tember 5, and close on the following Saturday morning. One course of five lectures will be given by Professor E. H. Moore, of the University of Chicago, and two courses of four lectures each by Professor Max Mason, of Yale University, and Professor E. J. Wilczynski, of the University of California. Titles and outlines of the courses are as follows:

On the Theory of Bilinear Functional Operations: Professor E. H. Moore.

In the light of the general theory of distributive functional operations and with emphasis on various analogies between algebraic and transcendental theories, the course is to consider bilinear functional operations, in particular the theory and applications of linear integral equations, as recently developed by Volterra, Fredholm, Hilbert and others. The general point of view with references is to be found in the article on functional operations by Pincherle in the Encyclopedia, II A $_{11}$.

Selected Topics in the Theory of Boundary Value Problems of Differential Equations: Professor Max Mason.

The course will deal with the real solutions of partial and ordinary linear differential equations of the second order. The analytical character of the solutions of partial differential equations of elliptic, parabolic and hyperbolic types will be discussed. Boundary value problems for equations of these types and for ordinary differential equations will be treated, with special reference to the applications of definite and indefinite integral equations and of Green's functions. The relation between boundary value problems and corresponding problems in the calculus of variations will be considered. Special reference will be made to writings of Hilbert, Picard, Hadamard and Bernstein, and to recent Göttingen dissertations. The lectures will not assume a knowledge of the theory of boundary value problems or of calculus of variations.

Projective Differential Geometry: Professor E. J. Wilczynski.

Differential geometry has, heretofore, been almost exclusively treated from the point of view of the group of motions. In the present course, which is confined to plane and space curves, and ruled surfaces, those properties are investigated which depend upon the infinitesimal elements of the configuration considered but which are invariant under all projective transformations. The references will be principally to the work of Halphen and that of the lecturer, which has been collected in a treatise soon to be published by B. G. Teubner under the same title as this course. Some knowledge of the theory of linear differential equations and of the theory of continuous groups will be assumed.

The morning lectures will begin at 10, the afternoon lectures at 2:30. Each lecture will occupy an hour, and consecutive lectures will be separated by an intermission. Two lectures will be given on each morning, Wednesday to Saturday, inclusive, and on each of two afternoons, and one lecture will be given on Wednesday evening at 8. One afternoon will be devoted to an outing. A charge of three dollars will be made to those attending any or all of these lectures.

James Pierpont,
Percy F. Smith,
Heinrich Maschke,
H. S. White,
F. N. Cole,
Committee on Summer Meeting.

SAMUEL LEWIS PENFIELD.

Samuel Lewis Penfield, professor of mineralogy in the Sheffield Scientific School of Yale University, died at South Woodstock, Conn., on August 12, 1906, at the age of fifty years. He has been continuously connected with the Sheffield School since his graduation from that institution in 1877.

Professor Penfield, as a student, made a specialty of analytical chemistry, and developed wonderful ability in that line of work. Soon after graduation he made many difficult analyses of minerals, particularly of phosphates from Branchville. He studied organic chemistry at Strasburg University in 1880–81, but immediately afterwards he became instructor in mineralogy at New Haven, and thenceforward devoted his whole attention to

that branch of science. He returned to Germany in 1884 to study crystallography and related subjects at the University of Heidelberg.

Penfield accomplished a vast amount of scientific work. Being a master of both the chemical and physical sides of mineralogy, he was able to make the most thorough researches, and he described many new minerals and reinvestigated many old ones. His scientific publications appeared chiefly in the *American Journal of Science,* and many of them were brought together in book form in the 'Studies from the Mineralogical and Petrographical Laboratories of the Sheffield Scientific School.' One of his important achievements was his prediction of the possible existence of an unknown mineral of the humite series, which was afterwards found and described by a European mineralogist.

As a teacher, Penfield was eminently successful. He inspired enthusiasm in his coworkers to a remarkable degree, and a number of his former pupils have become prominent in mineralogy. He devised many means for aiding the student and his laboratory became a model for the best methods of instruction; he revised and enlarged the standard work on Determinative Mineralogy of his teacher, predecessor and friend, Professor Brush; he wrote a number of pamphlets for the use of laboratory students, and besides mineralogical publications, he published important papers on analytical chemistry, cartography and crystal-drawing.

Penfield was a member of the National Academy of Sciences, and was foreign member or correspondent of many European Scientific Societies. He received the degree of LL.D. from the University of Wisconsin in 1904.

H. L. W.

SCIENTIFIC NOTES AND NEWS.

THE University of Greifswald, on the occasion of its celebration of its four hundred and fiftieth anniversary, conferred the degree of doctor of laws on Dr. W. W. Keen, professor of surgery in Jefferson Medical College.

DR. JOHN M. CLARKE, state geologist of New York, has been elected corresponding member of the Royal Academy of Sciences of Göttingen.

THE French Academy of Moral and Political Science has elected Lord Reay a foreign associate member in succession to the late M. Olivecrona. Lord Reay has been a corresponding member of the moral science section of the academy since 1902.

DR. STANISLAO CANNIZZARO, professor of chemistry at Rome and senator of Italy, has celebrated his eightieth birthday.

THE second annual course of lectures given by the Harvey Society of New York will be opened on October 20, 1906, by Professor A. E. Wright, of London. Nine other lectures are to be given during the year, the lectures and dates being as follows: November 3, C. A. Herter; November 17, W. T. Porter; December 1, J. G. Adami; December 15, George Huntington; January 12, F. G. Benedict; January 26, E. B. Wilson; February 9, S. J. Meltzer; February 23, W. T. Councilman; March 9, Friedrich Müller. The officers of the society for the coming year are Graham Lusk, president; Simon Flexner, vice-president; F. S. Lee, treasurer; George B. Wallace, secretary, and C. A. Herter, S. J. Meltzer and James Ewing, council.

THE prize of the Heidelberg Jubilee Foundation for the Encouragement of Scientific Research has been awarded to Dr. Friedrich Pockels, professor of theoretical physics, and to Dr. August Klages, professor of chemistry.

THE University of Strasburg has awarded the income of the Engelmann foundation for history or geography to Dr. Kalkoff, professor in the Gymnasium at Breslau.

DR. D. T. MACDOUGAL, of the department of botanical research of the Carnegie Institution of Washington, left New York on August 18 to carry on some observations in the deserts about Tehuacan south of the city of Mexico, in which he will be joined by Dr. J. N. Rose, of the U. S. National Museum. Dr. MacDougal expects to arrive at the Desert Laboratory, Tucson, Arizona, with the experimental