by the speaker.

GLOVER M. ALLEN,
Secretary.

DISCUSSION AND CORRESPONDENCE.

THE STRATIGRAPHIC POSITION OF THE JUDITH RIVER BEDS. A CORRECTION OF MR. HATCHER'S CORRECTION.

IN SCIENCE of November 21 Mr. J. B. Hatcher publishes a note in which he disputes some statements made by Professor Osborn in an article on 'New Vertebrates of the Mid-Cretaceous.' One of these relates to the position of the Judith River Beds, and Mr. Hatcher expresses the opinion that these beds which have usually been considered part of the Laramie are really much older than that formation. He says that 'The fact that Cretaceous Nos. 2 and 3 [Benton and Niobrara] are entirely wanting in this region leads to the inference that they are represented by the lower members of the Judith River beds, and that the lower members of these beds are in reality older than the oldest of the Belly River series, a little farther north.' This inference is wholly incorrect, but as it claims to be based on the field observations of so able and careful a worker as Mr. Hatcher it is likely to be accepted by many and to confuse all future discussions of the subject if it is not promptly corrected.

It has long been known that the equivalents of the Fort Pierre and Fox Hills beds underlie the Judith River beds in their typical exposures near the mouth of Judith River. Mr. Hatcher quotes Meek and Hayden's erroneous statement of 1857, but if he had examined their later references to the geology of the region he would have found the error corrected and that the sandstone first called 'No. 1' was later referred to the Fox Hills or 'No. 5.'*

The section has been studied by E. D. Cope, C. A. White and doubtless many others. In 1894 it was the writer's privilege, in company with Mr. W. H. Weed, to examine the section along the Missouri River from Fort Benton to the mouth of the Judith. Between these two points the distance along the meandering course of the river is somewhat over 100 miles and the rocks are well exposed almost continuously from the Benton shales up to the Judith River beds. By the latter term I mean the brackish- and fresh-water beds to which it was first applied, well exposed on both sides of the Missouri River near the mouth of Judith River, Montana. At many places in this neighborhood these beds were seen to lie directly on shales and sandstones containing an abundant marine invertebrate fauna which elsewhere is known to be characteristic of the Fox Hills beds. The relation of these fossiliferous marine beds to the overlying Judith River beds may be seen near the mouth of Dog Creek about three miles east of Judith P. O.; on Dog Creek three to four miles above its mouth; on the north side of the Missouri opposite Judith; and on the north side of the Missouri three miles northwest of Judith. Among the species collected are *Cardium speciosum* M. & H., *Mactra alta* M. & H., *Avicula nebrascana* M. & H., *Cymella undata* M. & H., *Sphæriola cordata* M. & H., *Callista nebrascensis* M. & H., and *Tancredia americana* M. & H. These are sufficient to establish the horizon as Fox Hills without question and the overlying Judith River beds cannot possibly be very much older than the Laramie. In my opinion they *are* Laramie.

The marine beds containing the faunas of the Fox Hills and Fort Pierre are exposed along the Missouri River for some miles above the mouth of the Judith. Between these and the typical Benton shales there is a series of coal-bearing sandstones and shales whose stratigraphic position is precisely the same as that to which the Belly River series has been assigned. In the Fort Benton folio Mr. Weed has called this the Eagle formation. It is separated from the Judith River beds by several hundred feet of marine beds and the lithologic resemblance is not very close, though it might be possible to confuse them in areas where the section is not well exposed.

* See Meek's statement in U. S. Geol. Surv. Terr. quarto Vol. IX., 1876, pp. xxxvi, xlviii, xlix.