

There still remain to be published chapters on the nervous system and organs of sense, organs of digestion, organs of circulation, organs of respiration, organs of secretion, and sexual organs. In the part already completed the chapters on morphology are marvels of detail and thoroughness. The work itself is a large octavo, and more than ninety pages are devoted, for example, to the study of the exoskeleton of the head, while nearly eighty pages are occupied with the treatment of the muscular system. Nearly all of the numerous and strikingly apt illustrations are original, having been drawn by Dr. Berlese himself. Each section of the work is followed by a very complete bibliography, and the author has shown a perfect knowledge of the work of other men, the publications of American authors having been considered and studied with a thoroughness quite unusual among European authors.

The second volume, which has been reserved for the treatment of biology of insects, will contain a careful consideration of all questions of economic importance, and it will undoubtedly be of interest to learn from this work Berlese's final views on the subject of parasitism, and especially the relations of insects and birds upon which point he has long been at odds with other Italian zoologists.

L. O. HOWARD.

SCIENTIFIC JOURNALS AND ARTICLES.

THE October number (volume 7, number 4) of the *Transactions of the American Mathematical Society* contains the following papers:

O. BOLZA: 'Weierstrass's theorem and Kneser's theorem on transversals for the most general case of an extremum of a simple definite integral.'

J. PIERPONT: 'Area of curved surfaces.'

W. A. MANNING: 'On multiple transitive groups.'

L. STICKELBERGER: 'Zur Theorie der vollständig reduciblen Gruppen, die zu einer Gruppe linearer homogener Substitutionen gehören.'

L. E. DICKSON: 'On commutative linear algebras in which division is always uniquely possible.'

H. F. Blichfeldt: 'On the order of linear homogeneous groups.'

J. I. HUTCHINSON: 'On automorphic groups

whose coefficients are integers in a quadratic field.'

F. R. MOULTON: 'A class of periodic solutions of the problem of three bodies with application to the lunar theory.'

J. H. McDONALD: 'A problem in the reduction of hyperelliptic integrals.'

C. N. HASKINS: 'On the differential invariants of a plane.'

This number contains also: Notes and Errata, volumes 6, 7; Table of Contents, volume 7.

THE November number (volume 13, number 2) of the *Bulletin of the American Mathematical Society* contains: Report of the Thirteenth Summer Meeting of the American Mathematical Society, by F. N. Cole; Report of the New Haven Colloquium, by Virgil Snyder; 'Theory and Construction of Tables for the Rapid Determination of the Prime Factors of a Number,' by Ernest Lebon (translated by W. B. Fite); 'On a Fundamental Relation in Abstract Geometry,' by A. R. Schweitzer; 'On the Orderly Listing of Substitutions,' by D. Lehman; 'The Boston Colloquium' (Review of Lectures on Mathematics by E. B. Van Vleck, H. S. White, F. S. Woods) by J. I. Hutchinson; Correction; Notes; New Publications.

SOCIETIES AND ACADEMIES.

NATIONAL ACADEMY OF SCIENCES.

THE autumn meeting of the academy was held on Tuesday, Wednesday and Thursday, November 20, 21 and 22, in the new buildings of the Harvard Medical School, Boston. The list of scientific papers was much longer than it has been at any session of the academy in recent years. It was, indeed, necessary to read by title many of the papers, which according to the program were as follows:

ALEXANDER GRAHAM BELL: 'A few Notes Concerning Progress in Experiments relating to Aerodynamics.'

WILLIAM EDWARD STORY, Clark University (introduced by A. G. Webster): 'A Method for the Enumeration of Algebraic Invariants.'

ARTHUR GORDON WEBSTER, Clark University: 'Acoustic Measurements.'

W. T. PORTER, Harvard Medical School (intro-

duced by H. P. Bowditch): 'Vasomotor Relations.'

ARTHUR A. NOYES and others, Massachusetts Institute of Technology: 'The Conductivity, Ionization, and Hydrolysis of Salts in Aqueous Solution at High Temperatures.'

