unknown. Not being able to arrive at any definite type of the "bob-tail," I shall not attempt to describe him.

From this writer it would appear that the Old English Bob-tail is a recent, or at least variable and poorly characterized breed. Lee[8] states, however, that Reingle's picture in the "Sportsman's Cabinet," very early in the last century, is typical of the breed as at present known, showing that this breed has probably existed for at least a century. He further states that it is possibly older than the collie. The varieties in England and Scotland are said to be identical, except that the latter usually has a long tail, the reason attributed for this being that the owners have steadfastly refused to amputate it! It is stated that in England many of these dogs are born either without tails or with very short ones, pups with and without tails usually occurring in the same litter. The tails may be docked so that no one can tell that the animals were not born tailless. They are said to be jet-black at first with white markings, in a few weeks becoming "silvery-lilac."

This writer argues that the antiquity and concentration of the strain is shown by the fact that if there is a strain of this breed in such breeds as the retriever, lurcher or spaniel many generations back, a typical specimen will occasionally appear.

In the "Dogs of All Nations" already referred to, which is a standard authority on the good and the bad points in the various breeds of dogs, giving their characterization according to the various dog clubs and breeders, a black and tan or brindle coat is considered a fault in the Old English Bobtail breed (*l. c.*, II., p. 471).

Such remarkable diversity as here described in a single litter of offspring could not be accounted for by the effect of external conditions of development and must therefore be due to differences of some sort in the germ cells of either or both parental individuals. No one character is present in all the offspring to the exclusion of its homologue. There is a decided tendency in any given character for the offspring to "take after" one parent or the other, though in certain cases, as in the character of the hair in Nos. 3 and 4, there is a marked departure from either parent. This is perhaps the reappearance of a character derived from some cross in the ancestry of one of the breeds.

One further fact worthy of mention is the disposition of dog No. 1. I had him in my possession for several years and often observed the usually very subdued and timid behavior, and at times the sudden and unexpected change to the aggressive attitude of his father. It will be noted that some of the dogs inherited the aggressive disposition of their father and others the timid and gentle disposition of their mother.

R. R. GATES

UNIVERSITY OF CHICAGO,
April 2, 1909

[8] Lee, Rawdon B., "A History and Description of the Modern Dogs of Great Britain and Ireland (Non-sporting Division), etc.," London, 1899, pp. 428.

THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

SECTION E—GEOLOGY AND GEOGRAPHY

SECTION E, Geology and Geography, of the American Association for the Advancement of Science, met Monday morning, December 28, 1908, at Johns Hopkins University. The section organized at 11 A.M., immediately after the adjournment of the general meeting of the association. The first five papers of a Symposium on Correlation were given during the morning and afternoon sessions on Monday. This symposium was continued on Tuesday and Wednesday under the auspices of the Geological Society of America.

Professor J. P. Iddings, of Chicago, gave his vice-presidential address, "The Study of Igneous Rock," on Monday, at 2:30 P.M.[1]

According to the custom for several years past, Section E adjourned Monday P.M., but its fellows and members were cordially invited to be present at the sessions of the Geological Society of America, December 29 to 31, 1908, and at those of the Association of American Geographers, January 1 and 2, 1909.

Following the dinner of the Geological Society of America on Wednesday evening there was a discussion of the relations that should obtain

[1] SCIENCE, Vol. XXIX., pp. 202–217.

between Section E and the Geological Society of America and the Association of American Geographers. This was done in order that the officers of the three geologic-geographic organizations may be able to plan future meetings for the reading of papers and for field excursions, so that the needs and wishes of all geologists and geographers may be met as fully as possible.

On Thursday evening, December 31, Dr. Albrecht Penck, professor of geography at Berlin University and Kaiser Wilhelm professor at Columbia University, delivered a public address on "Man, Climate and Soil," given under the auspices of the Association of American Geographers.

The Society of Vertebrate Paleontologists held its meeting during the week, an account of which has been given in SCIENCE.[2]

SYMPOSIUM ON CORRELATION

Monday, December 28

Pre-Cambrian.

C. R. Van Hise, "Principles of pre-Cambrian Correlation."

F. D. Adams, "The Basis of pre-Cambrian Correlation."

Discussion.

Early and Middle Paleozoic.

C. D. Walcott, "Evolution of Early Paleozoic Faunas in Relation to Their Environment."

Discussion.

A. W. Grabau, "Physical and Faunal Evolution of North America in the Late Ordovicic, Siluric and Devonic Time."

Discussion.

Stuart Weller, "Correlation of Middle and Upper Devonian and Mississippian Faunas of North America."

Discussion.

Tuesday, December 29

Late Paleozoic.

G. H. Girty, "Physical and Faunal Changes of Pennsylvanian and Permian in North America."

David White, "The Upper Paleozoic Floras, Their Succession and Range."

Discussion.

Vertebrates.

S. W. Williston, "Environmental Relations of the Early Vertebrates."

H. F. Osborn, "Environment and Relations of the Tertiary Mammalia."

Discussion.

[2] Vol. XXIX., pp. 194–198 and 376.

Mesozoic and Tertiary.

T. W. Stanton, "Succession and Distribution of Later Mesozoic Invertebrate Faunas."

Discussion.

W. H. Dall, "Conditions Governing the Evolution and Distribution of Tertiary Faunas."

Ralph Arnold, "Environment of the Tertiary Faunas of the Pacific Coast."

Discussion.

