

rence is in the oxidized portion of a contact metamorphic deposit in limestone at the contact with quartz-porphry. A number of carloads of this mineral were shipped in 1905. The mineral was identified by analysis.

Lines of Inference in Paleogeographic Studies:
Mr. BAILEY WILLIS.

The primary difficulty in attempting to draw a map of North America, for example, to represent the continent as it was during a given period, is to select facts which may be assumed to have had approximate synchronism. The New York Trenton, for instance, can not be narrowly correlated with an equivalent in the Mississippi Valley region or in the Nevada basin, even where the sequence of Ordovician strata is unbroken and the Trenton interval is represented by some part of the sediments. Hence, in treating a large area, it becomes necessary to accept approximate correlations and to present a sequence of geographic changes or a tendency toward a certain geographic state, rather than a definite state which may have been attained at a definite time. The data of paleogeography are: (1) the criteria of overlap and shore sediments to determine coasts; (2) the distribution of marine sediments to determine known seas; (3) the arrangement of oceanic depths, negative continental elements and positive continental elements, to determine possible extensions of the more or less probable lands and seas.

From this consideration of stratigraphic data there results in any case a certain possible distribution of lands and seas which may be tested in the following manner. Under the supposed conditions and under general laws of atmospheric and oceanic circulation, ocean currents presumably took certain courses. If the lithologic and faunal facies of marine deposits (local modifying influences apart) are determined primarily by oceanic currents and distributed accordingly, then the courses of the currents deduced from the supposed arrangement of lands and seas should lead to a distribution of facies corresponding broadly with the observed deployment of facies over the continent.

Applying these criteria to a definite problem, it is suggested that the marine circulation during Trentonian time developed into a central epicontinental current, which flowed northward from the Gulf of Mexico; bathed the shores of Colorado on the west and Appalachia on the east; spread around the Ozark and Wisconsin islands, and penetrated across the Laurentian region to the

Arctic. Return currents flowed southward along the St. Lawrence and Champlain trough and continued along the shore of Appalachia between the northward-flowing current and the land and their effect extended to Alabama and Arkansas. A similar current flowed south along the trough of the Rocky Mountains in British Columbia at least as far as the forty-ninth parallel. The distribution of two very distinct Ordovician facies, the Galena-Trenton and the Normanskill facies, appears to correspond with the deductions regarding currents.

PHILIP S. SMITH,
Secretary

THE TORREY BOTANICAL CLUB

THE first meeting of the season, held at the Museum of Natural History, on October 13, 1908, was called to order at 8:20 P.M. by Dr. Howe in the absence of other officers. Mr. George V. Nash was elected chairman. There were fourteen persons present. The resignation of Dr. C. Stuart Gager as secretary of the club, occasioned by his removal to the University of Missouri, was read, and accepted with regret, after an expression of the value of his services to the club.

The scientific program consisted of informal reports on field observations by members. Professor F. E. Lloyd was called upon first and spoke of his recent experiences in Mexico. He exhibited field notes and photographs of cacti collected largely in northern Zacatecas, Mexico; in a restricted region, about sixty species are found. Four species of *Opuntia* are reported to be new: there were no species of *Echinocereus*. Owing to the fact that cacti in conservatories often exhibit very different behavior from that in their natural habitat, the importance of such field study of the group is to be emphasized.

Professor Lloyd then spoke on the bionomics of *Parthenium argentatum*, known in Mexico as guayule. From this plant a large amount of commercial rubber is obtained; the rubber occurs in masses in cells of the pith, medullary rays and cortex, and is extracted by mechanical means. In addition to reproducing freely by seed, there is an interesting method of vegetative reproduction. The plant has, besides a tap-root system, long and slender horizontal roots near the surface, from which new shoots arise and produce new plants at a distance of a meter or more from the main plant. There may be from two to six of these shoots arising from one point, producing such a different habit that such plants may be

easily distinguished from the seedlings with their single trunk. A piece of the stem of *Landolphia*, a tropical liana, was exhibited. In this case the latex coagulates in the canals and the rubber is extracted by mechanical means.