R. S. WOODWARD, Carnegie Institution, Washington: 'Theory and Application of the Double Suspension Pendulum.'

RUSSELL H. CHITTENDEN, Yale University: 'The Minimal Proteid Requirement of High Proteid Animals.'

GILBERT N. LEWIS, Massachusetts Institute of Technology (introduced by A. A. Noyes): 'The Free Energy of Oxidation Processes.'

GEORGE W. PIERCE, Harvard University (introduced by John Trowbridge): 'Wave-length Measurements in Wireless Telegraphy.'

EDWIN H. HALL, Harvard University (introduced by John Trowbridge): 'Measurement of the Thomson Thermoelectric Effect in Metals.'

JOHN TROWBRIDGE, Harvard University: 'Analogy between Electrical Energy and Nervous Energy.'

JOSEPH BARRELL, Yale University (introduced by W. M. Davis): 'Continental Sedimentation with Applications to Geological Climates and Geography.'

THEODORE LYMAN, Harvard University (introduced by John Trowbridge): 'Light of Extremely Short Wave-length.'

W. M. DAVIS, Harvard University: 'The Eastern Slope of the Mexican Plateau.'

ELLSWORTH HUNTINGTON, Harvard University (introduced by W. M. Davis): 'Evidence of Desiccation during Historic Times discovered in Chinese Turkestan in 1905-06.'

WILLIAM H. PICKERING, Harvard University (introduced by E. C. Pickering): 'Planetary Inversion and the tenth Satellite of Saturn.'

S. I. BAILEY, Harvard University (introduced by E. C. Pickering): 'The Work of the Bruce Telescope.'

THEODORE W. RICHARDS, L. J. HENDERSON and H. L. FEVERT, Harvard University: 'The Heat of Combustion of Benzol.'

THEODORE W. RICHARDS and GEORGE S. FORBES, Harvard University: 'The Atomic Weights of Nitrogen and Silver.'

ROBERT T. JACKSON, Harvard University (introduced by E. L. Mark): 'Structure of Richthofenia.'

W. E. CASTLE, Harvard University (introduced by E. L. Mark): 'On the Process of Fixing Characters in Animal Breeding.'

E. L. MARK and J. A. LONG, Harvard University: 'The Maturation of the Mammalian Ovum.'

E. L. MARK, Harvard University: 'The Marine Biological Station at La Jolla, Cal.'

G. H. PARKER, Harvard University (introduced by E. L. Mark): 'Reactions of Amphioxus to Light.'

H. C. JONES, John Hopkins University (introduced by Ira Remsen): 'The Absorption Spectra of Solutions in Relation to the Present Hydrate Theory.'

S. F. ACREE, Johns Hopkins University (introduced by Ira Remsen): 'On the Salts of Tautomeric Compounds.'

CHARLES P. BOWDITCH, Peabody Museum (introduced by F. W. Putnam): 'The Temples of the Cross, of the Foliated Cross, and of the Sun, at Palenque, Mexico.'

GEORGE C. COMSTOCK, University of Wisconsin: 'Extent and Structure of the Stellar System.'

HENRY F. OSBORN, Columbia University: 'Tyrannosaurus: Upper Cretaceous Carnivorous Dinosaur.'

HENRY F. OSBORN, Columbia University: 'Section of American Tertiaries.'

HENRY F. OSBORN, Columbia University: 'Complete Mounted Skeleton of Fin-back Lizard Neosaurus of the Peruvian.'

OTTO FOLIN, McLean Hospital (introduced by H. P. Bowditch): 'Metabolism of Creatin and Creatinin.'

CHARLES S. MINOT, Harvard Medical School: 'Nature and Cause of Old Age.'

C. S. PEIRCE, Milford P. O., Pa.: 'Phanerescopy, or Natural History of Signs, Relations, Categories, etc.' A method of investigating this subject expounded and illustrated.

BAILEY WILLIS, U. S. Geological Survey (introduced by Charles D. Walcott): 'Heterogeneous Elements of the Continent as Factors in the History of North America.'

S. C. CHANDLER: 'Present State of Knowledge as to Motions of the Terrestrial Pole.'

CHARLES R. VAN HISE, University of Wisconsin: 'The Origin of the Ores of the Cobalt-silver district of Ontario.'

