

It is of great interest to consider the difference between the emphasis placed on various subjects by different countries. A comprehensive study of this difference becomes, however, quite difficult in view of the fact that the different countries vary widely as regards the line of division between their university courses and those treated earlier. It is, however, not difficult to establish certain decided differences. A slight study reveals the fact that American universities are unusually weak, on an average, with respect to courses on elliptic functions, general mathematics and theory of numbers; while the relative number of our courses in the theory of groups, theory of functions, and differential geometry is above the average. These results are deduced from a fairly extensive tabulation of the courses in mathematics which Professor J. B. Shaw recently presented before the Mathematical Club of the University of Illinois. In particular, Professor Shaw listed the courses of all German universities for a period of six years and found that during this period the number of lecture hours devoted to courses in the three great fields of pure mathematics—algebra, analysis and geometry—were in the proportion 193, 259 and 200, respectively.

G. A. MILLER

UNIVERSITY OF ILLINOIS

#### WILLIAMINA PATON FLEMING

MRS. WILLIAMINA P. FLEMING, curator of astronomical photographs at the Harvard College Observatory, was born in Dundee, Scotland, on May 15, 1857, and came to this country soon after her marriage in early womanhood. She soon drifted into the work which was destined to occupy her life, by undertaking some simple astronomical calculations at the Harvard Observatory, where, upon her death on May 21, 1911, she had just completed thirty years of service. These thirty years have covered a period of remarkable changes in the methods of attacking astronomical problems. The prism has revealed to us something of the nature of the heavenly bodies, and the photographic plate has made

a permanent record of the condition of the sky, which may be studied at any time. Celestial photography was systematically undertaken at Harvard in 1882, by Professor E. C. Pickering, the present director. The work was placed on a firm basis by the liberality of Mrs. Draper in establishing the Henry Draper Memorial, and in a short time, photographs were being taken in large numbers. The Harvard photographic library now contains over 200,000 plates.

Mrs. Fleming's duties were to qualify these plates, superintend their care, examine them for peculiar objects, and make investigations by means of them. Each plate must be so indexed that it can be found at any time, and must be carefully handled and stored, being of fragile glass, and without a duplicate. With a naturally clear and brilliant mind, Mrs. Fleming at once evinced special aptitude for this photographic investigation, which was so novel that precedents could not be found for its execution, and, in return, the photographs proved to be veritable mines of wealth for the extraction of information concerning the sidereal universe. Most of Mrs. Fleming's discoveries were made from the spectrum plates which are taken by means of a prism placed before the object glass of the telescope, and which often show the spectra of several hundred stars. She examined with a magnifying glass, all these plates taken at Cambridge and at the Harvard southern station in Arequipa, Peru, and marked all objects showing any peculiarities in their spectra. In this way, she found ten new stars and more than three hundred variable stars, because of the presence of bright lines in their spectra. She classified the spectra of 10,351 stars, which were published in 1890 in a volume of the *Harvard Annals*, called the "Draper Catalogue of Stellar Spectra." When stricken with the fatal illness, she was at work on a Memoir on Peculiar Spectra, which will give useful tables and much additional information concerning many interesting celestial objects. Much of her time was always occupied by tedious work upon the proof of the numerous volumes of the *Annals*

published by the Observatory during the last twenty-five years. Her diligence and patience were combined with great self-reliance and courage. She was a member of the Astronomical and Astrophysical Society of America, and of the Astronomical Society of France. The British Royal Astronomical Society made her an honorary member in 1906, and soon after, she was appointed Honorary Fellow in Astronomy of Wellesley College. Only a few months ago, the Astronomical Society of Mexico presented her with a gold medal for her discovery of new stars.

She left one son, Edward P. Fleming, who graduated from the Massachusetts Institute of Technology in 1901, and is now a mining engineer in Chile.

Of a large-hearted, sympathetic nature, and keenly interested in all that pertains to life, she won friends easily, while her love of her home and unusual skill in needlework, prove that a life spent in the routine of science need not destroy the attractive human element of a woman's nature.

ANNIE J. CANNON

HARVARD COLLEGE OBSERVATORY,  
CAMBRIDGE, MASS.,  
June 3, 1911

#### SOCIETY FOR THE PROMOTION OF ENGINEERING EDUCATION

THE program of the Pittsburgh meeting on June 27, 28 and 29, is as follows:

**TUESDAY.** Meetings at the School of Applied Science, Carnegie Technical Schools.

At 9:45 A.M. Address of welcome by Director A. A. Hamerschlag and response by President A. N. Talbot.

"Teaching English in Technical Schools," Professor S. C. Earle, Tufts College.

"The Preparation of Written Papers in Engineering Schools," Professor F. N. Raymond, University of Kansas.

"The Use of Logarithmic Diagrams in Laboratory Work," Mr. H. A. Gehring, Department of New York State Engineer.

"Highway Engineering," Professor A. H. Blanchard, Brown University.

At 2:00 P.M. Report of Committee on Teaching Mathematics to Engineering Students, Professor E. V. Huntington, Harvard University.

"Balance of Courses in Chemical Engineering," Dean C. H. Benjamin, Purdue University.

"Chemical Education for the Industries," Professor J. H. James, Carnegie Technical Schools.

A visit to the Country Club, followed by a dinner tendered by Director Hamerschlag on behalf of the Carnegie Technical Schools. During the evening President A. N. Talbot delivered his presidential address on the subject, "The Engineering Teacher and his Preparation."

**WEDNESDAY.** Meetings at the School of Applied Science, Carnegie Technical Schools.

At 9:30 A.M. Report of the Committee on Entrance Requirements, Professor J. J. Flather, University of Minnesota, chairman.

"All-year Session, Individual Instruction: Renewed Suggestions," Dean W. G. Raymond, University of Iowa.

"The Architecture of Engineering Schools," Professor J. M. White, University of Illinois.

"The Wentworth Institute," Director A. L. Williston, Wentworth Institute.

At 8:30 P.M. Executive session of the society and election of officers.

"The College Campus," illustrated lecture by Professor J. M. White, University of Illinois.

**THURSDAY.** Meetings at Thaw Hall, University of Pittsburgh.

At 9:15 A.M. Address of welcome by Chancellor S. B. McCormick and response by President A. N. Talbot.

"An Engineering Course for Underclassmen," Professors W. A. Hillebrand and S. B. Charters, Jr., Stanford University.

"Electrical Engineering Instruction," Professor E. B. Paine, University of Illinois.

"Teaching of Scientific Shop Management, with Use of Engineering School Shops as the Laboratory," Professors H. Wade Hibbard and H. S. Philbrick, University of Missouri.

"Technical Training from the Business Man's Standpoint," Mr. E. B. Raymond, vice-president of the Pittsburgh Plate Glass Co.

"Adapting Technical Graduates to the Industries," Messrs. C. F. Scott and C. R. Dooley, Westinghouse Electric and Manufacturing Co.

"Cooperative System of Engineering Education at the University of Pittsburgh," Dean F. L. Bishop, University of Pittsburgh.

At 8:30 P.M. Assemble in foyer of Carnegie Music Hall. The Pittsburgh alumni of engineering colleges were invited to meet the representatives of the faculties from their *alma maters*. A brief program was rendered upon the organ