

SCIENCE.

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FRIDAY, JANUARY 18, 1895.

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THE BALTIMORE MEETING OF THE GEOLOGICAL SOCIETY OF AMERICA.

THE seventh annual meeting was held in Baltimore, December 27, 28 and 29, in the geological rooms of Johns Hopkins University.

The first session took place at 10 A. M., December 27, and was presided over by President Chamberlin. The Society was welcomed by President Gilman, of the University, who made a graceful and cordial address, that was warmly received. Presi-

dent Chamberlin in reply expressed the feelings of the members in a few felicitous words. A printed report of the Council was distributed, reviewing the events of the year. B. K. Emerson and J. S. Diller were elected an auditing committee. The results of the ballot for officers were as follows:

President, N. S. SHALER.

1st Vice President, JOSEPH LE CONTE.

2d Vice President, C. H. HITCHCOCK.

Secretary, H. L. FAIRCHILD.

Treasurer, I. C. WHITE.

Councillors, R. W. ELLS, C. R. VAN HISE.

Messrs. Clements, Cobb, Hopkins, Hubbard and Spurr were elected fellows.

The constitution was so amended that the qualifications for fellows shall hereafter be as follows, geographical location in North America being no longer a requisite, "Fellows shall be workers or teachers in geology." An amendment allowing the Treasurer to be elected without limit was also passed. After some announcements by the local committee the Society listened to a memorial of the late Professor George H. Williams, of Johns Hopkins University, and Second Vice President of the Society, by Professor William B. Clark. It was on Dr. Williams' invitation that the Society met in Baltimore and the great loss to the science by his death was the thought uppermost in the minds of all present. Dr. Clark's graceful and touching memorial to his late colleague was appreciated by all

present. Brief additional tributes were also paid by Professor B. K. Emerson, of Amherst, Dr. Williams' first geological teacher and life-long friend; by J. F. Kemp, an old college-mate; by W. S. Bayley, his first student in petrography, and by his friends and colleagues, J. P. Iddings, I. C. White, C. D. Walcott and N. S. Shaler.

A memorial of Amos Bowman, of the Canadian Survey, was then presented by H. M. Ami, after which the Society listened to the reading of papers, as follows:

1. *On Certain Peculiar Features in the Jointing and Veining of the Lower Silurian Limestones near Cumberland Gap, Tenn.* N. S. SHALER, Cambridge, Mass.

The paper described peculiar forms of dolomitic limestone near Smiles, Tenn., in practically undisturbed strata which are ribbed and seamed by minute veins of calcite, in the form of small gash veins. They were regarded as due to some powerful, though local strains in the rock, but the subject was frankly admitted to be an obscure one.

2. *The Appalachian Type of Folding in the White Mountain Range, of Inyo Co., Cal.* CHAS. D. WALCOTT, Washington, D. C.

The White Mountain range, which lies east of the Sierra Nevada, was shown to consist of conformable quartzite and cambrian shales and limestone. The series had been thrown into synclinal folds with intervening eroded anticlines and with a structure which, on the whole, closely reproduces the Appalachian sections of the East.

The paper was discussed by Messrs. Becker, Ami, Willis and Russell, after which recess was taken until the afternoon session.

3. *New Structural Features in the Appalachians.* ARTHUR KEITH.

The paper reviewed the old generalizations of Appalachian structure, analyzed the recently published knowledge, described

new structures, such as fan structure, cross folds, cross zones of shear, a secondary system of folding, the distribution of metamorphism, and advanced a theory to account for their production. According to the theory, the compressive strain which deformed the strata began in the crystalline gneisses and granites, thrust the crystallines against the sediments and by the differential motion along the shear zones produced buttresses around which the chief changes of structure were grouped.

In the discussion which followed, Mr. C. Willard Hayes considered two of the shear zones with the conclusion that the changes in structure were due to differences of rigidity in the sediments when they were thrust against the crystallines.

Mr. Keith replied that the changes of structure extended through the crystallines as well as the sediments, a fact incompatible with a merely passive resistance on the part of the crystallines.

Mr. Bailey Willis argued that the chief structural changes were due to original differences in sediment and in bases of sedimentation. His conclusion was that the sediments moved against a rigid crystalline mass, being actuated by a force acting from the westward, which was due to the isostatic flow of material from beneath the load of sediment.

4. *The Faults of Chazy Township, Clinton County, N. Y.* H. P. CUSHING, Cleveland, O.

