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ERNEST FOX NICHOLS

By PHILIP FOX

The death of Ernest Fox Nichols, on April 29, 1924, was announced in this *Journal* in the issue of May 1924. With his death physics lost one of its foremost experimentalists; higher education one of its able administrators; this *Journal* one who served for many years as assistant editor and collaborator.

In writing of Professor Burnham, Professor Barnard remarked, "No man perhaps ever worked with a more varied assortment of telescopes than he"; and later, after citing them, "What a proud array of telescopes, which owe much of their reputation to this one man!" It might similarly be said of Professor Nichols that few men have worked in so many laboratories, touched so many institutions, giving to each of them new distinction.

Ernest Fox Nichols was born in Leavenworth, Kansas, at 707 Delaware Street, son of Alonzo Curtis and Sophronia (Fox) Nichols, on June 1, 1869. His ancestry is of English-Scotch stock. On his father's side the American branch, of which he was of the tenth generation, began with Francis Nichols, who came to America about 1637 and settled in Stratford, Connecticut. Through his mother he was of the eighth generation of descendants from Thomas Fox, who arrived in America in 1640 and settled in Concord, Massachusetts.

ERNEST FOX NICHOLS

In the early days Leavenworth, as a river town, vied with Independence and St. Joseph, Missouri, in importance as a point of departure for pioneers outfitting and venturing westward. With the coming of the railroads, Omaha to the north and Kansas City, near Independence and Wyandotte, to the south, diverted traffic from Leavenworth and also from St. Joseph, which accordingly subsided into cities of less importance. Leavenworth maintained an active and rather brilliant social life, due largely to the influence of the important army post immediately to the north at Fort Leavenworth. It is not inspiring to live in a city on the wane, yet in such a town the lad Nichols spent his childhood and youth, in the house of his birth or the later home at 308 Pottawatomie Street. But in other ways Leavenworth was not without its inspiration. One of the great epics of America's history had been staged there when it served as portal to the West; many of the streets of the city bear the names of Indian tribes, beautiful and poetic. On the bluffs opposite Fort Leavenworth can be pointed out certain earthworks built by early Spanish explorers who came north from Mexico (locally they are ascribed to Coronado); and then there is the great Missouri, rolling, boiling past.

The mention of this great river brings to mind a scene near the Parliament building in London, overlooking the Thames. In the summer of 1919 a group of American army officers were being shown about and most generously enlightened by Mr. John Burns, a former member of Parliament and of the British cabinet. One officer remarked rather flippantly, "So this is the Thames. Not much compared to the old Missouri." Mr. Burns, overhearing him, impressively replied, "The Missouri is but flowing water, while this is liquid history." One can appreciate the force of his remark, but, as history goes in America, it is certain that important chapters are linked with this "flowing water," this great, swift, turbulent, muddy river. Of all this history the boy Ernest Nichols heard from the soldiers at the post, those sturdy, self-reliant officers and men to whom we owe so much in the winning of the West.

I cannot leave the Missouri without relating another incident. There used to be a method of fishing in vogue at Leavenworth called "jugging." Short fish-lines were attached to the handles of empty, stoppered jugs which, set afloat, were followed down stream and collected at a point often several miles down the river. A bobbing jug, a disappearing or swiftly towed jug was the signal of a catch and for pursuit. Ernest's father, who was an excellent oarsman and who spent his spare time on the river for the benefit of his health, took the child, at the age of little more than three, on such a fishing trip. In gathering in the floats ten miles below Leavenworth, where the current runs nearly ten miles an hour, one of the hooks caught in a snag in midstream. In an instant the boat was overturned. His father tossed him toward the snag, calling "Hold on." Providentially his father also was able to reach the snag. There, at two o'clock the next afternoon, twenty-four hours later, they were rescued by an old river-man who had been sent down to look for them on what he believed was a hopeless errand.

The youth Nichols did not have the usual routine of school experience, for he was rather delicate. He early did some work in distributing newspapers, following in his brother Arthur's footsteps. This was both for out-of-doors exercise and to be earning something. After his mother's death, on March 6, 1882, he employed himself regularly in such work. His father died on the fourth of August, 1884. This event left the two boys—Arthur, nineteen years of age, and even then city editor of a Leavenworth newspaper, and Ernest, aged fifteen—alone; and it brought the turning-point in the latter's career. The household was broken up, and that fall Ernest went to Manhattan, Kansas, to the home of his uncle, General S. M. Fox, my father, and entered the Kansas State Agricultural College.