Mr. R. S. Williams spoke briefly of his five months' experience in Panama, particularly on the climatic and soil conditions as affecting vegetation.

Dr. E. B. Southwick exhibited a peculiar monstrosity of *Zea Mays*. Mr. Nash reported the discovery of the rare orchid, *Epipactis viridiflora*, at Letchworth Park.

TRACY E. HAZEN,
Secretary pro tem.

THE meeting of October 29, 1908, was called to order at the New York Botanical Garden at 3:30 P.M., Dr. M. A. Howe being asked to take the chair. Mr. Percy Wilson was elected secretary.

A microscopic preparation of the red snow plant, *Sphærella nivalis*, collected this autumn on Cape York, Greenland, was exhibited by Dr. N. L. Britton, who received it from the secretary of the Peary Arctic Club. Dr. Tracy Hazen gave a brief description of this interesting plant and raised certain questions still unsolved concerning it.

The first subject on the published program was "A Recent Collection of Mosses from Panama," by Mr. R. S. Williams. The following synopsis of this paper was written for the secretary by Mr. Williams:

"For the time spent in the field this was much the smallest collection of mosses ever made by the speaker. It may be accounted for partly by the fact that most of the work was done in the latter part of the dry season, namely, during the last week of February, through March and about three weeks of April, and partly because of the low level, mostly under 300 feet elevation, at which much of the collecting was done.

"In the city of Panama are a number of fine old ruins more or less overgrown with shrubs and smaller plants, but not a single species of moss was observed. On going to Penonome, some hundred miles west of the Canal Zone on the Pacific coast the conditions were found to be much the same. One species of moss, however, was found abundantly fruiting in a cultivated field of cassava. This was *Bryum coronatum* Schwaegr., a world-wide species of the tropics and occurring as far north as Florida. On going a few miles back of the town among the foothills and low mountains, various mosses become not uncommon, grow-

ing chiefly on trees, but even here very few species were obtained in anything like good fruiting condition. On leaving Penonome a trip was made southeast of the canal along the Pacific coast about 100 miles to the Gulf of San Miguel and up the Tuira River about 70 miles into the interior to the mining camp of Cana. Here much more favorable conditions were found, Cana being situated at an altitude of 2,000 feet above the sea with the Espirito Santo Mountains just back of the town rising 5,000 feet higher. Mosses and liverworts were fairly abundant and at a more favorable season doubtless a large collection might be made.

"Of the thirty species brought back from both sides of the Canal Zone, five sixths are known to be South American. Two of these, *Pilotrichum amazonum* Mitt., collected originally by Spruce on the Amazon, and *Lepidopilum brevipes* Mitt., found by Spruce in the Andes at 3,000 feet, had not been since reported by any other collector. The five remaining species appear to be unknown outside of Central America. They are *Syrrhodon Bernoullii* C.M.; a species belonging to the very large genus *Macromitrium*, apparently undescribed; a species of *Oryphæa*, also undescribed, and bearing numerous propagula on the stems; *Porotrichum cobanense* C.M. and *Cyclodictyon Liebmanni* Schimp., these last two being previously known only from the type localities."

The second announced paper, "The Morphology of *Tanioma*," by Miss Elizabeth I. Thompson, was not read, Miss Thompson being absent.

Dr. N. L. Britton gave a brief account of *Rhipsalis*, a genus of the Cactaceæ whose members are pendulous from tree trunks or rocks. Most of these plants occur in tropical America, but a few species, strange to say, are found in tropical east Africa. Of the fifty-three species that have been recognized, the speaker discussed chiefly those of Mexico, Central America and the West Indies, illustrating his remarks with herbarium specimens.

Dr. Tracy Hazen described in detail an interesting phase in the development of a species of *Chaetophora* found in the brook flowing through the herbaceous valley of the New York Botanical Garden. This investigation is, however, not yet complete. Dr. Hazen stated incidentally that the algal flora of this brook appeared to be considerably richer now than it was a few years ago, and a discussion followed as to the presence of additional forms, some attributing it to insects, frogs and other minor aquatic animals, and others to

the wild ducks that frequent this brook through the summer season.