That the Lake Champlain region is, structurally, one of faulting without folding, is well known. The structure is well exhibited in Chazy township, which has not heretofore been mapped in detail, except for a small area around Chazy village. Its consideration is of importance, because of its bearing on the structure of the Adirondack region, in which, on account of the lithological similarity of the rocks, the determination of the precise structural rela-

tions is a matter of great difficulty, if not impossibility. The great number of the faults, and the consequent small size of the various faulted blocks, are striking facts.

In discussion C. D. Walcott showed how these faults had led Professor J. Marcou to believe that he had discovered colonies of Trenton fossils in rocks of the Potsdam.

5. *The Formation of Lake-basins by Wind.*

G. K. GILBERT, Washington, D. C.

The paper described the formation of basins in the arid regions of the West, by the erosive action of wind-blown sand upon a shale devoid of vegetation. In time they became filled with water and formed small lakes.

6. *The Tepee Buttes.* G. K. GILBERT and F. P. GULLIVER.

The paper was read by Mr. Gulliver and described a series of conical buttes west of Pueblo, Col. They consist of Pierre shales, surrounding cores of limestone formed of shells of *Lucina*. It is supposed that as the shales were deposited, a colony of lucinas established themselves and grew upward *pari passu*, forming a conical or columnar deposit of limestone, whose greater resistance to erosion has left the buttes in relief.

7. *Remarks on the Geology of Arizona and Sonora.* W J MCGEE, of Washington.

The arid region was described as consisting of north and south mountain ranges with wide valleys between. In Arizona the surface is largely of volcanic rock, in Sonora of Mesozoic limestone. The rivers have definite courses and water in the mountains, but in the valleys they are lost by evaporation and absorption before the ocean is reached. Their valleys were transverse to the mountains and larger valleys because of the general southwesterly dip of the rocks. Buttes near the Gulf of California show slight talus, which fact gives good ground for thinking that the gulf has stood at an altitude, as regards the land, several

hundred feet above its present level in recent geological time, or, in other words, that the land has been depressed by that amount.

8. *Geology of the Highwood Mountains, Montana.* WALTER H. WEED, Washington, D. C., and LOUIS V. PIRSSON, New Haven, Conn.

On account of the illness of Mr. Weed this paper was not read.

9. *Genesis and Structure of the Ozark Uplift.* CHARLES R. KEYES, Des Moines, Iowa.

On account of the author's absence the paper was not read.

10. *The Geographical Evolution of Cuba.* J. W. SPENCER, Washington, D. C.

The description of the physical geography of Cuba and of the adjacent submerged banks was given. Exclusive of a few areas locally older, the apparent basement is composed of volcanic rocks of Cretaceous or slightly earlier date. These are succeeded by fossiliferous Cretaceous sands, etc., and limestone greatly disturbed. The Eocene and Miocene deposits form a physical unit, and are composed mostly of limestone having a thickness of from 1,900 to 2,100 feet. The Pliocene period was mostly one of high elevation, accompanied by a very great erosion. At the close of the Pliocene period the Matanzas subsidence depressed the island so as to leave only a few small islets, and permit of the accumulation of about 150 feet of limestones. Then followed the great Pleistocene elevation with the excavation of great valleys, the lower portions of which are now fjords reaching in one case at least to 7,000 feet in depth before joining the sea beyond. The elevation was followed by the Zapata subsidence, reducing the island to smaller proportions than to-day, and permitting the accumulation of the loams and gravels like the Columbia of the continent. The subsequent minor undulations are also noted, as shown

in terraces and recent small cañons now submerged. Also the modern coralline formations and harbors are notable.

On the completion of the paper the Society adjourned its business session until the following morning.

In the evening many members attended Professor Wm. Libbey's lecture on Greenland, and afterwards the reception which was hospitably tendered the visiting societies by the Johns Hopkins University in McCoy Hall. On reassembling Friday morning the council presented some minor points of business, and Mr. J. S. Diller, the chairman of the committee on photographs, read his annual report. It showed that some 1,200-1,500 photographs of geological phenomena and scenery had been presented to the Society, the same being on exhibition in the hall. The negatives of the U. S. Geol. Survey in many instances and also those of not a few geologists have been made accessible to the fellows for prints at cost. Mr. Diller finally tendered his resignation, which was accepted with regret. Mr. G. P. Merrill, of the U. S. National Museum, was appointed to the vacancy. The committee now consists of G. P. Merrill, W. M. Davis and J. F. Kemp.

The first paper on the programme was—

11. *Observations on the Glacial Phenomena of Newfoundland, Labrador and Southern Greenland.* G. FREDERICK WRIGHT. Oberlin, Ohio.