It seems strange now, in these days of hard conventions in college entrance requirements when colleges have become, at least in this regard, wholly impersonal, that a youth without a day of formal schooling could be admitted. His Aunt Esther, Mrs. S. M. Fox, writes about this:

> The peculiarities of his case appealed strongly to President Fairchild. Public school was out of the question. He was allowed to enter college on the sole condition that he make good. Mr. Fox assured the president that he would be able to do this, and the boy never failed in any subject. In many ways he was much better informed than most boys of his age: his mother was well educated, an excellent conversationalist, and his father was strong in chemistry and astronomy and inclined to research. In other things a bright boy in the fourth grade

was ahead of him—such writing, such spelling. He told me when he came here that he had read only two books through in his life. But his mother had read to the boys a great deal of the best sort. Both of the boys spoke correct English because they had never heard anything else. The scientific bent was from his father wholly.

His father was a photographer, and a photographer of that day was something of a chemist and skilled in mechanical manipulation. My mother writes further: "In the first year I stood ready to help the boy every day. His eyes were not good and he was a slow reader at best—help was necessary. I think he never forgot anything—his mind and attention were not dulled by routine. . . . . He finished his four years (receiving the degree of Bachelor of Science) among the three or four strongest students." In mentioning the inspiration and aid which he received from his aunt, the influence of his uncle, a man of scholarly habits and strong literary ability, should not be overlooked; nor the constant encouragement of his brother, with whom he maintained throughout his life a relationship of unusually close attachment.

He stayed on at Manhattan for an additional year of work, acting as an assistant in chemistry. He also looked after the meteorological instruments and records. At this time, too, he and my mother kept a daily record of solar activity, mapping the positions of sun-spots by projecting the solar image upon a screen. For this purpose they used a small telescope which had belonged to his father. These observations were my own introduction to astronomy. At this time the youth was greatly attracted toward the medical profession, especially surgery, but was deterred from following his inclination for fear that his strength was insufficient to withstand its demands. The way to physics seemed more practical; so in the fall of 1889 he went to Cornell with his classmate, Mr. F. J. Rogers, now professor of physics at Leland Stanford University.

Professor Edward L. Nichols, to whom Ernest F. Nichols acknowledged so much influence and inspiration, writes of his work there:

I turned Nichols' attention to the study of radiation almost at once and we worked together more or less throughout the three years which he spent at Cornell. The immediate product was the paper, "A Study of Transmission Spectra of Certain Substances in the Infra-Red," which was published on page 1, volume 1, of the *Physical Review;* and the much more important result, which flowered out later in his work with Rubens at Berlin and with Hull at Dartmouth. By his sweetness of character and his appreciation of the ethical, aesthetic, and artistic values of life, Nichols made a profound impression upon those with whom he associated in Ithaca, and to this day I am continually asked about him by those who remember those early days.

He was Brooks Fellow at Cornell in 1891–1892 and taught some sections of beginning physics. At this time, also, he received the degree of Master of Science.

In the fall of 1892 he went to Colgate University as professor of physics and astronomy. On June 16, 1894, he married Katharine Williams West, of Hamilton, New York, and almost immediately thereafter went to Germany for study in the University of Berlin. An account of the life of Mr. Nichols, to be a true picture, must mention the peculiar sympathy of his home life. Mrs. Nichols shared his life completely, supporting him in all of his tasks with sympathy, encouragement, and understanding. To this marriage was born one daughter, Esther Katharine, who through the years occupied a position of most charming intimacy with her father.

From David Fairchild, of the United States Department of Agriculture, son of President Fairchild, I gain these interesting impressions of Mr. Nichols during their association of this student period:

Ted (the name by which he was called in his family and by close friends of his youth) was my most intimate friend during the most impressionable part of my life. We were together in Manhattan in the same classes in college. I can see him now as he used to rise to answer a question put by the teacher, with his head at its characteristic angle. There was always a peculiar refinement about his manner, and he chose his words carefully.