CHARLES D. WALCOTT, U. S. Geological Survey: 'Geological and Biological Study of the Cambrian Brachiopods.'

J. M. CRAFTS, Boston: 'The Catalysis of Sulphuric Acids.'

W. B. SCOTT, Professor of Geology, Princeton: 'The Miocene Mammals of Patagonia.'

GEORGE E. HALE, Director of the Solar Observatory of the Carnegie Institution: 'Sun-spot

Spectra, and their Bearing on Stellar Evolution.'

For the first time a conversazione was held in connection with the meeting. The exhibits, according to the program, were as follows:

ARTHUR A. NOYES, professor of theoretical chemistry, Massachusetts Institute of Technology: Platinum lined bomb with insulated electrodes for electrical conductivity measurements with solutions at high temperatures and pressures.

THEODORE W. RICHARDS, professor of chemistry, Harvard University: Apparatus used in the precise determination of chemical and physicochemical constants including the nephelometer, the adiabatic calorimeter, the device for excluding moisture from fused salts, and other apparatus.

J. B. WOODWORTH, assistant professor of geology, Harvard University (introduced by W. M. Davis): Fossil foot-prints, including those of amphibians, from the Carboniferous shales of Plainville (Wrentham), Mass.

W. M. DAVIS, professor of geology, Harvard University: Diagrams illustrating a method of reconstructing the original course of a river, now flowing in an incised meandering valley.

JOSEPH BARRELL, assistant professor of geology, Yale University (introduced by W. M. Davis): Continental deposits of fluvial origin as indicators of geography and climate. Subaerial conglomerates, sandstones and shales: (1) From the Mauch Chunk Shale (Sub-carboniferous) of eastern Pennsylvania; (2) from the lower Coal Measures (Carboniferous) of eastern Pennsylvania; (3) from the Newark Shale (Triassic) of Connecticut and New Jersey.

B. K. EMERSON, professor of geology, Amherst College (introduced by W. M. Davis): A new geological map of Massachusetts.

W. NORTH RICE, professor of geology, Wesleyan University: Superintendent Connecticut Geological and Natural History Survey (introduced by W. M. Davis): Geological map of Connecticut, on scale of four miles to the inch, by H. E. Cryary and H. H. Robinson, to be published by the State Geological and Natural History Survey.

T. A. JAGGAR, JR., head of the department of geology, Massachusetts Institute of Technology (introduced by W. M. Davis): Apparatus and product of experiments illustrating the mechanism of rill erosion. Diagrams, photographs, and apparatus.

HENRY F. OSBORN: (1) Recent restorations of extinct horses of North America, executed by Charles R. Knight, under direction of Henry F.

Osborn, (A) water-colors, (B) photographs; (2) first complete section of the American Tertiary, —a preliminary study.

R. DEC. WARD, assistant professor of climatology, Harvard University (introduced by W. M. Davis): Some new curves illustrating types of temperature, rainfall and cloudiness in the torrid and the temperate zones. These curves show the variations in the different elements month by month throughout the year.

CHARLES P. BOWDITCH, member of faculty of the Peabody Museum (introduced by F. W. Putnam): The temples of the cross, of the foliated cross, and the sun, at Palenque. Maudslay's plates of Palenque.

ELLSWORTH HUNTINGTON, holder of Hooper Fellowship, Harvard University (introduced by W. M. Davis): Buddhist manuscripts, records and letters inscribed on wooden tablets in the Kharoithi language, small plaster figures from a Buddhist lamasery, cord shoes, small plates of leather armor, etc., dating from about the third or fourth century A.D., and collected by the exhibitor in 1905 from the sand-buried ruins in the Taklamakan desert in western China.

F. W. PUTNAM, curator of the Peabody Museum of Harvard University: Copies of mural paintings from the temple of the tigers, Chicken Itza, Yucatan. Copied by Miss Adela C. Breton.

