Shimek's criticism of the aqueous origin of Loess' is answered by Professor G. Frederick Wright. Mr. Paul W. Prutzman discusses the 'Chemistry of California Petroleum,' and the number concludes with an article by Professor Lawrence M. Lambe, 'On the Tooth-Structure of *Mesohippus westoni* (Cope),' which is illustrated by one plate giving four views of an upper molar of this primitive species.

The American Naturalist for March contains the following articles: 'The Anatomical Changes in the Structure of the Vascular Cylinder, Incident to the Hybridization of the Catalpa,' by D. P. Penhallow; 'The Occurrence and Origin of Amber in the Eastern United States,' Arthur Hollick; 'Fresh-water Rhizopods from the White Mountain Region of New Hampshire,' J. A. Cushman and W. P. Henderson; and 'The Reactions of the Pomace Fly (*Drosophila ampelophila* Loew) to Light, Gravity and Mechanical Stimulation,' by F. W. Carpenter. There are, besides, reviews of scientific literature.

ARTERIOSCLEROSIS in its relation to diseases of the nervous system is the subject of the opening paper in the May issue of the *Journal of Nervous and Mental Disease*. Dr. E. D. Fisher discusses the clinical aspect, and Dr. Harlow Brooks summarizes the pathology, with reports of three illustrative cases, one of syphilis of the cerebro-spinal axis, one of arteriosclerosis of the brain and spinal cord occurring in alcoholism, and one of acute arteritis occurring in vessels of the central nervous system in rabies. Drs. W. G. Spiller and C. H. Frazier follow with the presentation of some original views on the subject of nerve anastomoses. They have experimented in this line in the treatment of cerebral palsies, and their suggestions open up a field in neurological surgery that seems to be full of promise. Dr. Spiller also contributes a short illustrated paper, being mainly the report of a case which came under his observation and seemed to offer valid evidence for the location of the fibers of temperature and pain within the tracts of Gower. Dr. Jas. W. Wherry writes on the curability of epilepsy, and takes an optimistic view of the question, conditioned on beginning treatment promptly upon the appearance of the disease. His idea of the requirements in such treatment consists of 'A study of each case individually; special adaptation of drugs to individual conditions; personal supervision and individualization of diet, absolute change of environment.' The proceedings of the New York Neurological Society for December 6, 1904, and of the Philadelphia Society for December 27, 1904, are reported.

SOCIETIES AND ACADEMIES.

THE IOWA ACADEMY OF SCIENCES.

THE nineteenth annual meeting of the Iowa Academy of Sciences was held in the chemical lecure room of Iowa College at Grinnell, Ia., April 20 and 21. The following papers were presented:

B. SHIMEK: President's address, 'Botany and Intelligent Citizenship.'

C. C. NUTTING: 'The U. S. S. *Albatross* and its Work' (illustrated with lantern slides taken by the author).

L. S. ROSS: 'Apparatus for Plating Out Petri Dishes in the Field.'

BRUCE FINK: 'Some Studies in American Cladonias.'

L. H. PAMMEL: 'Some Notes on the Flora of the Bitter Root Mountains of Montana.'

JAMES E. GOW: 'An Ecological Study of the Sabine and Neches Valleys, Texas.'

W. S. HENDRIXSON: (*a*) 'Action of Bromic Acid on Metal,' (*b*) 'Determination of Bromic and Iodic Acids.'

R. E. BUCHANAN: 'A Study of a Thermophilic Bacterium.'

L. BEGEMAN: 'J. J. Thomson's Theory of Matter.'

H. S. FAWCETT: 'Variation in the Ray Flowers of *Anthemis Cotula* and Other Composites.'

T. H. MACBRIDE: 'Some Slime Moulds of New Mexico.'

B. H. BAILEY: 'Report on Some Iowa Birds.'

NICHOLAS KNIGHT: 'Different Methods of Determining Carbon Dioxide in Minerals and Rocks.'

MORTON E. PECK: 'Flora of Hardin County.'

C. F. LORENZ: 'Three-Color Projection.'

BRUCE FINK: 'Notes on Some Iowa Algæ.'

GRACE ROOD RUEDA: 'The Biology of *Bacillus Violaceus Laurentius*.'

J. P. Anderson: 'Plants New to the Flora of Decatur County, with Summary.'

R. B. Wylie: 'The Morphology of Vallisneria Spiralis' (illustrated).

J. L. Tilton: 'A Problem in Municipal Water-Works for a Small Town.'

T. J. Fitzpatrick: 'The Liliaceæ of Iowa.'

J. M. Lindly: 'The Flowering Plants of Henry County.'

J. L. Tilton: 'The Storage Battery and Switchboard at Simpson College.'

Fred J. Seaver: 'An Annotated List of Iowa Discomycetes.'

Charles R. Keyes: 'Northward Extension of the Lake Valley Limestone.'

