Observing the Heavens from Omaha
A History of the Creighton Observatory, 1886-1940

by
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A Thesis

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This thesis examines the dual purposes of the Creighton University Observatory as stated by its most prominent director, Father William Rigge. The observatory served as both an educational and research platform throughout its active use. Furthermore, this thesis explores how this small observatory with a lone astronomer interacted with the larger astronomical and public communities to which it belonged. This interaction brought prestige and positive popular attention to the university and its director, on the local, state, national, and international levels. In addition, the work done at the observatory and by its director garnered national and international attention from the astronomical community. This thesis argues that the benefits to the university stemming from the significant outlay of cash, manpower and space to build, equip and man the observatory went well beyond the intended purpose and benefited the university by drawing positive attention to Creighton as a center of scientific studies in the West.
DEDICATION

I’d like to dedicate this work to my parents who have always encouraged me to learn and grow intellectually; to my wife, who has supported me through this effort; and to my son; in whom I hope to instill a love of learning.
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Contents

Introduction – 1
  Overture – 1
  Primary Sources – 1
  Secondary Literature – 2

Background – 6
  Jesuit Astronomy – 6
  Americanism - 8
  Creighton College – 9

Thesis - 11

Support - 12
  Increasing the stature and prestige of the University – 12
  Purchase of Instruments – 15
  Building an Observatory – 23
  Using the observatory to help the college – 26
  Building the observatory – 28
  Mounting the Telescope – 34
  Teaching and Research in the Observatory – 41
  William Rigge, S.J., Back to Omaha – 50
  1900 – A New Century – 56
  Creighton Observatory Recognized – 59
  Creighton Steps Forward – 63
  Observatory verses the front Lawn? – 66
  Halley’s Comet Causes a Stir in Omaha – 72
  Creighton Astronomy in the Court – 77
  Cobwebs and Conferences – 84
  Longitude by Wireless – 86
  Continued Teaching and Research – 89
  Further Recognition for Creighton – 92
  The Observatory, Post Rigge – 96

Conclusion – 101

Appendix A: Timeline of significant events
Appendix B: Glossary of Scientific Terms
Appendix C: Bibliography
List of Figures

Figure 1 – Creighton Observatory five-inch equatorially mounted telescope on tripod – photo courtesy Creighton University Archives (JPG, 5KB), 17

Figure 2 – Photo of completed Creighton University Observatory, 1893 (JPG, 50KB), 36

Figure 3 – Map of Creighton, 1909 (Line Drawing), 67

Figure 4 – Observatory retaining wall under construction, March 17, 1910, the excavation for Twenty-fourth Street is visible on the left of the photo – photo courtesy Creighton University Archives (JPG, 41KB), 70

Figure 5 – Observatory retaining wall complete – photo courtesy Creighton University Archives (JPG, 35KB), 70

Figure 6 – Creighton University Aurora Tube?, on display in the Physics Department, Rigge Science Building (JPG, 871KB), B-1

Figure 7 – Depictions of the view through a terrestrial eyepiece and an astronomical eyepiece (Line Drawing), B-1

Figure 8 – Depiction of an equatorial mounting in relation to the earth (Line Drawing), B-2

Figure 9 – Photo of Creighton Observatory equatorially mounted telescope – photo courtesy Creighton University Archives (JPG, 14KB), B-3

Figure 10 – Creighton University Geissler Tube, on display in the Physics Department, Rigge Science Building (JPG, 27KB), B-3

Figure 11 – Creighton Observatory helioscope - photo courtesy Creighton University Archives (JPG, 15KB), B-4

Figure 12 – Diagram of a refracting telescope (Line Drawing), B-4

Figure 13 – Depictions of the view through a terrestrial eyepiece and an astronomical eyepiece (Line Drawing), B-5

Figure 14 – Creighton Observatory transit instrument – photo courtesy Creighton University Archives (JPG, 34KB), B-6
Introduction

Overture

The history of astronomy dates to the first human attempts to understand and observe the heavens. The seventeenth century saw lenses and telescopes become an integral part of observational astronomy. In nineteenth century America, resources became available through wealthy benefactors for institutions of higher education to build and equip observatories for student use. Many of these observatories played a larger role beyond institutional education and served as platforms for public relations, publicity, and raising the public's general knowledge on scientific topics. This thesis will examine one particular observatory and how it and its staff operated within various communities. The Creighton University Observatory was designed and built for the purpose of teaching students, but it served the university in many other ways. It is important to historians as an example of how a small educational observatory was used to support the university in ways beyond classroom education.

Primary Sources

Primary sources for this thesis include the personal memoirs of individuals involved in the history of Creighton University, both published and unpublished. These memoirs recount personal stories which would otherwise be lost to history. Local
newspapers and newsletters from Omaha and Nebraska provided contemporary accounts of events. College newspapers and journals provided contemporary, institutional views of events related to the observatory and its directors and students. National newspapers and magazines placed events in context with the larger national movements and interests. Popular and professional scientific journals and magazines provided references to astronomical activities and interests for the period. The specificity of this topic and the dearth of secondary material which specifically addresses Creighton astronomy compelled a heavy reliance on primary sources for the majority of the information contained in this thesis. This text constitutes the first time the entire history of the Creighton Observatory has been compiled in an academic format.

Secondary Literature

The historical study of optical astronomy of the last two centuries is a relatively small field. Significant contributors in the field include Nathan Reingold, John Lankford, Deborah Warner, and Daniel Goldstein. Very little academic writing focuses on capturing larger trends shaping institutions and individual observatories; much of the work instead focuses on the institutions with the largest instruments and does not address the use of smaller optical instruments at colleges and universities. The histories of astronomers focus on individual lives or work to categorize the professionalization of the science. Professionalization of astronomy occurred throughout the mid- to late-nineteenth century, along with the specialization of many other areas of American science. Secondary sources include historical studies of the astronomical profession, its instruments, and its personalities. The period of the active use of Creighton Observatory straddles the eras of old and new astronomy, when even the basic concepts of the study of astronomy were
moving from mathematics to physics. This change is also addressed by secondary sources.

The categorization of astronomers is a main discussion point for scholars including Nathan Reingold and Sally Kohlstedt. Dissatisfied with the dual representation of scientists as either amateur or professional, Reingold devised three categories, taking into account the scientists’ actions, their work, and employment status. Reingold categorized “researchers” as focused solely on advancing the science through original research; “practitioners” as employed and working extensively in a scientific area, though not advancing the science extensively; and “cultivators” who worked to publicize and advance the science through their deeds, but not necessarily through their own scientific inquiry. “Cultivators” may or may not have been employed in the sciences, but were passionate about its development.¹

Kohlstedt, who researched botanists, promptly challenged this division and advocated for the amateur-professional model, though she noted the strong influence of amateurs on professionals during the professionalization period.² Most academic studies since Kohlstedt’s publication have recognized the importance of not using modern terms to define amateur and professional when categorizing nineteenth-century scientists and their work.

The men of the Society of Jesus, or Jesuits, who operated the Creighton Observatory, fall outside the norm of most scientists. Jesuit astronomers acted as professionals in many respects, though they received no pay for their services. Though

not paid, their basic needs -- food, shelter, and clothing -- were met by the society. As a Jesuit, a man’s primary task was service to God. Some Jesuits at Creighton, along with their daily devotions, taught as part of their service to God. A few individuals also conducted original research in addition to teaching. The most prominent of these Creighton astronomers, William Rigge, was elected to professional organizations and wrote both popular and scientific articles on astronomy. The priests would seem an excellent example of “cultivators,” but were also professional in many respects. The most prominent of the Creighton astronomers did make a note in his autobiography classifying himself among the amateurs, though it is unknown if honesty or humility moved him to do so. While interesting, the astronomers’ status as professional or amateur does not factor into the thesis at hand. Regardless of an individual’s status, the relationship between amateurs and professionals in American astronomy was cordial throughout the late nineteenth and early twentieth centuries.

Amateurs and professionals in astronomy both benefited from a close working relationship. The Astronomical and Astrophysical Society of America patterned its amateur-professional relationship model after the British Astronomical Association. Marc Rothenberg notes in an article on the relationship between the two groups that American astronomers at the end of the nineteenth century worked in a unique situation in which professional astronomers used amateur activities to further the science. Lankford makes a similar argument: “The process of professionalization in astronomy

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5 Ibid., 305-325.
never completely excluded the amateur.” Daniel Goldstein goes on to argue that the amateur benefited through his or her affiliation with larger institutions. A connection to an established institution such as the Smithsonian made amateurs and “cultivators” seem more prominent than perhaps they truly were in the scientific community at large. The tactic of amateur association worked with other institutions as well, including the U.S. Naval Observatory, Georgetown University, and Harvard University.

Creighton Observatory fit nicely into this pattern of amateur-professional cooperation. Creighton astronomers collected data, computed orbits, and made observations. They then published the findings in national journals or forwarded the raw reports to larger institutions for inclusion in comprehensive surveys. Creighton scientists provided data, while the connection and personal contacts with larger institutions made their own efforts more evident and contributed to the larger astronomical world.

John Lankford and Margaret Rossiter published significant studies on cadres of astronomers from the nineteenth and twentieth centuries. Lankford’s publication is a significant resource on the profession, giving an analysis of more than 1200 astronomers’ careers from the mid-nineteenth century to the mid-twentieth century. While extensive and valuable to some degree, the usefulness of the text to other historians is limited because of Lankford’s deficiencies identified by reviewers. The most inconvenient deficiencies are his loose definition of “career astronomer” and the lack of a list of the 1200 astronomers he used for his statistics. Because of this, it is unclear if any of the

8 The most complete review is that of Karl Hufbauer, review of American Astronomy: Community, Careers, and Power, 1859-1940, by John Lankford, Minerva 38 (2000): 453-467. His review cites the previous reviews of Sally Kohlstedt, David DeVorkin, Deborah Warner and Gale Christianson among others.
Creighton astronomers were included in his tabulations. Nevertheless, he provides some useful anecdotes and a general picture of astronomy for the period of 1859 to 1940.

Margaret Rossiter has written extensively about women scientists, including astronomers, in *Women Scientists in America: Struggles and Strategies to 1940* and *Women Scientists in America: Before Affirmative Action, 1940-1972*. These are both significant resources on the astronomical community, but not especially useful for studying Creighton. For the majority of the period of the active observatory, Creighton College enrolled only men in the College of Arts and Sciences and assigned only male instructors to the observatory.

**Background**

**Jesuit Astronomy**

The following statement is telling of the Jesuit understanding of scientific research conducted by Catholic religious. Published in 1936 in *Woodstock Letters*, the internal newsletter of the society, it encapsulates the guiding principles behind centuries of Catholic inquiry into the natural world.

> Because science, research into truth, is, by right, Christian, for Truth – it is nothing other than Christ. Because all scientific research is a sort of priestly function, since, taking the creature into its hands, it raises it aloft to the Creator. How eminently fitting it is then that the hands of priests should point those instruments, should effect those discoveries which day by day make louder and clearer that hymn which on earth and in the heavens, the whole sum of creating is ever sounding throughout the ages.\(^9\)

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Jesuit astronomy was an observational science, confined to describing the observable, as the Creator made it. The priests and brothers of the Jesuits have long been more interested in science than most of the other ordered Catholic brethren. Many have written on the subject, investigating the link between the order and the sciences, including, most recently Augustín Udías, S.J. This thesis is not designed to examine the overall interest of Jesuits in astronomy, but rather the singular history of the Creighton Observatory and its relation to the communities in which it existed. A brief examination of the relationship will help further the reader’s understanding of the mission and goals relevant to Catholic observatories in general.

Udías built on a theory developed by Steven J. Harris about the scientific inquiry of the Jesuits. Udías advanced his theory specifically tailored to the modern Jesuits. He argues the astronomical studies of the Society of Jesus have been primarily focused on two core areas: education and missionary efforts. For the Jesuits, astronomy and observational studies supported education when teaching students about the heavens and God’s laws of nature. Jesuit astronomers were also missionaries to scientific circles where religion was not often discussed. In addition, one of the specific concepts Jesuits contemplate is to “find God in all things.” Udías, and it seems many other Jesuits, equate exploration of the heavens with the search for divine Truth as revealed in the celestial sphere.

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10 The Jesuit Order was founded in the 16th Century and grew until its suppression in 1773 by Pope Clement XIV. Though many Jesuits continued in the order, they were not officially supported by Rome. The society prior to the suppression is generally called the "old society" and the "modern" or "new society" begins in 1814, when the society was restored by Pope Pius VII. The intervening years are called the "Interim."

The original society flourished from its founding in the sixteenth-century until the papal suppression in 1773. The old society built or operated more than a hundred and fifty observatories around the world. After the society’s restoration in 1814, work in observatories began again. In the United States, Creighton University Observatory, built in 1886, was the fourth Jesuit Observatory established. Georgetown University, whose observatory was founded in 1841, was first. St. Louis University in St. Louis, Missouri, built a small astronomical observatory in 1855, and Campion College in Prairie du Chien, Wisconsin, built a small observatory in 1883. At that time, the Jesuits operated observatories around the world, including those at Stonyhurst College in England; in Zi-ka-wei near Shanghai, China; in Havana, Cuba; in Manila, Philippines; in Chile; and in the Vatican. This wide, loose network helped further the science and developed a cadre of Jesuit astronomers.

**Americanism**

As the United States expanded and began to take a leadership role on the world stage, a series of unconnected publications by Catholic religious suggested a reexamination of Roman Catholic dogma. As the publications surfaced about the same time, they were grouped under the broad term Americanism. Beginning in 1886, the ideas of Americanism were debated until discussion was halted by the Papal encyclical *Testem Benevolentiae* of Leo XIII in 1899. Though the Pope’s denunciation of Americanism was of the very specific theological meaning outlined in the encyclical, its release stopped the general discussions as well. Some proponents of these opinions lived and

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worked in the United States, though many of the most radical opinions were expressed by those who lived in Western Europe, primarily France.\textsuperscript{15} The central position of the various arguments was that the world was at a critical crossroads and the Catholic Church would need to adjust to the age. Democracies, such as the United States, and “the people” were moving to the forefront and leaving the old dynastic system behind.\textsuperscript{16} The traditional European tie between the state and religion was also loosening, with the United States leading the way. At the same time, various branches of science, primarily biology and geology, matured and provided evidence which could be interpreted to conflict with established dogma. Traditionalists felt the changes Americanists wanted to make to accommodate this new age would go too far and undermine the very foundation of the Roman Catholic Church.\textsuperscript{17} Americanists felt without change the Catholic Church would fade into history.\textsuperscript{18} In 1899, the \emph{Testem Benevolentiae} declared many elements of Americanism to be inconsistent with church teaching, though the most radical elements were descriptions of the fears of the traditionalists and not really Americanist ideas. While the controversy led to some changes in the curriculum, it did not, for the most part, affect the ongoing efforts in astronomy. Catholic astronomers sought to provide facts and Truth about the heavens through observation. The gathering and presentation of these facts did not contradict dogma. Theorizing about the implications of the facts might have brought more scrutiny. However, a good deal of latitude was granted to scientists,

\begin{itemize}
\item \textsuperscript{15} Thomas T. McAvoy, "Americanism and Frontier Catholicism," \textit{Review of Politics} 5, no. 3 (1943): 275-301.
\item \textsuperscript{16} Wangler, 420.
\item \textsuperscript{17} R. Scott Appleby, "Between Americanism and Modernism: John Zahm and Theistic Evolution," \textit{Church History} 56, no. 4 (Dec. 1987): 483.
\item \textsuperscript{18} Wangler, 419.
\end{itemize}
provided they did not directly deny established interpretation. Sufficient space existed in which research and teaching could exist without disturbing the theological *status quo.*

**Creighton College**

Upon her death in 1878, Mary Lucretia Creighton left a portion of the Creighton family wealth for the establishment of Creighton University. The university was the first in the burgeoning frontier town of Omaha. The original cadre of faculty included Scholastic William F. Rigge, S.J., who would later play a significant role in the development of the observatory. The 1880 census pegged the population of Omaha around 30,000\(^{19}\) -- not by any means a small town, but not a large city either. The decade of the 1880s brought significant change in Omaha. The city was one of the fastest growing in the United States, more than quadrupling its 1880 population by 1890.\(^{20}\) Creighton University grew as well. The third building constructed on campus was a small dome room built to house astronomical equipment purchased in 1884. Building construction began in 1885 and, including instruments, cost roughly $2500. This amount was significant for a small university to spend on a single-use edifice.