He took little part in the debating societies in college and was not engaged in any of the politics of the institution. He was then perhaps a trifle shy and was too busy making a wide acquaintance with the great authors to be interested particularly in many of the boys around him. I think the class would all agree that Ted was about the most scholarly member in it.

I remember spending occasional very happy days in his little lodgings at Ithaca, talking into the morning. . . . . Ted loved good music and good poetry. I remember going with him to hear dear old Doctor Corson read Browning, and to dine with that great architect and lover of music and friend to us both, William Miller. I can see him sitting in great ecstasy listening to the pipe organ or the delicate tones of the harp which one of Mr. Miller's daughters played with great feeling. His love and acquaintance with great music expanded when he went to Germany. Many were the hours we spent together listening to Wagnerian operas. We had one winter together of strenuous intellectual activity. My laboratory work was in the Agricultural Institute and his in Rubens' laboratory. On my way back from work I used to drop in and see him during those days when he was perfecting the radiometer. I had not thought of him as a technician, but when I saw the patience with which he fussed over the tiny, thin strips of mica and the delicate quartz filaments, I realized how delicate was his touch and what unbounded patience he had.

The interest in problems in radiation which Mr. Nichols had acquired at Cornell and carried on in his research work in the Physical Institute at the University of Berlin led directly to three important papers which later (in 1897) were presented to the faculty of Cornell University for the degree of Doctor of Science. They were: (1) "A Method for Energy Measurements in the Infra-Red Spectrum and the Properties of the Ordinary Rays in Quartz for Waves of Great Length," originally read before the Berlin Academy on November 5, 1896; (2) a joint paper by Heinrich Rubens and E. F. Nichols, "Heat Rays of Great Wave-Length"; and (3) of the same joint authorship, "Certain Optical and Electro-magnetic Properties of Heat Waves of Great Wave-Length." Studies for the first two were made in the Physical Institute of the university, and for the third, in the physics laboratory of the Charlottenburg Polytechnic Institute.

Of this work Professor Trowbridge, of Princeton, has said:

Unlike the majority of foreign students in Berlin in those days, Nichols worked on a problem of his own devising. He appeared older and more experienced than most of his fellow-students in the laboratory, though he was not yet twenty-seven years old. His assiduity and his patience in overcoming great experimental difficulties were amply rewarded by his producing a very fine piece of work. This first important research of his was the study of the optical properties of quartz in the infra-red region of the spectrum, and the results which he obtained led directly to the perfection of the so-called method of residual rays which has been used with conspicuous success by Rubens and his fellow-workers in investigating the extensive infra-red spectrum. Before he left Berlin at the end of his second year, Nichols had published important papers in collaboration with Rubens and he was regarded both in Europe and America as an experimental physicist of extraordinary ability.[1]

[1] *Science*, **59**, 415, 1924.

He returned to Colgate from Berlin and spent one more year there before being called to Dartmouth College as professor of physics, in the fall of 1898. The cornerstone of Wilder Physical Laboratory at Dartmouth was laid in this year and the building was occupied in the fall of 1899. Dr. Nichols was responsible for many details of design, construction, and equipment of this laboratory, and for the organization of the new courses of instruction.

At the time of its dedication in 1897 he visited the Yerkes Observatory, and this led to his measurements of stellar radiation. For the Berlin research Nichols had so improved the radiometer that it was the most sensitive instrument for the detection of radiation then available. In 1898 Professor Hale invited him to prepare a special radiometer and to use it for stellar observations with the best facilities which could be offered at the Yerkes Observatory. Professor Hale writes:

At that time the facilities were very crude. An ancient heliostat, employed many years earlier by Langley for his measurements of lunar radiation, was borrowed from the Allegheny Observatory and mounted in our heliostat room. Its decrepit condition, especially under the undue load of a large plate-glass mirror required to fill the 24-inch paraboloidal mirror of our two-foot reflector, made the task of observation extremely difficult, but Nichols overcame all obstacles. With the extraordinary skill in manipulation which characterized all of his work, he had made a very delicate suspension system for the radiometer. When exposed to variable sky radiation this was very unsteady, but by adopting a differential method of observation he succeeded in getting small but definite deflections from Vega, Arcturus, Jupiter, and Saturn, which gave their respective thermal intensities as 1, 2.2, 4.7, and 0.74. With the apparatus employed, assuming no atmospheric absorption, the number of candles in a group at a distance of sixteen miles could be determined by a series of measurements.

