JOHN WESLEY YOUNG—IN MEMORIAM

John Wesley Young* was born in Columbus, Ohio, November 17, 1879, and died in Hanover, New Hampshire, February 17, 1932, at the age of fifty-two years and three months.

It is fitting at this time to gather together a summary of the principal activities to which Professor Young gave of his energy, but the primary purpose of this article is to pay a sincere, but confessedly inadequate, tribute to Professor Young as a man and as a friend—as a man of many-sided ability with a long record of successes as research worker, teacher, administrator, committeeman, author, editor, and citizen; as a friend whose distinctive individuality and endearing personality remain real and living, even though their charm and vigor are now matters of memory alone.

John Wesley Young was the son of William Henry Young and Marie Louise Widenhorn Young. William Henry Young, born in West Virginia of native American parentage, had a varied and interesting career. After serving in the Civil War as a colonel, he was appointed by President Grant to the consular service in Germany. For a time he held a professorship at Ohio University in Athens, Ohio, but later retired to devote himself to business interests. Marie Louise Widenhorn was born in Paris, France, of a German father and a French mother. Previous to her marriage she had lived on the Continent and spoke both German and French with fluency.

When only a few years old, John Wesley took the first of many trips to Europe when his parents, ideally fitted for the task, took charge of a party of young people seeking a year of European travel and culture. Later, when his father's business interests required extended stays in South America, his mother maintained the family home in Germany. Hence, after four years of school divided between Karlsruhe, Germany, and Columbus, Ohio, John Wesley spent the six years from 1889 to 1895 in the Gymnasium at Baden-Baden. He then returned to the United States to complete his education.

Thus Young was not only born of an international marriage but also had the advantage of an international education,—an education by no means confined to formal learning from books, but one which included many lessons in the art of sane living in a world peopled with races and individuals of widely diversified standards, ideals, ambitions, and temperaments. Is it not reasonable to find in his early development and experiences a partial explanation of the unusual degree to which the mature man was open-minded on all questions, and uniformly tolerant of the views of others?

Although Young's years in German schools had many beneficial influences on his later life, Germany can claim little credit for his proficiency in mathematics. When he entered Ohio State University from the Gymnasium, he was granted advanced credits in both French and German, but was required

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* A notice regarding Professor Young has appeared in the American Mathematical Monthly, vol. 39 (1932), pp. 309–314.

to take courses in mathematics in the associated preparatory department to supply his deficiency in entrance credits in that subject.

Young received the degree of Ph.B. at Ohio State University in 1899 and remained in residence for another year as the recipient of a graduate fellowship. He had specialized in both mathematics and philosophy without, as yet, giving either the preference. The balance was swung in favor of mathematics, partly through enthusiasm engendered by contacts with his talented brother-in-law, E. H. Moore, partly because Cornell University offered him a graduate scholarship for the study of mathematics.

At Cornell from 1900 to 1903, Young concentrated on mathematics and mathematical physics. In 1901 he was awarded the degree of A.M. and was elected to Sigma Xi. His thesis for the Master's degree, written under G. A. Miller, was entitled *On the holomorphisms of a group*, and was published without delay in the Transactions of this Society.*

For the next two years (1901–1903) Young worked for his doctorate under J. I. Hutchinson, Miller having gone to Stanford University. During this period he concentrated on automorphic functions. His thesis, *On the group of the sign* $(0, 3; 2, 4, \infty)$ *and the functions belonging to it*, appeared in the Transactions of this Society.† From February to June, 1903, he was seriously ill with typhoid.

The eight years from 1903 to 1911 found Young rapidly advancing from an instructorship at Northwestern to a full professorship at Kansas. In 1905 he went to Princeton, as preceptor, where he enjoyed fruitful association with Oswald Veblen, of which more will be said later. On July 20, 1907, he was married to Mary Louise Aston of Columbus, Ohio, a former schoolmate, who survives him. Their only child, Mary Elizabeth, is now Mrs. H. W. Allyn.