In a promotional pamphlet about the observatory William Rigge offers two reasons for its construction.

> The Observatory was erected for a double purpose. First for the instruction of students. Besides the regular students in the college course of astronomy, there have been special and advanced ones, mostly during the vacation months. Secondly, to subserve the zeal of its directors. This has depended upon their own inclinations and the time they could spare from other duties. In following this inclination the Directors have given their attention to the observation of occasional occasions.


\(^{20}\) Ibid.
phenomena and to writing for the standard astronomical journals and for several popular magazines.²¹

Though Creighton used the observatory for teaching and research, the observatory offered the university many other benefits. Education and research goals were ever present for the observatory, but the research and teaching could have been conducted without an observatory.

**Thesis**

This thesis will examine the dual purposes of the Creighton University Observatory as stated by William Rigge. The observatory served as both an educational and research platform throughout its active use. Furthermore, this thesis will explore how this small observatory with a lone astronomer interacted with the larger astronomical and public communities to which it belonged. This interaction brought prestige and positive popular attention to the university and its director, on the local, state, national, and international levels. In addition, the work done at the observatory and by its director was of such a caliber as to garner national and international attention from the astronomical community. This thesis will argue that the benefits to the university stemming from the significant outlay of cash, manpower and space to build, equip and man the observatory went well beyond the intended purpose.

Support

Increasing the stature and prestige of the University

At Creighton University’s founding in 1878, Omaha had few students to offer for a true institution of higher education. Creighton College had to educate a cadre of students from grammar school onward. Omaha lacked the intermediate educational systems required to prepare a person for advanced studies, including astronomy. The college intended to follow the centuries-old plan developed for Jesuit higher education, the Ratio Atque Istitutio Studiorum Societatis Iesu, widely known as the Ratio Studiorum. Several American Jesuit schools utilized a slightly Americanized version of the Ratio Studiorum which was adjusted for American desire to have an increased level of utility in English, business, and science classes. The pedagogical methods favored were “prelection” and “emulation” where professors explained the text and students sought to follow the professors’ explanations.

Astronomy was likely planned as part of the original curriculum at Creighton University, though as an upper-level class, it was not taught the first years of the university’s existence. It was a higher function of the mathematical discipline thought essential to the overall development of thinking men. A paragraph from the first Creighton University catalogue explained the goal of a Creighton education and how astronomy fit into it.

The course of studies, when complete, will embrace the Doctrines and Evidences of the Catholic Religion, Logic, Metaphysics, Ethics, Astronomy, Mathematics, Natural Philosophy, Chemistry, Rhetoric, Poetry, Original Composition, Elocution, History, Geography, Book-

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22 Mihelich, 35.
23 Mihelich, 30.
Keeping, Arithmetic, Penmanship, the Latin, Greek, English, German and French Languages, and Vocal and Instrumental Music: thus affording every facility for the acquisition of a thorough classical, scientific, and commercial education.\(^{24}\)

As was the custom in the 1880’s, the university published and distributed a catalog after the annual commencement. It listed a prospectus and the names of professors and students among other information. Creighton’s first Catalogue was published in 1882.

Astronomy was part of the “Classical Course,” the course of study based on the Ratio Studiorum. It was not part of the more Americanized “Commercial Course.”\(^{25}\)

According to the 1881-2 university catalog, the Classical Course was:

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\ldots \text{completed in six years, and is designed to impart a thorough knowledge of the English, Latin and Greek languages; of Mental and Moral Philosophy; of Pure and Mixed Mathematics and of the Physical Sciences, besides all the usual branches of a polite education.}^{26}\]

Astronomy and science suited the curriculum not only in Catholic colleges, but in other Christian colleges and universities as well. Sherman Barnes notes that in the late nineteenth century, “it became almost a pious platitude that knowing the laws of nature would raise mens’ minds to the knowledge of God, for natural laws are thought of God, and natural science the rethinking of God’s laws.”\(^{27}\) Many scientists and clergy saw religion and science as cooperative rather than competitive.

Creighton taught mathematics in the fifth year and used Loomis’s *Spherical Trigonometry, Surveying, Analytical Geometry*.\(^{28}\) Mathematics continued in year six and augmented Logic, Metaphysics and Ethics, Mathematics, Mechanics and Astronomy,

\(^{25}\) Ibid., 8-10.
\(^{26}\) Ibid., 7.
Natural Sciences and Religion.\textsuperscript{29} The mathematics class used Loomis’s \textit{Differential and Integral Calculus}, and the Mechanics and Astronomy class used Snell’s revision of Olmsted’s \textit{A Compendium of Natural Philosophy} in 1881.\textsuperscript{30} St. Mary’s College in Kansas, another Jesuit institution in the Missouri Province, used Snell’s Olmstead as well beginning in 1881.\textsuperscript{31} In comparison, the University of Nebraska likewise used textbooks by Snell and Loomis in their early years of teaching astronomy in 1896.\textsuperscript{32} On the eastern seaboard of the United States, Georgetown University, a Jesuit university in another American Province was using \textit{Lockyer’s Astronomy} in 1881.\textsuperscript{33} These were all standard textbooks, teaching the same basic principles.

Around the same time the Society of Jesus, based in Rome, officially encouraged more science education at the college level. The twenty-third General Congregation of the Society of Jesus moved in 1883 to include more natural sciences in the \textit{Ratio Studiorum}, matching a common curriculum found among other American colleges. Going further, in the following year the Missouri Province, the province to which Creighton College was assigned, allowed the temporary suspension of the \textit{Ratio Studiorum} and replacement with a shortened four-year program more conducive to the time American parents would allow their sons for college studies.\textsuperscript{34} This suspension was more a factor of recruiting and retaining students to keep the college afloat financially than a move toward the trend of Americanism.

\textsuperscript{29} Ibid., 9.
\textsuperscript{30} Ibid.
\textsuperscript{31} St. Mary’s College, \textit{Catalogue of St. Mary’s College, St. Mary’s, Kansas, For the Academic Year 1881-82} (St. Louis, Mo.: Continental Printing Co., 1882), 16.
\textsuperscript{32} M. Eugene Rudd, \textit{Science on the Great Plains: The History of Physics and Astronomy at the University of Nebraska-Lincoln} (Lincoln, Neb.: University of Nebraska Press, 1992), 7.
\textsuperscript{33} Georgetown College, \textit{A Catalogue of the Officers and Students of the Georgetown College for the Academic Year 1880-81} (Baltimore, Md.: John Murphy & Co., 1881), 17.
\textsuperscript{34} Mihelich, 51.
The first few years of Creighton’s existence were dedicated to building a base of prepared individuals using the *Ratio Studiorum*. The initial cadre of students was ready beginning around 1883. In that year the need for better and more advanced science equipment became apparent. As the major benefactor for the university, John Creighton wanted “to furnish a complete physical and chemical department on a scale that would at least equal that of any college of the same rank.” He provided $10,000 for the purchase of scientific equipment; the specifics of the purchase were left to the administration of the college. John Creighton intended the gift to raise the stature of the college to match that of its peers.

**Purchase of Instruments**

At the time of the donation, Father Aloysius A. Lambert was the vice-president of the university and accepted the task of ordering the appropriate instruments and supplies for the scientific departments. William Rigge did not hold Father Lambert in high esteem. Rigge wrote in his memoir of Lambert, “His learning however was not profound, and he sometimes resorted to subterfuges and tricks to cover up his failures.” Lambert’s choice of instruments is interesting and reveals his priority of increasing the university’s prestige over purchasing the best instruments.

There were seventeen principal types of equipment; of these nine fell into the category of physics equipment. Teaching, at the time, did not include physics labs. Students learned principles through demonstrations conducted by the instructor. The display equipment for the physics lecture classes was excellent for its day, according to

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37 A glossary of terms relating to the equipment and science of astronomy has been provided for the convenience of the reader at Appendix B.
The instruments included a “Malden’s Triple Lantern, with the Chadwick Steward dissolving system, the first one of the kind in this country.”\footnote{Rigge, Memoirs, "The Physical Department," CV-CUA, 2.} It was one of the premier projection systems of the day. Instructors would light the gas burner to project an image onto a screen, much like an overhead projector.

Lambert ordered “Steward’s Improved Lantern Microscope, with double spring stage and three extra powers,”\footnote{Ibid.} also one of the best at the time. The electrical equipment included induction coils, Geissler tubes, aurora tubes and a Leyden jar, all primarily for demonstrating attributes of static electricity.\footnote{Ibid., 5.} William gave Lambert’s choice of demonstration equipment high marks, noting only one criticism. “Perhaps the only adverse criticism that may be passed upon Father Lambert’s selection, was that in some cases his choice was too showy, as it was in regard to the electrical and optical parts.”\footnote{Ibid., 7.}

The telescope and transit instrument later used in the observatory were part of these instruments which were “too showy.” It seemed Lambert was first interested in how the instruments would look, and thereby reflect on the university, and second interested in their usefulness.

The majority of these optical instruments came from one manufacturer in England. England had been for many years, and remained at the time, a leading producer of scientific equipment. The J. H. Steward Company of London made some of the best triple lanterns in the world. Steward crafted excellent optics and excellent mountings, but the mountings and auxiliary equipment for the purchased telescope proved more showy than functional. Intended as a showpiece for “occasional, popular, and educational rather
than for continuous technical use,”\textsuperscript{43} it was not designed for the complex observations of an observatory. For those initial intended purposes, though, it was an excellent choice.

William Rigge noted the college often entertained visitors with the instruments in hopes of increasing the stature of the university in the eyes of its visitors. “In the early days, in fact, almost during the first twenty-five years, visitors to the college were always led into the physical department, and its professor called upon to enlighten and entertain them at times even with experiments.”\textsuperscript{44} The apparatus demonstrated Creighton’s dedication to teaching science.

The refracting equatorial telescope purchased had a five-inch aperture with a focal length of eighty-four inches. It had a driving clock to make it automatically compensate for the earth’s rotation, graduated circles to help point it in the right direction and clamps and fine adjustment screws for small fine-tuning in aiming the telescope. Included with the telescope were one terrestrial, one diagonal, and five astronomical eyepieces and a helioscope. The instrument was mounted on a brass column atop an oak tripod. The

\textsuperscript{43} Rigge, Memoirs, “The Observatory,” CV-CUA, 2.
\textsuperscript{44} Rigge, Memoirs, “The Physical Department,” CV-CUA, 7.
tripod sat on an oak base which was held up by three pairs of large casters. The whole unit weighed more than 200 pounds and cost £105, roughly $525 U.S.\textsuperscript{45} The driving clock arrived after the telescope and cost an additional £20, or $100. Rigge argued, “the Creighton telescope was a large one in its day, and would not be outclassed in this respect even at present.”\textsuperscript{46} With a 5-inch aperture, the telescope was large when compared to the average telescope in 1886, but when compared to other telescopes mounted in observatories, it was at best a medium sized instrument. By the time Rigge wrote those words in 1927, it would have rated only as a medium or small scope for observatory purposes. Rigge likely made the statement in order to make the observatory seem more prominent than it really was, thus enhancing the work he had completed with it.

In *The History of Astronomy*, Giorgio Abetti notes that most university observatories had two functions, “that of scientific research as an end in itself, . . . and that of instruction.”\textsuperscript{47} As noted above, the Steward equatorial served much better as an instructional instrument, than one for research. The optics are an essential part of the telescope, while at the same time, the mounting and other machinery which makes the telescope a tool of measurement are just as important. Arthur Berry, in his history of astronomy, wrote that the mountings for telescopes advanced along with the size of the optics throughout the nineteenth century. Measurement portions of the mountings including the graduated circles were crafted with greater precision at the end of the

\begin{footnotes}\item[45] Conversion amounts are listed as William Rigge listed them in his memoir; it is assumed that this conversion rate is for the date of purchase. \item[46] Rigge, Memoirs, “The Observatory,” CV-CUA, 2. \item[47] Giorgio Abetti, *The History of Astronomy*, trans. Betty Burr Abetti (New York: Henry Schuman, Inc., 1952), 320. \end{footnotes}
Europe, especially Britain and Germany, led the world in production of optical and scientific equipment in the first half of the nineteenth century. The German opticians Merz and Mahler provided many of the large refracting telescopes for the period. Mounting experts Troughton and Simms of London and Grubb in Dublin built many of the best quality telescopes from Great Britain. But by mid-century, American competitors won most of the astronomy work in the United States. “[A]fter 1850 no more foreign telescopes were ordered for serious work.” Alvan Clark of Boston, Henry Fitz of New York City, John Brashear of Pittsburgh, Fauth and Company of the District of Columbia and Warner and Swasey of Cleveland took the place of the old world instrument makers in the later half of the nineteenth century.

Anyone paying attention to astronomy in the 1880s should have known about these American telescope makers. The most noted was perhaps a 26-inch diameter Clark telescope installed in the Naval Observatory in 1873 and used in 1877 in the discovery of the two moons of Mars. At the time of the purchase of the Creighton Steward equipment, Clark, Brashear and Fauth were making most of the instruments for serious astronomers in the United States. Doane College, another Nebraska institution, bought a Clark equatorial a year after Creighton bought their instrument. If Lambert had done some research into telescopes, he likely would have purchased an American instrument. It seems, perhaps, he was more interested in acquiring European instruments of which the university could boast. The projector was probably the instrument which would most

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likely be seen by the public, and it seems this particular instrument was the focus of the instrumentation order.

Also part of the shipment was a seven-inch Steward transit theodolite, also called an altazimuth. A theodolite is a portable survey instrument which can also be used in astronomical work for determining terrestrial position. The theodolite cost £40 or $200 U.S. It included horizontal and vertical circles reading to ten arc seconds, a compass, levels, and a field oil lamp for night work. The whole instrument, on its mahogany tripod, weighed 42 pounds, making it heavy to transport. It had one diagonal eyepiece for astronomical work and one terrestrial eyepiece. The astronomical eyepiece had one horizontal, five vertical, and two diagonal wires used for taking star transit measurements.\footnote{Rigge, Memoirs, "The Observatory," CV-CUA, 4.}

To complete the astronomical equipment setup, Lambert acquired an H. H. Heinrich chronometer second hand from a man in Omaha.\footnote{Ibid., 5.} Heinrich was a clock maker from New York. His instruments were useful and apparently available in Omaha.

