nection it is important to note that in the summary to this series of papers Dr. Noyes expresses his conviction that "the ionization of salts, strong acids and strong bases is a phenomenon primarily determined not by specific chemical affinities, but by electrical forces arising from the charges on the ions, that it is not affected, excepting in a secondary degree by chemical mass action, but is regulated by certain general, comparatively simple laws, fairly well established empirically, but of unknown theoretical significance, and that, therefore, it is a phenomenon quite distinct in almost all aspects from the phenomenon of dissociation ordinarily exhibited by chemical substances, including that of the ionization of weak acids and bases."

It is scarcely necessary to emphasize the importance of such a study of aqueous solutions as Professor Noyes has inaugurated, for, in addition to the direct physical and chemical significance of the knowledge thus to be gained, every one will recognize the importance of such investigations in their bearing on certain phases of chemical technology and chemical geology.

E. C. FRANKLIN
STANFORD UNIVERSITY

SCIENTIFIC JOURNALS AND ARTICLES

THE opening (January) number of volume 9 of the *Transactions of the American Mathematical Society* contains the following papers:

F. L. GRIFFIN: "Certain periodic orbits of k finite bodies revolving about a relatively large central mass."

G. H. DARWIN: "Further note on Maclaurin's spheroid."

O. D. KELLOGG: "Potential functions on the boundary of their regions of definition."

O. D. KELLOGG: "Double distributions and the Dirichlet problem."

G. A. MILLER: "Groups defined by the orders of two generators and the order of their commutator."

E. J. WILCZYNSKI: "Projective differential geometry of curved surfaces. (Second memoir.)"

The February number (volume 14, number 5) of the *Bulletin of the American Mathematical Society* contains: Report of the First Regular Meeting of the Southwestern Section, by O. D. Kellogg; "Note on the Composition of Finite Rotations about Parallel Axes," by Alexander Ziwet; "On an Integral appearing in Photometry," by A. S. Chessin; "Hermitian Forms with Zero Determinant," by J. I. Hutchinson; "Two Tetraedron Theorems," by H. S. White; "Singular Points of a Simple Kind of Differential Equation of the Second Order," by C. A. Noble; "The Theory of Electricity" (review of Abraham's Theorie der Elektrizität, volume 2), by E. B. Wilson; "Notes;" "New Publications."

The March number of the *Bulletin* contains: Report of the Fourteenth Annual Meeting of the Society, by F. N. Cole; Reports of the December Meeting of the Chicago Section and of the Joint Meetings at Chicago of Mathematicians and Engineers, by H. E. Slaught; Report of the Fifty-eighth Meeting of the American Association for the Advancement of Science, by G. A. Miller; "Shorter Notices" (Larmor's Memoir of G. H. Darwin, by E. W. Brown; Lambert's Computation and Mensuration, by E. W. Ponzer; Schütte's Darstellende Geometrie für Gymnasien, by Virgil Snyder; Thompson's Petrus Peregrinus, by F. Cajori; Broggi's Traité des Assurances de la Vie, by G. H. Ling); "Notes;" "New Publications."

SOCIETIES AND ACADEMIES

THE SOCIETY OF CHEMICAL INDUSTRY

IN place of the regular meeting of the Society of Chemical Industry on January 24, a joint meeting of the Society of Chemical Industry, the American Chemical Society, the American Electro-Chemical Society, the Chemists' Club of New York City and the Verein Deutscher Chemiker was held for the presentation of the Perkin Medal to Mr. J. B. F. Herreshoff. Mr. George C. Stone was in the chair.

After a few introductory remarks by the chairman, in which he emphasized the importance of stimulating chemical research by proper recognition, and bringing to the attention of the audience the life-work of Sir Perkin, who not only discovered a new product, but worked out its manufacture, developed

the method of using the same and sold it, he requested the secretary to read the report of the Perkin Medal Committee, and to speak about the meaning and importance of the Perkin Medal.

The secretary then delivered his address, "History of the Perkin Medal and Report of the Committee for its Presentation."

The chairman then called upon Professor M. T. Bogert to speak on the subject allotted to him, "Stimulus given Chemical Research and Invention by Suitable Recognition."