After two years as assistant professor at the University of Illinois, Young became the head of the department of mathematics at the University of Kansas, where he remained for one year. During the summer of 1911, he taught in the Summer Quarter of the University of Chicago.

These eight years were vitally significant for three reasons. They were the years in which Young devoted himself most assiduously to research. They were the years in which he gained a broad and intimate acquaintance with educational institutions of many varying types—coeducational and purely masculine, privately endowed and state controlled, collegiate and university, virtually every type except colleges exclusively for women. They were the years during which he formed many lasting friendships with fellow mathematicians whose roll embraces many of the present leaders. The value of this wide experience was evident in the skill with which he adapted himself to new conditions and the wisdom with which he solved new problems as they arose.

The remaining twenty-one years of his life, except for several leaves of absence, Young spent at Dartmouth College. Appointed originally as Professor of Mathematics on the Chandler Foundation, he was made B. P. Cheney Professor of Mathematics in 1912. He served as head of the department from

* Number 7 of the List of Professor Young's Publications at the end of this article. Hereafter, references to this list will be by number only.

† No. 10.

1911 to 1919, when the chairmanship system was adopted, and was appointed as chairman for the period 1923–1925.

For several reasons, it is difficult to state with accuracy the full extent of the individual credit due to Young for the progress made under his leadership. He was seldom dictatorial, and there was true democracy within the department. Important decisions were matters of group action and, while he freely gave credit to others for their good suggestions, he modestly disclaimed credit for many programs actively sponsored by others but indebted to his genius for their inception.

A comparison of recent Dartmouth catalogues with issues prior to 1911 reveals clear evidences of Young's influence on the courses offered. His interest in modern geometry, projective geometry (especially from the axiomatic point of view), and the fundamental concepts of mathematics, provided the inspiration for courses emphasizing these topics. Many of these courses were not intended solely for the specialist in mathematics, but were designed to afford the intellectually curious an opportunity, in a setting largely freed from technical difficulties, to gain an insight into the viewpoints of advanced mathematics as well as a keener appreciation of the logical aspects of elementary mathematics, and an understanding of the place of mathematics in the advance of civilization.

Young's influence was not restricted to courses in mathematics. He was instrumental in the establishment of the orientation courses in evolution and citizenship required of all freshmen at Dartmouth. He also organized a group of courses in the growth of science and devoted a great deal of time to studying and teaching the history of the development of the mathematical sciences.

Young was an ideal research worker—patient, philosophical, and thorough, but also highly imaginative, daring in the unconventionality of his attack, and extremely skillful in his clever handling of the technical difficulties so prevalent in worthwhile research. Moreover, he had the happy faculty of being able to present the fruits of his labors in a clear-cut fashion intelligible to others. At the end of this article is given a list of Young's papers. Comment here will be limited to a brief indication of the fields in which he worked.

His Master's thesis and a second paper* written during his year of work under Miller dealt with problems in abstract group theory. In his doctor's thesis,† written under Hutchinson, he studied in detail the monodromic group for the Riemann surface

$$y^4 = (x - k_1)^2(x - k_2)^2(x - k_3)(x - k_4)^3$$

of genus two, using methods developed by Klein in treating the elliptic modular group. He was thus led to a study of the associated θ-functions, which are a simple generalization of Poincaré's θ-Fuchsian functions, and particularly to the problem of the expansion in series of three fundamental functions in terms of which every θ-function of the group can be rationally expressed.

In his next paper‡ Young proposed a new line of attack, using hypercom-

* Nos. 7, 8.

† No. 10.

‡ No. 11.

plex numbers, upon the old unsolved problem of the arithmetical definition of the subgroups of the modular group. Then followed the first of three papers* on the discontinuous ζ-groups defined by normal curves of order n in space of n dimensions.

A paper† published in 1907 generalizes the Tchebychef problem of approximating to continuous functions by polynomials. Young replaces the polynomials by an arbitrary class of functions dependent on a finite number of parameters.