Note was made of the direction of the glacial scratches in Newfoundland and of the evidences of a preglacial elevation of the island; also of the contrast between the flowing outlines of the coast range of mountains in Labrador and the jagged character of the coast range of Southern Greenland. A description was also given of the projection of the inland ice which comes down to the coast near Sukkertoppen, in Lat. 65° 50', and of the phenomena which indicate the former extension of the Greenland ice

far beyond its present boundaries. Still, the bordering mountains were never covered with ice.

12. *Highland Level Gravels in Northern New England.* C. H. HITCHCOCK, Hanover, N. H.

Recent observations prove the existence of a glacial lake in the basin of Lake Memphremagog, whose beaches exceed a thousand feet above sea level, and others 1,500 feet above sea level in northern New Hampshire. The author wished to present a preliminary notice of what may prove to be of great service in a more exact definition of glacial work in New England and Canada.

The paper was discussed by Professor J. W. Spencer, who spoke of his own studies in the same region.

During the reading of the following six papers the petrographers and mineralogists adjourned to the room above and listened to the reading of papers of a petrographic character, as subsequently outlined. The principal session then listened to the following:

13. *Variations of Glaciers.* HARRY FIELDING REID.

The paper called attention to the desirability of keeping accurate records of the movements of glacial ice wherever possible. A committee was appointed to further this movement at the Geological Congress in Zurich last summer, and the writer urged the importance of the work, especially as regards our western glaciers.

14. *Discrimination of Glacial Accumulation and Invasion.* WARREN UPHAM, Somerville, Mass.

The accumulation of ice-sheets by snow-fall on their entire area was discriminated from an advance or invasion by the front of the ice, extending thus over new territory. The former condition is shown to have been generally prevalent, on the gla-

ciated portions of both North America and Europe, by the occurrence of comparatively small areas of ice accumulation beyond the extreme boundaries of the principal ice-sheets. The latter condition, or ice invasion, is indicated on the outer part of the drift-bearing area eastward from Salamanca, N. Y., through Staten and Long Islands, Martha's Vineyard and Nantucket, where the soft strata beneath the ice were dislocated and folded.

15. *Climatic Conditions Shown by North American Interglacial Deposits.* WARREN UPHAM, Somerville, Mass.

During the times both of general accumulation and growth of the ice-sheets and of their final recession, fluctuations of their borders were recorded in various districts by forest trees, peat, and molluscan shells, enclosed in beds underlain and overlain by till. Such fluctuations, while the ice accumulation was in progress, enclosed chiefly arctic or boreal species; but when the ice was being melted away, in the Champlain epoch, the remains of the flora and fauna thus occurring in interglacial beds, as at Toronto and Scarboro', Ont., may belong wholly to temperate species, such as now exist in the same district. The cold climate of the Ice age appears thus to have been followed by a temperate Champlain climate close upon the waning ice-border.

16. *Glacial Lakes in Western New York and Lake Newberry, the Successor of Lake Warren.* By H. L. FAIRCHILD, Rochester, N. Y.

The paper presented evidence that the finger lakes of central New York were all pre-glacial in character and that during the presence of the ice-sheet at their outlets they were backed up and discharged southward, as is abundantly shown by deltas at various heights on both sides of the present divide. Professor Fairchild cited eighteen glacial lakes from Attica on the west to the Onondaga river valley on the east. These

he has named from important towns now on the sites, as Lake Ithaca for the glacial form of Cayuga lake, which was 35 miles long, 5-10 miles broad and 1100 feet deep. It has been long known that when the ice covered western New York the great lakes discharged at Chicago to the Mississippi and the great lake formed by them is called Lake Warren, and has left a good beach. At a much later stage, when the Mohawk was uncovered, the waters ran to the Hudson, and the great lake on the site of Ontario has been called Lake Iroquois. The intermediate stage between these two, when the discharge of the water covering western New York was through the low pass at the south end of Seneca lake through Horseheads near Elmira, Professor Fairchild has called Lake Newberry. The elevations of this and the Chicago pass are such that when allowance is made for the depressed condition of the area at that time, the existence of the lake can be demonstrated.

The paper was discussed by Messrs. McGee and Gilbert, who commended the choice of the new name as felicitous and timely. J. W. Spenser also spoke, but differed with the author in some points.

Meantime, in the upper laboratory (the Williams room), the petrographic section, under the chairmanship of Professor B. K. Emerson listened to

18. *The Relation of Grain to Distance from Margin in Certain Rocks.* ALFRED C. LANE, Houghton, Michigan.

