ponent (X) of the earth's magnetic force, and to their secular variations, $\triangle Y$ and $\triangle X$. After obtaining the mean value of Y, for example, for a given parallel of latitude, he subtracts this from the values at selected points on that parallel. After proceeding thus for various latitudes he joins the places by lines where the residual Y has the same value, these lines being his 'isanomolous lines.' He finds that the X isanomolous lines present the same general characteristics as those of H (horizontal component), the Y as those of D (declination), and the Z (vertical force) as those of I (inclination). The same applies with regard to the secular variation of the components and elements. There is, furthermore, a strong resemblance between the respective isanomolous lines and lines of equal secular variation.

On the Distribution and the Secular Variation of Terrestrial Magnetism. No. IV.: On the Component Fields of the Earth's Magnetism. By L. A. Bauer. This paper is a continuation of the author's researches to localize the centers of disturbance in the earth's permanent magnetic field. He resolves the total field into three components, as follows:

I. A homogeneous magnetization about the rotation axis.

II. A homogeneous magnetization about an equatorial diameter.

III. The residual magnetization, *i. e.*, that which remains after deducting I. and II.

A striking graphical representation of No. III. is given. It is found, among other things, that the residual field and Schuster's diurnal variation field exhibit a strong resemblance.

Dr. Börgen, of Wilhelmshaven, contributes a valuable article in which he develops the most general expression for the coefficients in the formula giving the angular deflection of a magnetic needle produced by a deflecting magnet arbitrarily placed. After discussing the general case he takes up special cases ordinarily met with in practice.

Mr. Baracchi, the director of the Melbourne Observatory, gives an interesting account of 'Magnetic Work in Australia.' It seems unfortunate that no means have been found thus far to reduce and discuss the observations extending over thirty years.

Next follow editorial notes, reviews by Schott, Littlehales, Solander and P. W., and a list of current publications. This number concludes volume I.

SOCIETIES AND ACADEMIES.

THE SCIENTIFIC ASSOCIATION OF THE JOHNS HOPKINS UNIVERSITY.

THE one hundred and twenty-ninth regular meeting, President Remsen in the chair. The following papers were presented and read:

'Recent Researches on Metallic Carbides and Allied Compounds,' by Edward Renouf.

The recent application of the electric arc as a means of obtaining very high temperatures has stimulated research on metallic compounds formed at high heat and unstable in contact with water, hence not found in nature. We owe knowledge of the carbides or compounds of metals with carbon, principally to Moissan. Most metallic carbides are made by heating oxides with carbon at temperatures varying from 3500° to 5000°. They are metallic substitution products of hydrocarbons, and as a rule yield hydrocarbon and metallic hydroxide in contact with water. Some are acetylides yielding pure acetylene, as is the well-known calcium carbide used for the technical preparation of acetylene. Aluminium and beryllium carbides are methides yielding pure methane. Many other carbides, notably those of uranium and iron yield complex mixtures of saturated and unsaturated, gaseous liquid and solid hydrocarbons. Moissan thinks that natural gas and petroleum are formed by action of water on carbides contained in the earth's crust. Considering the evidence, this is the most acceptable solution of the problem of the formation of petroleum and natural gas yet offered. Metallic nitrides, compounds of metals with nitrogen, are mostly made by contact of nitrogen with metals at high temperatures; some by the action of ammonia on metals at high temperatures, when hydrogen escapes and the metallic nitrides are formed. They are decomposed by water into ammonia and metallic hydroxides, hence must be regarded as substituted ammonias.

Metallic silicides, compounds of metals with silicon, are formed by heating metals with sili-

con, and yield, on treatment with water, metallic hydroxides and silicon hydride. Metallic borides are made in the same way and behave similarly with water, excepting that boron hydride is itself decomposed by water forming boric acid.

The metallic hydrides, or compounds of metals with hydrogen, are but little known. The hydride of lithium has been carefully studied by Guntz, the hydrides of calcium, strontium and barium and of some rarer metals by Winkler. The hydrides are all stable at very high temperatures, but are decomposed violently by water, yielding metallic hydroxides and hydrogen.

Spectrum analysis proves the existence of hydrogen, carbon, and many metals, in the stars and in the atmosphere of the sun, at temperatures too high for water, ammonia and most metal oxides to exist. It is highly probable that the metals exist in the heavenly bodies at the present time and formerly existed on the earth when the earth was hot enough, in combination with the elements mentioned above. A study of the decomposition of these compounds with water and with air, throws light on the chemical changes and rearrangements occurring on the cooling of a world; for example, metallic hydrides cooled to a sufficient temperature in presence of oxygen take fire and burn, forming metallic oxides and water vapor; the oxides form hydroxides with the water. Carbides are broken down by the water into hydroxides and hydrocarbons. The hydrocarbons burn in oxygen to form water and carbonic acid, which last combines with the hydroxides to form water and metallic carbonates. The ammonia necessary for the beginnings of plant life could be furnished by action of water on the nitrides. The formation of silicates and borates would necessarily occur in the same way as that of the carbonates. Thus we can by laboratory study form a clear picture of the genesis of the metallic compounds now existing on the earth.