Then Mr. H. A. Metz followed with his address on "Services rendered by the Chemist in the Development of the Coal Tar Industry," and then Professor S. A. Tucker spoke on "Electricity as applied to Industrial Chemistry."

Professor Charles F. Chandler then presented the Perkin Medal to Mr. J. B. F. Herreshoff, with an appropriate and extremely interesting address.

Mr. Herreshoff in a well-chosen speech acknowledged the honor conferred upon him.

The ceremonies were concluded by an address by Dr. William H. Nichols, in which he described the intimate association between the recipient of the Perkin Medal and himself for the last thirty years. He also read a cable which he had just received from England, in which Lady Perkin and her daughters congratulate Mr. Herreshoff on receiving the medal.

Mr. J. B. F. Herreshoff was born in Bristol, R. I., and is a brother of the well-known yacht designer and builder; received his college education at Brown University and in 1870 was assistant instructor in chemistry for two years. After that he was chemist with Professor Charles A. Seely in New York and after that chemist for the Silver Spring Dyeing Establishment and chemist with William Habershaw at New York. In 1875 he was made Superintendent of the Laurel Hill Chemical Works of W. H. Nichols & Co. In 1890 he was made vice-president of the corporation of the Nichols Chemical Co. In 1900 he became the vice-president of the Nichols Copper Co. and consulting engineer of the General Chemical Co., and is still occupying these positions.

H. Schweitzer,
Secretary

THE CHEMICAL SOCIETY OF WASHINGTON

The 180th regular meeting of the Washington Section of the American Chemical Society was held at the Cosmos Club on Friday, February 13, 1908, at 8 P.M. The attendance was 44. The following papers were presented:

E. T. Allen: "The Rôle of Water in Tremolite and certain other Minerals."

H. C. McNeil: "Some Metallic Salts of Guaiacol."

F. W. Smither: "A Sample of Ferro-phosphorus."

J. A. LeClerc,
Secretary

THE AMERICAN CHEMICAL SOCIETY. NEW YORK SECTION

The fifth regular meeting of the session of 1907–8 was held at the Chemists' Club, 108 West 55th Street, on February 7.

Professor Chas. Baskerville read the first of a series of three papers relating to the chemical department of the College of the City of New York, his title for the evening being "Laboratory Organization."

Dr. A. S. Cushman, of the Office of Public Roads, read a paper on "The Extraction of Potash from Feldspathic Rocks."

The electrolytic method described was of scientific value only, but Dr. Cushman hoped it might lead to some commercially possible process. He described a practical method of rendering the rock itself available for fertilizing purposes and finally called attention to the great advantage this country would derive from having a cheap domestic source of potash.

C. M. Joyce,
Secretary

THIRTEENTH ANNUAL WINTER MEETING OF THE VERMONT BOTANICAL CLUB

This meeting was held January 17, 18, 1908, at the University of Vermont, Burlington. The following papers were read:

"Progress in the Forestry Movement," by Dr. L. R. Jones, University of Vermont.

"Notes on Moss," by Miss Towle, Edmunds High School.

"Seven Giant Puffballs," by Mrs. Lord, Burlington.

"Questions concerning Weed Distribution," by L. C. Cook, University of Vermont.

"The Fruits of some Shrubs and Trees of Vermont," by F. V. Rand, University of Vermont.

"Local Observations on Effect of Altitude on Vegetation," by Joseph A. Chapin, Middlesex.

"The Botrychiums of Dorset," by Allan Bourn, Yonkers, N. Y.

"*Oxalis Brittonæ* at Pownal," by Dr. Tracy Hazen, New York.

"Discovery of the Water Chickweed in Vermont," by Richard W. Woodward, Yantic, Conn.

"The Late Alphonso Wood," by Miss Alice E. Bacon, Bradford.

"The Fernery," by Miss Elizabeth Billings, Woodstock.

"Reproduction in Bread Mold," by L. R. Whitcomb, Edmunds High School.

"A New Station for the Green Dragon," by Geo. L. Kirk, Rutland.

"Soil Acidity in Relation to Flora," by H. A. Edson, University of Vermont.

"Some Rare Plants on Mount Horrid," by D. L. Dutton, Brandon.