In 1908 Young shared with Veblen the distinction of creating a set of postulates for projective geometry‡ which won the approbation of the mathematical world by their simplicity and effectiveness. The work of Hilbert and others had made it clear that sound logical foundations could be built for the ordinary euclidean geometry but only at the expense of bringing into consideration concepts and methods, which, if introduced into a purely deductive treatment of geometry, transformed a supposedly elementary subject into one of formidable complexity.

Veblen and Young pointed out the advantages of first developing a "general projective geometry" from a simple set of assumptions, a procedure which permits of the postponement of the difficult topics of linear order and continuity, and hence greatly simplifies the logical abstract treatment of a considerable body of geometry. In 1910 Veblen and Young published a text in projective geometry§ in which this plan was carried out with thoroughly satisfactory results.

A series of papers‖ published between 1909 and 1916 shows a continued interest in groups, but chiefly in their relation to associated geometrical considerations. Thus projective geometry on a complex line is linked with the geometry of inversion in a real plane, and, as a later generalization (with F. M. Morgan as co-author), well known Cremona transformations of the third and higher degrees are interpreted by representing them as linear transformations of a hypercomplex variable.

As early as 1911¶ Young showed interest in the formulation of generalized conceptions in algebra, which first found expression in formal papers** in 1927.

During the last twenty years of his life administrative tasks made heavy demands upon his time and formal published papers were few in number, but his interest in research remained unabated. Even when spending many weeks in a hospital bed, shortly before his final illness, his mind was actively occupied with an attempt to construct an angle calculus designed to facilitate the study

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* Nos. 12, 14, 18.

† No. 13.

‡ No. 15.

§ No. 1.

‖ Nos. 16, 17, 20.

¶ *On algebras defined by groups of transformations.* Read December 28, 1911. Abstract, this Bulletin, vol. 18 (1912), p. 216.

** Nos. 21, 22.

of those geometrical properties which are invariant under a similarity transformation.

An outstanding feature of Young's character was his really serious philosophical interest in any worthwhile problem, and his habit of keeping an absolutely open mind until full discussion brought out a convincing argument as to the side on which lay the truth.

He was never a conservative, but neither could he be fairly classed as a radical. He was that happy compromise suggested by the word progressive, that is, he was an ardent supporter of new ideas and methods but he never became so fanatical about them as to lose his sense of true values.

These traits made Young such an excellent administrative officer and committee member that many organizations availed themselves of his services. He became a member of the American Mathematical Society in February, 1902, was made an editor of the Bulletin and a member of the Council in 1907 and served steadily in these capacities for eighteen years. He served as a Vice-President from 1928 to 1930.

He aided in the creation of the Mathematical Association of America, became one of its Vice-Presidents in 1918, and its President from 1929 to 1931. The new organization appointed a committee on mathematical requirements with Young as chairman. In response to a widespread desire expressed both by secondary schools and by colleges that the definitions of mathematical requirements be revised, this committee was enlarged to make it nationally representative and was fully sponsored by the Mathematical Association of America with the generous financial assistance of the General Education Board. He served as the chairman of this National Committee from 1916 to 1923. From 1919 to 1921 Young was granted leave of absence to devote his whole time to this work. The final report* of the committee contained authoritative conclusions which have had and continue to have a far-reaching influence on mathematical instruction.

At the summer meeting of the Society in Providence in 1930 Young was appointed on an advisory committee to cooperate with the Society for the Promotion of Engineering Education which planned for the following summer a two-weeks summer school for teachers of mathematics to engineering students. It was at this summer school that his last paper,† *The adjustment between secondary school and college work in mathematics*, was given.

In 1918 Young was engaged in war work with the Educational Bureau of the Young Men's Christian Association with headquarters in New York City. He also spent some time in Washington, D. C., as a member of the Committee on Education and Special Training of the War Department.