Wednesday, December 30

Tertiary and Quaternary.

F. H. Knowlton, "Succession and Range of Mesozoic and Tertiary Floras."

Discussion.

R. D. Salisbury, "Physical Geography of the Pleistocene with Special Reference to Conditions Bearing on Correlation."

D. T. MacDougal, "Origination of Self-generating Matter, and the Influence of Aridity on its Evolutionary Development."

Discussion.

T. C. Chamberlin, "Diastrophism as the Ultimate Basis of Correlation."

The following note on the symposium on correlation, was prepared by Mr. Willis, for the secretary's report of the Baltimore meeting:

In accordance with the announcement made in SCIENCE, December 18, 1908, a symposium on correlation was presented at the Baltimore meeting under the auspices of Section E and the Geological Society of America. The object proposed was a discussion of the physical and biological criteria of correlation, and the influences of the physical upon the biological. While most of the papers presented were mainly paleontological, there was generally throughout the papers and the discussions an undercurrent of thought with reference to this relation of cause to effect. In some cases decided emphasis was placed upon the relation of faunas and floras to environment.

Messrs. Van Hise and Adams presented two views concerning the criteria of correlation of the pre-Cambrian and the classifications which result from their application. Van Hise maintained the validity of the dual classification of the pre-Cambrian, and, after discussing the value of lithologic similarity, stratigraphic similarity and unconformities for matching strata, applied these methods to the North American pre-Cambrian with results which he has elsewhere published recently. Adams approached the problem as a part of the record of continental history and based a tentative classification of the pre-Cambrian upon possible parallel events in North

America and Eurasia. In discussion Van Hise pointed out the similarities between the two sets of conclusions.

The correlation of the major part of the Paleozoic was discussed by Messrs. Walcott, Grabau and Weller, whose papers comprised the period from Cambrian to Mississippian, inclusive. Walcott followed conservatively the lines of classification laid down in his earlier papers on the Cambrian of North America. He felt obliged by the state of investigations to confine his discussion largely to evidence afforded by the brachiopods and indicated that more elaborate conclusions might be suggested by a similar thorough study of the trilobites and other elements of the faunas. Grabau discussed the faunas and sediments of Ordovician, Silurian and early Devonian times, together with certain phases of the paleogeography and climatic conditions, especially of New York and Michigan. Weller stated that during Middle and Upper Devonian time the faunas of North America occupied three provinces, the eastern continental, interior continental and the western continental. The provincial conditions continued into early Mississippian time, but gave place to more cosmopolitan conditions through the development of the great Mississippian province, with sub-provinces east of the Cincinnati arch and also in the western part of the continent.

The late Paleozoic and early Mesozoic were discussed by Messrs. Girty, David White and Williston, with reference, respectively, to the invertebrate faunas, the floras and the vertebrates. Girty considered chiefly the relations of the Pennsylvanian and possible Permian faunas of North America, and their correlation with the Permian of Russia. White brought out the world-wide distribution of certain late Paleozoic floras and touched upon the paleogeographic relations essential to their distribution.

Williston was followed by Osborn, who discussed the Cenozoic vertebrates, and in the discussion of their two papers the value of vertebrate paleontology in its bearing upon former land connections was distinctly apparent.

In discussing the succession and distribution of the later Mesozoic invertebrates, Stanton considered late Jurassic, Lower Cretaceous and Upper Cretaceous faunas in their bearing upon the geography of those periods. A problem of peculiar difficulty is presented by the marked distinction which exists between the Lower Cretaceous fauna of the gulf region and that of the Pacific coast, in spite of the fact that in Mexico a Pacific fauna invades the western margin of the province that was usually occupied by the gulf fauna. In order to explain these relations it appears to be necessary to recognize the probable existence of a southern extension of the land area of Arizona and its partial submergence first from the east and then from the west.

In discussing the conditions governing the distribution and evolution of Tertiary faunas, Dall emphasized the importance of temperature of marine waters and showed that in so far at least as Tertiary and existing faunas are concerned, it formed the dominant condition limiting the migration or continuance of the fauna. Following Dall in the discussion of Tertiary faunas, Arnold gave a detailed analysis of the Tertiary of the Pacific coast, and exhibited maps showing the geographic conditions at various stages from Eocene to Pliocene.

Closing the consideration of the historic succession, Knowlton discussed Mesozoic and Tertiary floras, Salisbury brought out those phases of physical geography of the Pleistocene which had special relations to conditions bearing on correlation, and MacDougal presented a consideration of the origination of self-creating matter and the influence of aridity upon its evolutionary development.

The symposium was closed by Chamberlin, who discussed diastrophism as the ultimate basis of correlation. The speaker emphasized the view that diastrophism is the basal phenomenon according to which other phenomena that afford criteria for correlation are modified and developed. Taking a broad view of the whole subject, he held that the periodicity of diastrophic movements affords the criteria for determining the major divisions, but he recognized also that all the related lines of evidence are required to work out the minutiæ of the problems of geologic correlation.

In connection with the discussions paleogeographic maps of North America at fifteen different periods were exhibited. They represented studies by Willis in association with a number of colleagues in regard to the geologic provinces of North America.