W. A. MURRILL,
Secretary pro tem.

THE club met at the American Museum of Natural History on November 10, 1908, and was called to order by Vice-president Burgess at 8:15 P.M. About 95 persons were present.

After the reading of the minutes of the meeting of October 29, Dr. N. L. Britton delivered the lecture of the evening on "Trees of the Vicinity of New York." The lecture was illustrated by lantern slides from the Van Brunt collection and was of a popular nature. The trees were taken up in a biological order, beginning with the gymnosperms, and the photographs exhibited illustrated both the general habit of the trees discussed and the details of their flowers and fruit.

MARSHALL A. HOWE,
Secretary pro tem.

SECTION OF GEOLOGY AND MINERALOGY OF THE NEW YORK ACADEMY OF SCIENCES

A REGULAR monthly meeting of the section was held October 5 in the academy rooms at the American Museum of Natural History. Four papers were presented, as follows:

Outline of the Geology of Long Island, N. Y.:

Professor W. O. CROSBY.

Professor Crosby is of the opinion that the Pleistocene history of Long Island is relatively simple, and the known facts are accounted for by a single ice-invasion. The recent reference of the underlying lignitic and pyritic Chesapeake (Miocene) clays and the Lafayette (Pliocene) yellow gravel to the Pleistocene glacial series is believed to be a mistake. From the early Pleistocene uplift dates the cuesta of Long Island, to which Long Island Sound holds the relation of an inner lowland. This lowland is still floored by Cretaceous clays and sands. The transverse valleys and deep bays of the north shore of Long Island are essentially preglacial, though greatly modified by glacial erosion and deposition.

The Production of Low-grade Copper Ore in the West: Professor JAMES F. KEMP.

The speaker presented a brief description of the recent development of the so-called "low-grade" copper mines in Bingham Cañon, Utah, and at Ely, Nev. By means of maps the geographical situation was made clear and the geological relations were outlined. The ores consist of bodies of silicified and brecciated porphyry, impregnated with chalcocite. They are mined by means of

steam shovels, in huge open cuts. They range in copper from less than two to two and a half per cent. The operation and processes of the mills and smelters were briefly outlined. The paper was based upon visits made the past summer.

Limestones Interbedded with the Fordham Gneiss in New York City: Dr. CHARLES P. BERKEY.

The discovery of beds of limestone at three points in such relation as to indicate interbedding with the banded gneisses was announced. This is an additional feature of similarity between the gneisses of the Highlands and the Fordham at its type locality. The largest bed is about 27 feet thick and is exposed in the east wall of the new Jerome Park Reservoir at 205th Street. In all cases these limestones are very impure and coarsely crystalline, carrying many unusual minerals arising chiefly from recrystallization. Chondrodite and actinolite are abundant. Sphalerite and galenite are also found.

Continental Formations of the North American Paleozoic: Professor A. W. GRABAU.

The change of opinion in regard to conditions under which many of the well-known sedimentary formations are originally deposited was outlined. A tabulated list of those formations of the Appalachian region whose characters seem to indicate continental origin was exhibited and the evidence was briefly discussed. This article is to be published in full in SCIENCE.

CHARLES P. BERKEY,
Secretary of Section

WASHINGTON SECTION OF THE AMERICAN CHEMICAL SOCIETY

THE 185th meeting was called to order by President Walker on Thursday evening, November 12. The attendance was 90, this large number being due to the fact that many visiting members of the A. O. A. C. were present. The following papers were read:

"Color of Lead Chromate," E. E. Free.

"Absorption of CO₂ by Moist Oxide," W. O. Robinson.

"Solubility of Gold in Salt Solutions," W. J. McCaughey.

"The Distribution of NaNO₂ in the United States," C. E. Munroe.

Three members of the society were elected as councilors to the American Chemical Society, *viz.*, L. M. Tolman, E. T. Allen and E. M. Chace.

J. A. LECLERC,
Secretary