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William J. Waggener – The First Graduate of the University  
Physicist and Founder of the Department of Physics at the University of Colorado

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University of Arkansas

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# William J. Waggener – The First Graduate of the University<sup>1</sup>

Physicist and Founder of the Department of Physics at the University of Colorado

By

Rajendra Gupta<sup>2</sup>

On the occasion of the 150th anniversary of the start of this University, we are inspired to tell the remarkable story of its first graduate.

The University, then known as the Arkansas Industrial University (AIU), opened its doors to the students on January 22, 1872. Approximately five weeks after the classes had already started, a new student, William J. Waggener (figure 1), from Farmington, just west of Fayetteville, enrolled for the classes. He became the first graduate of the University in 1876. Waggener returned to the University in 1885 to receive an honorary master's degree. What was to follow was a distinguished career as a physicist. Waggener founded the department of physics at the University of Colorado, which today is widely recognized as one of the premier physics departments in the country. He published two papers in physics journals and went to Berlin to learn advanced physics. The story below is that of an individual who had many firsts among his accomplishments: First to graduate from AIU, first physics professor at the University of Colorado, and the first person to publish a physics paper at the University of Colorado.



Figure 1: William J. Waggener while he was a student at the Arkansas Industrial University. Undated. Photo courtesy of the University of Arkansas, Fayetteville, Museum Collection.

The class of 1876, by a vote, had elected Waggener the class poet and class prophet. Yes, there was a class prophet among the first class. In this capacity, he wrote and read the class prophecy in verse to the graduating class, the faculty, and the attending public on June 15, 1876. That long poem, after some revisions, was published in the form of a booklet entitled, *Vox Clamantis in Academia* (Ref. 1).

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<sup>1</sup> Parts of this article have been adapted from Prologue I of *Acoustics to Quantum Materials: A Centennial History of the Department of physics, University of Arkansas*, by Rajendra Gupta and Paul C. Sharrah, (Physics Department, University of Arkansas, 2020). An abstract of this article was published in the magazine of the University of Arkansas Alumni Association, *Arkansas* (Winter 2021-2022), p. 7.

<sup>2</sup> The author is a Professor Emeritus of Physics at the University of Arkansas.

In the Introduction to this poem, he lists the names of the six graduates who received their A.B. degrees that day and states: "Upon these six, at that time, was conferred the degree of Bachelor of Arts: and they were the first graduates to receive any degree from the University of Arkansas: also, in the actual course of the ceremonies, I was the first of the six to receive the degree; and the other five followed immediately: and the order had no special significance, as there was no ranking of the graduates." Waggener's diploma, the first awarded by the University is displayed in figure 2.



Figure 2: William J. Waggener's diploma, the first one to be awarded by the Arkansas Industrial University. Photo courtesy of the University of Arkansas, Fayetteville, Museum Collections

Following his graduation, Waggener spent an additional year at AIU as a tutor. He went on to ultimately become the first physics professor at the University of Colorado, Boulder. Records available at Colorado indicate that during the period of 1885 to 1898, William J. Waggener was variously listed as a professor of natural sciences, natural philosophy, physical sciences, and physics and astronomy. He is credited with having inaugurated the university's Department of Physics. Much valuable information about him is available in *A History of the Department of Physics of the University of Colorado* by Albert Bartlett and Jack Kraushaar (Ref. 2).

Bartlett and Kraushaar have pieced together a great deal of information from available public sources about Waggener's activities after he left AIU in 1877 and have given an excellent account in their book. Noteworthy among these is that he

studied law at a law firm in Denver and was admitted to the Colorado bar on May 12, 1880. He only practiced law for a few short years and went back to teaching, which he had been doing during most of the time that he was in Colorado. Teaching is what, it appears, was his primary interest. He was principal

of the Del Norte Public Schools in Colorado for a brief period before he resigned in 1885 to accept professorship at the University of Colorado.

Waggener returned to AIU to receive an honorary master's degree in 1885, according to the 1885 University catalog. No information is available as to why the Board Trustees decided to confer an honorary A.M. degree on him. This was just before he was to join the University of Colorado as the Professor of Natural Sciences. One wonders as to where he learned his advanced physics. Bartlett and Kraushaar state: "As far as can be determined, before coming to Colorado, Waggener developed his very considerable knowledge in his undergraduate study at the University of Arkansas, and/ or later in self-study". He had to have been self-taught because only introductory physics was being taught at AIU when he was a student here, and the first physics professor was not employed until 1907.