A description of the variation in texture and grain of some quartz diabase dikes of Upper Michigan was given, and the same compared with effusive flows of similar mineral composition. These descriptions were based on series of thin sections of known distance from the margin. Interstitial micropegmatite is primary or pneumatolytic, and the feldspar crystallization begins before that of the augite, continuing until later. The distinction between the

intrusive or dike type and the effusive type was pointed out. The main object of presenting the paper at this time is to elicit the best methods of measuring the coarseness of grain of a rock, the object being to express by some arithmetical or mathematical formula based on statistics, or in some other definite way, the relation of texture to walls and thickness in a dike. The paper elicited considerable discussion by Messrs. Hovey, Kemp, Iddings, Cross, and G. P. Merrill, in which the following points were made; the large size of the phenocrysts in some very narrow dikes; the importance of not measuring minerals of the intratelluric stage; the great variability of circumstances under which dikes cooled, as heated or cold walls, pressure, mineralizers, etc., and the difficulties of getting reliable data of the kind required by Dr. Lane.

19. *Crystallized Slags from Coppersmelting.*

ALFRED C. LANE, Houghton, Michigan.

This paper described (with exhibition of specimens) slags from the cupola furnaces used in coppersmelting, which contained large melilite crystals, between one and two centimeters square, interesting optically and in mode of occurrence. Crystallized hematite was also noted.

The specimens elicited great interest on account of the size and perfection of the crystals.

20. *On the Nomenclature of the fine-grained Siliceous Rocks.* L. S. GRISWOLD, Cambridge, Mass.

The writer described the difficulties met first, in his study of novaculite, and later, in connection with other siliceous rocks, such as cherts, jaspers, etc., in applying definite names. The troublesome characters of opaline, chalcedonic and quartzose silica, as regards the origin of each, presented obstacles both for mineralogic and genetic classification.

This paper elicited an interesting discussion which threatened at times to take

up the whole subject of the classification of rocks. The general feeling seemed to be that rocks could best be named primarily on a mineralogic and textural basis, and that these principles furnished the best solution of the difficulties presented by the paper. The speakers were Messrs. Wolff, Emerson and Lane.

21. *On Some Dykes containing 'Huronite.'*

By ALFRED E. BARLOW, Ottawa. (Read by F. D. ADAMS.)

This paper contained a brief petrographical notice of certain dykes of diabase containing 'Huronite,' as the mineral was originally named by Dr. Thomson, of Glasgow, in his Mineralogy of 1836. Dr. B. J. Harrington's re-examination of this mineral in 1886 showed some very grave errors in Thomson's work and the 'huronite' must simply be regarded as an impure or altered form of anorthite, which has undergone either partial or complete 'saussuritization,' owing to metamorphic action. Certain localities were mentioned north and northeast of Lake Huron, where these dykes have been noted cutting the Huronian as well as the granitoid gneisses usually classed as Laurentian. Mr. A. P. Low, of the Canadian Geological Survey, noticed dykes containing this mineral cutting the Laurentian and Cambrian in the Labrador Peninsula.

22. *The Granites of Pike's Peak, Colorado.*

EDWARD B. MATHEWS, Baltimore, Maryland. (Introduced by W. B. CLARK.)

This paper gave an areal and petrographical description of the granites composing the southern end of the Rampart or Colorado range and showed that great macroscopic variation may result, while the microscopic characters remain monotonously uniform. Four types in all were distinguished, based on the size of phenocrysts and coarseness of grain. The paper was discussed by Whitman Cross and J. P. Iddings, after which the section adjourned to meet again at 4:30 P. M.

About the same time the main section also adjourned for lunch, which was most hospitably served to the visiting societies in the Johns Hopkins gymnasium. High praise is due the local committee for the excellent arrangements. After lunch the society reconvened and the first paper was :

23. *Notes on the Glaciation of Newfoundland.* By T. C. CHAMBERLIN.

The paper brought out the very interesting facts that the glaciation of Newfoundland is local and that the moraines and striæ show that it proceeded from the center of the island to the coast. The drift is all peripheral and can be easily traced to its sources.

24. *The Pre-Cambrian Floor of the Northwestern States.* By C. W. Hall. (Read in the absence of the author by WARREN UPHAM.)

The paper pointed out the distribution of the Pre-Cambrian areas in the territory under investigation so far as it is known at the present time. It then showed by means of records of deep and artesian well borings, within reasonable limits of probability, the depth of the Pre-Cambrian rocks over a considerable area beyond the surface area outlined.