The arrangements for the symposium on correlation included one unusual feature, inasmuch as a definite time schedule was prepared and published in the program, and this schedule was strictly adhered to during three days' proceedings. In general, about three quarters of an

hour was allowed for the presentation and discussion of each topic; the principal speaker took thirty minutes or less; the remainder of the time was given to discussion of the subject as presented by him. The following speaker was not allowed to begin until the hour stated on the program had arrived. This plan appeared to work to the satisfaction of the audience; the speakers confined themselves practically to the time allotted, and their convenience and that of all who had an interest in the subject was satisfactorily served.

The papers contributed to the symposium will appear in the *Journal of Geology* of Chicago University, in chronological order.

Monday morning at 11 A.M. in a subsection, with G. K. Gilbert as chairman, the following papers were read:

Some New or Little-known Geological Terms and their Application in Stratigraphic Writing: A. W. Grabau.

The following terms were discussed and defined:

1. *Disconformity,* proposed by Grabau in 1905 to cover unconformable relation of strata where no discordance of dip exists, the term *unconformity* being restricted to cases with perceptible discordance of dip.

2. *Rudaceous* and *rudyte, arenaceous* and *arenyte, lutaceous* and *lutyte,* proposed by Grabau in 1904 for pebbly, sand and mud rocks, respectively, irrespective of their composition; classification of clastic rocks by texture being advocated. According to composition we may have: *silicirudytes, silicarenytes, silicilutytes; calcirudytes, calcarenytes, calcilutytes; argillutytes,* etc.

3. *Chronofauna* and *chronoflora* and *locofauna* and *locoflora* (new), the first two for fauna and flora of a given time period, the other two for the fauna and flora of a locality.

4. *Epiplankton* (new) for organisms attached to floating objects and not primarily planktonic. There have been included under this term *pseudoplankton,* which it is proposed to restrict to dead organic and to inorganic planktonic matter.

5. *Epicontinental sea* to be restricted to the shallow seas lying within the continents and constituting with the *mediterraneans* the *intracontinental seas.* The term littoral to be applied as in zoology to the district extending from high water to limit of sun-illuminated bottom (edge of continental shelf in the oceans) and characteristic of oceans, intracontinental seas and lakes. The term epicontinental sea is not to be applied to the littoral district of the oceans as thus defined.

6. *Migration* to be active—in search of food, escape from enemies, etc.; *dispersal* to be passive —by currents, water or air, etc., or by carriage by other organisms, etc.

This paper was discussed by G. K. Gilbert.

Some Preglacial Valleys in Eastern New York and Their Relation to Existing Drainage: John H. Cook.

The valley of the Mohawk from Schenectady to the Hudson River is of post-glacial origin, as shown by the fact that between Niskayuna and Fort's Ferry it crosses a filled channel, trending north-northeast towards Round Lake and south towards Albany (at which city this channel probably opens into the Hudson valley).

For two miles above Schenectady borings along the Mohawk developed no rock at a depth considerably below the rock bottom of the river at the entrance to the upper gorge near Rexford Flats.

The channel of the preglacial Mohawk lies beneath the sediments of glacial Lake Albany, but may be traced approximately. It parallels, roughly, the Helderberg escarpment and probably reaches the Hudson just north of Coeyman, where there is a break in the rock wall elsewhere almost continuously exposed for several miles north and south of that point.

Drift and sands and clays deposited during the retreat of the ice sheet had filled these channels and spread widely over the divides when the re-excavation of the Hudson valley and the draining of Lake Albany were accomplished. The waters of Lake Iroquois still found outlet through the Mohawk valley as far as Schenectady, but, as a point near Rexford Flats lay at an elevation below the level of the deposits immediately south and west, the stream there poured over the low divide, crossed the filled channel mentioned above and took the course it now pursues to the Hudson.

This paper was discussed by G. K. Gilbert and F. P. Gulliver.

Monday afternoon, following the vice-presidential address of J. P. Iddings on "The Study of Igneous Rocks," the reading of papers was continued.

The Metamorphism of Glacial Deposits: Frank Carney.

Till and tillite are two extremes in the structure of glacial deposits.

So far as we yet know, the periods of glaciation are spaced by long lapses of time; therefore we have only disconnected data in the metamorphic cycle of glacial sediments.

Evidence is adduced tending to show: (1) That some chemical activities are accentuated by the saturated condition of sediments beneath an ice-sheet. Carbonation and hydration would be enhanced, and even oxidation may occur. (2) That the great pressure to which unconsolidated materials of an earlier drift sheet are subjected by a later invasion of ice is an important agent of alteration. This pressure based on a conservative estimate of the thickness of the ice amounts to over nine thousand pounds per square inch. Not only are these materials made compact, but they are faulted and jointed. Furthermore, this density increased capillarity which has operated in more recent alterations. In addition to the pressure of a superincumbent ice-mass, it is probable that hydration has increased the pressure-effects.

This paper was discussed by George D. Hubbard.

A New Occurrence of Carnotite: EDGAR T. WHERRY.

A supposed occurrence of autunite at Mauch Chunk, Pa., has been investigated, and the material found to be similar in character to the Colorado carnotite. It occurs in layers of conglomerate at the top of the Mauch Chunk red shale on the west side of the Lehigh River, one mile north of the town, having been extracted from intercalated lenses of black shale and graywacke and deposited in fissures and porous beds by circulating surface waters. The dark color of these lenses is due, not to carbon, but to the presence of comparatively fresh hornblende, biotite, etc., resulting from the disintegration of the metamorphic rocks of the highlands to the south and east, during the arid climate prevailing in late Mississippian times, and much of the vanadium and uranium originally distributed through these rocks is concentrated in them. As the western deposits of carnotite occur in similar positions, namely, in arenaceous formations overlying red shales, it is suggested that they may have had a similar origin.