Creighton University advertised the new equipment in the 1884-85 catalog noting:

A highly finished Equatorial Telescope of six\footnote{The catalog size of six inches is a misprint; the telescope actually had only a five inch aperture.} inches aperture, with five astronomical eye pieces from 100 to 300, one day power, two solar prisms. The driving clock is of improved form and regulates the motion most correctly.

A Chronometer of most accurate construction, running 56 hours.

A seven-inch Transit Theodolite of the very highest finish vertical and horizontal circles divided on silver, two verniers to each circle, reading 10 seconds, micrometer wires arranged with illuminating lamp for night work.\footnote{Creighton College, \textit{Catalogue of Creighton College, 1884-85} (Omaha, Neb.: Hearld Printing and Publishing House, 1885), 15.}
To add to the distinction of the equipment, the catalog further noted that J. H. Steward was the “Optician to the Government” and that the instruments were “imported free of duty for educational purposes.” To the average person, these instruments may have seemed the best of the best. The catalog suggested it would be ungrateful for the people of Omaha not to allow their sons to use this magnificent equipment. “It is to be hoped that the people of Omaha will appreciate this great kindness and liberality and profit by it, giving to their sons sufficient time to be thoroughly educated.” While some of the equipment was indeed superlative, the astronomy equipment could have been better.

After ordering the equipment for Creighton, Father Lambert left, having served only during the 1883-1884 academic year.

Father Dowling remembered receiving the first shipment of instruments in his *Recollections*.

On Ash Wednesday, 1883[4], a consignment of apparatus from London arrived, several large boxes and many barrels. I shall never forget the eagerness with which I assisted in opening the various packages. Such beautiful things I have never before seen, much less handled. The telescope, lantern, microscope and the huge induction coil, and all the other instruments were the talk of the town.

Various instruments continued to arrive for the next couple of years. During the following September a class using the instruments began, taught by Mr. P. J. Mullconry.

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56 *Ibid*.
57 According to the *Catalogus Provincie Missouriana*, the Jesuit record of assignments within the Missouri Province, Lambert was at Creighton for the academic year 1883-84 and again for the academic year 1885-86, having left for a year in-between.
58 Father Dowling seems to have romanticized the event in his *Recollections*. William Rigge notes the date of May 7, 1884, for the arrival of the instruments. The date of 1884 fits better with other circumstantial evidence for the instruments. Father Lambert only taught at Creighton in academic year 1883-4 meaning he probably came in the summer of 1883, even if he had arrived at Creighton in January 1883, it is unlikely the instruments would have arrived a mere 8 weeks after his arrival. I have found several references which note that Father Lambert ordered the instruments. Furthermore, Dowling states in *Recollections* that the date was Ash Wednesday, March 5, 1884, about two months early for the arrival of the equipment according to Rigge. The date was likely romanticized for the effect giving the arrival more importance.
59 Dowling, 61.
In 1884, the university built an 1800-square-foot, rectangular, single-story building to house the chemical laboratory and some of the other purchased equipment. The southern half of the building was dedicated to a chemical lecture room and laboratory. The northern portion of the building contained a dark room and a mechanical workshop. The middle section of the building was divided into east and west sections. The larger western section served as a storeroom for the lab. The smaller east room was accessible only through a double door on the outside wall and stored the telescope. The room was purposely cut off from the rest of the lab in order to prevent any contamination from chemical fumes. The telescope could be wheeled outside away from the buildings where students and instructors swept the sky for objects of interest.

Creighton University touted its new science building in the 1884-85 Catalog. “A New Building, containing the chemical laboratory, with its furnaces and apparatus, having a complete outfit for each student; the astronomical department, the photographic gallery, and the mechanical workshop.” The telescope and other scientific equipment helped Creighton establish itself as a center for teaching science in the “Great West.” With an observatory, its reputation would grow.

In the catalog for 1884, the year after the large purchase of scientific instruments, the college touted their significant stock of scientific equipment. “Students are offered special facilities for acquiring a practical and thorough knowledge of the Natural Sciences. Instruments of the most improved pattern for experimenting in every branch of

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61 William F. Rigge, "The Driving Clock and the Clamp and Slow-Motion Screws of an Equatorial," *Popular Astronomy*, Nov. 1912, 555.
Physics and Chemistry are at their disposal.” In 1884, two classes were added to the fourth year for students in the Classical program. Mathematics classes used Loomis’s *Plane Geometry, Plane Trigonometry, Surveying*. Classes in astronomy in the fourth year used *Application of Trigonometry, Observations*. The new telescope provided a practical mathematical outlet for younger students as well as supporting the sixth-year class.

The catalog also noted the university’s gratitude to John Creighton for his donation of the new scientific equipment, “a complete and perfect, chemical, physical, and astronomical outfit” which would offer the people of Omaha “a thorough and practical education in the scientific pursuits of our day.”

**Building an Observatory**

Father Dowling assumed the role of Rector of Creighton College on July 18, 1885. According to William Rigge, one of the first faculty requests Dowling made to his superior, the provincial of the Missouri Province, Father Bushart, was to appeal that Father Joseph Rigge, S.J., William’s older brother by 15 years, come to Omaha “to take charge of the science departments.” Joseph Rigge was primarily a chemist by training as well as a Jesuit priest. He would be able to develop the newly equipped Chemistry Department. Though most knowledgeable in chemistry, he was a man of general scientific knowledge, as were many scientists in the nineteenth century.

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64 Creighton College, *Catalogue, 1884-85*, 5.
65 Ibid., 14.
66 Ibid., 15.
Joseph arrived from St. Mary’s College in Kansas to teach at Creighton College August 21, 1885. As a man of science, he realized the telescope could be used more effectively if it were permanently mounted, rather than rolled outside for each use. Astronomy in the mid- to late-nineteenth century was primarily a mathematical discipline seeking ever more precise measurements through optical observation. Sitting atop a tripod on castors made the telescope unsteady. The constant moving of the telescope also precluded use of the circles to align the telescope to specific locations in the celestial sphere. It worked well for looking at objects but was not precise enough for study and research.

Joseph requested a simple shed to house the instrument. A utilitarian building with a solid foundation and a removable roof would have permitted him to permanently mount the telescope. A similar structure, built only two years earlier in Wisconsin, served Campion College well. Father Dowling eagerly received Rigge’s proposal and expanded it after he “pronounced such a paltry mounting as unworthy of the dignity of Creighton College.” Dowling approached John A. Creighton for funds to build a small, traditional observatory befitting the prestigious university Creighton sought to establish. John Creighton obliged with a $1200 donation.

An observatory was a status symbol for many schools. It was not only an instrument of instruction, but it demonstrated that the university was developing its scientific program. Historian Robert Bruce argues that colleges began acquiring

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telescopes and building observatories in the 1840s “as signs of intellectual grace.” He notes most colleges used their observatories for instruction, with the usual student requirement of eighty hours of class time in astronomy.

Other Midwest colleges and universities were busy building observatories before Creighton. The University of Missouri had a small observatory from the 1850s and built a new, modern observatory in 1880. In 1881, the University of Wisconsin made an effort to increase its astronomical facilities by building the Washburn Observatory. The first observatory in the state of Nebraska rose in 1883 on the grounds of Doane College in Crete. Charles Boswell, a Connecticut philanthropist, gave a large donation to the college for the purpose. Observatories were popular, useful and in demand across the nation. According to Agnes Clerke, a nineteenth century historian of astronomy, “The organisation of astronomy in the United States of America was due to a strong wave of popular enthusiasm. . . . On the 1st of January 1882 no less than one hundred and forty-four [observatories] were active within its boundaries.”

Other colleges and universities built observatories at the same time as Creighton. Butchel College in Akron, Ohio, erected an observatory which opened in 1886. The observatory included a transit circle made by Fauth and a clock by Howard. Pike & Sons, a small optical company based in New York, constructed the equatorial for the observatory. The Lick Observatory was under construction in 1885 and would be equipped with the largest telescope in the world in 1887. The observatory used Clark and

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72 Bruce, 87.
73 Ibid.
Fauth telescopes and a Howard clock. Leander McCormick Observatory of the University of Virginia opened in a public ceremony in 1885 with a Clark telescope. McKim Observatory of DePauw University opened September 1885 with a 9.5 inch Warner and Swasey telescope. The Jesuits continued to build and operate other observatories around the world including a new edifice in Rome with telescopes made by Merz. In San Jose, California, the University of the Pacific opened a new observatory with a 6-inch Clark equatorial in 1885.

**Using the observatory to help the college**

Even before the foundation was poured, the Creighton Jesuits attempted to use the promised observatory to raise the stature of the university and improve its local reputation. Adjacent to the college, a barnyard fouled the air for the college and neighborhood with the usual scents of a barnyard. The college offered to purchase the farm for a lower purchase price than the owner wanted. The owner declined. Instead, John A. Creighton’s brother-in-law, John McCreary, bought the farm for the asking price, then demanded even more money from the college for its purchase. To foment a deal, McCreary “purposely allowed animal manure to accumulate along the common property line.” The Jesuits offered to name the planned observatory after McCreary if he would sell the land for a reasonable price. The lasting legacy was not enough to sway McCreary. John A. Creighton and the Jesuits eventually paid $17,000 in land and cash to acquire the property in 1887. With the property in the hands of the university, the farm was closed, the yard cleaned and Creighton raised its reputation by clearing the air on campus.

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76 Ibid., 87.
77 Ibid., 88.
78 Ibid., 93.
79 Mihelich, 57.
80 Mihelich, 57.
Though the offer did not work, it was clear that the Jesuits felt the observatory was something to be prized.

Creighton University sought national attention by notifying the Smithsonian Institution of the construction of the observatory. It appeared in the list of American observatories generated by George H. Boehmer. The yet to be constructed edifice was listed under Omaha, Nebraska, as “Creighton University Observatory,” though the entire note in the Report of the Smithsonian Institution of 1885 read:

**OMAHA, NEBRASKA.**

*Creighton College Observatory.*

Longitude from Washington, --------.
Latitude, --------.

*Director:* --------.

For readers of the reports, the listings were practically useless, other than noting that there was an observatory in Omaha. But for Creighton, they were able to list a linkage with the Smithsonian in their catalog and use that connection to raise the stature of the institution as a whole.

Linking Creighton University through the observatory with the Smithsonian Institution was one way for this small astronomical endeavor in the West to increase its profile locally and create an association to the scientific establishment on the East Coast. Historian Daniel Goldstein argues, “Because the Smithsonian enjoyed the respect and admiration of the nonscientific population, local scientists gained stature in the public eye

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when they could link themselves to the institution.”

The Smithsonian connection was only one of a number of other connections Rigge and Creighton University made to establish the legitimacy and status of the new observatory. According to Goldstein, creation of new scientific enterprises beyond the East Coast later led to the decrease in direct correspondence by amateur and professional scientists in the field with the Smithsonian. Having linked themselves with the Smithsonian, Creighton was one of the local scientific institutions which took over as a source of scientific knowledge in Omaha and Nebraska when the East Coast correspondence to the area lessened.

With the construction of an observatory, Creighton University fit itself into a system unique to the United States. According to historian Allan Chapman, two kinds of observatories populated the American scientific landscape. Public stations built through subscription within a city and the Liberal Arts College observatory.

The observatory is first mentioned in the 1885-86 catalog, by giving thanks to John Creighton for “furnishing, in great part, means for the construction of an Observatory. The university also began to advertise scientific lectures given by the new Creighton faculty, Professor Rigge, and Professor Hubert Gartland, S.J.

**Building the observatory**

Creighton’s building was simple and utilitarian. Relatively small, it consisted only of a circular wall fifteen feet in diameter, measured to the outside of the wall.

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83 Goldstein, 589.
84 Goldstein, 597.
86 Creighton College, *Catalogue of Creighton College, 1885-86* (Omaha, Neb.: Gibson, Miller and Richardson, 1886), 12.
Construction began swiftly with the foundation dug on October 6, 1885. A sheet-iron, mushroom-cap shaped dome covered the completed building. The dome could rotate to move an eighteen-inch-wide slit to point to any part of the sky. A cog wheel attached to a hand crank powered the dome “by means of a rack and pinion movement.” In the center of the building, a solid block of sandstone in the shape of a steep truncated pyramid formed a freestanding pier to mount the equatorial telescope. The pier tapered from a wide base, anchored six feet below the foundation, to eighteen inches square at the top where it was capped with a cast iron bed plate one inch thick. This freestanding pier provided a solid base for the telescope so it would not vibrate with the building, thus preventing blurred images in the telescope.

When Joseph finally mounted the telescope, the brass column under the scope, the bed plate, and the stone pier were all firmly bolted together. The building was nearly complete by December, but the telescope was to be part of an exhibition before it was mounted.

Dowling sought money from another Creighton University benefactor to purchase the rest of the equipment needed for a fully functional observatory. On February 7, 1886, John A. McShane donated $1000 for a driving clock, chronograph, and electrical outfit. Father Joseph Rigge took charge of ordering the instruments. He chose instruments both scientifically sound and elegant. They were also of the same sophistication as instruments installed at other observatories being built at the time.

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91 Rigge, Memoirs, ”The Observatory,” CV-CUA, 3.
Rigge purchased a $500 clock from the E. Howard Clock Company of Boston. The Howard and Company Clock Company was a prominent U.S. clock maker, well known in astronomical circles and among prominent builders in the Midwest. Howard and Company provided the master and slave clocks for the Iowa State Capitol building in 1882-3.\textsuperscript{92} Having the same clock system as the Iowa Capitol building surely gave Creighton some recognition. The chronometer was an eight-day clock driven alternately by two independent weights, in addition to a maintaining spring. One weight drove the gears while the other wound up. It had a 24-hour dial, and broke an electric circuit to mark specific increments of time as needed by the observer.\textsuperscript{93} This system allowed the observer to compare observation marks to the master clock and thereby chart the positions of stars and other celestial objects.

Rigge also purchased a Fauth and Company chronograph for $150 and had it shipped from Washington, D.C. Fauth and Company made excellent astronomical instruments for many observatories across the country. The Creighton Observatory chronograph consisted of a “cylinder about seven inches in diameter, and fifteen inches long, covered with a sheet of paper and rotated with uniform speed once or twice a minute by clock work of its own.”\textsuperscript{94} On this drum a fountain pen drew a spiral line notched by the breaking of the current from the clock. The break in current could come from the regular intervals set on the clock or from a push button pressed by the observer.