Maps and a series of profiles accompanied the paper.

The paper was discussed by G. K. Gilbert, who called attention to the importance of the results.

25. *A Further Contribution to Our Knowledge of the Laurentian.* FRANK D. ADAMS, Montreal, Canada.

After referring briefly to the author's previous work on the anorthosite intrusions of the Laurentian, the paper gave a condensed account of the results of a study of the stratigraphical relations and petrographical character of the gneisses and associated rocks of the Grenville series in that portion of the protaxis which lies to the north of the Island of Montreal. By means of lan-

tern slides Dr. Adams gave a very graphic account of the region in question. Some thin sections of rocks as large as an ordinary lantern slide were used to illustrate the passage of a massive rock into a crushed and sheared or gneissoid form. The paper formed not only an important contribution to the geology of the region, but to our knowledge of dynamic metamorphism as well. Discussion was reserved until after the reading of the next two.

26. *The Crystalline Limestones, Ophiolites, and Associated Schists of the Eastern Adirondacks.* J. F. KEMP, New York.

After a brief introduction and sketch of what others had done on the subject in hand, the areas of these rocks, especially in Essex county, were outlined and described with geological sections. It was shown that they are generally small, usually less than a square mile; that they consist of (a) white graphitic crystalline limestone, with great numbers of inclusions of silicates, (b) of ophiolites, (c) of black garnetiferous hornblende schists, (d) of lighter quartz schists, and (e) in one area, of closely involved granulite very like the Saxon granulite. The evidence of the plasticity of limestone under pressure was graphically shown by lantern slides. The trap dikes that often cut the limestones were referred to, and the relations with the intrusive gabbros were set forth, and the argument made that the limestones are older than the gabbros and anorthosites of the Norian series, and that they are the remnants of an extended formation which was cut up by these intrusions, metamorphosed largely by them and afterward eroded. A comparison was drawn with those on the western side of the mountains.

27. *The Relations of the Crystalline Limestones, Gneisses and Anorthosites in St. Lawrence and Jefferson Counties, N. Y.* C. H. SMYTH, JR., Clinton, N. Y.

The paper dealt especially with areas in

the towns of Diana, Pitcairn and Wilna, but was really a review of the relations of these rocks in a wider region and was based on extended field experience. Petrographic details were presented of the several kinds of rocks, and especially of the varieties of the anorthosites, which were shown to shade into angite-syenites, and apparently into red gneiss. Many irruptive contacts of anorthosites and limestone were cited and the location of the classic mineral localities of this region was shown to be along these contacts. The same important thesis was worked out as in the preceding two papers, that the great intrusions of the Norian series were later than the gneisses and limestones.

The papers were discussed by Whitman Cross, who called attention to the close parallelism of the geology in the Pike's Peak district of Colorado; and by C. D. Walcott who referred to his own studies in the Adirondacks and similar conclusions to those advanced.

29. *Lower Cambrian Rocks in Eastern California.* CHARLES D. WALCOTT, Washington, D. C.

An account of the discovery of the Lower Cambrian rocks and fauna in the White Mountain range of Inyo County, Cal. See also No. 2 above. This important discovery affords a means of correlating the early Cambrian life in the remote West with those already known in the East.

29. *Devonian Fossils in carboniferous strata.* H. S. WILLIAMS, New Haven, Conn.

The paper described the fauna of the Spring Creek limestone of Arkansas, which lies between the Keokuk-Burlington strata below and the Batesville sandstone above, and is at about the horizon of the Warsaw and Chester of the Lower Carboniferous in the Mississippi Valley. The fossils are closely related to the carboniferous fauna described by Walcott from Eureka, Nev., and by J. P. Smith from Shasta County, Cal.

But certain Devonian forms as *Leiorhynchus quadricostatum* and *Productus lachrymosus* of the New York Devonian are found with them, which are lacking in the Mississippi Valley, but are found in the Devonian of the West. The interpretation was then made, that the Arkansas fossils indicated a Devonian incursion from the westward.

During the reading of this and the succeeding titles the petrographers reconvened in the upper laboratory, as later recorded.

30. *The Pottsville series along the New River, West Va.* DAVID WHITE, Washington, D. C.

This paper was a careful description of the stratigraphy of the series, the determinations being based on the fossils, which evidence was presented in full.

31. *The Cretaceous Deposits of the Northern Half of the Atlantic Coast Plain.* WM. B. CLARK, Baltimore, Md.