*Figure 3: Professor William J. Waggener while he was on the faculty of the University of Colorado. Undated. Courtesy of Carnegie Library for Local History/ Museum of Boulder Collection.*

In 1885, Waggener was appointed Professor of Natural Sciences at the University of Colorado, Boulder (figure 3). He was the first, and the only physics professor during his entire 13-year tenure at the University of Colorado. Bartlett and Kraushaar state that, "The arrival of Professor Waggener in the Fall of 1885 marks the real start of physics at the University of Colorado." He designed new physics courses, acquired laboratory spaces, and designed new laboratory equipment, to name just a few of his activities. He was to remain at the University of Colorado until 1898, when ill health forced him to resign. Bartlett and Kraushaar have chronicled Waggener's contributions to the University of Colorado in detail and state that "almost single handedly he built a Department of Physics where none had existed before. There must have been many elements of frustration in this tremendous task," and "he was vigorous in his devotion to teaching both physics and astronomy." Professor Waggener's contributions to the University of Colorado are so varied and so important that Bartlett and Kraushaar have devoted 102 pages in their book to him and his contributions. A plaque has been installed in honor of Professor Waggener in the lobby of Duane Physical Laboratories, University of Colorado, which is

shown in figure 4.

If he were alive, he would have been very pleased that the department he started can today be counted among the very best in the country. Four of the faculty associated with the physics department have been awarded Nobel Prizes and three have been awarded MacArthur Fellowships ('genius grants') in the recent years.

Waggener was very interested in the development and construction of new scientific equipment, some of which was still in use in Colorado as late as 1942. These included a tangent galvanometer, a self-evacuating barometer, a two-mirror heliostat, and a telescope. In 1891 he published a paper entitled



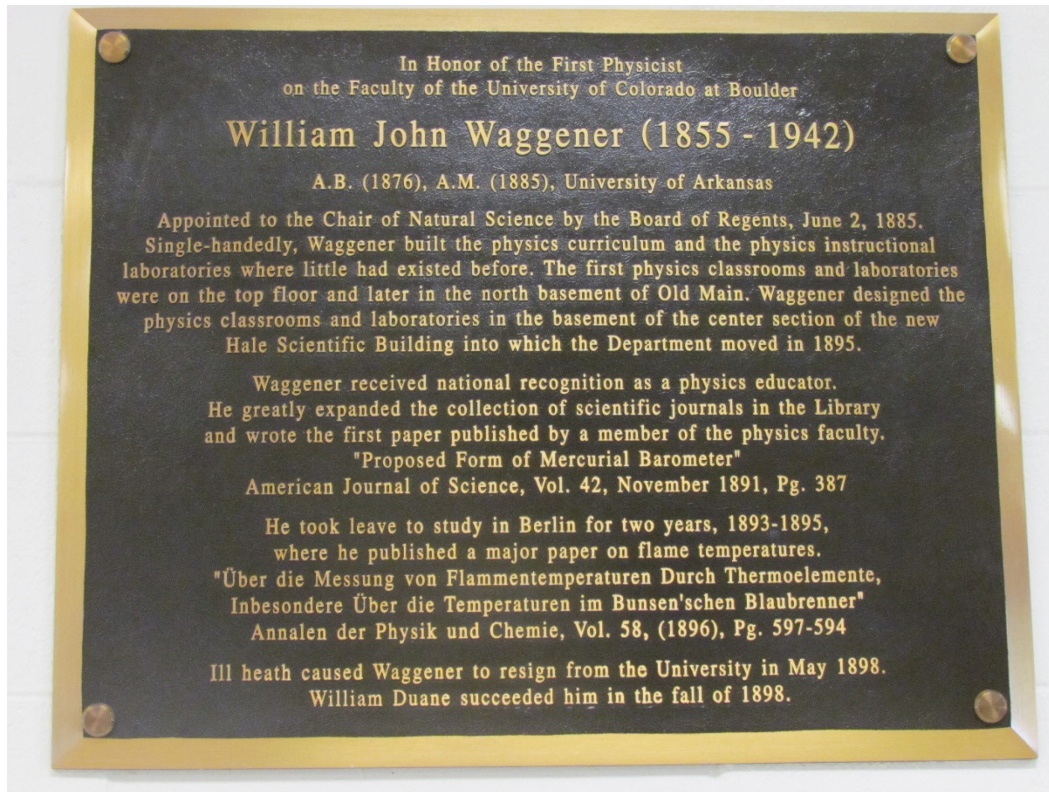


Figure 4: The Plaque in honor of Professor Waggener in the lobby of Duane Physical Laboratories, University of Colorado. Photo courtesy of Reeta Vyas and Surendra Singh.