E. C. PICKERING, professor of astronomy, Harvard University—Harvard College Observatory: Recent work of the Harvard College Observatory; illustrated by diagrams, etc. Discovery of variable stars and satellites; methods and results. Studies in stellar spectra and in lunar detail; Peruvian meteorology; diurnal variations at different altitudes.

C. S. SARGENT, Arnold Arboretum, Boston: Silvicultural exhibit.

A. F. BLAKESLEE, Harvard Botanical Museum, instructor in botany (introduced by W. G. Farlow): Earliest states of sexuality in plants, illustrated by cultures of fungi.

M. A. CHRYSLER, instructor in botany, Harvard University (introduced by G. L. Goodale): Cambium in the monocotyledons.

CHARLES S. MINOT, professor of comparative anatomy, Harvard University: Evolution of the automatic microtome; Harvard embryological methods.

HAROLD C. ERNST, professor of bacteriology, Harvard University (introduced by W. T. Councilman): Ultra-violet photomicrography and methods of use.

J. H. WRIGHT, director of clinico-pathological

laboratory, Massachusetts General Hospital (introduced by W. T. Councilman): Demonstration of the histogenesis of the blood plates.

F. B. MALLORY, associate professor of pathology, Harvard University (introduced by W. T. Councilman): Demonstration of intracellular substances, and differential methods of staining.

E. E. SOUTHARD, assistant professor of neuropathology, Harvard University (introduced by W. T. Councilman): Demonstration of nerve cells and neuroglia.

S. B. WOLBACH, instructor in pathology, Harvard University (introduced by W. T. Councilman): Demonstration of two pathogenic fungi related to genus *Oidium* exhibiting changes in morphology and protective phenomena when inoculated into animals.

W. T. PORTER, professor of comparative physiology, Harvard Medical School (introduced by H. P. Bowditch): Improved kymographions.

M. L. FERNALD, assistant professor of botany, Harvard University (introduced by G. L. Goodale): Certain plants in eastern Canada.

E. C. JEFFREY, assistant professor of vegetable histology, Harvard University (introduced by G. L. Goodale): Photographic and photomicrographic illustrations of Cretaceous plants.

OAKES AMES, assistant director of the botanic garden, Cambridge (introduced by G. L. Goodale): New orchids from the Philippines.

G. L. GOODALE, professor of botany, Harvard University: A new form of 'container' for museums of botany, plaster-plaques for museums, selections from recent photomicrographs of fibers.

E. E. TYZZER, director of cancer research laboratory, Harvard University (introduced by W. T. Councilman): Photomicrographs illustrating the dermatitis produced by the Brown Tail moth.

W. B. CANNON, professor of physiology, Harvard University (introduced by H. P. Bowditch): Movements of the stomach and intestine as seen in the zoetrope.

ARTHUR GORDON WEBSTER, professor of physics, Clark University: A set of instruments for the performances of quantitative researches in acoustics.

J. C. BRANNER, professor of geology, Stanford University: Album of photographs relating to the geology of the California earthquake of April 18, 1906.

THEODORE LYMAN, instructor in physics, Harvard University (introduced by John Trowbridge): Photographs of short wave-lengths.

GEORGE C. COMSTOCK, director of the Wash-

burn Observatory: Pendulum apparatus for the determination of the force of gravity.

W. B. SCOTT, professor of geology, Princeton University: Drawings and plates of fossil mammals, etc., for the reports of the Princeton University expeditions to Patagonia. Also published parts of reports.

BAILEY WILLIS, Geologist, U. S. Geological Survey (introduced by Chas. D. Walcott): Geological map of North America, prepared for the International Geological Congress at the City of Mexico.

CHARLES S. MENDENHALL, professor of physics, University of Wisconsin (introduced by George C. Comstock): New apparatus for pendulum determinations of gravity.

LOUIS KAHLENBERG, professor of chemistry, University of Wisconsin (introduced by Charles R. Van Hise): Apparatus for the investigation of osmotic pressures.

CHARLES F. BURGESS, professor of applied electro-chemistry, University of Wisconsin (introduced by George C. Comstock): Exhibits in applied electro-chemistry.