The several formations established as a result of a detailed study of the Cretaceous strata of Monmouth county, New Jersey, were shown to have a wide geographical range towards the south. They have been traced throughout the southern portion of that State, while all except the highest members of the series are found crossing Delaware and the eastern shore of Maryland. Several representatives of these formations appear on the western shore, reaching to the banks of the Potomac.

32. *Stratigraphic Measurements of Cretaceous Time.* G. K. GILBERT, Washington, D. C.

The writer described a great series of Cretaceous rocks, 3500-4000 ft. thick, lying in the Arkansas River Valley, west of Pueblo, Colo. They consist of layers of limestone 1 ft. to 1 ft. 6 in. thick, separated by 1 in. of shale—this alternation being uniformly repeated through the whole thickness. The writer argued that frequent continental oscillation from deep to shallow water deposits was unlikely as having caused

the beds, and hence appealed to climatic cycles.

The cycles of a year's changing seasons is too short to account for the limestone; the next longer cycle, the lunar, involves no changes of climate; hence the cycle of the precession of the equinoxes, 21,000 years long, was selected, and allowing four feet of deposit for each cycle, this portion of Cretaceous time was estimated at 21,000,000 years.

There was no discussion, but a very evident feeling of solemnity at the announcement.

33. *Notes on the Cretaceous of Western Texas and Coahuila, Mexico.* E. T. DUMBLE, Austin, Texas.

The author being absent the paper was only read by title.

The main section then adjourned until the presidential address at 7:30 the same evening. Meantime the petrographers listened to

34. *Spherulitic Volcanics at North Haven, Maine.* W. S. BAYLEY, Waterville, Me.

In the *Journal of Geology* a few months ago the late Dr. George H. Williams referred to the existence of old rhyolites on the coast of Maine. The author described very briefly the occurrence of these rocks, and exhibited specimens of them. The specimens showed very perfect spherulites, lithophysæ and all the common features of glassy volcanics. They brought out an interesting discussion regarding the abundance of these rocks along the Atlantic sea-board. J. E. Wolff spoke of their great extent near Boston, and especially at Blue Hill, where the relations with the Quincy granite are a hard problem. A. C. Lane mentioned their frequency in central Maine, as shown by the collections of L. L. Hubbard. T. G. White referred to those near Mt. Desert. J. F. Kemp spoke of recent field and petrographic work in progress on the great areas near St. John, N. B. W. S. Yeates brought up the curious phosphatic spherulites lately

found in Georgia, which closely simulate lithophysæ, and remarks were made on them by W. Cross and J. P. Iddings.

35. *The Peripheral Phases of the Great Gabbro Mass of Northeastern Minnesota.* W. S. BAYLEY, Waterville, Me.

On the northern border of the great gabbro mass in northeastern Minnesota are basic and granulitic rocks whose composition indicates their relationships with the gabbros with which they are associated. The basic rocks are aggregates of the basic constituents of the gabbro. They are characterized especially by the abundance of titanite iron. The granulitic rocks differ from the central gabbro mainly in structure. They consist of aggregates of rounded diorite, hypersthene and plagioclase, all of which minerals are present also in the normal rocks. The basic rocks are probably differentiated phases of the gabbro, of earlier age than the great mass of the normal rock. The granulitic phases are simply peripheral phases. Closely parallel cases were brought out in the discussion as existing in the Adirondacks (by C. H. Smyth, Jr., and J. F. Kemp), and in Quebec (F. D. Adams), where they have been called granulites, augite-syenites and augite gneisses. H. D. Campbell mentioned the same phenomena in similar rocks in Rockbridge county, Virginia, and all the speakers commented on the peculiar development of orthoclase feldspar in the border facies of a gabbro mass.

36. *The Contact Phenomena at Pigeon Point, Minn.* W. S. BAYLEY, Waterville, Me.

The speaker distributed copies of his recent *Bulletin U. S. Geol. Survey*, No. 109, and exhibited a series of specimens which illustrate the peculiar contacts and transition rocks at Pigeon Point. Discussion followed by J. P. Iddings and others.

37. *A New Discovery of Peridotite at Dewitt, 3 miles east of Syracuse, N. Y.* N. H. DARTON. *Petrography of same*, J. F. KEMP.

Mr. Darton described the opening up of this new boss of peridotite in the building of a reservoir. The wall rock is Salina shales, and the geological section of that part of the state was outlined in explanation. J. F. Kemp described the rock as a very fresh peridotite as these rocks go, with perfectly unaltered olivines and a ground mass of small augite crystals, with what was probably originally glass. Gabbroitic segregations were also mentioned containing feldspar. The interest of the rock lies in the fact that it gives much fresher material than that described by Dr. G. H. Williams from Syracuse, in which the larger original minerals were represented only by alteration products. No perovskite or melilite could be found in the Dewitt material.