\textsuperscript{93} Rigge, Memoirs, “The Observatory,” CV-CUA, 3.
\textsuperscript{94} \textit{Ibid}.
to mark an event. Two different clocks could be attached to the chronograph to find the
difference between them.95

Joseph Rigge was on vacation when the clock was ready for installation. William
Rigge came from his teaching post at St. Ignatius College in Chicago on August 14,
1886, to supervise the installation of the clock by W. R. James, agent for the Howard and
Company Clock Company.96 The trip was William’s first back to Creighton since he left
Omaha in 1881 to continue his Jesuit training.97 On August 18, 1886, James set the clock
on two large cast iron pipes inside the dome room to the west of the telescope. The
chronograph was mounted on a table between the clock and the door on the southern wall
of the dome room.98 On August 21, they strung seven wires from the observatory to the
main building of the college to provide power from batteries kept in the basement of the
main building of the college and to establish communication lines with the observatory.99

As Claude Fischer noted in *Technology and Culture* magazine, at the time, a telephone
line was not a personal convenience but a practical communication device similar to the
telegraph, to be used only for serious endeavors.100 The observatory phone line served as
a critical link for disseminating time services. Once fully functional, Father Dowling saw
the opportunity for the observatory to promote the college and raise its status even further
by providing a time service to the city.101

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101 Dowling, 94.
Even before the clock was installed, William began making preparations to determine the geographical coordinates of the observatory. The first observational task any observatory must complete is to determine its own location; only then can other scientific observations be accurately calculated. William was unsure of the condition of the instruments at Creighton so he brought a reflecting circle along from Chicago in case the Creighton theodolite was unusable. The theodolite was in a useable condition, though he did have to determine the constant error of the instrument and make corrections for it.¹⁰²

William mounted the theodolite on a post in the ground just outside the observatory on the night of August 17 to get ready for his observations. He began observing the heavens on August 20, but the field lamp of the theodolite kept blowing out, leaving Rigge in the light of the stars alone. He eventually found a coal lamp intended for use with the Steward microscope and used it in place of the oil lamp for observations. On August 22, William observed the planet Mars and several occultations, or eclipses, of distant stars by our moon or some other celestial body.¹⁰³ He continued for the next few nights and completed nineteen observations. The average of his observations resulted in a longitude of 41º 16’ 10”.7. This original computation with the theodolite was later found to be in error by only 5.”1 or about 515 feet.¹⁰⁴

Excited by the new observatory, William wrote a series of articles for the Omaha Herald, describing the observatory and the equipment in it.¹⁰⁵ These were William’s first

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¹⁰³ Ibid., 4.
¹⁰⁴ Ibid., 5.
¹⁰⁵ Published September 4, 13 and 27.
published articles which began a long line of publications which increased the interest in
and stature of the small observatory on the prairie. The college used the observatory as
promotion for the school by including these three articles in one of the appendices of the
1886-87 university catalog.106

When Joseph Rigge returned from his vacation on August 27, he asked William to
help set up the Creighton University scientific display at the first Omaha Inter-State
Exposition before he returned to Chicago. On September 1, William, Joseph, and some
students moved the equipment, by wagon, a mile from the university at approximately
24th and California Streets to the exhibition hall at 15th and Douglas Streets. The
Exposition was intended to show the progress of Nebraska and surrounding areas,
exhibiting “a history of the march of civilization into the once boundless West.”107 The
Exposition opened daily for two weeks beginning September 4. Joseph and his students
manned the booth to talk about the equipment and give demonstrations as feasible.108 A
local newspaper described the exhibit as a “snug department all to themselves, where
they delight in explaining the mysteries of science to all comers.”109 The Creighton
display included most of the scientific equipment at the college including the celestial
globe, the chronometer and the equatorial telescope.110 In the evenings, Joseph Rigge
presented slide shows using the “famous Malden triple lantern” in front of the Exposition
building, projecting the images across the street.111 Ever looking to advertise his scientific

106 Creighton College, *Catalogue of Creighton College, 1886-87* (Omaha, Neb.: Gibson, Miller &
Richardson, 1887), Appendix II.
110 “Opening day of the show,” *Omaha Herald*, Sept. 4, 1886.
equipment, he inserted a slide reading “Creighton College Exhibit” several times throughout his program.\textsuperscript{112}

Before William left on September 9, he suggested that a transit instrument and sidereal clock would greatly assist an observer to keep an accurate time at the observatory. In making astronomical observations, knowing the correct time and one’s own exact position is essential to scientific operation. These two pieces of information allow the observer to start from a known reference point for observations and calculations.

John Creighton was pleased with the praise and publicity the scientific exhibition brought to the university. Four days after William had suggested additional instruments, on September 13, John Creighton offered $1,600 for a transit instrument\textsuperscript{113} if the college would build the building.\textsuperscript{114}

**Mounting the Telescope**

Joseph finally installed the Steward telescope in May 1886. Pierre De Vregille, a French Jesuit writing on Catholic Observatories worldwide, noted the observatory at Creighton had “une histoire intéressante” in that the university acquired the telescope prior to the building of the observatory.\textsuperscript{115} Father William Rigge later lamented the limitations of the Steward instrument since it was not intended to be mounted.

As an observatory instrument the Steward equatorial was decidedly an awkward one. It must be said, however, in justification of the maker and the buyer that neither had intended it for such a purpose. It had

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\textsuperscript{112} Rigge, Memoirs, "The Physical Department," 8. \\
\textsuperscript{113} Rigge, Memoirs, "The Observatory," CV-CUA, 6. \\
\textsuperscript{114} Dowling, 95. \\
\textsuperscript{115} Pierre De Vregille, S.J., "Les observatoires de la Compagnie de Jésus," Revue des questions scientifiques third series 9, no. 59 (Louvain, Belgium: La Société Scientifique de Bruxelles, 1906), 555.
\end{flushleft}
been made and bought as a physical instrument, to be rolled out on the lawn for occasional sight seeing. Its driving clock and divided circles served no practical purpose, they were to show what such attachments were supposed to do on a permanently mounted equatorial.\footnote{Rigge, Memoirs, "The Observatory," CV-CUA, 22.}

Joseph was able to construct homemade workarounds for some of the problems. The declination clamp and slow motion screws and clamps were placed too far from the observer, so Joseph added strings or metal rods to lengthen them or at least make them accessible to the observer. The driving clock on an observatory telescope is usually mounted in the pier underneath the telescope so it does not impede the free movement of the telescope. On the Steward telescope, the clock was mounted on a table to the southwest of the telescope, the driving clock made viewing the northeastern sky difficult.\footnote{Rigge, Memoirs, "The Observatory," CV-CUA, 22-23.}

The observatory itself also caused some difficulties with the equatorial. The taper of the pier, though steep, was not enough to allow the telescope to be pointed directly overhead. The telescope had to be dismounted and the pier shaved vertically straight down to about fifteen inches from the floor. The telescope was then remounted after the Inter-State Exhibition. Later on when the driving clock was attached to the pier, a vertical well had to be cut on the west side to allow the weights to descend.

Construction of a small transit room to the east of the dome room started October 7, 1886.\footnote{Creighton College, “October 7, 1886,” \textit{Historia Domus (Collegii Omahensis)} Sep 4, 1881-Oct 23, 1888, Creighton University Archives.} A short passageway connected the two rooms. The 16-foot square room was finished inside and out with pressed brick. A clear north-south line through the meridian, covered by glass doors and roof shutters, provided an unobstructed view of the meridian.

William Rigge noted the construction was unique and difficult for the builders. “This [the
construction] amounted practically to putting up two houses 18 inches apart without touching each other, and presented quite a [sic] unusual problem to the builders." The specific construction allowed the observer to view the celestial dome all the way down to the horizon. The builders succeeded and the observatory was ready for the transit instrument when it arrived.

![Image of completed Creighton University Observatory, 1893](JPG, 50KB)

**Figure 2 – Photo of completed Creighton University Observatory, 1893**

Though designed in two separate parts, the whole of the observatory followed established architectural norms. The design was a typical, utilitarian design for educational observatories. “A plan consisting of a central block with wings on either side was most frequently adopted for the principal observatories built between 1815 and 1875.” Other Jesuit observatories followed similar construction patterns. With only a single wing, the Creighton observatory still followed the general model.

The three-inch transit ordered from Fauth and Company arrived in May 1887. The transit instrument had a refracting telescope with a three-inch aperture. It rotated only along the meridian. There were seven vertical and two horizontal threads in the

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120 Donnelly, 63.
121 Dowling, 95.
eyepiece used to mark the passage of stars. A star would be placed between the two horizontal wires. As the earth rotated, the star would have an apparent motion of crossing each vertical line in succession from east to west. The observer would press a button to record the time of the passage on the chronograph.122

The transit instrument was used in conjunction with the chronograph and sidereal and solar clocks to determine the correct time. A solar clock, which reference the earth’s rotation, is the time reference most of the world uses on a daily basis. A sidereal day is about four minutes shorter than a solar day so there is no precession of the stars throughout the year. The sidereal time is equal to the right ascension of the star on the meridian.123 In other words, the celestial map is exactly the same for every sidereal day at the same time. The sidereal clock can be used to find the location of the stars at any given time. By recording the passage of the star through a specified location (measured by the transit instrument) on the chronograph along with the solar time (indicated by the observatory solar clock), an observer can compare the two and compute the instrument error of the solar and sidereal clock. The transit instrument also had a circle of sixteen-inches in diameter to find latitude. Two microscopes allowed the observer to read the circle down to a tenth of an arcsecond, thus giving an error of only about ten feet on the surface of the earth. Also included are several levels to allow detection of unevenness as much as an inch at forty miles away.124

The Fauth transit was an excellent astronomical instrument, intended for serious research in addition to education. Rigge noted, “the five-inch lens of the Steward

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124 Ibid., 7.
equatorial in \textit{sic} fairly good, not the equal, however, of the three-inch in the Fauth transit,” even though the Fauth had a two-inch smaller aperture.\textsuperscript{125}

The sidereal clock suffered some damaged in transit and Joseph Rigge returned it to Washington, D.C. for repairs. It did not return to Creighton until December 1887. Upon its return, Rigge bolted the clock to two iron pipes in the southeast corner of the transit room and hooked to the chronograph. A user could distinguish the marks of the Howard solar and the Fauth sidereal clocks on the chronograph by either omitting or inserting regular pulses to the chronograph indicating specific seconds.\textsuperscript{126}

With the transit room addition complete and the Fauth transit in place William Rigge returned to Omaha on July 1, 1887, to help his brother determine the official longitude of the observatory.\textsuperscript{127} The rough position William determined in 1886 was good, but the newly mounted telescopes would give a more precise location. William planned to spend two months in Omaha working to establish a more accurate set of coordinates for the observatory. The first requirement before using the transit was to ensure it was in working order. William reset the wires in the eyepiece of the transit to one-hundredth of an inch apart. Rigge moved the chronograph from near the equatorial to the northwest corner of the transit room to put the clock in direct view of the transit observer. He meticulously leveled and aligned the transit instrument with the meridian. Rigge wrote, the “axis of the telescope had to be levelled \textit{sic} within an error of less than one-millionth of its length, the whole instrument brought within a hair’s breadth of the

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\textsuperscript{125} \textit{Ibid.}, 23.  \\
\textsuperscript{126} \textit{Ibid.}, 7.  \\
\textsuperscript{127} \textit{Ibid.}, 7. 
\end{flushleft}
meridian.”\footnote{Ibid., 8.} Once those tasks were completed, he verified the constants for the instruments. It took most of a month to get the instruments ready for use.

When the instruments were finally ready, William proposed exchanging clock signals with the U.S. Naval Observatory. He wrote, “This would not only be a big ‘ad’ for the Creighton College Observatory, but also superb astronomical practice.”\footnote{Ibid., 8.} The observatory had received regular time signals from the Naval Observatory since January. The signal came at 11 a.m. weekdays over Western Union telegraph lines. The university paid $75 per year for this service.\footnote{Ibid., 4.} A dedicated exchange between the two would both be more accurate and produce the “ad” for Creighton University.

William contacted the Naval Observatory to set up an exchange, but the Naval Observatory, work of its own to accomplish and replied that the U.S. Coast and Geodetic Survey left a marker not more than two miles from the observatory. A triangulation from that point would serve to provide the most accurate longitude for the observatory. A time signal exchange would not be necessary. William, who was eager to tie his work to the prestigious Naval Observatory, kept urging the Naval Observatory to, “Please, oblige, anyhow.”\footnote{Ibid., 8.} The Navy astronomers acquiesced and offered to exchange clock signals over the telegraph wires.

Rigge and the Naval Observatory attempted to exchange signals on August 2-4, but clouds at one location or the other prevented observation on all three days. The first exchange of signals occurred August 5. Both observatories checked their clocks by recording 10-12 transits. The Naval Observatory sent its signals first through the
telegraph lines from Washington through Philadelphia, Pittsburgh, Chicago and finally to Omaha. “From 8:55 to 9:00 P.M. central time Washington clock broke the circuit every second except the 29th and the last five of every minute, and these breaks were recorded on our chronograph along with those of our own clock.”\textsuperscript{132} On the Creighton end of the line, William had numerous technical difficulties; the pen wouldn’t write, a pencil didn’t leave enough of a mark; and the new cords on the chronograph weights tangled. By the time the glitches were corrected, it was Creighton’s turn to respond. Rigge returned the signals via the same telegraphic lines.

The next day the exchange was repeated and again on August 7. On August 13 and 16, Rigge received word that his signals had been received and recorded in Washington.\textsuperscript{133} Before leaving, William wrote an article on the transit instrument for the \textit{Omaha Republican}. He departed Omaha for Woodstock College in Maryland on August 30, 1887. On his way to Woodstock, William stopped at the Naval Observatory in Washington to visit with Professors Skinner and Winlock. While there, he made celestial observations using the Navy equipment which he could then use to compute his personal equation. Continuing on to Woodstock, Rigge used the figures for his personal equation and determined the final values for the longitude of the Creighton Observatory. He sent them to Washington on November 21, 1887. On June 4, 1888, Rigge received his results back from Washington, his observations gave “a longitude thirty-eight hundredths of a second of time greater than that determined by the United States Coast and Geodetic Survey.”\textsuperscript{134} Rigge could feel secure in his observational skills.

\textsuperscript{132} \textit{Ibid.}
\textsuperscript{133} \textit{Ibid.}, 9.
\textsuperscript{134} \textit{Ibid}, 10.
The established professional relationship between Creighton and the National Observatory (U.S. Naval Observatory) is noted in the acknowledgement section of the catalog for 1887-88. In that year, Creighton received the text *Washington Observations, 1883* from Washington and added it to the Creighton Scientific Department and Library. Observatories regularly exchanged publications with each other as both a professional courtesy and in an effort to bolster their own reputations. Creighton’s receipt of the publications showed it was on the distribution list of one of the most respected observatories in the nation.

**Teaching and Research in the Observatory**

Upon the completion of the transit room the observatory was again noted in the 1886-87 university catalog. In contrast to earlier statements, the description of the observatory is understated to a degree. It reads, “[t]he building is plain but substantial.” The catalog does go on to explain that the observatory receives a daily time signal from the National Observatory in Washington through a telegraph connection provided by Western Union Telegraph Company. It also notes that the “College will soon be prepared to furnish standard time to any one who desires connection by wire with the Observatory.” Appendix I of the catalog discusses some quantifiable details of the observatory and Appendix II contains William Rigge’s three articles from the *Omaha Herald* on the observatory.

In 1886 the Missouri Province met to reestablish the *Ratio Studiorum* with as few deviations as American culture would allow. This was before the wide ranging emergence of Americanism, though probably fell in the same general spirit of the...

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137 *Ibid*.
138 *Ibid*.
movement. This 1887 “Course of Instruction” formalized a three-year secondary education curriculum and a four-year college curriculum. The catalog for 1887-88 noted the agreement among the Jesuit colleges of the Missouri Province. “The following Course of Instruction is the one generally adopted in the Colleges of the Society of Jesus throughout the west.” The fourth year of the college years was termed “Philosophy” in which the goal was to “impart sound principles of mental and moral philosophy.” Classes included Evidences of Religion, Logic and Metaphysics, Ethics, Mathematics, Science and Astronomy among others. Father Joseph Rigge is first noted in the 1887-88 catalog as Professor of Chemistry, Astronomy and German. The Ratio Studiorum still offered more to students of astronomy in the West than the state university could. A regular course in astronomy was not added to the curriculum at the University of Nebraska until 1894.