"A Bacterial Rot of the Muskmelon," by N. J. Giddings, University of Vermont.

"A Trip to Mount Mitchell," by W. W. Eggleston, Rutland.

"Mount Washington" (illustrated with lantern), by John W. Ritchie, Jr., Boston.

Professor M. L. Fernald, Gray Herbarium, Harvard University, was the guest of the club and delivered a public lecture on "The Flora of the Shickshock Mountains and the Gaspe Coast" (illustrated with lantern).

The following were elected officers for the ensuing year:

President—Ezra Brainerd, Middlebury College.
Vice-president—Cyrus G. Pringle, University of Vermont.
Secretary—L. R. Jones, University of Vermont.
Treasurer—Mrs. N. F. Flynn, Burlington.

The next meeting will be in conjunction with the Federation of New England Natural History Societies at Mt. Washington about July first.

The club has an active membership of nearly 200 and publishes an annual bulletin, of which the third number will appear in April.

L. R. JONES,
Secretary

THE GEOLOGICAL SOCIETY OF WASHINGTON

AT the 196th meeting of the Society, held at the Cosmos Club, on Wednesday evening, November 27, 1907, under informal communications, Mr. Willis T. Lee announced the discovery of fossils in the red beds of the foothills region of New Mexico. Collections were made near Rowe, a station of the Atchison, Topeka and Santa Fe Railway in the Pecos Valley and also at a point about five miles northwest of Las Vegas, near the base of the red sediments which are here 5,000 feet or more in thickness. The fossils have been identified by G. H. Girty, of the United States Geological Survey, and found to belong to the fauna characteristic of the lower group of the Pennsylvanian (Carboniferous) series of central New Mexico, now known as the Magdalena group. These collections indicate that a part, at least, of the so-called "Permo-Triassic Red Beds" of the eastern Rocky Mountains are of Pennsylvanian age.

Professor G. D. Harris, of Cornell University, presented informally a summary of the results of his investigations of the salt domes of Louisiana and Texas. The Mississippi embayment is a huge "*pitching trough*," pitching southward, and in the course of its development, differential uplift or settling of one of the planes has given rise to lines of weakness in two directions, northeast-southwest and northwest-southeast. The points of intersection of such lines generally occur at sharp anticlines and there saturated salt solutions could easily escape upwards into the overlying later formations. But salt waters, if saturated at high temperatures, precipitate, on cooling, a portion of their dissolved salt, and the force which can be exerted by crystallizing salt is of about the same order of magnitude as its ultimate strength. On testing it was found that a 4-inch cube of salt withstands a pressure of 50,000 pounds without even cracking, and the inference is therefore warranted that the crystallizing salt can lift at least 3,000 feet of Tertiary and Quater-

nary sands and clays. Clays and sands, however, have a density of about 2.5, while that of salt is 2.16, and the expansive force of the salt from the crystallizing source will be very circumscribed and the salt domes local in character. The domes in both Texas and Alabama are of similar origin, though some may consist in large part of gypsum, limestone or sulphur as well as of salt. Some of these cores of salts have been pushed up through Cretaceous strata, others through Eocene and many into the Quaternary; they are distinctly exogenous in character and may be termed foreign intrusions. Similar occurrences of salt domes have been noted at Ischel in Algeria and seemingly in the Salt Range of India. The material for these salt domes is considered to have been taken up by the circulating solutions from the late Paleozoic or Mesozoic salt and gypsum layers which constitute the floor of the pitching trough of the Mississippi embayment. The arching or doming up of pervious and impervious strata by the crystallizing salt domes facilitates the segregation of the oil and gas which are also found in this region.

Regular Program

The Occurrence of the Silurian in Western America: Mr. E. M. Kindle.

Mr. Kindle reviewed briefly the evidence on which many geologists have questioned the reported occurrences of Silurian strata in the western states. Three localities which had come under the speaker's observation were cited from which distinctly characteristic Silurian faunas had been obtained. These localities are in the Wasatch Mountains of Utah, in southeastern Alaska and in northeastern Alaska. The bearing of these observations on one of the problems of Silurian paleogeography was pointed out.

