

6, 1879. On August 10, 1887, a contract between the society and Northwestern University was made, and shortly thereafter the instruments were transferred to Evanston and placed in the observatory built through the gift of Mr. James B. Hobbs. Professor Hough actively conducted the observing until his death on January 1, 1909. The present director, Professor Philip Fox, was appointed September 1, 1909.

PROFESSOR E. J. SAUNDERS, of the department of geology of the University of Washington, will conduct a geological field course in the Glacier and Yellowstone Parks from June 19 to July 28.

THE plans for the coming season of the Harvard Field School of Physiography and General Geology provide for eight weeks of continuous field work in an unsurveyed portion of the Rocky Mountains. Camp will be established on the south slope of the San Juan Mountains of southwestern Colorado. Work will begin early in July and continue until the second of September. There will be accommodations for twenty-four students in the party. Two distinct units will be organized. Professor Wallace W. Atwood will have general charge of the work. Dr. W. P. Haynes will have immediate direction of the work of one unit, and Dr. F. H. Lahee of the other unit. During the first six weeks a systematic geological and geographical survey will be made of a portion of the range. This work will be conducted as nearly as possible along the lines approved by the U. S. Geological Survey. During the last two weeks the party will take a somewhat extended tour through the higher mountains, so as to study a wide range of phenomena, visit several of the mines and mills, and come to appreciate the larger problems in the geologic and physiographic history of the mountain area. Those wishing to join the party should apply to the director as soon as possible. Membership will probably be closed by the first of June.

THE Naples Table Association for Promoting Laboratory Research by Women has held its annual meeting at Bryn Mawr College. It was voted to offer a prize of \$1,000 for award

in April, 1918, for the best thesis written by an American woman on a scientific subject embodying new observations and new conclusions based on independent laboratory research in biological (including psychological), chemical or physical science. Miss Virginia Gildersleeve, dean of Barnard College, was elected president for 1916-17; Mrs. Elizabeth L. Clarke, representing Smith College, treasurer; Mrs. Ada Wing Mead, of Providence, secretary for three years.

THE estate of Addison Brown, for many years a United States District Judge, who died on April 9, 1913, has been appraised at \$883,406. Judge Brown, who was an authority on the flora of the United States, left United States Steel stock valued at \$21,775 to the New York Botanical Gardens for publications. He gave \$10,000 to Harvard, of which \$7,500 was to establish a scholarship for an undergraduate student, and \$2,500 for a prize in the law school for an essay on maritime or private international law. Amherst College and Bradford Academy each received \$5,000 for scholarships.

#### UNIVERSITY AND EDUCATIONAL NEWS

THE fiftieth anniversary of the founding of Carleton College will be celebrated on October 12 and 13.

THE curriculum of the college of mining of the University of California has been reshaped so that with the beginning of the sophomore year students will choose between mining engineering, metallurgy, economic geology, or petroleum engineering. A new four-year course in chemical engineering has been announced by the college of chemistry, of which Gilbert N. Lewis is the dean.

COL. JOHN BIDDLE, engineer officer, U. S. A., at Baltimore, has been appointed superintendent at West Point to succeed Col. Clarence P. Townsend on July 1.

MRS. AURELIA HENRY REINHARDT has been elected president of Mills College, California.

At the New Mexico College and Station, Dr. E. P. Humbert has resigned as dean of agriculture and agronomist to become plant

breeder in cotton investigations at the Texas Station, and has been succeeded by Rupert L. Stewart.

DR. F. J. E. WOODBRIDGE, Johnsonian professor of philosophy in Columbia University and dean of the graduate faculties, has been appointed lecturer in philosophy on the Mills Foundation in the University of California, from January 31 to June 30, 1917.

DR. WILLIAM F. ALLEN, instructor in anatomy, University of Minnesota, has accepted a position as professor of anatomy in the medical department of the University of Oregon.

DR. ALFRED L. GRAY, professor of physiology in the University of Virginia, has been transferred to the chair of roentgenology and has been succeeded by Dr. Charles H. Lewis.

PROFESSOR W. H. TWENHOFEL, of the University of Kansas, has been appointed associate professor of geology at the University of Wisconsin, to succeed Professor Eliot Blackwelder.

FRANK H. PROBERT, a graduate of the Royal School of Mines, London, and for the past twenty years engaged in consulting mining engineering practise, has been appointed professor of mining in the University of California, as successor to the late Professor Samuel Benedict Christy.

DR. JEAN FELIX PICCARD, of the University of Lausanne, Switzerland, has accepted an invitation of the University of Chicago to spend next year at the university as assistant professor of organic chemistry. Dr. Piccard, who has worked with Professor Willstaetter and been research assistant of Professor v. Baeyer, will devote himself exclusively to graduate work and to directing research in organic chemistry.

## DISCUSSION AND CORRESPONDENCE

### CONSERVATIO VIRIUM VIVARUM

TO THE EDITOR OF SCIENCE: The term energy was introduced by Thomas Young in 1807 to denote  $MV^2$ , or twice what is now known as kinetic energy. Rankine extended its use to cover potential and total energy. But though the name was new the concept was not. This was known long before under the term *facultas*

*agendi*, which is in some respects more appropriate, for if our word energy is to be translated into Greek it must be rendered *δύναμις* not *ενέργεια*.

The following extract from an old paper contains a part of the early history of the idea of energy.<sup>1</sup>

There seems to be a general impression that the natural philosophers of the last century, when they used the quantities now known as kinetic, potential and total energy at all, regarded them from a purely algebraical or geometrical point of view, failing to perceive their great physical significance. In this respect these physicists seem to have been underrated: as some passages from the first John Bernoulli, Euler's teacher and D. Bernoulli's father, will show. In a paper on the true conception of living forces<sup>2</sup> he generalizes the idea of *vis viva* and defines it as equivalent to capacity for doing work, or *facultas agendi*, which is simply a Latin equivalent of the Greek energy [as Young understood it]. In Section I. of this paper he says (translated):

*Vis viva* does not consist in the actual exertion, but in the capacity for doing work; for it subsists even when it does no work nor has any object whereon it could act; so for example a strained spring, or again a body in motion, has in itself the capacity of doing work, so that if nothing external to itself comes in its way upon which it may exert itself, and so long as there is no object present with which it can come in contact, it infallibly retains it all undiminished by time, and does not do the work which it would be capable of doing if it had the opportunity.

This seems a clear and even a vivid statement of the law:

When a system is subjected to no external forces, its energy remains constant.

In Section III. he takes a further step.

*Vis viva* (which would be more aptly named *facultas agendi*, *gallieé le pouvoir*)<sup>3</sup> is something real

<sup>1</sup> *Amer. Jour. Sci.*, Vol. 45, 1893, p. 97. See also *idem.*, Vol. 46, 1893, p. 151.

<sup>2</sup> "De vera notione virium vivarum," *Acta Eruditorum*, Leipzig, 1735, p. 210.

<sup>3</sup> The term power is now rarely used for energy, but it is scarcely a generation since this meaning was common enough. Saint-Venant (*op. cit.*, p.