'A Recently Discovered Property of the Blood Serum in Animals immune from Certain Diseases and its Application to the Diagnosis of these Diseases in Human Beings,' by Dr. Simon Flexner.

A significant advance has just been made in regard to the diagnosis of typhoid fever. The basis of this advance is the so-called cholera reaction of Pfeiffer which, it may be recalled, was introduced for the purpose of discriminating between the vibrio of Asiatic cholera and certain allied bacterial forms. Pfeiffer found that the blood serum of an animal rendered immune from the cholera germ would, if admixed with a pure culture of this germ and introduced into the peritoneal cavity of a guinea pig, cause a rapid dissolution of the micro-organisms, while no effect was exerted upon other, although closely allied, species. The same reaction can be obtained with various other bacterial forms, such as the diphtheria bacillus, typhoid bacillus, cholera bacillus, etc., provided the serum of animals immune from these organisms be substituted for the cholera serum. Thus it was shown that the action of the immunized sera is specific for a particular kind of bacterial protoplasm. The changes which are induced in animals by exposing them to experimental infection with the bacteria mentioned take place, in a similar manner, in human beings who suffer from the diseases caused by these micro-organisms. In the course of typhoid fever, cholera and diphtheria immunizing substances, before absent, now appear in the blood and other fluids of the body.

It seems very natural to reverse the order of applying the reaction mentioned and, instead of using a specific immunized blood serum to detect a particular kind of bacterium, to employ a specific micro-organism in order to discover the presence of the immunizing substances. Proceeding upon this idea Widal, and after him Grünbaum, suggested that in doubtful cases of typhoid fever the blood of the patient might be utilized for the purposes of diagnosis. The method of making the tests are simple and readily carried out. Widal recommends adding to a bouillon culture of the bacillus typhosus about 1-10th of its volume of the blood serum from the suspicious case. If it is one of typhoid fever the bacteria soon begin to run together, form clumps and gradually sink to the bottom of the test tube in the form of a sediment. A slight modification of this method consists in using a mixture of blood serum and bouillon in the proportions mentioned, which

is inoculated with typhoid bacilli from a pure culture. The growth of the bacilli, instead of taking place in a diffuse manner throughout the fluid, is in the form of clumps, which fall to the bottom of the tube. In the simplest form the reaction may be obtained from a drop of blood taken from the finger tip or lobule of the ear and which has been allowed to dry upon a glass slide. The dried blood is moistened with a drop or two of water in order to cause a solution of the serum, and a small amount of this solution is added to a drop of a living culture of the typhoid bacillus. If this mixture is now observed under the microscope the bacilli are seen to quickly lose their motility, and in a short while (within 30 minutes) to run together to form clumps, or, as these have been called, 'agglutinates.' This reaction has been obtained as early as the third or fourth day of the disease and as late as the ninetieth, and promises to be fairly constant. It may persist for a considerable period—limit unknown—after recovery; for the blood of persons still shows the reaction two years after the disease. As far as we are informed at present the reaction is to be relied upon as diagnostic. It has grown out of the Pfeiffer cholera reaction; but it differs from this in dispensing with an animal for the experiment, and also because in it the bacteria do do not proceed to disintegration but merely to agglutination.

The papers presented and read by title were:

'On Singularities of Single Valued and Generally Analytic Functions,' by A. S. Chessin.

'On the Analytic Theory of Circular Functions,' by A. S. Chessin.

Adjourned. CHAS. LANE POOR,
Secretary.

THE ANTHROPOLOGICAL SOCIETY OF WASHINGTON.

THE 256th regular meeting of the Society was held Tuesday evening, January 5, 1897. The program for the evening consisted of a Review of Anthropological Progress during 1896, in ten minute papers.