This investigation, the first to give us definite knowledge of stellar heat radiation, underlies the important recent work of Coblentz, Nicholson and Pettit, and Abbot. It influenced the design of the Mount Wilson 60-inch and 100-inch reflectors by emphasizing the desirability of the coudé type of mounting, chosen also for high dispersion work on stellar spectra. Thanks to this arrangement, and to the greatly improved radiometer constructed by Nichols and Tear for his use, Abbot obtained last summer with the 100-inch telescope the very extraordinary results on stellar radiation and stellar energy spectra which have enabled him to derive the temperatures and diameters of several stars of various types.

This work was carried on during the summers of 1898 and 1900. The results appear in the *Astrophysical Journal*, **13**, 101, 1901. In later years he visited the Mount Wilson Observatory, in 1906 and again during a period of convalescence in the winter of 1921–22. The result of the work of 1906 gave a paper,[1] "The Absence of Very Long Waves from the Sun's Spectrum."

In the Wilder Laboratory, Professor Nichols, in collaboration with Professor Gordon F. Hull, conducted one of the most important pieces of research of his scientific career, which bore on the interesting question of light-pressure, suggested as a consequence of Maxwell's theoretical work. Experimental work was begun in 1899 and quantitative measures of this pressure were soon obtained. The first note on it appeared in the *Astrophysical Journal*, **15**, 62, 1902. The full paper was presented before the American Academy of Arts and Sciences and published in their *Proceedings*, **38**, 559, 1903. At just this time Peter Lebedew, in Moscow, attacked the same problem by different methods and was also successful in establishing experimentally, and quite independently, this radiation pressure. A note on Lebedew's work appeared in the same number of the *Astrophysical Journal*, immediately preceding the note by Nichols and Hull cited above. This experimental demonstration of light-pressure is of great importance, for the principle established thereby has very wide application in both physics and astrophysics. Ultimately within the star is found a balance between radiation pressure and gravitational attraction, a phenomenon which is important in fixing both the masses and diameters of stars.

From the *Dartmouth Alumni Magazine* of June 1924 I make this abstract from a paper by Professor Gordon Ferrie Hull:

> The years 1899–1903 were strenuous and exhilarating years for the department of physics. New equipment was constantly being added, new courses were being offered and very exacting research was being carried on. Vacations, except for tramping trips in the mountains, were largely given up to research. In all of this work Dr. Nichols was the invigorating spirit. The successful completion of certain research work, notably that having to do with the detection and measurement of the pressure of light, together with his breadth as a teacher, gave Dr. Nichols a prominent place in the educational world. Natu-

[1] *Contributions from the Mount Wilson Solar Observatory*, No. 19, 1907; *Astrophysical Journal*, **26**, 46, 1907.

rally he was wanted elsewhere, and in 1903 he was offered and he accepted a professorship of physics in Columbia University. Before he severed his connection with Dartmouth, however, he was given the honorary degree of Doctor of Science in recognition of the significant service he had rendered to science and to Dartmouth.

This degree was the first of a series of such honors conferred upon him. In further acknowledgment of his work he was elected vice-president of the American Association for the Advancement of Science in 1903, and later, in 1906, he became a member of the American Philosophical Society, Member of the National Academy in 1908, Fellow of the American Academy of Arts and Sciences in 1913. He had received the Rumford Medal of the American Academy in 1905.

After one year at Columbia he took a year's leave of absence (1904–1905), which he spent abroad at Cambridge. In May 1905 he accepted an invitation to lecture before the Royal Institution on radiation pressure. Upon his return to Columbia, Nichols found his time rather largely taken up with teaching, with the direction of research of the graduate students, and with important departmental administrative matters. One problem devised at this time for investigating radiation and ionization of gas subjected suddenly to high pressure, in which a pressure-chamber was mounted on the end of a rifle barrel, still remains unfinished. It is hoped that this problem may be carried forward to completion by another. The apparatus at present is at Northwestern University.

A lecture on physics delivered at Columbia University in the series on Science, Philosophy, and Art, as the opening lecture in the natural science group, October 23, 1907, reveals a fine example of popular exposition, one of the best brief summaries of physics of the time.