For seven years, for four years as chairman, Young was a member of the Committee on Instruction at Dartmouth, and he also served on many other

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* *The Reorganization of Mathematics in Secondary Education*; report by the National Committee on Mathematical Requirements under the auspices of the Mathematical Association of America, Inc., 1923. x+652 pp.

† No. 29.

important committees of the college. From 1915 to 1917 he was Chief Examiner in Geometry for the College Entrance Examination Board.

His memberships in learned societies included most of the well known mathematical organizations of America and Europe, and he was a regular attendant at the International Congresses. He was also an active member of many other organizations such as the Dartmouth Scientific Association, Gamma Alpha, the New Hampshire Academy of Science, and the Connecticut Valley Section of the Association of Teachers of Mathematics in New England (of which he was President in 1926–1927).

He found time to write or edit a number of texts in mathematics. Mention has already been made of the *Projective Geometry* written with Oswald Veblen and published in 1910. His *Lectures on Fundamental Concepts of Algebra and Geometry*,* published in 1911, aroused widespread interest and was translated into Italian. In 1918 and 1919 he wrote with F. M. Morgan freshman texts in *Elementary Mathematical Analysis*† and *Plane Trigonometry*.‡ From 1924 until his death he was the mathematical editor for the Houghton-Mifflin Company and nearly a score of successful texts were published under his supervision.

Young also served in an editorial capacity for the Mathematics Teacher, the Colloquium Publications of the American Mathematical Society, and the Carus Mathematical Monographs. Number Four of the latter, *Projective Geometry*,§ was written by Professor Young. He also contributed an article on geometry‖ to the fourteenth edition of the Encyclopedia Britannica.

Such is the partial record of the busy life led by John Wesley Young. For several decades he has been an inspiring leader in the mathematical life of this country, while his sincere friends may be found in many parts of the world.

He carried on to the very end of his life. After spending most of the first semester of the present academic year in the hospital, he recovered sufficiently to take up his college work in the second semester. His strength was equal only to a restricted teaching schedule, but he met his classes and taught them with his usual effectiveness to the end. When he left his class at noon of February 15, he was taken directly to the hospital, to await courageously the final summons, which came before the class had met again.

In the words of part of the faculty resolution, "It is true that the Faculty of Dartmouth College has lost one of its most distinguished members. But in a more personal way we shall miss his calm, sometimes whimsical, and always logical and unprejudiced treatment of matters under discussion in meetings of the faculty. We shall miss his smiling greetings on the street and his kindly interest in our doings. We shall miss those stimulating conversations that we have had with him on matters far from mathematical."

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* No. 2.
† No. 4.
‡ No. 5.
§ No 6.
‖ No. 27.

LIST OF PUBLICATIONS

Books

1. *Projective Geometry* (with Oswald Veblen), vol. 1, Ginn & Co., 1910. x+342 pp. (Vol. 2, published under authorship of Veblen and Young, was written by Veblen alone.)
2. *Lectures on Fundamental Concepts of Algebra and Geometry*, Prepared for publication with the coöperation of William Wells Denton with a note on the Growth of Algebraic Symbolism by U. G. Mitchell. The Macmillan Company, 1911. vii+247 pp.

   Italian Translation by D. Mercogliano: *I Concetti Fondamentali dell' Algebra e della Geometria*. Naples, L. Pierro, 1919.
3. *Plane Geometry* (with A. J. Schwartz), Henry Holt & Co., 1915. x+223 pp. Second edition, 1923.
4. *Elementary Mathematical Analysis* (with F. M. Morgan), The Macmillan Company, 1918. xii+548 pp.
5. *Plane Trigonometry and Numerical Computation* (with F. M. Morgan), The Macmillan Company, 1919. vii+122 pp.
6. *Projective Geometry*. The Carus Mathematical Monographs, No. 4. Open Court Publishing Co., 1930. ix+185 pp.

