there is room for a healthy difference of opinion. For many kinds of original work, especially in connection with accurate measurement, there is need of expensive apparatus; and it is often difficult to persuade a student to do his best with imperfect appliances, when he knows that by other means a better result could be attained with greater facility. Nevertheless, it seems important to discourage too great reliance upon the instrument-maker. Much of the best original work has been done with the homeliest appliances; and the endeavor to turn to the best account the means that may be at hand develops ingenuity and resource more than the most elaborate determinations with ready-made instruments. There is danger, otherwise, that the experimental education of a plodding student should be too mechanical and artificial, so that he is puzzled by small changes of apparatus, much as many school-boys are puzzled by a transposition of the letters in a diagram of Euclid.

In closing, Lord Rayleigh touched on the 'Greek question,' or 'Greek and Latin question,' and tried to ease the fears of the good souls who fear some day to awake and find their souls are no longer their own, but have been made away with by some scientific investigator.

INTELLIGENCE FROM AMERICAN SCIENTIFIC STATIONS.

GOVERNMENT ORGANIZATIONS.

U. S. geological survey.

(Work proposed for the ensuing fiscal year.)

THE plans for work to be done during the year ending June 30, 1885, have been matured as follows, subject to the exigencies of the service:—

North Atlantic district. Topography. — The work done during the past year, in this district, by the authority of the secretary of the interior, will be continued under the general direction of Mr. Henry Gannett. Recognizing the value of the work in progress in Massachusetts, the governor recommended and the legislature appropriated a sum of forty thousand dollars, to be expended during three years — ten thousand the first year, and fifteen thousand during two succeeding years — for topographic work, to be done under the general direction of a commission appointed to co-operate with the geological survey. This commission consists of Hon. F. A. Walker, president of the Institute of technology, Prof. N. S. Shaler of Harvard college, and Assistant H. L. Whiting of the coast-survey. Four parties will be put in the field, in charge of Messrs. H. F. Walling, Anton Karl, J. D. Hoffman, and S. H. Bodfish respectively, assisted by Mr. W. G. Newman and others. The topographic work by the state of New Jersey having ceased, and the material having been transferred to the geological survey without expense to the United States, it is proposed that the topographical work be taken up by Mr. C. C. Vermeule, aided by competent assistants, under the general superintendence of Prof. George H. Cook, state geologist, who gives his services gratuitously for that purpose.

General geology. — General geological work will be carried on in New England under the direction of Prof. R. Pumpelly.

South Atlantic district. Topography. — The work begun in 1882 will be continued under the general direction of Mr. Gilbert Thompson. Six topographical parties will enter the field under Messrs. C. M. Yeates, Morris Bien, F. M. Pearson, W. A. Shumway, and one other; there will be also two triangulation parties, one under S. S. Gannett, with general assistants Messrs. Wilson, Blair, McKinney, Oyster, Hackett, Hayes, Wakefield, Niblack, Michler, and Harrison. The area it is proposed to survey includes that portion of the Appalachian region comprised in eastern Kentucky, south-western Virginia, western North Carolina, eastern Tennessee, north-western South Carolina and Georgia, and northern Alabama.

General geology. — This part of the work in this district will be in charge of Mr. G. K. Gilbert, assisted by Messrs. I. C. Russell, Ira Sayles, H. R. Geiger, J. C. White, and W. D. Johnson. The work begun in the District of Columbia will be suspended during the absence of parties in the field, but the geology will be extended by Mr. McGee through parts of Virginia and Maryland.

Southern Mississippi and Rocky Mountain district. Topography. — Excepting in Yellowstone National Park, the general direction of work in this district will be taken by A. H. Thompson. In Arizona two parties, under H. M. Wilson and A. P. Davis, will be assisted by Messrs. Holman, Wallace, Maher, and Chapman. In Texas, Mr. E. M. Douglas will direct the work, as will Mr. R. U. Goode, with Messrs. Hawkins and Ratcliff assisting, in parts of Kansas, Missouri, and Arkansas. Some astronomical work in this district will be executed by Mr. Robert S. Woodward, assisted by Bushrod Washington. In the Yellowstone National Park, Mr. J. H. Renshawe will remain in charge of the work, assisted by Ensigns Chase and Garrett and Mr. S. A. Aplin.

Geology. — Arnold Hague, assisted by Messrs. Iddings, Weed, Wright, and Davis, will carry on the geological survey of the Yellowstone Park.

Northern Mississippi and Rocky Mountain district. Geology. — The survey of the glacial formations in this district will be continued under Prof. T. C. Chamberlin, assisted by Messrs. Salisbury and Todd. General geological work in Michigan, Wisconsin, and Minnesota, will be continued, as heretofore, under the direction of Mr. R. D. Irving, assisted by Messrs. Chauvenet, Daniells, C. W. Hall, Vanhise, and Merriam. Dr. F. V. Hayden will re-enter upon his investigations of the geology of the Upper Missouri, assisted

by Dr. A. C. Peale. The extinct volcanoes of the Rocky Mountain and Cascade ranges will form the subject of continued study by Capt. C. E. Dutton, U.S.A., assisted by Messrs. Diller and Van Hoesen.