Dr. Thomas Wilson, in his review of Prehistoric Anthropology during the year 1896, considered: 1. *Pithecanthropus erectus*, in which he noted the decision of this Society, that the specimens found by Dr. DuBois in the Island of Java were human remains, and that naturalists concurred in this view; that they belonged to the Pliocene age, and the associated fossil vertebrate fauna resembles that of the Siwalik hills of India. Personally he (Dr. Wilson) refused his adhesion to this theory and proposed to await further developments. 2. Prehistoric Man in Egypt. Late explorations and excavations made in Chaldea, by a party from the University of Pennsylvania, pointed to the discovery of written characters, said to date about 5000 B. C., that of Egypt about 1000 years less. He had seen the last will or testament of an Egyptian, from Kahûn, dated about 2650 B.C. and has a copy of its translation, which could be admitted to probate in our Orphans' Court.

The discoveries by General Pitt-rivers and Prof. H. W. Haynes did much toward establishing the existence of a Palæolithic age in that country. The latest researches were made by Mr. de Morgan, and prehistoric settlements were found scattered from Cairo to Thebes, a distance of nearly 500 miles, and a collection from these places was exhibited by Dr. Wilson, which indicated human occupancy of the Nile valley by a people in the Neolithic stage of culture and, consequently, much earlier than any of those belonging to any Egyptian stage heretofore known.

Prof. Otis T. Mason then spoke 'On the Mato Grosso, South America, as a Mingling Ground of Stocks,' and called attention to the investigations of Paul Ehrenreich, Carl von den Steinen and Herman Meyer. In the region of the Xingu, Tocantins and Maderia rivers are mingled people speaking the same stock languages, Carib, Arawak, Gès or Tapuya, as when Columbus made his first voyage of discovery, and using implements found among the inhabitants of the head waters of the Amazon in western Brazil and eastern Peru, and also those in use in eastern Brazil; thus were the cultures of the east and west parts, both dissimilar, found associated in the Mato Grosso.

There are two kinds of bows found in South America: the long, black palm-wood bow, of rectangular shape, of the western country; and the broad, wide blade of red mimosa wood, of

eastern Brazil, and monkey bone lashed at an angle, used as harpoon and arrow combined in the west and pointed reed in the east.

In the west, wood-skin or bark boats; in the east, raft of logs or reeds; but in this region the Mato Grosso, both varieties of bows, arrows, rafts and boats were used, showing how the two dissimilar cultures were united in a common locality. Discussed by Messrs. Pierce and Lamb.

Mr. Geo. R. Stetson gave the results of 'Memory Tests of Whites and Blacks,' in which he gave the details of tests made upon white and black school children. In some tests the range of percentage varied quite largely and in others they were remarkably equal between the two classes of subjects. Discussed by Prof. Lester F. Ward.

'Aboriginal Habitations of Maine,' by Mr. F. H. Cushing, was omitted owing to his absence.

Prof. W J McGee spoke upon Zooculture, in which he described the three stages of the relation of birds and animals to man, as individuals and as a community: 1. Toleration. 2. Domestication. 3. Artificialization. Discussed by Messrs. Flint and Stetson.

Dr. J. W. Fewkes read a paper on 'Types of Pueblo Pottery.' He noted the fact that pottery was found in the most ancient ruins and that the art of pottery making was still practiced by modern Pueblo people, but it had degenerated as to texture, finish and adornment.

More care was taken by the ancient potters in the fineness of paste, in the symbolic decoration and general finish. In classifying pottery the classification of Holmes seemed the best. 1st. Coiled ware. 2d. Plain ware. 3d. Painted ware, and to this he would add a 4th, glazed ware.

The principal fact brought out in his studies for 1896 was the collection of material illustrating the extension of Tusyan people southward. The one point he wished to emphasize, relative to the different types of Pueblo pottery, was homogeneity of ancient Pueblo culture. Discussed by Prof. Thos. Wilson.

Dr. J. H. McCormick reviewed the principal events in the field of Folk-Lore for 1896. The memoirs of the American Folk-Lore Society were by Mrs. Fanny D. Bergen, on 'Current Superstitions,' in which she has collected a great variety of superstitions of English-speaking people in the United States, embracing every phrase of life, from birth to death; and 'Navajo Myths,' by Dr. Washington Matthews. No one is better qualified than this author to tell us the mythology of this tribe, and it constituted the most valuable contribution yet published concerning this interesting people.

The speaker also paid deserved tribute to the memory of Capt. J. G. Bourke, who had died during the summer of 1896, and who was at the time President of the Folk-Lore Society. These two publications, together with Mr. Cushing's paper on 'Outlines of Zuni Creation Myths,' in 13th Annual Report of Bureau of Ethnology, constituted the most important contributions to Folk-Lore during 1896. The work of the Society was discussed at some length, and the establishment of a Local Branch at Cincinnati, under the presidency of Prof. Chas. L. Edwards, of the University of Cincinnati, as a result of a visit by the speaker to that city, and the excellent work done by the Local Branch in Baltimore, were noted.