Though Creighton continued to offer the same number of astronomy classes overall in 1887, the sixth-year astronomy class moved to a more modern textbook, Newcomb and Holden’s Astronomy. St. Mary’s College moved to the same textbook in 1887 as well, though St. Mary’s did not have an observatory at the time. Georgetown University switched to Newcomb and Holden’s Astronomy the same year. It appears an observatory did not significantly change the curriculum for Catholic colleges. Though it

139 Mihelich, 58.
140 Creighton College, Catalogue 1887-88, 14.
141 Ibid., 15.
142 Creighton College, Catalogue 1887-88, 26.
143 Rudd, Science on the Great Plains, 29.
144 Creighton College, Catalogue 1887-88, 15.
145 St. Mary’s College, Catalogue of St. Mary’s College 1887-88 (privately printed, [1888?]), 14.
146 Georgetown College, A Catalogue of the Officers and Students of Georgetown College, Washington DC, for the Academic Year 1886-87 (Baltimore, Md.: John Murphy & Co., 1887), 17.
provided an opportunity for practical application, the texts used to teach were the same regardless of having an observatory.

Though no new astronomy classes were offered, Joseph’s position as astronomy professor gained more prominence. In the 1890-91 catalog he is listed as “Rev. Joseph R. Rigge, S.J. – Mathematics, Astronomy, Chemistry” with chemistry moving from the first of the list to the last. Though we cannot know if the order change was intentional, it could have shown the order of importance of the courses to the university. It was likely the first time the astronomy course was even taught to more than one or two students since Creighton finally awarded its first baccalaureate degrees in 1891. That summer, the grammar school ceased admitting new students, and Creighton University became a true college in the Jesuit tradition.

The astronomy class remained unchanged until 1893 when the textbook again changed, this time to Young’s *Elements of Astronomy*. St. Mary’s again moved in lockstep with astronomy textbooks, further indicating that the curriculum was likely driven from the province level rather than by individual institutions or facilities available such as an observatory. That year Physics was added to Joseph Rigge’s teaching load, listed after astronomy and before chemistry.

During his time at Creighton, Father Joseph Rigge published popular astronomical information in the local paper but no scientific articles on astronomy, though it would have been possible. Father Dowling noted in his book on the history of

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147 Creighton College, *Catalogue of Creighton College, 1890-91* (Omaha, Neb.: Burkley Printing Co., 1891), faculty section.
148 Mihelich, 63.
149 Creighton University, *Catalogue of Creighton University, 1893-94* (privately printed, [1894?]), 16.
150 St. Mary’s College, *Catalogue of St. Mary’s College, St. Mary’s Kansas, 1893-1894* (St. Louis, Mo.: Little and Becker Printing Co., 1894), 16.
151 Creighton University, *Catalogue of Creighton University, 1893-94* (privately printed, [1894?]).
the college, “Though it was mainly designed for teaching purposes, intermittent technical work can be done and often has been done at the Creighton Observatory.”\textsuperscript{152} Father Joseph Rigge used the observatory for both teaching and recreational observation. For example, in preparation for a total eclipse of the moon on January 28, 1888; Rigge invited a reporter from the \textit{Omaha Republican} to Creighton to talk about the eclipse. He told the reporter he was happy to teach the public about the eclipse.

\begin{quote}
I love to talk – that is, to chat – upon any branch of my favorite study, and especially when there is a chance that what I may say will perhaps interest Omaha – Omaha the city and the people, in which I take a very large amount of interest and high pride.\textsuperscript{153}
\end{quote}

Joseph invited the reporter to come view the eclipse from the observatory. During the eclipse, Joseph instructed the reporter to look through the telescope and explain what he saw. He reported a round shadow on the moon to which Rigge replied, “The chief interest surrounding an eclipse of the moon centers on the positive proof that it affords of the world being round.”\textsuperscript{154} No matter how small the point of fact, Rigge showed great pride in using the observatory to teach others about the heavens. He also observed a partial solar eclipse from the observatory on the first day of 1889, though he did not record the event in the papers. The observatory provided a platform from which he could make precise measurements of these events.

In order to provide a more stable environment for the clocks, Rigge built a vault to house them in May 1889. Triple walls and roofs prevented significant temperature changes inside the vault and an electric heater ensured a constant temperature. Two round windows in the walls provided the observer with a view of the faces of the clocks. This

\textsuperscript{152} Dowling, 97.
stable environment helped keep the clocks running at a constant speed and eliminated most of the error due to temperature changes. Rigge installed a switchboard in 1887 and connected it to the clocks in the vault. It allowed the two clocks and two telescopes to be linked to the chronograph in any combination.\footnote{Rigge, Memoirs, "The Observatory," CV-CUA, 11.}

William Rigge returned to Omaha for a third summer to finish helping his brother establish the observatory. He also continued to pursue his own interest in astronomy over the summer, staying from June 26 to September 4, 1889. He traveled with another Woodstock student, Mr. Donoher; he came along on the trip to help with the observatory, but really only spent limited time there.\footnote{Rigge, Memoirs, "The Observatory," CV-CUA, 10.} Joseph was away the whole time, and William filled in as the local astronomical authority. On June 28 he refurbished the sidereal clock; July 3 and 4 he reset the reticle of the transit.

Painstaking calibration, careful observation, meticulous calculation and other purposeful scientific work consumed most of William’s time at the observatory that summer. However, he remembered one night which he enjoyed a layman’s view of the sky.

> I for the first and only time gave myself up to the poetry of astronomy. I directed the equatorial to all the interesting objects in the sky, and thereby not only learned exactly what a five-inch telescope can do, but also gathered information that proved to be very serviceable in the instruction of students and in the entertainment of visitors.\footnote{Rigge, Memoirs, "The Observatory," CV-CUA, 10.}

The break from the scientific helped him better understand how to teach those without his background in astronomy.

Rigge took time to publicize the observatory and its equipment by timing professional baseball pitches at an Omaha game with the chronograph on August 29. He
also published an article about an occultation of Jupiter by the moon in the local paper.\textsuperscript{158} His article generated interest in the event, drawing many visitors to the observatory the night of September 3, including John Creighton. Among the visitors was Father Jerome S. Ricard of Santa Clara, California. He studied with Rigge at the observatory from August 12 until the day after the occultation. Ricard later became a professional meteorologist and astronomer who tied sunspot activity to weather conditions on Earth.\textsuperscript{159}

Finally, during the summer of 1889, Rigge triangulated the location of the observatory from the U.S. Coast and Geodetic Survey marker approximately one mile away on the grounds of Central High School. The Coast and Geodetic Survey was one of the initial scientific endeavors of the United States government. Commissioned to measure America, the organization was the mapmaker for the United States Government. By linking Creighton to the Naval Observatory and the Coast Survey, Rigge tied Creighton with both the timekeeper and mapmaker for the United States Government. This collaboration literally put Creighton on the map.

Joseph Rigge aided a fellow astronomer, Professor Goodwin DeLoss Swezey of Doane College by helping confirm the location of the Doane Observatory. In 1890, they used a telephone connection to exchange time signals and determine the longitude of the Doane Observatory based on those signals. The Boswell Observatory at Doane College, the first astronomical observatory in Nebraska, held an eight-inch Clark refractor, a larger and better telescope than Creighton’s. Though Swezey could determine his location through observation, the connection with Creighton linked Doane to Creighton which was linked to the official U.S. government time and maps. This collaboration exemplifies

\textsuperscript{158}William Rigge, “Jupiter Will Hide His Face,” \textit{Omaha Bee}, Sept. 1, 1889.
both Creighton’s rise in prominence as a scientific institution and Rigge’s development of professional networks.

Joseph continued to receive help from his brother in Maryland. From May 11 to June 30, 1891, William Rigge worked at the Georgetown Observatory with his classmate Father John Hedrick, S.J. The observatory director Father John Hagen taught Rigge how to observe variable stars. William Rigge in turn provided these lessons through correspondence to his brother Joseph in Omaha. The exchange shows additional informal professional collaboration, though it did not amount to much as Joseph conducted no serious work on variable stars at Creighton.

Joseph Rigge left Creighton College in August 1894 on ecclesiastical orders to British Honduras as a missionary among the Maya Indians. Father Dowling noted, “During the nine years of his stay in Omaha, Father Joseph Rigge raised the scientific reputation of Creighton College to a high level.”

Joseph Rigge had built the entire observatory from the dome room to the vault and procured the Fauth Transit instrument, the solar and sidereal clocks, and the chronograph, but his brother William would use the observatory to its fullest to bring national and international acclaim to Creighton University. Though his scientific work brought some acclaim to the university, Joseph’s primary center of attention had been chemistry. When leaving for Central America he sought to refocus his time and efforts on the pastoral role of his profession.

Teaching continued in the next two years, though there were no faculty members specifically knowledgeable in Astronomy. The Catalogus Provinciae Missourianae, a list of all the Jesuits in the Missouri Province and where they were working, lists Father Carol (Carolus) J. Borgmeyer, S.J. as the instructor in astronomy for the 1894-95

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160 Dowling, 89.
academic year.\textsuperscript{161} The 1895-96 Creighton Catalog lists Bernard J. Otten, S.J., as “Professor of Mathematics, Chemistry and Astronomy” and Rev. Francis X. Mara, S.J., as “Professor of Mathematics, Natural Philosophy and Christian Doctrine.”\textsuperscript{162} There appeared to be little to no change in the curriculum itself.

Later, William Rigge recalled that the observatory failed to continue its productivity in the two years after his brother’s departure:

During the next two years the Observatory passed into the hands of two men, one each year, who did no more than use the big telescope for sight seeing, wind the clocks and keep the house in repair. I do not say this because I find fault with their conduct. Not at all, I am merely stating a fact.\textsuperscript{163}

Rigge noted with incredulity that Father Borgmeyer, didn’t even know how to find his own time with the transit instrument. Borgmeyer did make astronomical observations during his time as director of the Creighton Observatory. In his report to the US Naval Observatory on the transit of Mercury on November 10, 1894, he wrote weather prevented viewing the first and second contacts, but clearer skies in the afternoon allowed his observation of the third and fourth contacts, though the fourth was mired a bit in haze. Unfortunately he also goes on to state he obtained his time correction by “comparing clock with Washington noon signal in Western Union office by means of a chronometer.”\textsuperscript{164} While this action seems reasonable to the average individual, for an astronomer with a working transit instrument, this was at best lazy and at worst

\begin{footnotesize}
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\item[\textsuperscript{161}] Societatis Jesu, \textit{Catalogus Provinciae Missourianae: Ineunte Anno MDCCCLXXXV} (St. Louis, Mo.: Evaristi E. Carreras, 1895).
\item[\textsuperscript{162}] Creighton University, \textit{Catalogue of The Creighton University, 1895-96} (privately printed, [1896?]), officers and faculty section.
\item[\textsuperscript{163}] Rigge, Memoirs, “The Observatory,” CV-CUA, 12.
\end{itemize}
\end{footnotesize}
incompetent. Rigge was obviously embarrassed by this event writing that the man “had the imprudence to say so in his official report to the Naval Observatory, which I read in print.” He must have felt the Creighton Observatory lost a good deal of prestige at the hands of these less capable men. The observatory also stopped receiving the daily Naval Observatory time signals in 1894.

At the time of Joseph’s departure, William Rigge had been ordained a priest and taught at St. Louis University in St. Louis, Missouri. He left Missouri in August 1895 to work at the Georgetown University Observatory in Washington, D.C., the most active Catholic observatory in the United States. Rigge intended to make his career in astronomy and was training with the best Catholic astronomers in the United States. At Georgetown, Rigge worked on photographic observations of the variation of latitude and a photographic determination of the right ascensions of stars. This was important work as it was the first photographic attempt, making it free of personal equation errors.

Unfortunately, his eyes could not endure the strain of working with miniscule dots on a glass plate. As he remembered, “My eyes could not stand the strain, and after three months I broke down so completely that I had to give up all observatory work, and even ordinary reading.” He taught algebra at Georgetown for the rest of the school year. Though he could not continue in the cutting edge research at Georgetown, he was still able to teach and continue with some of the grosser work of astronomy.

166 Twenty-three teams reported their results from the transit to the Naval Observatory. Of those 23, two other Catholic teams reported their results, Georgetown University and Catholic University, both in Washington, DC.
169 Ibid.
170 Georgetown University, Georgetown University, 1895-96 (privately printed, [1896?]), 31. Accessible in the Georgetown University Archives.
William Rigge, S.J., Back to Omaha

Unable to conduct his own astronomical work at Georgetown, William Rigge knew of an observatory in Nebraska which was in need of a new director. He requested permission to return to Creighton to teach and run the observatory he helped his brother develop. Rigge’s superiors granted him permission to return to Omaha, and his poor eyesight led him to Creighton University once again. With William Rigge’s arrival the public relations function of the observatory began in earnest. He was an eloquent speaker and a strong writer. His primary tool for communicating with the public was his pen. His writing evolved from his belief that the public at large needed scientific education. “The general public, as a rule, is intensely ignorant on the simplest and most fundamental things in every science.” Though this may seem to be harsh on the public, Rigge did use his knowledge to educate the lay public.

In August 1896, William Rigge returned to Creighton to teach and work with the observatory. Though his eyes were not of the best quality, his education and training were on par with the staff of other observatories. According to John Lankford, in his exhaustive prosopographical work, *American Astronomy*, many observatories and even astronomy departments had only one astronomer at the turn of the century. In 1900, Princeton University employed only one astronomer, Charles A. Young, for its astronomy department. Both Yale University, in 1900, and the University of California at Berkeley, in 1901, employed only two astronomers each. Closer to Creighton, the University of Nebraska had one professor in astronomy for more than thirty years,

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173 Ibid., 94, 106.
beginning in 1894. Lankford asserts, “Observatories lacking assistants to help reduce and analyze data may do little more than accumulate observations.” Rigge’s training in mathematics enabled him to observe, reduce and analyze by himself, though his pace was far slower, and he chose only certain subjects to address. At this point in his life, Rigge had a bachelor’s degree and some graduate work accumulated while at Georgetown. This placed him approximately in the middle of the educational spectrum for professional astronomers at the time. As a Jesuit he was also part of an established astronomical community composed of other U.S. Jesuit observatories and part of a larger global network of Jesuit observatories. He would later participate in the secular astronomical community, but at the time of his appointment as the Creighton Observatory Director his professional contacts came primarily through the Catholic Church.

One of his first tasks was to return the observatory to a scientifically useful condition. The university ran electricity to the observatory March 27, 1897. Seven wires ran through a buried iron pipe which Father Joseph requested. On June 14, William connected the driving clock on the equatorial to run on city power rather than battery.

Joseph, back from South America, took a break from his work to return to the observatory for a partial annular eclipse visible from Omaha on July 29, 1897. The Rigge brothers observed the contact times, viewing the sun on a piece of white cardboard attached to the five-inch equatorial and published their results in *Astronomical Journal*.