The Phenomena of Æolian Sand Drift: E. E. FREE.

Wind-drifted sand moves by "saltation" or in a series of leaps in a manner quite analogous to that recently described by McGee for the suspended matter of streams. The forms shown by collections of such sand are of two main types: (1) the large heaps or dunes, (2) the minor surface figures, of which ripples form the best example. Previous discussions of dune formation are satisfactory except that far too little importance has been assigned to the eddy behind the dune. Many anomalous forms can be explained as due to it. Ripple formation is probably connected with the production in the moving air of eddy systems analogous to the Helmholtz vortex-surface.

This paper was discussed by C. H. Richardson, George D. Hubbard, J. H. Cook, G. K. Gilbert and F. P. Gulliver.

The following papers were read by title.

The Mills Moraine, with Some General Remarks on the Glaciation of the Longs Peak Region of Colorado: EDWARD ORTON, JR.

The Longs Peak group is a mountain mass with several summits, lying in front or east of the continental divide and connected with it by one narrow and much-dissected ridge or spur. The district is very wild and rough and existing maps are of the most elementary sort and furnish no accurate details. The highest peak is 14,271 feet high and the mass as a whole, towering 1,000 or 1,500 feet above the general summit level of the main range of the Rockies, is easily the dominating point of northern Colorado.

Separating the main range and the Longs Peak group are deep gorges occupied by the head waters of the Big Thompson and the St. Vrain rivers. The heads of these gorges, winding around behind Longs Peak, cut deeply into the connecting ridge, and have nearly isolated the group from the main range, of which it was once an integral part.

The high valleys and cirques lying between the main range and the western slopes of the Longs Peak mass, offered an excellent gathering ground for snows, owing to the great elevation of the peak and the position of the gorges with reference to the prevailing winds and storms. Great glaciers developed there, and made their way out north and south, curling around to the eastward past the base of the great peak on either side, and building magnificent moraines along their flanks and termini. The nature, location and general topographic features of these moraines is discussed, and some evidences of periodicity in their development is noted.

On the east side of the Longs Peak group, located in a small cirque between the three highest summits, a small but very active glacier has been at work, and has built up a very beautiful moraine system, entirely independent of the general glaciation of the district. On account of this isolation, these moraines offer a very good opportunity for a study of the periodicity of the glacial phenomena of the mountain areas of the west.

A topographic map drawn from original surveys of the gorge of this, the Mills glacier, and the moraines which it built, has been prepared.

The Red Beds of the Wichita-Brazos Region of North Texas:[3] C. H. Gordon.

The region to which this paper relates is of special interest as having furnished the data for the discussions on the Texas Permian which have appeared in various publications in recent years. In the study of the underground water conditions of the region under the auspices of the U. S. Geological Survey, it was observed that the red sandy shales and red sandstones so conspicuous in the Wichita valley region were replaced southward in large part by blue shales, light-colored sandstones and limestones. In some places the transition from a sandstone into a limestone was plainly seen. Formations to which the names Wichita and Clear Fork have been given, when traced along their strike toward the southwest, are found to grade into those included under the terms Cisco and Albany. The former have been regarded as Permian, while the latter have usually been assigned to the Pennsylvanian. Some authors, however, have suggested that the Albany should be considered Permo-Carboniferous. An abundant marine fauna characterizes the beds toward the south. In the Red Bed region marine forms are few, appearing only in the few beds of limestone that persist. Along with them in this region appear vertebrate remains upon which the references to the Permian have been based. It is the conclusion of the author that the Red Beds of this region are the near-shore representatives of the Albany and the decision as to their age will rest upon that of the latter.

The Invertebrate Faunas and Correlation of Some So-called Permian Rocks of the Mississippi Valley, with Remarks on Their Stratigraphy: J. W. Beede.

Discussion of the stratigraphy, fossils and correlation of the higher Paleozoic rocks of Kansas and Nebraska and their correlation with rocks of the United States and Eurasia. Remarks on stratigraphy and paleophysiographic conditions under which faunas lived, and a few fundamentals of paleontologic correlation.

Differential Effects of Eolian Erosion upon Rock-belts of Varying Induration: Charles R. Keyes.

The desert regions of our country may be regarded as comprising those tracts where the annual amount of rainfall is less than ten inches. More than nine tenths of whatever rainfall there is sinks at once into the dry and thirsty soil and does not appear as stream-water at all. The only perennial rivers are those whose headwaters are extralimital and whose courses merely traverse the arid region on the way to the sea. With so small and unimportant precipitation characteristic of the arid country, the high evaporation, often several times greater than the amount of annual rainfall, and the loose dry soils, wind-scour becomes a far more potent erosive agency than is usually fancied.

The sequence of geologic terranes and their lithologic characters in the desert region, and particularly in the northern part of the Mexican tableland where the isle-like aspects of the mountain ranges dotting a vast sea of earth is so characteristic of what the Germans in the South African deserts have so aptly termed the "Inselberglandschaft," are such as to permit eolian influences to fashion their finest subjects of desiccate sculpture. Ten thousand feet of hard limestones are succeeded by an even greater thickness of soft shales and friable sandstones. On account of frequent and profound faulting which, in early Tertiary times, the region had undergone and the subsequent planing off of the country to the condition of a peneplain, there has been imparted to the areal distribution of the geologic formations a remarkable alternation of belts of resistant and weak rocks.