Economic geology. — The commissioner of Indian affairs having requested, and the secretary of the interior having directed it, an examination of the coal-lands of the Great Sioux reservation in Dakota will be made by Mr. Bailey Willis and assistants. In Colorado, especially in the Kokomo, Silver Cliff, and Denver districts, work will be continued by Mr. S. F. Emmons, assisted by Messrs. Cross, Dun, Eakins, Hillebrand, Rodgers, and Schonfarber.

District of the Pacific. Topography. — This work, which has been in progress for two years, will be in charge of Mark B. Kerr, assisted by Messrs. Ricksecker and Ahern. The topographical and geological survey, carried on under the auspices of the Northern Pacific railway in Montana and Washington Territory by Prof. R. Pumpelly, having been discontinued, the maps, field-notes, and material have, at his instance, been turned over to the U. S. geological survey. These explorations, covering some forty-two thousand square miles, will thus be utilized and made public on the standard scale of the survey.

Geology. — Dr. Becker, assisted by Messrs. Melville, Raborg, and Turner, will continue the geological exploration of the cinnabar deposits of California.

(General work of the survey.)

Statistics and economic geology. — Last year Mr. Albert Williams, jun., collected a large amount of mining statistics, which were issued under the title of the 'Mineral resources of the United States.' No volume published by the survey has been more eagerly sought for, or given more general satisfaction. It is proposed to issue one of these volumes yearly, thus bringing the mining statistics annually up to date.

Paleontology. Vertebrates. — The vertebrate paleontology of the north-west will be further investigated by Prof. O. C. Marsh, assisted by Messrs. Williston, Bostwick, Hermann, and Barbour. Invertebrates. — Dr. C. A. White, assisted by Messrs. J. B. Marcou, L. C. Johnson, and Frank Burns, will carry on investigations among mesozoic and tertiary forms. Mr. C. D. Walcott, with the assistance of Messrs. Cooper Curtice and J. W. Gentry, will investigate the paleozoic fauna. The work on the fossil lamellibranchiata, begun by Professor James Hall, will be promoted by the assistance of the survey. Paleobotany. — Dr. Newberry will continue his work on the fossil flora of the north-west, and Prof. W. M. Fontaine his researches on mesozoic botany; while general paleobotany will be in charge of Mr. Lester F. Ward, assisted by Mr. O. C. Ward.

Chemistry. — Since the organization of the laboratory of the survey, its work has grown enormously, almost precluding original investigations by the mass of economic questions demanding solution. The work will continue to be directed by Prof. F. W. Clarke, assisted by Messrs. Chatard, Gooch, Barns, Hallock, Manners, Whitfield, Erni, Chase, and Howard.

Forestry. — The work of mapping the forest districts of the United States will be continued under the direction of Mr. George W. Shutt.

Publications. — Mr. W. H. Holmes will continue to supervise the preparation of the illustrations of various kinds for the survey publications, on the satisfactory and artistic character of which so much depends. He will be assisted by qualified collaborators.

RECENT PROCEEDINGS OF SCIENTIFIC SOCIETIES.

Academy of natural sciences, Philadelphia.

July 15. — Mr. Thomas Meehan remarked that in many composite flowers the pollen is ejected from the apex of the staminal tube, and it became a matter of interest to ascertain the mechanism by which this is accomplished. The flowers of Compositae are much frequented by pollen-collecting insects, honey-gatherers seldom resorting to them. It is difficult, therefore, to watch the flow of pollen in the open air, as it is collected by the insects as fast as it appears. Some flowers of Helianthus lenticularis Dougl. were gathered, and, for the purpose of study, placed in saucers of water in a room where insects could not disturb them. In this way it was observed, that, after the corolla tube had reached its full length, very early the following morning the staminal tube commenced to grow beyond the mouth of the corolla, and by about nine A.M. had extended to a distance of one-fourth the whole length of the latter. The pollen then commenced to emerge through the upper portion of the staminal tube, which, the stamens narrowing, left the apices free. During the day the pollen continued to pour out, until by nightfall a large amount had accumulated at the apex of the tube. The morning of the second day the arms of the pistil emerged, and commenced to expand; and at once the staminal tube commenced to descend. At the end of the third day the staminal tube had retired entirely within the tube of the corolla, and, with the pistil, had begun to wither. A careful examination shows, that, through the whole course, the column of united anthers remains entirely of the same length, the filaments only being elastic. These stretch fully one-half their length. They are attached to the tube of the corolla at the inflated portion, a short distance above the akene, and extend to about midway between this point and the end of the tubular portion at the base of the limb; but, when the anther-tube is extended, the filaments occupy the whole of the space. Thus pollen could fall on the stigma of the previous day's flower; but, as this is