This publication marked the first of a long line of technical publications for the Creighton

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177 Rigge, Memoirs, ”The Observatory,” CV-CUA, 13.
Observatory. The brothers also published a less technical version of the findings for *Popular Astronomy*.\(^{179}\) Joseph’s time in Central America furthered his dedication to the pastoral role of priests. He lost interest in astronomy and William had to coax him to help with the solar observations. Ten years later, William could not even convince his brother to go to the observatory once during a visit to Creighton in 1907.\(^{180}\)

William was listed in the 1896-97 catalog as Rev. William B. [sic] Rigge, S.J., “Professor of Astronomy, Mathematics and Natural Philosophy.”\(^{181}\) His title was changed the next year to “Professor of Astronomy, Mathematics and Physics.”\(^{182}\) The change in title reflected the specialization of the sciences at the time. Earlier in the century, most sciences were contained under the general term “Natural Philosophy.” As specific sciences developed, they broke out into their own disciplines.

The Creighton Catalog for 1897-98 included additional information about how Rigge taught the astronomy classes. The class included, “actual use of the transit instrument in the observatory. Determination of thread intervals, and of the collimation, level, azimuth and clock corrections. Complete reduction of a night’s observations . . . use of the equatorial by day and by night. The double mirror heliostat. Sun dials on any plane at any place.”\(^{183}\) Students apparently enjoyed their time in astronomy class as well. The Class of 1898 gave the observatory covers for the celestial and terrestrial globes.\(^{184}\)

The catalog for the following year, 1898-99, was even more explicit in the training provided to astronomy students and Rigge’s approval of that use.

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\(^{180}\) Rigge, Memoirs, ”The Observatory,” CV-CUA, 12.


\(^{182}\) Creighton University, *Catalogue of The Creighton University, 1897-1898* (privately printed, [1898?]), officers and faculty section. Accessed at Creighton University Archives.

\(^{183}\) Ibid., astronomy section.

\(^{184}\) Ibid., acknowledgments section.
Class work comprises the whole of descriptive astronomy generally. In addition, some points of practical astronomy are specially emphasized. Besides the mathematical theory of the equatorial, the transit instrument, the meridian circle, and the zenith telescope, and the computation these entail, together with the practical use of the American Ephemeris, the class studies the formulæ for the transformation of spherical coordinates, the principle of the sun-dial upon any plane at any place, the elements of the theory of planetary orbits, the determination of the true from the apparent ellipse of a double star, and the graphic construction of solar and lunar eclipses and occultations.\(^{185}\)

Students preferred to use the transit over the equatorial, and therefore completed more time calculations than positional studies. The catalog explicitly denotes that the observatory work was satisfactory. “The actual use made of the Observatory by the students has invariably been satisfactory.”\(^{186}\) Though classes did not expand significantly, the observatory was included in the astronomy curriculum.

The catalog of 1899-1900 placed special emphasis on the practical education of Creighton astronomy students. “Our astronomical observatory is exceptionally well supplied with complete modern apparatus; and few of the foremost universities are more thoroughly equipped for the practical teaching of astronomy.”\(^{187}\) Compared with other teaching observatories around the country in 1900, Creighton’s was well equipped, but at least forty had equal or better facilities.\(^{188}\)

Creighton University and by extension the observatory continued to associate itself with other prominent astronomical groups through its yearly catalog. The acknowledgments section of the 1896-97 Creighton University Catalog notes the


\(^{186}\) *Ibid.*

\(^{187}\) Creighton University, *Catalogue 1899-1900* (privately printed, [1900?]), Guiding Principles in Education.

\(^{188}\) W. E. Chandler, *Congressional Record*, April 11, 1900, 4026.
Creighton Observatory’s new professional connections with the arrival of William Rigge. The catalog notes that Creighton received the text *Photographic Transits of 161 Stars* from the Georgetown College Observatory among other publications and Volume I, Part 7 of the *Publications of the University of Virginia Observatory*. When Creighton changed its catalog cover in 1898 to feature drawings of college buildings, the astronomical observatory was one of those featured. The acknowledgements section noted that the university had received a descriptive pamphlet about the newly opened Yerkes Observatory. Although this pamphlet contained only basic information about the observatory and was of little practical value to students, the fact that Creighton had received it, showed that Creighton was on the list for distribution of current astronomical material from the institution with the largest refracting telescope in the world.

Creighton advertised the observatory on a regular basis in its yearly catalog. The catalogue of 1899-1900 noted that the dome room was decorated with Poole’s map of the moon and “a dozen selected and framed photo-engravings of the heavenly bodies.” The walls of the transit room held teaching aids including pictures of “various types of astronomical instruments, photographs of noted astronomers, and graphic constructions of solar and lunar eclipses by students of the College.” It further noted the intended development of science at Creighton. “The foregoing summary will convince any one conversant with the subject that the astronomical department of CREIGHTON

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189 Creighton University, *Catalogue 1896-97*, Acknowledgments.
190 Creighton University, *Catalogue 1897-1898*, cover.
191 Creighton University, *Catalogue 1897-1898*, Acknowledgments section.
192 Creighton University, *Catalogue 1898-99* (privately printed, [1899?]), Astronomy section.
193 Ibid.
UNIVERSITY aims to be on a level with the highest kindred institutions in the land.”  

The next year Creighton made even stronger claims about the observatory.

CREIGHTON UNIVERSITY offers its students facilities in the study of practical Astronomy that are surpassed by few institutions in the country. The Observatory that it places at their command is of the most modern design and furnished with the very best instruments. A summary of its advantages will illustrate the thoroughness with which CREIGHTON UNIVERSITY intends to equip its departments.  

The catalog goes on to note Senator Chandler’s speech on the Senate floor and how he “described the equipment and work of our Observatory and gave it rank among 61 of the principal observatories of the country.” The catalog does not note that Creighton was ranked among the bottom of those institutions. While still a good observatory, it was not as significant as the catalog makes it seem. What Creighton did have was a well-trained astronomy professor in Father Rigge, which few other colleges in the area had. The observatory stood as an excellent example of the scientific education available in Omaha.

As a landmark on campus, the observatory served non-scientific purposes for the university. The American Protective Association, an anti-Catholic group, was especially strong in the Midwest and Omaha in the late 1890s. To counter claims that Catholics were un-American, Creighton University painted the observatory dome red, white, and blue on June 1, 1898, and kept it that way until to August 29, 1899. The sections of the dome alternated between red and white and the shutter was adorned with a blue field and white stars. Father Rigge noted his displeasure with this use of the observatory. “The walls also would have been similarly painted if I had not protested against this further caricaturing of a scientific building. I am happy to state that during all this time no
photograph was taken of the Observatory.” It was unlikely that this effort achieved its desired effect, though it does show that the university tried to use the observatory to better relations within the local community.

1900 – A New Century

By the turn of the century, most American colleges across the nation had moved to the “elective” system in which some courses, beyond the basic core of classes, were selected by the student based on the interest of the student and not the dictate of the institution. This was in direct opposition to the Ratio Studiorum which the Jesuits felt “prepares its beneficiary to cope with the difficulties of life and competes successfully in the struggle.” The catalog defended the choice to stay with the Ratio Studiorum “Our unwillingness to adopt extreme views with regard to electives, specialties, novelties and fads might more properly be urged as proof that we have studied to some purpose the science of education.” Creighton and other Jesuit Colleges wanted to ensure they were not allowing Americanization into the core Jesuit curriculum; especially after the Pope had issued the Testem Benevolentiae in 1899 condemning Americanism. The encyclical addressed specific religious points of Americanism and as such did not specifically address the Ratio or college curriculums. The Jesuits were not reacting specifically in defense of the Pope’s edict, but rather showing a general defense for traditionalism and that they were not adjusting to the age, by changing the course load. The 1902-03 catalog again defends the Ratio Studiorum. “It does not pretend to teach every thing, but it does claim to teach thoroughly and successfully the branches it undertakes to teach.”

198 Creighton University, Catalogue of The Creighton University, 1902-03 (Omaha, Neb.: Burkley Printing Company, 1903), Guiding Principles in Education.
199 Creighton University, Catalogue 1899-1900, Guiding Principles in Education.
200 Creighton University, Catalogue, 1902-03, Guiding Principles in Education.
Pedagogically speaking, the Jesuits insisted on a specified curriculum to produce a solid citizen, while still adhering to the core tenets of Catholicism.

Rigge continued to conduct research on a mathematical level in astronomy and teach astronomy to students in the “Philosophy” year. As a researcher, in April 1901 Rigge published “A graphic Method of Predicting Occultations by Means of a Star Chart” in the German scientific magazine *Astronomische Nachrichten*. While the Creighton University catalog made significant note of the observatory’s connection to the astronomical community, the article did not necessarily advance the science, but did provide a new way to predict celestial events.\(^{201}\) The catalog noted that reprints of the article were “sent to all the observatories of the United States and to the principal ones of foreign countries.”\(^{202}\) Creighton continued to publish a full-page description of the observatory in its catalogs until 1918.

Rigge’s astronomy course was listed in the 1902-03 catalog as being conducted five hours a week for one semester. The class consisted of two parts; a classroom section and a practical section. The classroom portion was titled “The Doctrine of the Sphere” and included study of celestial mechanics and the various bodies found in the universe. The practical portion of the course included use of the transit circle, equatorial, spectroscope, astronomical publications and the calculation of eclipses.\(^{203}\) This description remained basically unchanged until 1918-19. In April and May 1900 and May 1907 the students worked with the astronomy students at the University of Nebraska to

\(^{201}\) Creighton University, *Catalogue of The Creighton University, 1900-01* (privately printed, [1901?]), The Astronomical Department. Accessed at Creighton University Archives.
\(^{202}\) Creighton University, *Catalogue 1900-01*, The Astronomical Department.
\(^{203}\) Creighton University, *Catalogue 1902-03*, Courses.
exchange clock signals and find the difference in longitude between the institutions. The students used both the transit instrument and the chronometer in their work.\(^{204}\)

Rigge later lamented that the limited time he had with students did not allow him to teach the students to utilize fully the observatory.

I tried to impress upon them, and upon all student visitors, the fact that the Observatory was primarily built for their education. The time, however, was too short and their education not sufficiently advanced to enable them to use the instruments, especially the transit, to full advantage. This was done to some extent by the advanced students, practically all of them Jesuits, who came during the vacation months. And some even came several times.\(^{205}\)

As he noted, he did train some advanced students, but they were few and most were training to teach astronomy themselves. In the 1902-03 school year, Father Villiger of the Catholic Benedictine Order studied mathematics, physics and astronomy as a student of Rigge. In his memoirs, Rigge claims to have taught a total of nineteen advanced students between 1889 and 1926. Of Rigge’s advanced students, it seems only the first, Father Jerome Ricard, S.J., who studied under Rigge in 1889, made serious advances for astronomy.\(^{206}\)

Students continued to support the observatory and astronomy classes. The class of 1902 donated a Gurley reconnaissance transit to the observatory.\(^{207}\) Possibly though, the instrument was just a bequest to subsequent classes. It was far lighter and easy to carry than the 42-pound instrument the college had owned since the 1880s. The graduating class of 1904 gave the college a Steinheil grating spectroscope, a student graduating in

\(^{204}\) Creighton University, *Catalogue 1899-1900* and Rigge, Memoirs, "The Observatory," CV-CUA, 18.

\(^{205}\) Rigge, Memoirs, "The Observatory," CV-CUA, 44.

\(^{206}\) Rigge, Memoirs, "The Observatory," CV-CUA, 44.

\(^{207}\) Creighton University, *Catalogue 1900-01*, Acknowledgments.
1908 gave a Zollner star spectroscope and the Class of 1912 gave the college a Gaertner position micrometer all for use in the observatory and with astronomy classes.208

The 1905-06 catalog shows Creighton University moving slightly toward the elective system by offering a range of “optional subjects” of which astronomy was one. Other optional classes included Civics, Geology, Physical Geography, Physiology and Hygiene and Political Economy.209 While the subjects were optional, students still were required to take a certain number of these limited optional courses. This left only a few subjects in which students would not take a course. While Creighton continued with a modified Ratio Studiorum, other Nebraska universities added electives. The University of Nebraska increased its course offerings in astronomy from four courses in 1896 to ten different courses in 1906.210 Creighton continued with a single course in astronomy.

**Creighton Observatory Recognized**

At the turn of the century, American astronomy was perhaps the best in the world. Across the nation, active philanthropy and a continued interest in astronomy and observatory construction created an environment ripe for significant progress. Howard Miller in *Dollars for Research* provides an in depth look at how millionaires attempted to best one another by building a bigger and better telescope.211 These grandiose philanthropic activities culminated in the construction of the Yerkes Observatory for the University of Chicago in 1897 which houses a 40-inch refracting telescope, and which remains today the largest refracting telescope in the world.

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208 William F. Rigge, “The Driving Clock . . . .”, 556.
211 Howard S. Miller, *Dollars for Research: Science and its Patrons in Nineteenth-Century America* (Seattle: University of Washington Press, 1970). Miller provides an extensive look at the largest of the American refractors and how they were funded, but does not cover smaller educational observatories. Many of these observatories shared some of the same philanthropic energy of the larger instruments, but were not often recorded as such.
By 1900 each of these observatories was busy with its own program of observations and research. Few worked in collaboration on larger projects. On the floor of the U.S. Senate, William E. Chandler of New Hampshire lamented the lack of coordination. He noted that there were at least sixty-five observatories in the United States capable of carrying on scientific research. Though Chandler’s picture of coordinated astronomy was dismal, he named Creighton Observatory as one of the institutions possessing useful equipment. He went on to report Creighton was conducting work “consisting of thorough instruction in both practical and theoretical astronomy.”

Though chastising the lack of national organization, Chandler categorized Creighton along with the nation’s leading observatories.

On a more local level, Creighton Observatory was acknowledged as the leader in positional astronomy in Nebraska. In April 1900, Professor Swezey, who moved from Doane College to the University of Nebraska in 1894, asked for Rigge’s help in determining the position of his new observatory at the University of Nebraska in Lincoln. The observatory at Lincoln was small and held a 4-inch Brashear refracting telescope. The two men used a telephone line provided by Nebraska Bell Telephone Company to exchange clock signals, testing the equipment first on a rainy April 23. The two actually exchanged clock signals to determine longitude on April 25, 30 and May 1. Swezey then came to Omaha to determine his personal equation on May 4. According to Rigge, he was the first professional astronomer to come to the Creighton Observatory.

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212 Senator William E. Chandler, *Congressional Record*, April 11, 1900, 4026.
215 Ibid., 38.
Rigge knew the advantages an observatory could bring to an educational institution. In his memoirs, he notes the difference in his guests at the observatory, “The visitors to the Observatory may be divided into two classes, distinguished and ordinary ones, understanding by the first professional astronomers or persons otherwise high in social standing.”216 Swezey was the first of the professional sort. Among those Rigge included in the “high in social standing” category were John Creighton and his friends who visited the observatory often. As other distinguished visitors came to campus, Rigge was more than happy to show them the observatory. As for ordinary visitors, Rigge was practical and not overly friendly. He wrote later,

The publicity that a frequent use of the pen brings with it entails also at times a less agreeable feature. This is that one is molested both by telephone and by letter, and also by personal interviews, by ignorant people who either seek information on a subject to which they have never before given a thought or wish to have their erratic conceptions confirmed.217

Rigge seems to have been receptive to those truly interested in astronomy, and annoyed by the casual observer.