E. L. MARK, Hersey professor of anatomy, Harvard University: A machine for cutting wax reconstruction plates by means of an electrical device; a paraffine bath heated by electricity.

G. H. PARKER, professor of zoology, Harvard University (introduced by E. L. Mark): *Mistichthys luzonensis*, the smallest vertebrate.

W. E. CASTLE, assistant professor of zoology, Harvard University (introduced by E. L. Mark): Wild and tame guinea-pigs and hybrids between the two.

ROBERT T. JACKSON, assistant professor of paleontology, Harvard University (introduced by E. L. Mark): Binocular preparative microscope.

J. E. WOLFF, and C. PALACHE, professor, Harvard University (introduced by W. M. Davis): Examples of recent instruments, models, etc., for the study and exposition of mineralogy, petrography, and optical mineralogy.

A. G. WEBSTER, Clark University, Worcester: Dynamical tops.

GEORGE E. HALE, director of the solar observatory of the Carnegie Institution: Photographs and drawings from the solar observatory.

C. BARUS, Brown University, Providence: Charts of the distribution of atmospheric nucleation in the lapse of time.

From four to five o'clock an exhibit of lantern slides was made in the lecture room on the first floor, by Professors S. I. Bailey,

E. C. Jeffrey, A. G. Webster, Harold Ernst and E. E. Southard.

NEW YORK STATE SCIENCE TEACHERS' ASSOCIATION.

THE next annual meeting of the New York State Science Teachers' Association will be held at Teachers College, Columbia University, New York City, December 26 and 27.

The program is as follows:

WEDNESDAY AFTERNOON.

DEAN JAMES E. RUSSELL, address of welcome.

DR. KELLY, Ethical Culture School: 'Are High School Courses in Science adapted to the Needs of Adolescents.'

J. M. JAMESON, Pratt Institute, Brooklyn: 'More Interesting Mechanics.'

PROFESSOR MINCHEN, University of Rochester: demonstration, 'The Principle of Interference and its Applications.'

HENRY R. LINVILLE, De Witt Clinton High School, New York City: 'Biology as Method and as Science in Secondary Schools.'

DR. GRACE E. COOLEY, Newark High School: 'The High School Biologist and the Citizen of Tomorrow.'

JENNIE T. MARTIN, Central High School, Buffalo: 'Field Work in Physical Geography.'

W. H. PLATZER, High School, Poughkeepsie: 'The Value of the Inductive Study of Relief Forms in Field Work.'

PROFESSOR GALE, University of Rochester: 'The Place of Transformation Theory in Geometry.'

PROFESSOR KEYSER, Columbia University: 'Concerning the Introduction of Modern Notions into the Geometry of Secondary Mathematics.'

WEDNESDAY EVENING.

PROFESSOR D. E. SMITH, Teachers College, Columbia University: 'The Preparation of the Teacher of Mathematics in Secondary Schools.'

PROFESSOR E. L. THORNDIKE, Teachers College, Columbia University: 'Science Teaching seen from the Outside.'

THURSDAY FORENOON.

PROFESSOR MANN, Chicago University: 'The New Move for the Reform of Physics Teaching in Germany, France and America.'

PROFESSOR SHERMAN DAVIS, Indiana University: 'Purpose of Science in the Culture of the Adolescent.'

W. M. BENNETT, West High School, Rochester:

'Some Demonstrations in Refraction and Dispersion of Light.'

J. Y. BERGEN, Cambridge, Mass.: 'Plant Physiology in Secondary Schools.'

PROFESSOR BIGELOW, Teachers College, Columbia University: 'Some Established Principles of Nature Study.'

LESTER B. GARY, High School, Buffalo; GEORGE T. HARGITT, High School, Syracuse, and JAMES T. PEABODY, Morris High School, New York City: 'The Teaching of Biological Science in some of the High Schools in New York State.'

PROFESSOR RICHARDSON, Syracuse University: 'The Study of Minerals and Rocks in Physical Geography in the High School.'

DR. JOHN M. CLARKE, State Geologist, 'Barachois, Bar and Tickle.'

