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Ernest Fox Nichols

Dartmouth's Scientist President

by Timothy E. Lesle '01

On the morning of 29 April 1924, the voice of Ernest Fox Nichols echoed throughout the halls of the National Academy of Sciences Building in Washington, D.C. It was the first day of scientific discussion ever held in the building, opened with much fanfare by statesmen and scientists just a day before. Nichols had been instrumental in bringing about the creation of the new headquarters and was now presenting a paper on his latest research. That would turn out to be one of the most important events in a life filled with discovery. An experimental physicist during some of the formative years of modern physics, Nichols' talent would take him from a modest upbringing in the Kansas of the Old West to the universities and institutions of the Northeast and Europe, with a couple of stops at Dartmouth along the way.

Ernest Nichols was born in Leavenworth, Kansas, in June of 1869. Described as a "delicate" youth (Brown & Rieser, 1966), Nichols' health prevented him from getting any real measure of early formal schooling, although he did manage to gain an interest in science from his father and an appreciation of culture from his mother. By the age of 15, though, both of Nichols' parents had passed away, and he was sent to live with an aunt and uncle.

It was at that time, when young Nichols had never had a regular education, when he claimed to his aunt that he "had only read two books through" in his entire life (Fox, 1925, p. 4) that he was allowed entrance into the Kansas State Agricultural College, in Manhattan, Kansas. He excelled in his studies and graduated near the top of his class.

Nichols remained at the college for another year, working in the department of chemistry while taking weather measurements and keeping astronomical records. It was during this year that a Cornell physicist, Edward L. Nichols, gave a lecture at the college. Ernest Nichols was in attendance, and was so excited by the subject that he decided to devote himself to the study of physics.

Nichols entered Cornell as a graduate student in the physics department at the age of 20. Under the guidance of Edward Nichols, he attained his master's degree and went to work at Colgate University. There, he married Katherine West, and in 1894 they moved to Berlin, Germany. At the University of Berlin's Physical Institute, and later at Charlottensburg Polytechnical Institute, Nichols continued his physics research. He worked a great deal with physicist Heinrich Rubens, and his research during this period would establish his reputation as a remarkable scientist in both America and Europe.

In Germany, Nichols published a classic paper entitled "A Method for Energy Measurements in the Infrared Spectrum and the Properties of the Ordinary Ray in Quartz for Waves of Great Wave Length." In his efforts to characterize the infrared spectrum of long wavelengths, Nichols was responsible for the development of various techniques for measuring wavelengths. Among those was his development of the most sensitive radiometer in existence at the time. The radiometer was able to measure the radiant light energy from a candle a mile away and would play an important role in Nichols' later work.

Nichols returned to Colgate and stayed for about a year before resuming his work at Cornell, completing the requirements for his Doctor of Science degree in 1898. That fall, Nichols came to Dartmouth College, a new professor of physics.

Nichols wasted no time in getting to work. He helped to design the interior of the new Wilder building and oversaw some of its construction and the physics department's move from Reed Hall. He also began work on his most well known research.

Nearly twenty-five years before Nichols' arrival at Dartmouth, the physicist James Clerk Maxwell posited that light has pressure. Maxwell formulated an equation that describing this phenomenon and predicting its value. For several years, no one had been able to prove whether Maxwell was right or wrong. Nichols decided that he would be the one to do so, and he could accomplish this by making some modifications to his radiometer. He set to work in 1898, working closely with another physics professor, Gordon Hull, to solve the problem. During this period, Nichols was also invited to work at Yerkes Observatory, in Wisconsin. While there, he was able to modify his radiometer to measure the energy radiating from stars and planets, an achievement that others had come close to, but had never reached.

Nichols and Hull received preliminary results for their light pressure work in 1901 and achieved success in 1903. The results not only proved that light does exert pressure, but also showed that Maxwell's theoretical value was correct. Solving this problem brought Dartmouth into the spotlight as an institution that fostered groundbreaking research and sealed the reputation of Nichols as an experimental physicist of highest caliber and world renown. In that same year, though, Nichols left Dartmouth for a position with the Columbia department of physics.

The reasons for Nichols departure are not well known. According to Dartmouth physics professor John Walsh, who has made a special study of Nichols, it is likely that Nichols felt constrained at Dartmouth. The new president of Columbia was investing a great deal in scientific research and Nichols probably felt that he could accomplish more in New York than he could in Hanover.