Professor B. K. Emerson exhibited remarkable pseudomorphs of olivine from a rediscovered though long lost mineral locality in Massachusetts, and corundum with interesting enclosures.

The section then adjourned with the intention of having an exhibition of rock sections the following morning in the same place.

A goodly audience greeted President Chamberlin at 7:30 in the evening for the annual presidential address, the subject being *Recent Glacial Studies in Greenland*. The speaker brought out the distribution of the ice sheet over Greenland, described his observations at Disko Bay and elsewhere and his final location at Lieut. Peary's station, Inglefield Gulf. Many peculiar features of Greenland glaciers were brought out, such as their rampart-like terminal cliffs, their general foliation or banding and enclosed debris, their causeways of morainic material, etc. The glaciation is thought to be now near its maximum extent because just beyond the ice are unglaciated areas and jagged islands that have never been covered. A large series of lantern views followed and brought out still more forcibly

the points of the address. President Chamberlin was listened to with close attention during the two hours occupied, and all thoroughly enjoyed the lecture, but it is nevertheless true that an hour and a quarter, or at most an hour and a half, is about as long as a speaker can wisely keep a general audience.

The Society reassembled in the geological laboratory about ten o'clock for the annual supper. After an excellent menu had been cared for, Professor B. K. Emerson was chosen toastmaster, and by his characteristic sallies, in which he was ably aided by several speakers, resolved his hearers into intermittently active spiracles of mirth upon the lava stream of his wit.

When the Society reassembled on Saturday morning the first paper read was

38. *The Marginal Development of the Miocene in Eastern New Jersey.* WM. B. CLARK, Baltimore, Md.

The deposits which characterize the marginal phase of New Jersey Miocene in Monmouth and Ocean counties were especially discussed. The gravels, sands and clays were considered and their relations shown, together with the occurrence of glauconite in certain areas. The connection of the strata in the northern counties with the highly fossiliferous beds in South Jersey was explained. The paper was discussed by N. H. Darton bringing out some slight divergence of views on the classification of the deposits, in that the discovery of fossils by W. B. Clark had somewhat revised the earlier stratigraphic work.

39. *Sedimentary Geology of the Baltimore Region.* N. H. DARTON, Washington, D. C.

An account of the local geology of Mesozoic and Cenozoic formations and some statements regarding certain unsolved problems in coastal plain geology, illustrated by maps and sections. The sections which passed through the crystallines of the Piedmont plateau and the city of Baltimore

brought out admirably the relations of the later sediments to the older protaxis.

40. *The Surface Formations of Southern New Jersey.* ROLLIN D. SALISBURY, Chicago, Ill.

The surface formations of southern New Jersey, which have often been grouped together under the names, 'Yellow Gravel' and 'Columbia,' are believed to be divisible into five formations, the oldest of which greatly antedates the glacial period. The several formations are unconformable on each other and are believed to have been widely separated in time of origin. These formations were called the (1) Beacon Hill, (2) Canasaucon (the spelling may be wrong), (3) Jamesburg, (4) Trenton and the (5) Keyport. It is impossible as yet to say which are Columbia and which not, but (2) is probably Pleistocene, and formed during ice action on the north. Nothing later than (3) is Columbia. The paper was discussed by Warren Upham.

41. *New Forms of Marine Algae from the Trenton Limestone, with Observations on Buthograptus laxus,* Hall. R. P. WHITFIELD, New York. (The paper was read by E. O. HOVEY.)

Certain fossils from Platteville, Wis., referred years ago by Hall with doubt to the graptolites, were shown to be really articulated, marine algae, and referable to several species. True corallines from the same horizon at Middleville were also described which are much older than any hitherto mentioned members of this group of plants.

42. *On the Honeycombed Limestones in the Bottom of Lake Huron.* ROBERT BELL, Ottawa, Canada. (Read by H. M. AMI.)