A. W. FARNHAM, Oswego Normal School: 'The Relation which School Gardens may bear to Industrial and Commercial Geography.'

W. T. MORREY, Morris High School, New York City: 'Use of Reference Books in Physical Geography by Pupils in the High School.'

PROFESSOR HAWKES, Yale University: 'Secondary Mathematics from a College Standpoint.'

C. E. BIKLÉ, Horace Mann High School: 'What Equipment does a High School need for the Effective Teaching of Mathematics.'

PROFESSOR WEBB, Stevens Institute: 'The Relation between High School and College Mathematics.'

THURSDAY AFTERNOON.

PROFESSOR HALLOCK, Columbia University, demonstration: 'Optical Oddities.'

FRED Z. LEWIS, Boys' High School, Brooklyn, demonstration: 'Photomicrographs.'

PROFESSOR DAVIS, Harvard: 'Laboratory Exercises in Physical Geography,' illustrated.

W. BETZ, East High School, Rochester: 'Open Questions in the Teaching of Elementary Geometry.'

The President of the Association of Teachers of Mathematics in the Middle States and Maryland: 'The Necessity of Closer Affiliation of Mathematical Associations.'

DR. E. O. HOVEY, American Museum of Natural History: 'West Indian Volcanoes and their Recent Eruptions,' illustrated.

THURSDAY EVENING.

Lecture by Professor C. M. Woodward, and reception by the trustees of Columbia University.

TEACHERS COLLEGE, COLUMBIA UNIVERSITY,

JOHN F. WOODHULL.

NEW YORK CITY.

NEW YORK ACADEMY OF SCIENCES. SECTION OF
GEOLOGY AND MINERALOGY.

At a meeting on Monday, October 8, the following papers were read:

Notes on the Microscopic Examination of the Opaque Constituents of Ore Bodies: Dr. WILLIAM CAMPBELL. (Illustrated with lantern slides.)

The first part of the paper dealt with the preparation of the specimen for examination; of the various types of microscopes used; and the means of obtaining illumination by reflected light. Next the paragenesis of the constituents of certain alloys was shown by microphotographs. Lastly the methods were applied to the opaque constituents of ores from Butte; the cochise district of Arizona; Ducktown, Tenn.; Rossland, B. C.; Sudbury, Ont.; southeast Missouri, etc.

Notes on the Preglacial Channels of the Lower Hudson Valley as revealed by Recent Borings: Dr. C. P. BERKEY.

Borings made by the Board of Water Supply of New York City, in connection with the project of bringing water from the Catskill Mountains, have shown the existence of numerous deeply buried channels representing preglacial stream courses. Many of them indicate channels cut far below present sea level at considerable distances back from the Hudson River. From engineering records it appears that the depth to bed-rock in the Hudson River has never been determined at any point in its lower course. Profiles of supposed rock-bottom based upon wash-borings have been proven by the recent work to represent simply the bottom of the finer silt filling. The results show that more than 200 feet of more compact material lies below this silt at the point now being tested, and that the rock bottom of the ancient Hudson lies more than 450 feet below the present river level throughout a large part of its lower course.

Notes on the Character and Origin of the Pottsville Formation of the Appalachian Region: Dr. A. W. GRABAU.

The character of the overlap of the several divisions of the Pottsville, and the material and type of cross-bedding were discussed and

the conclusion reached that the formation is of the nature of an alluvial cone—or several confluent ones, with occasional marine intercalations.

Professor D. S. Martin exhibited a large crystal of pink beryl, which he had lately obtained at Haddam Neck, Conn. The old quarry in the albite pegmatite at this locality, long famous for its colored tourmalines, is not now being worked; but a new one has been opened closely adjacent, and apparently on a continuation of the same vein or dike. This one has yielded less tourmaline than the former, but much more beryl, and particularly the heretofore very rare pink variety. Of these, a number of fine large crystals have been obtained, comparable with those lately developed from the gem-tourmaline mines in San Diego County, California.