General desert-leveling and lowering of an elevated country by deflation is comparable in the nature of its larger relief effects to that of general corrasion in a humid climate. It is in the arid region that the eolian influences as erosional processes find their maximum activities. In the dry lands the weaker rock-masses are rapidly removed; while the harder belts long resist deflative attack. Under conditions of aridity, the differential effects of wind-scour, or deflation, upon rock-belts of contrasted induration are very different from what they are in a normal moist climate. The inequalities of surface relief are in consequence very much more intensified than when stream-action is the chief eroding agent. In general, it may be estimated that in the case of hard rock-masses in an arid land deflative erosion is probably less than one tenth as efficient as in a normal wet country water-action would be; while in the case of weak rocks it is more than ten times greater. This is, no doubt, one of the principal reasons why to most observers in the desert regions such manifest evidences of enormous ero-

[3] Published by permission of the director of the United States Geological Survey.

sion are so impressive on every hand, while the recognized absence of an abundance of running waters makes it appear that the progress of erosion must be extremely slow.

In southwestern United States, where the lofty and numerous desert ranges have been regarded as having developed out of an old peneplain, a remnantal portion of which seems to be represented in the great Mesa de Maya, where through faulting and folding there has been produced a rapid succession of resistant and weak rock-belts, where deflative phenomena are thought to be typically expressed, and where there are several large rivers flowing from the humid zones of the higher Rockies in deep canyons through to the sea, there appears to be all of the data at hand by which to measure not only the relative rapidity of deflation upon contiguous areas of hard and soft rocks, but also to gauge the comparative effects between erosion by direct deflation and erosion by corrasion unaided by extended chemical decomposition of the rocks at the surface.

Locus of Maximum Lateral Deflation in Desert Ranges: CHARLES R. KEYES.

Deflative erosion in an arid land is preeminently plains-forming. Its general effects are best likened to the work of the sea along an exposed coast where there is carved out of the shore a marine platform. In a smaller way, as a detritus-laden stream impinges against its banks, forming high bluffs or cliffs, so in the dry regions the swiftly moving air-current heavily charged near the ground with sands and dusts tends to wear away fastest the least sheltered portions of the desert hills and mountains.

The air-currents of the desert are both strong and constant. Their transportative powers have never been measured quantitatively. When transportation is active the "sandstorm" results. The personal discomfort to the traveler in a sandstorm is so very great that he is usually oblivious to all else. The volume of soil flowing along the surface of the ground during one of these storms must be prodigious. Compared with the amount of sediments carried along by some large river, as the Mississippi in time of flood, it is estimated that in the lower twenty feet of the deflation-stream there are equal amounts of rock-waste moving in like cross-sections of the great river and of the air-stream of the desert. The air-stream moves forty miles an hour instead of four, as in the case of the water-stream; and in place of being only a mile wide the path of the sandstorm is several hundreds of miles in width. The lower six inches of the air-stream is almost wholly moving sand and fine gravel. The finer dust soars upwards thousands of feet, darkening the light of the sun as by a heavy thunder-cloud.

Over surfaces of drifted sands and of weak rocks the erosion is mainly accomplished by a trituration of the particles of the heavily sand-laden bottom stratum of moving air. Whenever bare or hard rock-masses are encountered there is vigorous sand-blast action. Thus, hypsometrically, among the desert ranges which are all composed of very hard rocks usually devoid of a soil-mantle, the notably exposed zone is at the very base of the mountains, or immediately above the surface level of the surrounding plains. This is probably the chief reason why there are no foothills flanking the mountain ranges of the desert, why mountain and plain so sharply meet, and why the bases of the desert ranges are often so abrupt and straight as to suggest at once the presence of fault-scarps as an explanation of the steep faces to the mountains.

When we institute search for direct evidences of fault-lines which are supposed to give rise to the escarpments, we usually look in vain. Although the mountain may be a faulted block the movement, however profound, is commonly discovered to be of ancient date. Its fault-plane is found to be far out in the plain, often at distances of four or five miles. The intervening space has a smooth and gently sloping rock-floor and has every appearance of a marine plain of denudation from which the sea has but recently retired. McGee[2] notes many such plains with extensive rock-floors fashioned from the hardest rocks, among the desert ranges of Sonora in Mexico. Others are described more in detail in the New Mexican region.[3] They are now widely known throughout the arid lands of the west. Thus, in the general leveling and lowering of the desert region anciently faulted and planed off so as to present alternating belts of resistant and weak rocks the areas of the latter are worn chiefly downward by the wind-action, but the hard mountain belts which have emerged from the softer areas are attacked laterally; and the zone of maximum eolation is at and just above the general plains-level.

A New Trachodon from the Laramie Beds of Converse County, Wyo.: CHARLES H. STERNBERG.

A complete skeleton, except hind feet, one tibia and fibulæ and tail vertebræ. It lies on its back.

[2] *Bull. Geol. Soc. America*, VIII., p. 87, 1897.

[3] *Ibid.*, XIX., p. 78, 1908.

and the soft cross-bedded sand contains the impression of the skin that entirely envelops the bones, which are nearly all in normal position. The contents of the stomach are also preserved. It will be mounted as in death by the American Museum of Natural History.

Isobases of Post-Algonquin Elevation Across Lakes Michigan and Huron: J. W. Goldthwait.