Charles R. Keyes: 'Geological Structure of the Jornada Del Muerto and Adjoining Bolson Plains.'

Charles R. Keyes: 'Bisection of Mountain Blocks in the Great Basin Region.'

A. C. Page: 'A Laboratory Barometer.'

Edwin Morrison: 'Cohesion of Liquids and Molecular Weights.'

C. O. Bates: 'Municipal Hygiene.'

L. H. Pammel and Estelle D. Fogel: 'Some Bacteriological Analyses of Railroad Water Supplies.'

The following officers were elected for the ensuing year:

President—M. F. Arey, Cedar Falls.

First Vice President—J. L. Tilton, Indianola.

Second Vice President—C. O. Bates, Cedar Rapids.

Secretary—T. E. Savage, Des Moines.

Treasurer—H. E. Summers, Ames.

T. E. Savage,
Secretary.

THE ONONDAGA ACADEMY OF SCIENCE.

The regular meeting of the academy was held in Syracuse, on the evening of April 15. Professor W. M. Davis, of Harvard University, gave an illustrated lecture on the Colorado Canyon, based upon four visits to the Arizona plateaus. He emphasized the origin of the canyon as a valley of normal erosion exceptional only in depth, as shown fifty years ago by Newberry; its independence of the great fractures of the region whose course is usually north and south, as shown thirty years ago by Powell and Dutton, while the canyon is cut from east to west; and the record of a long geological history magnificently displayed in the canyon walls. This history of the region was traced backwards, first stripping off the horizontal layers of the plateau series, next reconstructing, untilting and stripping off the now inclined layers of the so-called Algonkian 'wedge' and then roughly building the lost mountains of the crystalline foundation rocks, commonly regarded as Archean but not yet demonstrated to be of so great antiquity. Having thus traveled backwards through the 'corridors of time' to the earliest stage of geological history there recorded, the return journey was made along the normal succession of events. Six long ages of time, occupied alternately by deposition and by erosion, were thus reviewed: Three ages of enormous deposition, requiring a correspondingly enormous erosion elsewhere, and three alternate ages of enormous erosion, suggesting an equally enormous deposition elsewhere. The short chapter of canyon erosion was entered upon only after the long earlier ages were closed: thus a correction was suggested for the erroneous view that the erosion of a great canyon requires a long part of geological time. The apex of the Algonkian wedge and the associated ancient plains or peneplains of erosion, best seen from Grand View, sixteen miles east of the railroad terminus, were indicated as the points on which the attention of the inquiring visitor should be focussed. The volcanic history of the district, as associated with the erosion of the canyon, was briefly touched upon.

J. E. Kirkwood,
Corresponding Secretary.

THE NEW YORK ACADEMY OF SCIENCES. SECTION OF ANTHROPOLOGY AND PSYCHOLOGY.

A meeting was held on February 27, in conjunction with the Ethnological Society. General Wilson occupied the chair. The following papers were presented: 'Anthropometry of the Jews of New York,' Maurice Fishberg. Whether the Jews have maintained their racial purity to the present day is a question that can be examined by comparing the physical type of Jew from different countries. Extensive measurements of Jewish

immigrants in New York from various countries of eastern Europe show that the Jewish type in those countries is not Semitic, but varies in the different countries, always approximating, in stature and cephalic index, to the native or Christian population of the respective countries.

'Anthropometric Work at the St. Louis Exposition,' R. S. Woodworth and F. G. Bruner. As many as possible of the racial groups represented at the exposition were measured. The best material was found among the Philippine Islanders, of whom about 700 were measured. The Christianized tribes, such as the Tagalog, Pampango, Ilocano, Bicol, Visaya, were found very uniform in physical type. Measurements showed no clear evidence of differentiation among them. The average height of the several tribes differed but little from 161 cm., the cephalic index differs little from 83, etc. The Moros of Mindanao also are practically identical in physical type with the Christian tribes. The pagan Igorots and Bagobos seem to differ considerably from this type, especially in height, which is about 155 cm.; while the Negritos were clearly marked off from all the rest by their kinky hair, small stature (144 cm.), broad nose, and small head in proportion to stature.

R. S. WOODWORTH,
Secretary.

THE PHILOSOPHICAL SOCIETY OF WASHINGTON.

THE 600th regular meeting, held April 15, 1905, was celebrated by historical addresses in University Hall of the George Washington University, followed by a social hour with refreshments.

After a brief address by President Littlehales, half a dozen papers were read giving a review of the activities of the society since its foundation in 1871, under the presidency of Joseph Henry, in the lines of most interest to its present membership. Mr. Gore grouped and characterized succinctly the papers presented in mathematics. Mr. Wead reviewed the papers on physics, beginning with Henry's 'Aberrations of Fog Signals' and including recent notable work on aerodynamics. Mr. Clarke told of the great local development of activity in chemistry since 1871. Mr. Gilbert spoke of the opportunities the society had furnished to discuss questions in geology, instancing cases where the discussions had led to important researches. Mr. Hayford recalled some of the notable advances in geodesy that had been presented to the society, Mr. Eichelberger reported on the papers in astronomy and Mr. Bauer spoke of the activity in electricity and magnetism. A brief letter from Dr. Gill was read regarding the interest in biology before the formation of the other scientific societies.