In the scientific community, Rigge made Creighton known by participating in observations of the total solar eclipse of May 28, 1900. The solar eclipse was an important one for American astronomers. The last total solar eclipse in the United States had occurred eleven years earlier and the next one would not be for another eighteen years.218 “Creighton University determined to contribute its share toward the scientific observation of the eclipse, and accordingly sent its astronomer to Washington,

216 Ibid., 37.
William led a team of Jesuit astronomers to the small town of Washington, Georgia, about 80 miles east of Atlanta. The team included fellow Jesuit astronomers Charles Charroppin, S.J.; St. Louis University professor Aloysius Frumveller, S.J.; and St. Xavier College (Cincinnati) professor William P. Quinlan, S.J. The small team set up their camp on the grounds of St. Joseph’s Catholic Church between the orphanage and academy. There they set up an observation station and determined their latitude by finding the distance from the Massachusetts Institute of Technology station also set up in the city of Washington. Rigge observed the four contacts between the moon and sun using the Heinrich chronometer and a three-inch telescope lent to him by a friend in Chicago. Rigge established his position with the help of the county surveyor.

Ever the educator, Rigge set up Creighton University Supplemental Parties consisting of Jesuit professors and their students in Macon, Georgia and Mobile, Alabama. Rev. Edgar J. Bernard, S.J., of St. Stanislaus College in Macon and Rev. A. L. Wagner, S.J., professor at Spring Hill College in Mobile, led a total of 21 students in Creighton supplemental observations at the two colleges.

Rigge published articles about his trip in the local papers. He also published scientific articles on his findings in the MIT Publication, Technology Quarterly, and in Popular Astronomy and Scientific American. These publications tied Creighton to the larger eclipse experiments as well as to MIT. In addition, by soliciting the help of the two Catholic colleges in the path of totality, he further spread the notion of Creighton College’s excellence in astronomy.

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221 Ibid., D169.
Creighton Steps Forward

The Creighton Observatory was part of a world-wide network of Jesuit astronomical observatories. Though the observatories did not necessarily cooperate on projects, the scientists did visit each other and exchange information. Father José Algué, director of the Manila Weather and Astronomical Observatory in the Philippines stopped at Creighton June 20 and 21, 1904, while en route to set up a display on the observatory at the World’s Fair in St. Louis.

Father William Rigge visited the St. Louis World’s Fair during the Scientific Congresses September 18 to 24, 1904. He attended the sessions of the American Astronomical Society and had dinner with his astronomical mentor, Father Hagen at a restaurant called “Tyrolese Alps.” At dinner, Father Hagen personally introduced Rigge to prominent astronomers from the United States and abroad.222

Rigge continued to write for both local papers and scientific publications, furthering Creighton’s reputation in science. In September 1904, Rigge wrote an article for Scientific American titled, “When was the Photograph Taken?” It demonstrated how an astronomer could identify the time of day a photograph was taken using only the shadows in the photograph and knowing the location it was taken. This article would later come back to Rigge in a way he could not have imagined.

Rigge maintained the instruments of the observatory well, but they did require professional attention on occasion. In January 1906, Rigge dismounted the equatorial telescope and sent it to the Omaha Plating Company to be cleaned and relaquered. The cleaning went well, but the relacquering did not work. Creighton University paid $25 for

222 Rigge, Memoirs, "The Observatory," CV-CUA, 16.
the effort. When the telescope was re-installed, Rigge added a new curtain around the telescope to protect it when it was not in use.\textsuperscript{223}

Creighton received a financial boost with the awarding of the Creighton estate to the college in March 1908. Flush with fresh cash, a new University President, Reverend Eugene A. Magevney, authorized refurbishing the observatory inside and out to make it the “Gem of the Institution”.\textsuperscript{224} A local carpenter refurbished the woodwork and the shutter covering the slit in the dome was improved. The iron pipes originally installed for the clocks were removed since the clocks had been moved to the vault in 1889. Platers added ceiling and wall plate Rigge picked from the Carter Cornice Company. Interior walls received a new coat of paint and the telescopes new curtains. Rigge added light blocking curtains to the dome room and brackets for electric lamps as well as a marble switchboard. Finally the outside of the observatory took on a fresh coat of gray stone paint.\textsuperscript{225}

As the observatory was being renovated, Rigge worked around them. A partial solar eclipse on June 17, 1909, spurred Rigge to invite several individuals to view the eclipse through the equatorial telescope.\textsuperscript{226} The timing of the eclipse was such that it was only visible during commencement, which was proceeding as planned in the auditorium.\textsuperscript{227}

The new infusion of cash to the college also opened some new opportunities for Father Rigge. With the college finances on a good footing, money was available for joining professional societies and associations. University Rector Magevney proposed

\textsuperscript{223} Ibid., 27.
\textsuperscript{224} Ibid.
\textsuperscript{225} Ibid., 27.
\textsuperscript{226} “Eclipse of sun occurred at 6 o'clock last evening,” \textit{Omaha World-Herald}, June 18, 1909.
\textsuperscript{227} Rigge, Memoirs, "The Observatory," CV-CUA, 18.
Rigge’s membership in the American Association for the Advancement of Science.  

Rigge first joined the Royal Astronomical Society of England on June 11, 1909. As one of the oldest astronomical societies, it was among the most prestigious internationally. His goal was to publish with them. He noted, “[i]ts annual dues are rather high priced, two guineas, and its Monthly Notices highly leveled, but F.R.A.S., after my name has given me a great deal of prestige.” He also acted on Father Magevney’s suggestion and applied to be a member of the A.A.A.S. He gained membership on December 27, 1910, at the Minneapolis meeting, though he was not present at the meeting.

Rigge did attend the 1911 meeting of the A.A.A.S. in Washington, D.C. He stayed at Georgetown University and likely visited with his fellow Jesuit astronomers there. Many of the astronomical A.A.A.S. members were also members of the Astronomical and Astrophysical Society of America (later renamed the American Astronomical Society). Rigge joined this second organization on December 28, 1911.

Rigge’s membership was part of an effort by the Society President, Edward C. Pickering, to include more “cultivators” and amateurs among the society’s membership. The A.A.S. was the primary association for professional astronomers in the United States in the late nineteenth- and early twentieth-centuries. For Rigge, as an astronomer, this affiliation raised his stature, though Rigge himself may or may not have placed much importance on the membership. He wrote later in his memoir:

Membership in learned or technical societies is not of itself a testimony of ability and proficiency, it is at times merely an indication of the

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228 Ibid., 45.
229 Ibid., 47.
230 Ibid., 39.
231 N. Reingold’s term for publicizes and promoters; see introduction.
length of one’s purse, because in practice almost any person may join such an organization and remain in it, if he is faithful in paying his dues. Still, such membership does give one a standing, and is practically required of those who come before the public as writers or speakers. It brings with it also many advantages. Such as the ready acceptance of one’s articles by all magazines, and especially the personal acquaintance with the great man. For this last purpose of course it is necessary that one should attend the meetings of the society as often as possible.233

Father Rigge would later appreciate these affiliations much more so. As for local affiliations, he also joined the Nebraska Academy of Science on April 23, 1911.

Observatory verses the front Lawn?

At the time of Creighton University’s incorporation in 1878, the university buildings stood at the edge of a developing frontier town. Twenty-Fourth Street did not extend north past the college, though there had been a plan for it to do so at some indefinite point in the future. Father William Rigge related the optimism for this development in his memoir.

This street held our the hope of becoming one of the most important ones in the city, and this hope, together with the hill and the extensive view towards the east and north, were the controlling reasons in making the College building face this street, although it was at the time not yet cut through.234

He thought that the cutting through of Twenty-Fourth Street would open the university to greater stature in the city.

233 Rigge, Memoirs, "The Observatory," CV-CUA, 45.
In the late 1890s and first decade of the 1900s the city began making efforts to finish cutting through streets like Twenty-Fourth Street. The topography was too steep for a roadway, so the land would have to be cut down to reduce the grade. In November 1905, Father Dowling, father rector of the university, made a preemptive decision to pare down the northwestern lawn of the university to match the expected grade of the street.\(^{235}\)

In the middle of this topography problem sat the observatory. The expected grading would require the land under the observatory to be lowered about 20 feet. Dowling and Rigge began looking for alternative locations for the observatory. Dowling seems to have felt the observatory could not provide the university the same prestige a significant entrance to the university could.

Dowling considered moving the observatory to the roof of the college building. Rigge objected to this positioning as the telescope could not be mounted on solid ground and the vibrations would cause significant problems for scientific observing. He wrote, “the shaking would be magnified by the height, by the rumbling of the water pipes, by people moving about, by glee club, orchestra and band practice, by the elevator, and by

\(^{235}\) Rigge, Memoirs, ”The Observatory,” CV-CUA, 16.
high walls.” The unacceptable effects of vibrations in a building had been found in other Jesuit observatories placed atop tall buildings in Marquette and Valkenburg. Father Dowling eventually chose not to dig up the lawn until the road was actually cut through so the new grade could be more easily matched. Luckily for the observatory, Father Dowling left to found a new Jesuit college in 1908. The observatory stayed where it was.

On August 6, 1907, the Omaha City Council passed an ordinance to continue 24th Street past Creighton College. Even though the ordinance passed, preparations for construction began in July 1909. Grading began for the street on August 2, 1909. This again put the newly refurbished observatory in a precarious position. There was little available land on campus to which the observatory could be moved and placing the observatory on top of an existing building was still not a viable option if scientific research were to continue in the observatory. Tearing down the observatory and rebuilding it in the same location, only lower, would be so expensive the observatory might not be rebuilt at all. The option of moving the observatory out to the edge of the city would be costly, would “dampen the ardor of its director, render its safeguarding impossible, and on account of the growth of the city, only renew the present difficulties,” according to Rigge. The university eventually chose to keep the observatory where it was, lower the ground around it, and build a ten-foot retaining wall to support the observatory at its original elevation. The observatory would not have to be moved and the project was the cheapest option which retained the observatory. Rigge wrote that the choice would ensure “the future of the Observatory would be permanently

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236 Ibid., 26.
237 Ibid., 19.
238 Ibid.
secured.” In addition, there would still be room for enlargement of the observatory at the new ground level.

The grading of the lawn also brought some additional, unexpected attention to the university. A partial skeleton was unearthed on August 11. William Rigge looked into the find and discovered it was likely the remains of M. C. Gaylord, one of the original settlers of Omaha. He died in July, 1854, and was buried on a ridge outside the city. Creighton University builders had already found these remains once before during the excavation for the college building in 1877. The remains had been buried a short distance away and the record lost. Found anew, Creighton interred Gaylord in a proper cemetery.

In late September, a construction crew dug a trench around the observatory for the reinforced concrete retaining wall. The retaining wall built around the observatory allowed the lawn to be graded to a level ten-feet lower. The retaining wall around the observatory was completed on April 4. The crew filled in the remaining spaces under the observatory with soil on April 6. On April 23, 1910, the construction crew finished the lawn grading. The drop was insufficient to accommodate the new road. A retaining wall along the street held another 10 feet from crumbling into 24th Street. The University ended up without a level entrance from the road and spent a significant sum on the grading of the lawn and observatory retaining wall.

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239 Ibid., 19.
240 Ibid., 20.
241 The wall extended ten feet above the new ground level to the level of the observatory floor. The foundations for this wall extended five feet below the new ground level. The wall flared from a thickness at the top of one foot to an eight foot thickness at the bottom. Since they dug about two feet beneath the soil around the observatory for the flare this caused some instability. On November 7, ten cubic yards of soil fell away from the ground attached to the dome room. The construction workers had to come and shore up the building while the architect "kept on protesting that the ground could not fall." (Rigge, Memoirs, "The Observatory," CV-CUA, 21.)
The observatory came to life on the night of April 7, with a comet viewing party, even though the concrete steps to the new elevated observatory were not completed until April 22.\textsuperscript{242} Streetcar tracks were laid on September 26, 1910 and service began October 16, though the street was not paved until the following August.\textsuperscript{243} The one problem with

\textsuperscript{242} Rigge, Memoirs, "The Observatory," CV-CUA, 21.
\textsuperscript{243} Rigge, Memoirs, "The Streets and Streetcars Near the Campus," CV-CUA, 3.
the observatory as it then stood was a slight rumble from the streetcars as they passed. Rigge noted it, but few others did. “It is only during the few seconds that a street car is passing its nearest point that I can detect a slight quiver in a star image. Nobody else has ever noticed it, not even Professor Swezey, even when his attention was directed to it.”

Though less important than a nice front lawn for the college, the observatory would continue to bring prestige and acclaim to Creighton University.

Work at the observatory could not continue during the first few months of construction. On November 25, Rigge took the opportunity to move the equatorial from the dome room to the college shop where he could work on fixing some of the peculiarities of the Steward instrument. Since it was not intended for use in an observatory, it was an awkward device to use. Rigge contacted internationally known mount makers Warner and Swasey of Cleveland for assistance, however the cost for shipping and a new mount was prohibitive. Rigge instead constructed some workaround devices which solved the major problems. He was modest about his abilities, writing, “although it bears the thumbmarks of having been homemade, it proved to be a decided success.”

Rigge, always looking to show the work at Creighton, wrote an article published in *Popular Astronomy* showing his “homemade” handiwork.

William thought about getting a bigger telescope, but in the end determined, “A five-inch is large enough for the purpose of instructing students and entertaining visitors, 99 per cent of whom have never looked through any telescope at all. And city smoke and

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245 William F. Rigge, "The Driving Clock …," 556.
246 Rigge, Memoirs, "The Observatory," CV-CUA, 23.
247 William F. Rigge, "The Driving Clock …," 551-561.
electric lights are not congenial to a large telescope.”\(^{248}\) Even this most ardent supporter of the observatory realized the limits of a city-bound telescope in 1910.

**Halley’s Comet Causes a Stir in Omaha**

In September 1909, the Harvard University Observatory announced Halley’s Comet had been spotted and photographed.\(^{249}\) The periodic comet was once again returning near earth after a 76-year roundtrip to the outer solar system and back. Shortly after the announcement, Harvard calculated the trajectory and announced that the comet would be closest to earth on May 19, 1910. Almost a year before, in January, 1909, the Lick Observatory in California had completed a spectrographic analysis of the tail of the Morehouse Comet and found a poisonous gas, cyanogen, in the tail.\(^{250}\) A later announcement by the Director of the Harvard Observatory, Edward Pickering, noted that the earth would pass through the tail of the comet on May 18. He warned that the tail was made of gasses that could be “verey [sic] disagreeable,” but that the gas would be so thin, (rarified) that it would not be noticeable.\(^{251}\) Numerous other astronomers concurred that passing through the tail of Halley’s Comet would not be harmful to people.

In February 1910, the Yerkes Observatory of the University of Chicago announced that a spectrographic analysis of the tail showed “very prominent cyanogen bands.”\(^{252}\) While the majority of astronomers remained steadfast in the belief that anything from the tail would be too rarified to have any effect on people, a few astronomers made dire predictions. Camille Flammarion, a famous French astronomer and popularizer of astronomy opined “that the cyanogen gas would impregnate the

\(^{251}\) “Earth in path of comet,” *New York Times*, Nov. 6, 1909. Accessed through TSAO.
atmosphere and possibly snuff out all life on the planet.”

While this debate was ongoing, the Creighton telescope had been dismounted and was being refurbished while awaiting the completion of the retaining wall around the observatory. Comet Halley was first visible in Omaha on March 2, 1910. William Rigge and interested others viewed the comet using a portable telescope from the third floor of the college. On April 7, with the retaining wall finished and the ground filled in, Rigge remounted the Steward equatorial.