The results of precise measurements of altitude of the Algonquin beach, during the last four years, are here summarized.

With data collected last summer for the Canadian Geological Survey, isobases of the deformed water-plane are constructed over the region east of Lake Huron and Georgian Bay in Ontario. It is found that at the south end of Lake Huron the Algonquin beach is horizontal, and twenty-five feet above the present lake; that forty or fifty miles north of Sarnia the beach begins to rise towards the north-northeast, at a rate which increases slowly to three feet per mile over Lake Simcoe, and then very rapidly north of Orillia to five feet per mile near the pre-Cambrian border. Beyond that, to North Bay, the warping seems to have been much more irregular.

The attitude of the deformed Algonquin plane, south of the pre-Cambrian boundary in Ontario, is compared with that over the north half of Lake Michigan, three hundred miles away. Isobases drawn across Lakes Michigan and Huron emphasize the close correspondence in the details of post-Algonquin uplifts in these two regions.

Conclusions are drawn as to: (1) The regularity of the uplifts over the Great Lake region, south of the pre-Cambrian border; (2) the southern limit of the uplifts; (3) the original altitude of Lake Algonquin above sea level and (4) the cause of the uplifts.

Sand and Gravel Resources of Nebraska: G. E. Condra.

This paper is now in press. It consists of 210 pages of text and 82 figures in Part 3 of Vol. 3, Nebraska Geological Survey.

The Glacial Character of the Yosemite Valley: F. E. Matthes.

The Yosemite is a stream-worn canyon modified by ice erosion. That it is primarily a product of stream cutting no one familiar with its relations to the rest of the Merced River canyon, and with the position which the latter occupies in the series of great transverse valleys of the Sierra Nevada, will question. That it has been invaded by glaciers, on the other hand, and has to some extent been remodeled by them, is amply attested by the threefold record of glaciation, viz., the moraines, striæ and glacial sculpture in and about the valley. The glacial character of the Yosemite is however by no means equally pronounced throughout: most accentuated at the upper end, it rapidly fades downvalleyward and ultimately vanishes at the lower end. This gradation is explained by the circumstance that the valley lay close to the periphery of the glaciated zone of the Sierra. In earlier glacial times the ice advanced considerably beyond the foot of the valley, but the later glaciations appear to have been more moderate, the ice front seldom reaching down to the "gateway." The lower portion of the valley bears therefore no fresh signs of glaciation, and since the older icework has been considerably obliterated by subaerial erosion, its glacial character can now scarcely be detected except by the trained eye. The upper half of the valley, Tenaya Canyon and the Little Yosemite, on the other hand, having suffered more frequent, more intense and also more recent glaciation, have been extensively remodeled and present today a glacial aspect of the most pronounced and clear cut type.

The disparity between the lower and upper portions of the Yosemite is further heightened by the presence in the latter of a variety of aberrant sculptural features. The ice had to deal here with rock-masses of singularly variegated structure, ranging all the way from the schistose to the massive. Since ice accomplishes most of its work by plucking, its effectiveness as a sculpturing agent is largely determined by the fissility of the materials it attacks. Its action in the Yosemite was therefore necessarily a selective one, guided and controlled locally by the direction, attitude and distribution of the joints. Thus it was permitted to achieve large results where the intensity of the fissuring favored plucking, as in the region about the Cathedral Spires, while it found itself almost powerless against such huge masses of unjointed rock as Mt. Broderick, El Capitan or the Cathedral Rocks. Again, the remarkable wall-like smoothness as well as the orientation of the cliffs over which the waterfalls plunge, reflects the strong directive influence of the rock structure.

List of Papers Read Before the Geological Society of America

Abstracts of these papers have been sent to Science by the secretary of the Geological Society of America.

President Calvin's address, "The Latest Phase of the Pleistocene Problem in Iowa."

Physical and Structural

Some Distinctions between Marine and Terrestrial Conglomerates: JOSEPH BARRELL.

The Chemistry of the Pre-Cambrian Rivers: REGINALD A. DALY.

The Primary Origin of the Foliated Structure of the Laurentian Gneisses: FRANK D. ADAMS and ALFRED E. BARLOW.

Relations of Present Profiles and Geologic Structure in the Desert Ranges: CHARLES R. KEYES.

Deflation and the Relative Efficiencies of Erosive Processes under Conditions of Aridity: CHARLES R. KEYES.

Unconformity Separating the Coal-bearing Rocks in the Raton Field, New Mexico: WILLIS THOMAS LEE.

Evidence that the Appalachian and Central Coal Fields were once Connected across Central Kentucky: ARTHUR M. MILLER.

The Bearing of the Tertiary Mountain Belt upon the Origin of the Earth's Plan: FRANK BURSLEY TAYLOR.

On Faults: HARRY FIELDING REID.

Mass Movements in Tectonic Earthquakes: HARRY FIELDING REID.

The Alaskan Earthquake of 1899: LAWRENCE MARTIN.

A Recent Landslide in a Shale Bank near Cleveland accompanied by Buckling: FRANK R. VAN HORN.

The Volcano Kilauea: C. H. HITCHCOCK.

Mt. Pelé of Martinique and the Soufrière of St. Vincent in May and June, 1908: EDMUND OTIS HOVEY.

Glacial

Multiple Glaciation in New York: H. L. FAIRCHILD.

Glacial Waters West and South of the Adirondacks: H. L. FAIRCHILD.

Correlation of the Hudson and the Ontarian Glacier Lobes: H. L. FAIRCHILD.