The present specimen measures about four inches in both length and diameter; it is a fine termination, of the type characteristic of this variety. It has been recently shown by Ford (*Am. J. Sci.*, Sept., 1906) that these pink beryls, from whatever locality, present a peculiar type of crystallization. Instead of the long hexagonal prism with flat basal termination, usually seen in the green beryls of New England, the pink ones tend to a strong development of pyramidal planes, especially the pyramid of the second order (*s*), while the prismatic faces are short. It is very interesting to see how perfectly this crystal, from a new locality, conforms to this statement. It shows three very short and partly broken prismatic faces, and a large and perfect hexagonal pyramid of the second order; the basal plane is reduced to a small irregular face about one inch in its longest diameter, and bears several shallow pits or depressions, of which the inclined sides conform to the pyramid of the first order. Altogether, the specimen is one of unusual interest.

A. W. GRABAU, *Secretary*.

THE AMERICAN CHEMICAL SOCIETY. NEW YORK
SECTION.

The first regular meeting of this section was held on November 9 at the Chemists' Club, 108 W. 55th Street.

Professor A. A. Breneman, chairman of the section, presented his opening address, which was, in the main, an account of the history of organization among chemists in America, with remarks upon the present status of chemistry as a profession. He described the origin of the American Chemical Society and the Chemists' Club and urged the importance of maintaining a high standard of education among chemists.

Professor Winslow, of the biological department of the Massachusetts Institute of Technology, spoke 'On the Disposal of City Sewage.' Professor Winslow presented the prominent features of the development of sewage treatment in a clear and comprehensible manner, showing numerous slides to illustrate the various types of sewage plants. He indicated the research work now in progress at the Massachusetts Institute of Technology sewage experiment station and finally spoke of the latest developments in the purification of sewage, noting especially the trickling system.

The subject was supplemented by remarks from Professor Pellew on an interesting sewage problem in White Plains and by Dr. Soper, who spoke of the coming need of purifying sewage before dumping it into New York Bay.

C. M. JOYCE,
Secretary.

DISCUSSION AND CORRESPONDENCE.

PRINCIPLES WHICH GOVERN THE UNITED STATES GEOLOGICAL SURVEY IN ITS RELATIONS WITH OTHER GEOLOGICAL SURVEYS AND WORK- ING GEOLOGISTS.

TO THE EDITOR OF SCIENCE: Certain questions raised by the correspondence published by Professor Branner in SCIENCE for October 26 are, as he says, of general interest; and, in view of the manner in which they are there presented, require a statement of the principles which govern the United States Geological Survey in its relations with other geological surveys and working geologists.

There is among scientists in general a rule of courtesy that denies to others the privilege of investigation in a direction which one has made his own by reason of his contributions

to knowledge along that line. The rule is variously construed in different countries and by different men, but it is no part of my purpose to minimize its force. It has been recognized by the national survey since the days of Director King, and is now effective in relations with individuals and state surveys. It is, however, necessarily controlled by the progress of the general survey and the development of general plans, which sometimes require that work shall be done by the national organization notwithstanding meritorious individual claims. Moreover, professional courtesy on the part of a public official is subject to limitations imposed by his obligation to Congress and to the people to render prompt and efficient service.

A long experience, including relations with nearly all the working geologists of the country, has clearly demonstrated that men whose first obligation is to a university can not work as efficiently for the national survey as can the geologists constantly in its employ, and recognition of this fact has led in recent years to a reduction of the proportional amount of work allotted to teachers of geology, who can give but a share of their time to it.

These considerations governed the national survey in the matter of the Arkansas coal fields. Not only professional courtesy but also personal regard prompted the offer of co-operation made to Dr. Branner under date of January 31, 1906, the purpose of which was to secure to him the publication of his results and the credit due him for his service to the state, as well as to avoid unnecessary duplication of field work. The obligation to execute the surveys with that promptness and efficiency which could follow only from undivided attention required that his desire to finish the work should be disregarded.

It appears from Dr. Branner's latest letter that he still regards the survey of a coal field worth many millions of dollars and capable of serving several millions of people as his personal affair. This bureau is directed on broader lines. He is led by his personal view of the question to misconstrue not only the correspondence which has passed, but also the administrative policy of the national sur-