The Origin of Limestone Breccias: Mr. Marius R. Campbell.

There is such a common tendency to ascribe all brecciation of rocks to movement, that the writer takes this opportunity to describe the formation of a solution breccia which, fortunately, he was able to observe in various stages of its development near Fort Stanton, New Mexico. The exposure is in a narrow box canyon cut in horizontally bedded carboniferous limestone.

The initial stage of the process consisted of a solution channel formed by a stream of running water. From this channel the limestone has been dissolved along the bedding planes for varying distances, amounting, in some cases, to as much as fifty feet. As the limestone is variable in composition, the cavities are irregular, extending in many places vertically through the beds, probably along incipient joint cracks. In some places this action had gone on until the more siliceous portions of the rock remained as a mere honeycomb, filling a cavity possibly 100 feet long and 8 or 10 feet high. Subsequently the rock had been eaten through and droppings had filled the cavern with an irregular mass of subangular fragments. The final stage showed this mass recemented by the calcareous waters into a solid breccia completely filling the cavern in which it was formed.

Several examples were seen where this process had gone on to its culmination, and in such cases one could follow the bedding of the limestone above and below and on both sides of the original cavern, but within all trace of bedding had been obliterated. If this process were repeated many, many times, it is conceivable that it might result in the complete brecciation of certain beds which were more soluble than the rocks above and below and thus give rise to such a formation as the "sheet ground" of the Joplin zinc and lead district.

A Recent Vein at Ojo Caliente, New Mexico: W. Lindgren.

Ojo Caliente is a small village situated in northern New Mexico, about fifteen miles west of Barranca station on the Denver and Rio Grande road. Strong mineral springs of great local reputation issue here from the bottom lands of a small tributary to the Chama River. The water has been analyzed by Dr. Hillebrand. It is of a strongly alkaline character and contains much sodium carbonate. Other interesting constituents are boron,

fluorine and barium. Fluorine is present in considerable amount. Near these springs the foot-hills of pre-Cambrian gneiss contain veinlets of colorless fluorite, which doubtless was deposited by these hot waters when they issued at a somewhat higher elevation. Still higher up on the western slope is found a narrow vein, which contains small amounts of gold and silver in a gangue of colorless fluorite with a little barite, and this vein appears to be capped by a deposit of tuffaceous character, which principally consists of carbonate of lime, but also contains a notable amount of fluorine and traces of gold and silver. It is believed that this vein and the deposit were formed at about the same time, the deposition of the lime carbonate taking place at the surface while fluorite was the principal deposit in the vein a short distance below the surface. All this indicates that these springs have been active during a long time, and it is probable that the hot waters issued at gradually lessened elevations as the erosion deepened the valley.

AT the 197th meeting of the society, held on December 19, 1907, Mr. Waldemar Lindgren, the retiring president, presented an address, entitled "Present Tendencies in the Study of Ore Deposits."

Mr. Lindgren stated that he wished to place before the society in the briefest way the tendencies of the study of ore deposits as shown during the first seven years of the twentieth century. In a way the year 1900 might be considered as marking a mile-stone in the progress, for during that year the prevailing theories found specially clear exposition at the hands of many observers. The activity of the various nations in this study was mentioned, and it was shown that the United States, Germany and Scandinavia were most prominent in this respect. The different modes of publication, monographic descriptions *versus* geographic treatment were emphasized. Next, the progress in the technical methods was noted and special reference made to the metallographic methods to the study of opaque minerals. The relation of chemistry to the science of ore deposits occupied attention and it was shown that in spite of some recent activity much remained to be done in this direction, not only with reference to investigation of methods of mineral formation, but also, for instance, in regard to the examination of the hot springs and their deposits, especially in the western states. The relative merits of the monographic and the geographic treatment of ore deposits was discussed. It was stated that excellent results had been obtained by Professor DeLaunay in Paris by applying this method to the ore deposits of Africa and Italy; it was also shown that much remained to be done in this direction in the United States.