Pleistocene Features in Northern New York: H. L. FAIRCHILD.

Pleistocene Geology of the Southwestern Slope of the Adirondacks: W. J. MILLER.

Weathering and Erosion as Time Measures: FRANK LEVERETT.

The Glacial Phenomena of Southeastern Wisconsin: WM. C. ALDEN.

Concerning Certain Criteria for Discrimination of the Age of Glacial Drift Sheets as Modified by Topographic Situation and Drainage Relations: WM. C. ALDEN.

Lake Ojibwa, the Last of the Great Glacial Lakes: A. P. COLEMAN.

Glacial Erosion on Kelley's Island, Ohio: FRANK CARNEY.

Interglacial Epochs: ALBRECHT PENCK.

Stratigraphic

The Chalk Formations of Northeast Texas: C. H. GORDON.

Geologic History of the Ouachita Region: E. O. ULRICH.

Some Results of an Investigation of the Coastal Plain Formations of the Area between Massachusetts and North Carolina: WM. BULLOCK CLARK.

The Geologic Relations of the Cretaceous Floras of Virginia and North Carolina: EDWARD W. BERRY.

Occurrence of the Magothy Formation on the Atlantic Islands: ARTHUR BARNEVELD BIBBINS.

Erosion Intervals in the Tertiary of North Carolina and Virginia and Their Bearing upon the Distribution of the Formations: BENJAMIN L. MILLER.

The Character and Structural Relations of the Limestones of the Piedmont in Maryland and Virginia: EDWARD B. MATHEWS and J. S. GRASTY.

Recurrence of the Tropidoleptus Fauna and the Geographic Range of Certain Species in the Chemung of Maryland: CHARLES K. SWARTZ.

The Geological Distribution of the Mesozoic and Cenozoic Echinodermata of the United States: WM. BULLOCK CLARK and M. W. TWITCHELL.

On the Age of the Gaspé Sandstone: HENRY S. WILLIAMS.

Revision of the Paleozoic Systems in North America: E. O. ULRICH.

The Aftonian Sands and Gravels in Western Iowa: B. SHIMEK.

An Aftonian Mammalian Fauna: S. CALVIN.

The Brachiopod of the Richmond Group: A. F. FOERSTE.

Areal

The Trap Sheets of the Lake Nipigon Basin: ALFRED W. G. WILSON.

Reconnaissance in Arizona and Western New Mexico along the Santa Fé Railroad: N. H. DARTON.

Geologic Studies in the Alaska Peninsula: WALLACE W. ATWOOD.

Our Present Knowledge of the Oklahoma Red Beds: C. N. GOULD.

Paleontologic

The Fauna of the Glen Park Formation: Stuart Weller.

Petrologic

Some Features of the Wisconsin Middle Devonic: H. F. Cleland.

A Classification of Crystals based upon Seven Fundamental Types of Symmetry: Charles K. Swartz.

Quartz as a Geologic Thermometer: Fred. E. Wright and E. S. Larsen.

The Use of "Ophitic" and Related Terms in Petrography: Alexander N. Winchell.

Ice-borne Bowlder Deposits in mid-Carboniferous Marine Shales: Joseph A. Taff.

Chemical Composition as a Criterion in Identifying Metamorphosed Sediments: Edson S. Bastin.

Petrography of the South Carolina Granites (Quartz Monzonites): T. L. Watson.

Physiographic

Tertiary Drainage Problems of Eastern North America: Amadeus W. Grabau.

Pre-Glacial Drainage in Central New York: H. L. Fairchild.

Some Physiographic Features of the Shawangunk Mountains: George Burbank Shattuck.

Nantucket Shorelines III.: F. P. Gulliver.

Nantucket Shorelines IV.: F. P. Gulliver.

Note on Striations and U-Shaped Valleys Produced by other than Glacial Action: Edmund Otis Hovey.

Cartographic

Paleogeography of North America: Charles Schuchert.

Historical Notes on Early State Surveys: George P. Merrill.

Economic

The Iron Ores of Maryland: Joseph T. Singewald, Jr.

The Shortage of Coal in the Northern Appalachian Field: I. C. White.

Symposium on Correlation

Principles of Pre-Cambrian Correlation: C. R. Van Hise.

The Basis of Pre-Cambrian Correlation: F. D. Adams.

Evolution of Early Paleozoic Faunas in Relation to Their Environment: C. D. Walcott.

Physical and Faunal Evolution of North America in the late Ordovicic, Siluric and Devonic Time: A. W. Grabau.

Correlation of Middle and Upper Devonian and Mississippian Faunas of North America: Stuart Weller.

Physical and Faunal Changes of Pennsylvanian and Permian in North America: G. H. Girty.

The Upper Paleozoic Floras, Their Succession and Range: David White.

Environmental Relations of the Early Vertebrates: S. W. Williston.

Environment and Relations of the Cœnozoic Mammalia: H. F. Osborn.

Succession and Distribution of Later Mesozoic Invertebrate Faunas: T. W. Stanton.

Conditions Governing the Evolution and Distribution of Tertiary Faunas: W. H. Dall.

Environment of the Tertiary Faunas of the Pacific Coast: Ralph Arnold.

Succession and Range of Mesozoic and Tertiary Floras: F. H. Knowlton.

Physical Geography of the Pleistocene with Special Reference to Conditions Bearing on Correlation: R. D. Salisbury.