“Proposed Form of Mercurial Barometer” in the *American Journal of Science*, Vol. 42, pp. 387–388 (1891). This is believed to be the first paper published by the faculty of the Department of Physics of the University of Colorado.

From 1893 to 1895, Waggener took a leave of absence to take up special studies at the Frederick Wilhelms Universitat in Berlin, Prussia. The famous teachers there from whom he had the privilege of learning or taking courses were Max Planck, professor of theoretical physics who was to later win a Nobel Prize in physics, H. von Helmholtz, famous pioneer in the natural sciences and the science of sound, and L. Fuchs, a professor of mathematics. Bartlett and Kraushaar state that “his studies in Berlin show that he knew where the great scientific work of the day was being done. His work in Berlin indicates a high degree of competence in contemporary experimental physics,” and that “one suspects that one of his goals in going to study in Germany was to earn a PhD. But the doctoral degree somehow eluded him.”

He published a paper entitled “Ueber die Messung von Flammentempeturen durch Thermoelemente, insbesondere uber die Tempeturen im Bunsen’schen Blaubrenner” in *Annalen der Physik*, Vol. 294, pp. 579–594 (1896)<sup>3</sup>. His author affiliation is listed as Physikalisches Institute, Berlin.

<sup>3</sup> The English translation is: “On the Measurement of Flame Temperature by Means of Thermal Elements, in Particular, in Bunsen’s Blue Burner.” The paper was also presented to the Physical Society of Berlin, on November 15, 1895. One should note that the same article has been referenced in Reference 2 as *Weidemann’s Annalen der Physik und Chemie* 58, 579–594 (1896). Apparently, the two journals were merged for a while.

Apparently, his work was considered important by his contemporaries. For example, he had some correspondence in 1901 with Edward L. Nichols of Cornell University, the first editor-in-chief of the prestigious physics journal, *Physical Review*, who was engaged in similar work, about this paper. It may be of interest to note that the very next article to Waggener's in this journal was by Ludwig Boltzmann, a giant in the field of statistical mechanics and thermodynamics. When he retired from the University of Colorado in 1898, *Silver and Gold*<sup>4</sup> (May 20, 1898) paid a glowing tribute to him and wrote, among other things, that "as a teacher and instructor, as a mathematician and physical scientist, Professor Waggener ranks among the first rank; as a scholar and as a man he is equaled by few."

Sometime after leaving the University of Colorado, Waggener moved to California. There he pursued his life-long interest in the invention and fabrication of scientific instruments. In a letter to Mrs. Southworth (Ref.3) he reported that he built a tellurian (a model of the earth, moon and sun system) before he entered the university in Fayetteville and that this homemade device was displayed in one of his classes in the university. As noted above, while at the University of Colorado, he developed and built physics apparatus for instruction and even published one of his inventions. His development of "contrivances" for teaching was of sufficient importance that he was requested to develop a display for the World's Columbian Exposition in 1893 in Chicago. The *Arkansas Alumnus* (1938) reported that since leaving the University of Colorado, "he has devoted his studies to the invention, design and construction of scientific instruments and mechanical devices for special purposes."

Waggener died in Los Angeles on January 16, 1942 at the age of 86.

## References

1. Special Collections, University of Arkansas Libraries (MC740)
2. Albert A. Bartlett and Jack J. Kraushaar, *A History of the Department of Physics of the University of Colorado* (Department of Physics, University of Colorado at Boulder, 2002)
3. Mrs. Marie Gates Southworth was the daughter of the first president of the University, Noah P. Gates. This letter is housed in the Special Collections, University of Arkansas Libraries (MC 737). An article based on this letter entitled, "The Inaugural Years of the University of Arkansas: Seen through the Eyes of its First Graduate" by Rajendra Gupta was published in the Journal of the Washington County Historical Society, *Flashback*, Vol. 72, pp. 98-103 (Fall 2022).

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<sup>4</sup> A University of Colorado faculty and staff newspaper.