In regard to classification it was shown that no consistent genetic system had as yet been successfully applied. The usefulness of the terms "syngenetic" and "epigenetic" was insisted upon and mention was made of the present tendencies in transferring a large number of deposits to the epigenetic class. This was exemplified by reference to iron ores of Sweden and pyritic deposits in various countries. In the latter class a syngenetic origin was maintained by a few observers, but the general trend of opinion was away from the view of chemical precipitation in lakes or seas and in favor of the subsequent introduction of the metals by hot solutions.

Historic geology has its counterpart in our branch of the science, and it was pointed out that during the last years, both abroad and in the United States, attempts have been made to distinguish the various periods of mineralizing activity.

The latter part of the address was devoted to the question of the origin and genesis of ore deposits, always a most difficult and unsatisfactory problem since its solution must always be based on hypothesis and suppositions. The general prevalence in the end of the last century of the theory of ore deposition by circulating surface waters was noted, and it was shown that the theory of ore deposition from magmatic waters began to find general acceptance in the first years of this century. It is impossible to peruse the literature of any country of the last few years without noticing the remarkable spread of this idea. It seems to pervade the whole atmos-

phere of research and find expression among the workers from all countries. The views of contemporary workers on this subject were explained and it was stated that while the adherents of the theory of magmatic emanations may go too far in some directions, this theory has come to stay, and that it and no other satisfactorily explains a great number of ore deposits.

The prevailing theoretical tendencies of the present might be summed up as follows: We unanimously agree in seeking the ultimate source of the metals in the igneous rocks. We say that the rarer metals in concentrated forms, dissolved in water, emanate from the magmas during and after their eruption into higher levels of the lithosphere, and that minerals containing these metals are deposited along the pathways of the waters. We assert that atmospheric waters may search the congealed rocks, abstract from them a part of the small residues of the valuable metals, and deposit them along the channels. We say further that metamorphism, when acting upon these igneous rocks, is a potent factor in favor of further concentration, aided by the moisture contained in the rocks.

We say finally that as erosion degrades the volcanic mountains and their ore deposits, and the fragments are carried down to form sedimentary beds, the heavy native metals, such as gold and platinum, are concentrated into placers, and the baser metals are distributed as salts of various kinds throughout the beds. Atmospheric waters take up these particles into solution, and, aided by the influence of reducing substances as organic matter, concentrate them as deposits in congenial places.

At the close of Mr. Lindgren's address the fifteenth annual meeting of the society was held for the purpose of electing officers, and the following officers were elected for the ensuing year.

President—Mr. Waldemar Lindgren.

Vice-presidents—Mr. M. R. Campbell and Mr. A. H. Brooks.

Secretaries—Messrs. Ralph Arnold and Philip S. Smith.

Treasurer—Mr. Joseph A. Taff.

Members at Large of the Council—C. A. Fisher, F. L. Hess, C. E. Siebenthal, G. B. Richardson, George H. Ashley.

Fred E. Wright,
Secretary

Discussion and Correspondence

The Teaching of Mechanics

To the Editor of Science: It seems to me high time for something to be done for the teaching of the first principles and definitions of mechanics in our schools. In the "Report of the Committee of the Central Association on Algebra in the Secondary Schools" which has just reached me. I find the following:

6. Momentum = velocity × weight. It is a measure of the force with which one body strikes another.

The "clear and concise statements" of physical laws which the committee recommends should have the additional merit of a reasonable degree of accuracy.

Ernest W. Brown

New Haven, Conn.

Adjustable Burden Baskets

To the Editor of Science: Dr. William L. Abbott has sent to the U. S. National Museum five Dyak burden baskets of an entirely new type. They might be called "adjustable burden baskets," since by means of lacings their holding capacity may be expanded or contracted, like a shoe front.

Three of the specimens have each a framework of two U-shaped bows crossing on the bottom; the others have each a four-sided footing, incurved on the sides and pinched in at the corners to fit the lower ends of the four uprights that strengthen the body. All of the specimens are left open, the wrapping on the upper margin being continued down the front opening and united at the "up-set," or place where the bottom turns into the body. Hence the two margins are joined together in the examples with U-shaped bows even to the center of the bottom. The border consists of a small rattan stem, whose close neat wrapping with a thin split of the same material is, at intervals of an inch or two, united with the warps on the sides and to the twined weaving of the upper margins, by mousings.