THE 601st meeting was held April 29, 1905.

Professor W. S. Eichelberger exhibited one of the Riefler self-winding astronomical clocks belonging to the Naval Observatory and described its construction. It is in a case from which about one eighth of the air is exhausted; the pendulum is of nickel-steel alloy compensated; the power comes from two small cells of battery and is applied about twice a minute. The rate is very small and very constant.

Professor F. H. Bigelow then spoke on 'Ionization and Temperature-Effects in the Atmosphere.' The great problems in meteorology relate to the vertical distribution and semidiurnal curve of temperatures; and to the variations in vapor tension, atmospheric electricity and magnetic field. A great number of curves representing the results of observations on the quantities involved in these problems were exhibited, and the attempt was made to explain the facts according to the modern theory of ionization. The paper will appear in the *Monthly Weather Review.*

CHARLES K. WEAD,
Secretary.

THE SCIENCE CLUB OF NORTHWESTERN UNIVERSITY.

THE Science Club held its regular monthly meeting on Friday, April 7, 1905, at 7:30 P.M.

The following papers were presented:

MR. G. G. BECKNELL: 'An Investigation of the Residual Current of the Electric Arc.'

MR. GORDON FULCHER: 'The Duddell Oscillograph.'

Professor O. H. Basquin: 'The Bending Moment of a Uniformly Loaded Beam; a New Experimental Demonstration.'

Floyd Field,
Secretary.

DISCUSSION AND CORRESPONDENCE.

CONNECTION BY PRECISE LEVELING BETWEEN THE ATLANTIC AND PACIFIC OCEANS.

To the Editor of Science: In your issue of April 28, 1905, page 673, is an article by Mr. Hayford on 'Connection by Precise Leveling between the Atlantic and Pacific Oceans.' About twenty years ago I wrote to Science in connection with precise leveling over the Alleghanies and the Rocky Mountains, and stated that it might be well to have a systematic determination of bench marks at stated intervals owing to the unrest in the earth's crust. At that time I stated that my work on the corps of the Pennsylvania Railroad had shown me that, however carefully the bench marks might be established at any one time, at the expiration of a comparatively few years there would be a discrepancy between them and the datum plane. The Pennsylvania Railroad has reviewed its bench marks a number of times owing to these discrepancies due to earth motion. The want of agreement, therefore, between the levels of the Atlantic and Pacific Oceans, unless the bench marks were established by surveys which began and ended at exactly the same period throughout the entire distance, might be due to earth movements between the times of the beginning and the end of the survey.

I would again suggest, as I did at my first letter to this paper, that the United States Geological Survey secure not only the lists of bench marks of all railroads, but the variations that have occurred in these bench marks as shown by repeated surveys. If these are carefully tabulated throughout a century, we may obtain important information in regard to the upward and downward crustal movements across the continent.

Edward H. Williams, jr.

SPECIAL ARTICLES.

THE HORIZONTAL PLANE OF THE SKULL AND THE GENERAL PROBLEM OF THE COMPARISON OF VARIABLE FORMS.

In comparative studies of the skull it is customary to select one transversal plane defined by the axis of symmetry with which it is at right angles and by two points, as the standard plane to which the skull is referred. Some authors have made the selection of the two determining points based on morphological considerations, while others have endeavored to determine the physiological horizontal position, determining the latter by two points which are more or less accurately parallel to the direction of horizontal sight.

When this problem is considered from a purely morphological point of view, it will be recognized that there is no justification in selecting arbitrarily two points and disregarding all others, but that the best method of comparison must be based on the assumption that every point of the skull has equal weight and that the nearest approach of all points must be attempted. In this form the problem is applicable to the comparison of all variable forms.

The most favorable superposition of any two forms will be obtained when the sum of the squares of the distances between all pairs of homologous points becomes a minimum. We will refer the body to a system of rectangular coordinates and call x', y' *and* z' the ordinates of a point of the first body, x'', y'' and z'' the ordinates of the homologous point of the second body. By moving the second body by the amounts u, v and w in the direction of the three ordinates, we can modify the relative positions of homologous points without torsion of the body. Then the sum of the squares of the distances of homologous points

$$\Sigma(x'-x''-u)^2+\Sigma(y'-y''-v)^2+\Sigma(z'-z''-w)^2$$

is to be a minimum. Therefore,

$$\Sigma(x'-x''-u)=0.$$

And

$$u=\Sigma(x'-x''),$$

$$v=\Sigma(y'-y''),$$

$$w=\Sigma(z'-z'').$$