Articles on Mathematical Research

7. *On the holomorphisms of a group*, Transactions of this Society, vol. 3 (1902), pp. 186–191.
8. *On a certain group of isomorphisms*, American Journal of Mathematics, vol. 25 (1903), pp. 206–212.
9. *A simple existence proof for logarithms*, American Mathematical Monthly, vol. 10 (1903), pp. 227–230.
10. *On the group of the sign* $(0, 3; 2, 4, \infty)$ *and the functions belonging to it*, Transactions of this Society, vol. 5 (1904), pp. 81–104.
11. *The use of hypercomplex numbers in certain problems of the modular group*, this Bulletin, vol. 11 (1905), pp. 363–367.
12. *A class of discontinuous ζ-groups defined by normal curves of the fourth order in a space of four dimensions*, Rendiconti del Circolo Matematico di Palermo, vol. 23 (1907), pp. 97–106.
13. *General theory of approximation by functions involving a given number of arbitrary parameters*, Transactions of this Society, vol. 8 (1907), pp. 331–344.
14. *A fundamental invariant of the discontinuous ζ-groups defined by the normal curves of order n in space of n dimensions*, this Bulletin, vol. 14 (1908), pp. 363–367.
15. *A set of assumptions for projective geometry* (with O. Veblen), American Journal of Mathematics, vol. 30 (1908), pp. 347–380.
16. *The geometry of chains on a complex line*, Annals of Mathematics, (2), vol. 11 (1909–10), pp. 33–48.

17. *Two-dimensional chains and the associated collineations in a complex plane*, Transactions of this Society, vol. 11 (1910), pp. 280–293.
18. *The discontinuous ζ-groups defined by rational normal curves in a space of n dimensions*, this Bulletin, vol. 16 (1910), pp. 363–368.
19. *Fundamental regions for cyclical groups of linear fractional transformations on two complex variables*, this Bulletin, vol. 17 (1911), pp. 340–344.
20. *The geometries associated with a certain system of Cremona groups* (with F. M. Morgan), Transactions of this Society, vol. 17 (1916), pp. 233–244.
21. *On the partitions of a group and the resulting classification*, this Bulletin, vol. 33 (1927), pp. 453–461.
22. *A new formulation for general algebra*, Annals of Mathematics, (2), vol. 29 (1927), pp. 47–60.

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23. *On some tendencies in geometric investigations*; "Remarks addressed to my students" by Corrado Segre, translated by J. W. Young, this Bulletin, vol. 10 (1904), pp. 442–468.
24. *The present and the future of mathematical physics*; address delivered before the section of applied mathematics of the International Congress of Arts and Science, St. Louis, September 24, 1904, by Henri Poincaré; translated by J. W. Young, this Bulletin, vol. 12 (1906), pp. 240–260.
25. *Remarks to problem* 409, American Mathematical Monthly, vol. 22 (1915), p. 270.
26. *The organization of college courses in mathematics for Freshmen*; read at the meeting of the Mathematical Association of America at the University of Rochester, September 5, 1922, American Mathematical Monthly, vol. 30 (1923), p. 6.
27. *Geometry*, Encylopedia Britannica, fourteenth edition, 1929.
28. *Functions of the Mathematical Association of America*; retiring presidential address delivered at Minneapolis, September 8, 1930, American Mathematical Monthly, vol. 39 (1932), pp. 6–15.
29. *The adjustment between secondary school and college work in mathematics*, Journal of Engineering Education, vol. 22 (1932), pp. 586–595.

Reviews in this Bulletin: vol. 12, pp. 127, 128, 399; vol. 13, p. 405; vol. 14, p. 147; vol. 15, p. 463; vol. 16, p. 254; vol. 17, pp. 42, 258; vol. 18, p. 193; vol. 19, p. 370; vol. 27, p. 484; vol. 28, pp. 224, 416, 469, 471; vol. 29, pp. 38, 40, 185, 232, 271, 470, 480; vol. 30, pp. 88, 182, 278; vol. 34, p. 788.

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