Six years after Nichols' departure, in 1909, William Jewett Tucker stepped down as Dartmouth's ninth president; Dartmouth would welcome Nichols back as its tenth. Nichols seemed an unlikely choice, quite different from his predecessors. He was not a humanist, a member of the clergy, or a Dartmouth graduate; the reasons for choosing him are not entirely clear. The trustees had asked many others in the Northeast, but no one would take the job. It is generally considered that Nichols left a strong, positive impression among the students, faculty and administrators at Dartmouth. That high regard, coupled with Nichols' renown as a scholar and the direction of scholarship that Tucker had been taking the college, made Nichols an attractive candidate; plus, he accepted the position.

The Nichols inauguration was a major event. According to coverage by The Boston Journal, it attracted nearly one hundred college presidents to the ceremonies, Princeton president Woodrow Wilson among them, as well as a number of other dignitaries and scientists that included British ambassador James Byrne and inventor Alexander Graham Bell. The appointment of Nichols was met with mixed emotions; though there was no real opposition, many felt that a very talented man was being taken out of the environment where he did the most good. As one guest at the inaugural dinner said,

> "There may be, there doubtless are, a thousand men qualified to do thoroughly well what a college president has to do. Where will you find another to measure the pressure of light or determine the heat from the fixed stars? These are problems that had baffled all who came before, and he had solved them. Do you realize, moreover, that upon such work as that, and upon it only, the lasting and true fame of an institution rests?" (Nichols, 1925, p. 116).

And that idea, that Nichols could not make a scientific contribution, was quite true, for he spent the next several years fulfilling the duties of the president. He traveled the country, raising support for the school; during his tenure, Dartmouth saw an increase in the endowment and student attendance. Nichols continued to foster research at Dartmouth, as Tucker had begun before him (a trend that would come to an end when Ernest Martin Hopkins took over the presidency and decreased the level of scientific research at Dartmouth). Nichols remained at

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Nichols and Einstein at Nela Laboratories

Dartmouth for seven years, but his desire to return to science got the better of him, and he accepted a position at Yale.

Nichols was not long at Yale before he went to work elsewhere. The year was 1916, and Nichols was brought to the Department of the Navy, for which he did research throughout the First World War. Few records are available on Nichols' projects, but it is known that he developed a mine trigger that is activated by the magnetic fields created by submarines, a creation for which he received the gratitude of then-Secretary of the Navy Franklin Roosevelt.

1920 found Nichols no longer working for the War Department or in academia. He was now director of the Nela Park Research Laboratory in Cleveland and continued to work on radiation problems under the auspices of parent-company General Electric. Nichols was, as usual, not there for long, though, as he was invited to assume the presidency of the Massachusetts Institute of Technology. Though he had great expectations for his tenure as president, he was soon forced to resign because of ill health stemming from heart problems, quite possibly the same sorts of troubles that had plagued his youth. Nichols returned to his directorship at Nela Park.

Ernest Fox Nichols was one of the most famous scientists of his era, a result that came about because of his remarkable abilities, not a tendency toward self-promotion. He quite literally made front-page headlines, and was admitted into some of the most elite arenas of science, academia, and government. Elected a Fellow of the National Academy of Sciences, the organization founded by physicist and Smithsonian director Joseph Henry and President Abraham Lincoln during the Civil War, he became its vice president in 1903. He was also instrumental in the National Research Council, a subsidiary of the National Academy of Sciences that directly advises the president. In existence for about fifty years, the Academy had never had any real headquarters. Through his involvement, Nichols played an important role in securing the funding and support for a new five million dollar endowment building to house the Academy.

The building's opening on April 28, 1924, was met with great fanfare, as politicians, scientists, and President Calvin Coolidge took part in the dedication. During the inaugural scientific sessions the next morning, Nichols stood on the dais addressing an audience composed of hundreds of scientists. As he neared the end of a presentation of his latest work, Nichols fell silent in mid-sentence. He moved slightly and leaned against a marble stand; as the New York Times described, many had thought he was resting, while others thought he was checking on some instruments. The reality was soon made clear, though, for his heart had failed and, still on stage, Ernest Fox Nichols collapsed and died. It was the abrupt, and rather remarkable, end of the life of one of America's most eminent scientists. ■

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