When William Jewett Tucker resigned as president of Dartmouth College, the choice for his successor fell on Dr. Nichols, who in June 1909 became the tenth president of that institution.

The call of an investigator of proven ability to a position in which administrative duties absorb all of his energy may be justified for the purpose of leavening the whole institution to the need of research and quickening all of its members to productive scholarship. Nevertheless, the withdrawal of President Nichols from the laboratory was the occasion of some very deep regret on the part of many of his co-workers in physics.

From Professor Frost of the Yerkes Observatory, an alumnus of Dartmouth College, and largely responsible for Professor Nichols' appointment as professor of physics there, I quote the following:

> I personally regretted his giving up research in physics to educational administration. The latter calls for qualities of ready speech and interpretation in a wide field of thought, and the training of a physicist is somewhat contradictory to the requirements of an educator; that is, he is supposed to speak only on topics wherein he has experimental evidence or well-established theory. It was greatly to the credit of Ernest Nichols that he succeeded so well as a college president, but it is not surprising that he was anxious to get back into the field of research for which he was so exceptionally fitted.

His friend, David Fairchild, says:

> His quiet inquisitiveness and great patience and keen sense of the cosmos about him were so much greater than his social talents—great as these always were—that I shall never cease to regret that the Dartmouth Board of Regents lured him, a great investigator, away from the work he loved most and work that he should have been supported in doing. When a man does investigative work surpassingly well, why lure him away from this real passion of his life? I cannot help feeling that my dear old friend and classmate was a victim of the mistaken idea that it is more important to have a good college president than a good research man. No matter if Ted was a good president, he was a real investigator and there are ten good presidents—yes, twenty—to one really great investigator.

Before leaving this phase of his life, I wish to quote from a letter from his successor as president, Ernest M. Hopkins:

> Peculiarly, I have an entirely different impression of him in each of the different relationships which I had with him, and his personality, as I think back upon it, now appears to me rather as a group of facets than as anything commonplace and unvarying.
>
> I remember as a student how his ability to teach impressed me, and I remember as well the perfection of preparation and the mastery of detail which made his experiments in class real illustrations. I have no memory of any one of these ever having failed in any detail, and we came to admire him as an artist, in this matter of the experiments which he used for illustration, as well as a scientist.
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> Later in all of my social contacts with him through the years before he went to Columbia I found him agreeable in every way—a delightful conversationalist

with a background of general reading and appreciation of the arts supplementing his deep observation in all questions arising in the field of science.

So far as Dartmouth is concerned I think that the College called upon him to take up the presidency in one of the most difficult periods of its history, for it required something more than usual administrative genius and executive skill to help the College to continue to progress, to say nothing of not retrograding after the brilliancy and wide popular appeal of such an administration as President Tucker's. The extent of the sacrifice which President Nichols made in laying scientific work aside for a time and the value of the contribution which he made to Dartmouth cannot be overestimated. Moreover, I think that the effort necessary upon his part was larger than any ordinary mortals can even guess. For in the last analysis his longing was for the laboratory and for scientific research rather than the office and the rough and ready manner of arriving at decisions necessary in administrative work. To most of us there is not the distress of mind and the violation of instinct in making a necessary decision with full knowledge that it may prove to be wrong that there is to the true scientist—and no one ever questioned that the spirit of Dr. Nichols was that of the true scientist. In company with the host of those who knew him, the knowledge of his work and his aspirations will be to me a most lucid definition of what constitutes the spirit of scientific research.

Concerning President Nichols' administration at Dartmouth, I quote further from Professor Hull's article cited above:

President Nichols' administration was characterized by a high idealism for the scholarship of the College. Means were found for giving larger recognition to the best students. The closer association of faculty and students was urged and an organization to bring this about was set up. Productive scholarship was encouraged on the part of the faculty and notable professorial appointments were made. On the other hand the business part of the administration was enlarged and separated from that of the educational executive. The College grew. It may be that increase in endowment and student numbers is due to the onward march of a number of forces which the president of a college can neither wholly arrest nor greatly accelerate. However, it is a matter of record that the number of students, the productive funds, and the value of the college plant were all substantially increased during President Nichols' administration.