Origination of Self-generating Matter and the Influence of Aridity upon Its Evolutionary Development: D. T. MacDougal.

Diastrophism as the Ultimate Basis of Correlation: T. C. Chamberlin.

Relationship of the Pennsylvanian and Permian Faunas of Kansas and Their Correlation with Similar Faunas of the Urals: J. W. Beede.

Glacial Character of the Yosemite Valley: François Matthes.

Age and Geologic Relations of the Sankaty Beds, Nantucket: W. O. Crosby.

Age and Relations of the Sankaty Beds: H. W. Shimer.

The Mills Moraine with some Discussion of the Glacial Drainage of the Longs Peak (Colo.) District: Edward Orton, Jr.

List of Papers Read before the Association of American Geographers

A short account was sent to Science by the secretary of the Association of American Geographers.[4]

President Gilbert's address, "Earthquake Forecasts."

Professor Albrecht Penck gave a lecture on "The Relation between Climate, Soil and Man," on Thursday evening, December 31.

Round Table Conference on Geography for Secondary Schools: Richard Elwood Dodge.

[4] Vol. XXIX., pp. 273–275.

Some Undescribed Features of the Yellowstone National Park: WILLIAM LIBBEY.

Accumulation of Inherited Features in Shorelines of Elevation: J. W. GOLDTHWAIT.

The Origin of Loess Topography: G. E. CONDRA.

The Stream Robbery on which the Belle Fourche Reclamation Project is Based: N. H. DARTON.

Delta Form and Structure of the Thames River Terraces, Connecticut: F. P. GULLIVER.

On the Elements of the Surface Sculptured by Valley Glaciers: WILLIAM HERBERT HOBBS.

Existing Glaciers of the Western Hemisphere: O. D. VON ENGELN.

Map Criticism: CYRUS C. ADAMS.

The Topographer's A B C of Land Forms: FRANÇOIS E. MATTHES.

The Principles of Topographic Delineation: FRANÇOIS E. MATTHES.

The Topographic Base Map of Alaska: ALFRED H. BROOKS.

The Requisites of a School Wall Map: J. PAUL GOODE.

How may the Teaching of Geography in Elementary Schools be Improved? C. T. MCFARLANE.

On Apparatus for Instruction in the Interpretation of Maps: WILLIAM HERBERT HOBBS.

Three Gatherings of Geographic Interest: ALBERT PERRY BRIGHAM.

Status of the Magnetic Survey of the Earth: L. A. BAUER.

A Reconnaissance in the Arctic Slope of Alaska: ERNEST DE KOVEN LEFFINGWELL.

The Climate of Cuba: HENRY GANNETT.

The Temperature at Great Heights above the American Continent: A. LAWRENCE ROTCH.

The Cyclonic Unit in Climatological Investigations: R. DEC. WARD.

The Climate of the Historic Past: ELLSWORTH HUNTINGTON.

Origin of Civilization Through Intermittency of Climatic Factors: J. RUSSELL SMITH.

The National Forest Policy: HERBERT A. SMITH.

A Proposed Ecological Survey in Illinois: HENRY C. COWLES.

Decrease in Population in the Plateau Region of Central New York: RALPH S. TARR.

Locations of Towns and Cities in Central New York: RALPH S. TARR.

Some Anthropogeographic Effects of Glacial Erosion in the Alps: N. M. FENNEMAN.

Results of Recent Census of Cuba: HENRY GANNETT.

The Anthropography of Some Great Cities: MARK JEFFERSON.

The Capacity of the United States for Population: ALBERT PERRY BRIGHAM.

The Reservoir Systems of Flood Protection in the Light of the Recent Floods of the Mississippi River: ROBERT M. BROWN.

Geographical and Other Influences Affecting the Pottery Industry of Trenton, N. J.: RAY HUGHES WHITBECK.

Geographical Influences in the Development of Ohio: FRANK CARNEY.

Trade Routes in the Economic Geography of Bolivia: ISAIAH BOWMAN.

The Geography of Wisconsin: LAWRENCE MARTIN.

The Geographic Distribution of Culture: MARK JEFFERSON.

The Influence of the Precious Metals on American Exploration, Discovery, Conquest and Possession: GEORGE DAVID HUBBARD.

Some Practical Results of the Ninth International Geographical Congress: H. G. BRYANT.

A Remarkable Glacial River and Its Modern Representative: F. B. TAYLOR.

The Baltimore meeting was one of great interest to geologists and geographers, not only on account of the large number of papers presented, many of which had to be read by title, but also because there were so many opportunities to meet men from different sections of the country and to discuss and compare individual fields of work, without which great advance in science can not be made. Great credit should be given to the members of the Geological Department of Johns Hopkins University for the arrangements of the details of the meeting.

F. P. GULLIVER,
Secretary Section E

SOCIETIES AND ACADEMIES

TWENTY-FIFTH MEETING OF THE CHICAGO SECTION OF THE AMERICAN MATHEMATICAL SOCIETY

THE twenty-fifth meeting of the Chicago Section of the American Mathematical Society was held at the University of Chicago on Friday and Saturday, April 9 and 10, 1909. The attendance upon the various sessions numbered over sixty, including forty-six members of the society. On Friday evening forty members dined together in the café of the university commons, and discussed informally various topics of interest, including the plans for the meeting of the British Association for the Advancement of Science to be held in Winnipeg this summer, and the next International Congress of Mathematicians to be held in England in 1912.