The Limestones over a certain region in the bottom of Lake Huron are extensively eroded in a peculiar manner which the writer calls honeycombing and pitting. He described this condition, the area within which it is found, the depth of the water and other conditions most favorable to its pro-

duction and then attempted to account for its origin, enumerating various possible causes which might suggest themselves, and giving the most probable one, namely, a differential solubility of the rock in the presence of slightly acidulated water. Reasons in support of this view were stated. The geological ages and the lithological characters of the various limestones attacked were mentioned in trying to arrive at the conditions which produce the phenomena described. The localization of this form of erosion may be attributed to a slight acidity of the water in that part of Lake Huron, and reasons are given for believing that an acid condition actually exists. In addition to the considerations due to the structure and composition of the rock lying at the bottom of such water, certain external conditions were mentioned as favoring the honeycombing process, which appears to be still in active progress. Examples were given of somewhat similar erosion elsewhere, but the typical honeycombing here described appears to be confined to Lake Huron. The paper was illustrated by specimens and photographs.

43. *On the Quartz-keratophyre and its Associated Rocks of the Baraboo Bluffs, Wisconsin.* SAMUEL WEIDMAN. (Read by J. P. IDINGS.)

In the vicinity of Baraboo, Wisconsin, occur acid porphyritic rocks which correspond chemically with quartz-keratophyres. They exhibit under the microscope fluxion, spherulitic, poicilitic, and other structures of volcanic rocks, and are associated with volcanic breccias which show them to have their origin in a surface flow. They are of Pre-Cambrian age, since they rest upon the upper Huronian quartzite and are overlaid by the Potsdam sandstone and conglomerate. In some portions of the area they have been completely changed to finely foliated sericite schists through the orographic movement which elevated the quartzites to form the Bluffs.

44. *The Characteristic Features of the California Gold Quartz Veins.* WALDEMAR LINDGREN, Washington, D. C.

The writer described the extent and associations of the veins, bringing out the fact that they are in all manner of wall rocks, although especially in the auriferous slates. They were shown to be true fissure veins that cut the walls at all angles, although mostly along the strike. Direct issue was taken with the view that they are replacements of limestone or related rock, for it was shown that while the veins are siliceous and filled with quartz, the wall rocks have very generally suffered carbonatization. Finally the source of the gold was placed in deep seated regions, whence it had been brought by uprising solutions.

On the conclusion of the paper, the customary votes of thanks were passed to the local committee, to the Johns Hopkins University and to others whose efforts had made the session a success. The next place of meeting, a year hence, has not been settled. On the whole, the meeting was the best attended and most interesting and successful yet held.

J. F. KEMP.

COLUMBIA COLLEGE.

THE BALTIMORE MEETING OF THE AMERICAN MORPHOLOGICAL SOCIETY.

THE Society met on Thursday morning in the lecture room of the Chemical Building and again upon Friday afternoon, adjourning for the intermediate sessions of the Society of Naturalists. In the absence of Professor C. O. Whitman, President of the Society, Professor W. B. Scott, of Princeton, Vice-President, took the chair. Among those present at these sessions besides those who presented papers were Alpheus Hyatt, Edward S. Morse, Edward D. Cope, Samuel F. Clarke, C. F. Herrick, Henry F. Osborn, E. A. Andrews, W. H. Dall.

The officers elected for the year 1895 were:

President—Professor Edmund B. Wilson, Columbia College.

Vice-President—Professor W. B. Scott, Princeton College.

Secretary and Treasurer, Dr. G. H. Parker, of Harvard University.

The following are abstracts of the papers presented:—

Dr. C. W. Stiles, of the U. S. Agricultural Bureau, presented the first paper upon *Larval Stages of an Anoplocephaline Cestode* and exhibited specimens of *Distoma* (*Polyorchis*) *molle* (Leidy, '56), S. & H., '94; of *Diocetophyme gigas*, Rud., and of *Distoma tricolor*, S & H. Five hundred of the last named species are ready for distribution as exchanges to college zoölogists.

Professor William A. Locy, of Lake Forest University, presented the first paper on *Primitive Metamerism in Selachians, Amphibia and Birds*. It has been generally assumed that the metameric divisions of the Vertebrates depend primarily on the middle germ-layer, and that whenever they appear in the ectoderm they are secondarily moulded over the mesodermic segments. This proposition is not supported by these observations. We find in very young embryos of amphibians and birds, primitive metameric divisions which effect the entire epiblastic folds and in Selachians extend also out into the germ-ring. They are present before any protovertebræ are formed and are most clearly marked in the border regions. These segments become later coincident with the so-called neuromeres, but it is to be noted that they are by no means confined to the neural tube. The time-honored designation 'metamerism of the head' should be interpreted as meaning regional metamerism not as a different form of segmentation from that which affects the trunk region. This paper was discussed and the accuracy of the author's observations was questioned because of the conspicuous character which he assigned to