Recognition of his service is inscribed in the records of the trustees in part as follows:

In difficult processes of readjustment you (Dr. Nichols) have brought to bear a high order of administrative ability enriched with a large tolerance, an exhaustless patience, a noble dignity, and generosity. You brought to your task trained powers of analysis coupled with the loftiest ideals of scholarship.

You have thus built up in the College an educational and administrative organization adequate and harmonious.

He served Dartmouth as president for seven years. Throughout this period he cherished the hope that he might return to the laboratory. He resigned the presidency of Dartmouth in 1916 to fulfil that hope and accepted an appointment as professor of physics at Yale University.

He was not, however, to have uninterrupted service here, for within the year America entered the war and Professor Nichols volunteered his services to the government through the National Research Council. He was engaged throughout the period of the war with the Navy Department, working on submarine defense and other problems connected with the Department of Naval Ordnance. Concerning the details of this work nothing is known outside of the Navy Department, but there is indication that it was of great importance.

After the war he returned to Yale for a season, but in 1920 resigned to accept the directorship of the division of pure science of the Nela Research Laboratory at Cleveland. Here he took up again his work on radiation problems, but in 1921 was called again to administrative duties as the president of the Massachusetts Institute of Technology. One of the institute's foremost alumni, Professor George E. Hale, makes this statement concerning the appointment:

When Nichols was elected President of the Massachusetts Institute of Technology I was beset with conflicting emotions. I had gladly seen him resume research at Yale after relinquishing the presidency of Dartmouth College because I felt that able investigators are less common than good executives, and believed his greatest service could be done in the laboratory. Technology, however, greatly needed a man who appreciated the importance of fundamental science, with the ability to restore it to the place in the scheme of the Institute originally intended by President Rogers. He told me of his plans and I saw their great possibilities.

His inaugural address sounded a note of great importance for the ideals of engineering and scientific professions. It urged the responsibility of the engineer to society and the importance and need of crowding the work of research in pure science. This address appeared in *Science*, **53**, 523, 1921.

Scarcely had he entered upon his new duties when he was prostrated by the malady which finally proved fatal. Realizing that the problems of the Institute demanded one in full physical vigor and being assured that he could not, for months to come, drive himself to normal capacity, he begged the trustees in the following letter to accept his resignation:

A sufficient time has now elapsed since the onset of a severe illness, which followed immediately upon my inauguration, to enable my physicians to estimate consequences. They assure me certain physical limitations, some of them probably permanent, have resulted. These, they agree, make it decidedly inadvisable for the Institute or for me that I should attempt to discharge the manifold duties of president. Indeed, they hold it would be especially unwise for me to assume the grave responsibilities, to attempt to withstand the inevitable stresses and strains of office, or to take on that share in the open discussion of matters of public interest and concern inseparable from the broader activities of educational leadership.

As my recuperation is still in progress I have contended earnestly with my doctors for a lighter judgment. I feel more than willing to take a personal risk, but they know better than I, and they stand firm in their conclusions.

The success of the Institute is of such profound importance to our national welfare, to the advancement of science and the useful arts, that no insufficient or inadequate leadership is sufferable. Personal hopes and wishes must stand aside.

It is therefore with deep personal regret, but with the conviction that it is best for all concerned, that I tender you my resignation of the presidency of the Institute and urge you to accept it without hesitation.

To you who have shown me such staunch and generous friendship it is pleasant to add that in the judgment of my physicians the physical disqualifications for the exigencies of educational administration are such as need not restrict my activities in the simpler, untroubled, methodical life of scientific investigation to which I was bred. It is to the research laboratory, therefore, that I ask your leave to return.

When this resignation had been accepted, he returned to Cleveland with the new appointment, director of the Nela Research Laboratory. It is a fine commentary on his fixity of purpose and his courage that neither the distracting duties of administrative work nor impaired health left him hopeless to approach the problems of the new physics. He succeeded in inaugurating at Nela some important studies and resumed his earlier productivity. In fact, his last piece of work was perhaps one of the most important, at least in some ways the most gratifying, of his whole career in that it served to bridge the gap between the short electric waves and the long heat waves and gave us the whole electro-magnetic gamut from the longest electric waves to the infinitesimal X-rays without break. The paper presenting this work, "Joining the Infra-Red and Electric Wave Spectra," is printed in this number of this *Journal*.