The 8th annual meeting, in New York, was then considered in some detail.

'Developments of Education during the year' was the subject of Mr. J. H. Blodgett, and it was noted that expansion and modification of ideas rather than distinct steps or discoveries had been the rule.

The most notable events were the continued agitation of the art and manual training studies in schools, child study and its bearing on psychology, and the teaching of religion in schools. The latter had been discussed more in other countries than our own. Considerable attention had been given to the methods of teaching and the principles which underlie them.

The 257th regular meeting of the Anthropological Society was held Tuesday evening, January 19, 1897.

This being the annual meeting, the reports of the Secretary, Secretary of the Board of Managers, Treasurer and Curator were submitted.

The election resulted in the selection of the following officers for 1897: President, Dr. Frank Baker; 1st Vice-President, Prof. W J McGee (re-elected); 2d Vice-President, Mr. Geo. R. Stetson (re-elected); 3d Vice-President, General Geo. M. Sternberg (re-elected); 4th Vice-President, Dr. Cyrus Adler; General Secretary, Dr. J. H. McCormick (re-elected); Secretary to Board, Mr. Weston Flint (re-elected); Treasurer, Mr. P. B. Pierce (re-elected); Curator, Mr. F. W. Hodge (re-elected); Councils (additional members of): Mr. J. H. Blodgett, Mr. J. W. Fewkes, Dr. Geo. M. Kober, Mr. J. D. McGuire, Mr. J. O. Wilson, Dr. Thomas Wilson.

No papers were read.

J. H. McCormick, M. D.,
Secretary.

SECTION OF THE AMERICAN CHEMICAL SOCIETY, 92D MEETING, JANUARY 14.

At this the 13th annual meeting of the Society the following officers were elected for the ensuing year; viz:

President, W. D. Bigelow; Vice-Presidents, H. N. Stokes, Peter Fireman; Secretary, V. K. Chesnut; Treasurer, W. P. Cutter; Executive Committee, the foregoing officers and E. A. de Schweinitz, Chas. E. Monroe, W. H. Krug, Wirt Tassin.

Dr. E. A. de Schweinitz, the retiring President, announced the date of his annual address as February 25th, the subject to be 'The War with the Microbe.'

V. K. Chesnut,
Secretary.

BOSTON SOCIETY OF NATURAL HISTORY.

A general meeting was held December 16, 1896, twenty-eight persons present.

Prof. F. W. Putnam prefaced his statement concerning some recent work at Trenton, N. J., bearing upon the early presence of man in the Delaware Valley, with a detailed description of the discovery, in 1879, in the undisturbed gravel, of a stone implement near a boulder. Explorations in the Trenton gravels have been carried on systematically since 1891, by Mr. Ernest Volk, under the direction of Prof. Putnam; and a section at the place recently examined shows three distinct upper layers, namely: (1) black soil, (2) glacial sand, and (3) white glacial sand. Implements of chert, jasper, and quartz, as well as of argillite and of pottery, characterize the black soil, while chipped argillite, with occasionally a quartzite, are found in the glacial sand. All but four specimens thus far found in the glacial sand are of chipped argillite; there are no jaspers or cherts. The distinctive implements and the layers are sharply correlated, and the accuracy of Abbott's early work is emphasized by the later work of Volk.

Prof. G. Frederick Wright discussed the extent of preglacial erosion in the United States and its bearing on the question of the length and date of the Glacial period. The new evidence as to the age of the deposit of the Trenton gravels confirms the results first announced by Lewis and Wright. The Philadelphia brick clays are older than the Trenton clays, and the work of E. H. Williams proves that the rock erosion was earlier than the Philadelphia brick clays. Prof. Wright reviewed the work of Salisbury in New Jersey, of White in the deposits of the Monongahela River, the evidence obtained in Iowa, and Claypole's discovery in the glacial till of Ohio, and showed that the necessary data for more accurate conclusions were accumulating.

Prof. Putnam spoke of the rude knife found at Steubenville as the most highly finished of all the specimens yet found, and said that being *chipped* was favorable to its greater antiquity than if it had been *flaked*. The patina on the implement is very decided.

Samuel Henshaw,
Secretary.

THE GEOLOGICAL CLUB OF THE UNIVERSITY OF MINNESOTA.

At the weekly meeting, held Saturday, January 16th, a paper was read by Arthur H. Elftman, on the use of certain terms prominent in petrology. Incidentally the terms granitic and pegmatitic were noted. The growth of the terms ophitic and poikilitic in geologic literature was then outlined and an attempt made to define them more rigidly than had hitherto been done by petrologists.

Charles P. Berkey,
Secretary.