It was while presenting this paper, the joint work of Dr. J. D. Tear and himself, that his death occurred. Professor Trowbridge, in the article in *Science* mentioned above, has the following words:

> Surrounded by friends and associates and addressing, as one of the leaders in his own field of science, a distinguished audience of fellow scientists, Ernest Fox Nichols died suddenly on April 29 in the auditorium of the building of the National Academy of Sciences at Washington.
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> Were it possible to be unmindful of the added shock and sorrow to his family which such sudden death brings, his friends could have wished for him no more fitting ending of his life, devoted as it was to the advancement of scientific knowledge, than to die in full mental vigor, in physical health as it seemed, and to the very last instant taking the part of a leader in his profession.

Professor Nichols' ideas of education and ideals for our colleges and universities and their relations to society were sound and profound. He knew that the college existed for the student: "Clever or dull, industrious or lazy, serious or trifling, he is the only apology the college has to offer for its life."

He wrote, "Spiritual interpretations embodied in the nobler forms of artistic expression, in music, in poetry, in art, must keep pace with intellectual progress. It was in a genius for adequate, free, artistic expression, it was in imagination, in poetry, in consummate art, and an exalted patriotism, that the classic civilizations were strong."

"The intellectual life within the college should be broader, stronger, freer than outside it."

"I know no better measure of a man's real education than the adequacy of his thought and action in whatever situations he may find himself, for adequacy of thought and action imply some hold on world-experience. Our daily use of the phrase 'common sense' has no other meaning."

For the teacher he had lofty demands. "Scholarship breeds scholarship." "The man in whose mind truth has become formal and passive ought not to teach. Youth needs to see knowledge in action." "The driving power of intellect is enthusiasm. There is no lack of it in that passionate devotion to research which so painstakingly and properly excludes all warmth from its calm statement of results."

Though not a strong athlete at any time in his life, he favored athletics: "The severest test of a gentleman is his ability to take victory or defeat with equal good will and courtesy toward his opponent." His exercise in early days was in rowing, swimming, and tennis; in later years, in tramping. I recall one severe test of his fiber when in September 1902 he lay near the summit of Mount Washington with two companions, unsheltered through a night of rain and snow. He came through smiling and even when, starting on through the blizzard in the first gray of the morning, he came to a monument marking the spot where an unfortunate climber had been frozen to death on the fourth of July two years previous, he held cheerily and encouragingly forward.

Able though he was as an administrator, and effective as a teacher, it was as an investigator that he attained his greatest eminence. He was gifted with that rare quality, scientific imagination, and with an intuitive sense of promising methods of approach to the solution of a problem. Various estimates of these qualities have already been quoted, and I add only the words of Professor Frost: "Ernest Nichols always impressed me as having a temperament just suited for a man engaged in scientific research. He was remarkably skilful as a manipulator of scientific apparatus; he went about his work calmly, unhurried; but his experiments proceeded rapidly. It was a pleasure to see him produce quartz fibers when making his radiometer more than twenty-five years ago. He had a genius for seeing what problems needed to be worked out, and he approached them simply and effectively"; and of Professor Hale, "His constructive imagination, large conceptions of research possibilities, extreme skill in manipulation, and endless patience in the tedious task of overcoming obstacles will inspire and fortify those who follow the new paths he has opened."

It is surprising to one who has known him from his early youth and knew his extreme diffidence that so many penetrated behind this and found the true man—his love of poetry, music, and other forms of artistic expression; his whimsical sense of humor; and those scores of other traits which go to make a most agreeable companion.

It could be said of him, as he said of his friend and colleague, Richard Cockburn Maclaurin, "Himself he took wholly for granted. I do not believe it ever occurred to him that his own personal affairs could possibly be of interest to anybody else. His reserve was absolutely natural, not worn as a defense." Yet many did penetrate the reserve, as is attested by the quotations given above. From Trowbridge we have this last tribute: "His modesty with regard to his own place in American science was so great that one wishes he might have known what was to happen at his death: that the most distinguished gathering of his fellow-scientists of America were to stand uncovered, bowed and sorrowful, at the tragic loss of an honored colleague as his dead body was borne through their ranks."

Dearborn Observatory
November 1924