Public interest in Halley’s Comet in Omaha began to soar as the comet drew nearer to Earth. Even though the comet did not appear over the horizon until the small hours of the morning, Father Rigge accommodated the early morning interest of the public and fellow Creightonians. He recorded in his memoir, “On April 20 from 4:10 to 4:40 a.m. another eager ‘mob’ drove me to the Observatory to find the comet for them, and likewise on the 23rd at the same early hour. But on both occasions we could not see it,” The comet was first visible through the equatorial at the Creighton University Observatory in the early morning hours of April 28. Rigge welcomed another crowd of visitors on the morning of May 4 from 3:45 to 4:00 AM. Comet Halley continued to approach earth and the tail grew as it sped closer to the sun. On May 12 and 13 the tail was measured to be thirty degrees (eighteen million miles) long from the Creighton Observatory, four million miles longer than would be needed to reach the earth.

253 Ibid.
254 Rigge, Memoirs, ”The Observatory,” CV-CUA, 23.
255 Ibid., 23.
256 Ibid., 24.
257 Ibid.
Rigge related to the reporter asking about the comet that people who want to see it should wait until the following week, because it could be viewed in the evening.\footnote{Ibid.}

Additional theories about what would happen to tail particles as they entered our atmosphere began to crop up as the comet drew closer. Professor O. C. Wendell of the Harvard Observatory announced there would be no interference to communication lines, wired or wireless, caused by the tail.\footnote{“Wireless Won’t Feel Comet,” \textit{New York Times}, April 27, 1910. Accessed through TSAO.} Another Harvard astronomer disagreed. Dr. Robert W. Willson said there might be some interference with the wireless and there may even be “a little glow in the atmosphere,” or there may be “a little darkening of the atmosphere.”\footnote{“Comet May Darken the Air,” \textit{New York Times}, May 12, 1910. Accessed through TSAO.} In May, just before the comet tail was to engulf Earth, Professor Deslandres of the University of Dijon reported that the cyanogen gas found earlier in the tail spectrum earlier had disappeared in March, but had reappeared again in May and that it would be possible for the gas to affect the atmosphere. Meanwhile, the original devil’s advocate, Camille Flammarion, had changed his mind and said he thought “the tail of the comet is simply an optical phenomenon produced by the flight through ether, similar to the wake of a ship at sea.”\footnote{“Comet’s Tail Poisonous,” \textit{New York Times}, May 11, 1910. Accessed through TSAO.} The majority of astronomers remained convinced that the tail would have little-to-no effect on the atmosphere at all, and certainly cause no risk to life.

This indecision among astronomers, no matter how slight, caused concern among some of the public. Chicago reported an increase in nervous and hysterical individuals as the comet approached. One women in Chicago reported “stopping up” her windows and

doors in an attempt to keep out the poisonous gases. Anthracite minors in Pennsylvania refused to enter the mine on May 19, they said, “if the world came to an end they wanted to be on the surface, where they could see, instead of in the depths of the mine.”

Druggists in Rome, it was reported, ran out of oxygen and had none to give an ailing man because they had all sold their oxygen to individuals preparing for the cyanogen gas.

The same fears appeared in Omaha to such an extent that William Rigge contributed to the chorus of prominent professional astronomers indicating the planet was safe. Rigge wrote an article two days before the tail’s arrival giving seventeen reasons why the comet tail was harmless. He began his article with this reassurance, “As there still are some timid souls that are afraid of the tail of Halley’s comet, it may be well to emphasize once more and for the last time the absolute harmlessness of our passage through it.”

One can almost feel his frustration with the ignorance of some in the general public. Though the World-Herald ran Rigge’s article on the front page, the second part of his article on page two was followed by other stories with headlines including: “Astronomers Disagree,” “Comet No Menace to Earth,” and “Predicts Meteor Shower.” These certainly didn’t help conclude the controversy.

On the night of May 18, the Comet Halley’s tail had grown to reach across 110 degrees (more than half) of the sky as viewed from Omaha. Some individuals,
including some priests from the university, spent the night of the 18th near the observatory waiting for something to happen. Father Rigge was not part of the crowd, and seemed to disdain the foolishness.

The net result of their wake was a clogging of the drain pipes with their matches and cigar stumps. The faculty, and the students in the “Beanery” went about it more reasonably. They portioned the hours among them. All had orders to wake me if anything unusual happened. And as for myself I slept all night, because I was convinced that nothing would happen, and nothing did.270

The excitement of passing through Comet Halley’s tail and the expertise of William Rigge put him in company with the other professional astronomers around the world debating the effect of the passage.

After the passage through the tail, Rigge continued to educate the public and serve as a guide to the comet and the night sky while Halley’s Comet remained visible. On May 19, he drew a good-sized crowd, but the sky was cloudy. May 23 the sky was clear and the comet appeared by 8:25 p.m. Rigge recorded his service to the public in his memoir.

The crowd was enormous. People stood in line for two hours and a half. They could be admitted only through one south door, and had to make their exit through the north window. To add to the interest, the moon was totally eclipsed from 11:09 to midnight. Its color was then a beautiful red, the best I have ever seen. The comet’s tail was sixty degrees long. The head set at 10:58. It would have been a bootless task to try and convince these people that the naked-eye view of the comet in its entirety was better than the telescopic one of its head only. I was forced to yield to the popular demand. I remember a lady who took only one glimpse through the telescope and wished to come down at once from the observing chair. When I urged her to take her chance of a lifetime and look longer, she declined. She had seen the comet through the Creighton College telescope, and that was satisfaction enough for the rest of her days.271

270 Ibid.
271 Ibid.
William continued another two observation nights on May 24 and 25, though the views were partly obscured by the brightness of the moon.²⁷² Halley’s Comet disappeared from view in Omaha on June 11. His work and service over the two months of intense interest brought him no financial gain, but Rigge did note that it may have gained him some points in his guardian angel’s notebook, and it certainly won some popularity for himself and the college. It also netted him two free cigars. Unfortunately, he didn’t smoke.²⁷³

Other Catholic Observatories viewed the comet as well. William’s former mentor, Father John Hagen, provided the Pope a look at the comet in the Vatican Observatory.

“Pius X was keenly interested, but remarked that what one could see of the comet did not seem to justify all the commotion it had created in the old and new continents.”²⁷⁴

Another former student of Hagen’s, Father Algué at the Jesuit observatory in Manila observed the comet, seeking to prove it had a solid core. He was unable to gather any evidence of his hypothesis.²⁷⁵

**Creighton Astronomy in the Court**

Always interested in sharing his knowledge, William Rigge wrote prolifically. He notes in his memoir:

I am convinced that 99 per cent of the reputation that I am said to have acquired for Creighton University and myself, has been due exclusively to my using my pen. We live in what may pre-eminently be called the age of the press, in which everybody can put his ideas in print.²⁷⁶

Rigge’s publications remain today, the most solid record of his activities.

William Rigge may have viewed an astronomical triumph in court as his most well-known work. William kept a man from being convicted of attempted murder on

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²⁷² Ibid.
²⁷³ Ibid.
²⁷⁶ Ibid., 47.
faulty evidence and saved him from ten years in a Nebraska prison. He invalidated eyewitness testimony by establishing that the supposed eyewitnesses were nowhere near the crime scene when the crime was committed. Rigge used an astronomical math problem to solve the question and in the process showed that even theoretical astronomy could provide practical service. Rigge remembered it in grandiose terms, “On Sunday afternoon, May 22, 1910, an event occurred which was destined to make the Creighton Observatory known all over the world, in popular as well as in scientific publications.”

A local political boss, Tom Dennison, found a suitcase on his porch at 2:50 p.m. May 22, 1910. Inside the suitcase was a bomb rigged to explode when the suitcase was lifted. Frank Erdman, a local firebrand, was arrested based on the testimony of two girls, Helen and Julia Hageleit, aged eleven and fourteen. The two girls claimed to have seen a person fitting Erdman’s general description in the neighborhood carrying a suitcase around the time of the discovery. The defense attorney wanted to establish a definite timeline for the girls to prove if it was even possible for them to have seen what they claimed to have seen. The girls claimed to have seen Erdman while returning home after a confirmation ceremony at St. Paul’s Lutheran Church. After the ceremony, the girls were in two pictures taken outside the church. These photos were the only physical evidence which could establish a timeline for the actions of the girls.

The defense attorney noticed a sizeable shadow in the corner of the photos and remembered an article about telling time by shadow written by William Rigge for Scientific American in 1904. William agreed to look at the photo and see if he could determine the time it was taken. He “entered into his ideas with enthusiasm, because I

277 Ibid., 28.
foresaw what scientific glory that would bring to the Creighton Observatory.” He sought only to aid in finding the truth.

Rigge went to the church in the photograph and measured where the shadow had been in the photos. He referenced his previous article and thought the photo was taken at roughly 3:20 PM. Excited by the possibility of debunking the only witnesses against his client, the defense attorney hired a surveyor to help make more accurate measurements. Rigge used these new measurements to recalculate the time. Using four different calculations, he found four different times, all within twenty-one seconds of each other. The average of the times was 3:21:26, well after the time the suitcase had been discovered.

On December 9, 1910, Rigge testified in criminal court to his calculations and time of the photo. The prosecution tried to show that the shadows could have been inserted afterward, but Rigge rebuffed him stating that all the shadows would have had to change. The first jury was split six and six and eventually hung. Rigge published his findings in the *Omaha World-Herald* December 1910 and *Scientific American* in February 1911. A second trial began in March. The officers of the court remained the same, with only the jury different. The prosecuting attorney, James P. English, was also from Creighton University, though in the College of Law. His son was in one of William’s classes. His tactic was to cast doubt on Science.

. . . he belittled, and then made fun of all scientific accuracy, especially in regard to weather predictions and to Halley’s comet, which had just then caused such a stir. He was full of sarcasm for his opponent Yeiser, and with his witticisms kept the jury in a continuous roar of laughter during the two hours his speech lasted.279

English’s prose was persuasive and the jury voted unanimously for a guilty verdict and a sentence of 10 years. Erdman’s attorney appealed to the Nebraska Supreme Court.

While awaiting a ruling from the Nebraska Supreme Court, Rigge visited the location of the photograph the day after the anniversary, May 23, 1911, and confirmed his calculations by verifying the position of the shadows on the physical site at the calculated time.

I now had another argument in my possession, one that would convince any jury and outweigh in their minds all the mathematics in the world. . . [with this verification] I could safely defy the world and challenge everybody to come and see for himself.  

Rigge notified the papers and an article on the shadow ran in The *Omaha World-Herald* on May 25, 1911. The prosecutor called Rigge and accused him of influencing public opinion and possibly tainting a new jury pool. Rigge apologized and asked the other papers not to print the story; they acquiesced.

The Nebraska Supreme Court finally delivered a ruling on February 23, 1912, which reversed the lower court’s ruling due to insufficient evidence. The police chief came to Rigge and asked for a name to verify Rigge’s findings. He suggested Professor Swezey in Lincoln as the nearest practical astronomer who could complete the task. Swezey took a new set of measurements and recalculated the time. He arrived at a time twenty-nine seconds different from Rigge. With this verification, the police chief gave up on getting a conviction with the evidence available. Erdman was released in the custody of a Colorado sheriff who returned him to Colorado to finish out a sentence in that state.

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Though the case was not pursued past the Supreme Court dismissal, Rigge felt a need to be publicly vindicated in his calculations and thereby in his sworn testimony. He published an article in the *Omaha World-Herald* on May 19, 1912, three days before the second anniversary of the photograph. The article concluded with the statement:

> Next Wednesday, May 22, will be the second anniversary of the taking of the photograph. Within one minute of twenty-one and a half minutes after 3 o’clock the shadow will be in exactly the same position it occupied at the time the photograph was taken. It was there last year at that time, and it will be there each anniversary as long as the church stands. Anyone interested in the matter may go to Twenty-eighth and Parker streets and verify the fact for himself.\(^{283}\)

The day of the second anniversary a class of students and an *Omaha Daily News* photographer were at the scene. None of the court officers came. The photographer took three photos, one minute apart each, at 3:20:30, 3:21:30 and 3:22:30. The second picture taken at the calculated time of the original photograph matched the original almost perfectly. Physical evidence was then available for verification at anytime, thus vindicating the calculations and testimony of Rigge. The photographs remained the only physical record after 1913. The building was destroyed by a tornado which ripped through Omaha on Easter Sunday, 1913, thus preventing any further first-hand reviews of the site in succeeding years.

William Rigge was not humble about this accomplishment in his memoirs, writing, “This triumph of science and this glory of Creighton University deserved and received the universal admiration and praise that has ever been poured upon it.”\(^{284}\) The story was widely circulated and the event publicized worldwide. Several articles followed in local papers. Rigge wrote a third article for *Scientific American* which was translated

\(^{283}\) Ibid.
\(^{284}\) Rigge, Memoirs, ”The Observatory,” CV-CUA, 33.
into French and reprinted in *Photo-Revue and Photo-Magazine*. Rigge’s former teacher, Father Hagen director of the Vatican Observatory, wrote an article on the event for *Stimmen aus Maria-Laach*, in 1913 under the title “Ein Gerichtsurteil im Widerspruch mit der Astronomie,” (A Court Decision in Opposition to Astronomy.)

In addition, Rigge highlighted the event by writing his first scientific paper for a conference. At the December 1912 meeting of the Astronomical and Astrophysical Society of America meetings in Cleveland, Ohio, Rigge read a paper entitled, “Astronomy in the Civil Court.” Father Rigge was introduced by Edward C. Pickering, Director of the Harvard College Observatory and President of the society. He remarked that Rigge’s work and testimony on the shadow “proved itself to be of great practical utility” in the courtroom. Pickering went on to travel Europe during the summer of 1913 and spoke of Rigge’s paper in astronomical meetings in Bonn, Hamburg and Birmingham. *The Observatory*, an English astronomical journal, mentioned the event numerous times. In addition to Pickering’s praise, the Secretary of the Royal Astronomical Society of Canada, C. A. Chant, asked Rigge to write an article on the subject for the society’s journal. The article was published in the March-April 1913 issue. In that article, Rigge included more technical details and countered theoretical assertions that the sun is never in the same place in the sky on any two dates, by asserting that the practical result is similar enough to appear exactly the same on an annual basis.

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287 Ibid., 34.
His presentation led to his election in early 1913 as a fellow in the A.A.A.S., “one of the highest honors conferred on a scientist in America.”

Fellowship is bestowed upon scientific leaders and individuals who have made significant contributions to science. Rigge was the second Omahan and second on the Creighton Faculty to be elected fellow. This recognition led to his name being listed in the 1913 *International Who’s Who in Science.*

Rigge’s story even crossed over into popular literature, Arthur B. Reeve, one of the early popular fiction writers to use science to solve mysteries, incorporated photographic shadow evidence in his short story “The Campaign Grafter,” published in 1913. Reeve used the same times and day and even noted that a scientist could testify to the fact in court.

The story persisted for several years after its initial splash. The Royal Photographic Society of Great Britain exhibited the shadow pictures along with panoramic pictures from the Creighton Observatory at their 6th Annual Exhibition of Photographs in London August 23 to October 2, 1915. Rigge’s article “The Saving Shadow” was reprinted in London’s *The Wide World* in March 1916, and the story appeared again in the Creighton University magazine *Shadows* in May 1923. The story also surfaced in a notice in the U.S. Jesuit publication *Woodstock Letters,* remembering some of Rigge’s achievements at his golden Jubilee. The note read, “From time to time he has attracted the attention of the general public by notable services, one of which was

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292 Rigge, Memoirs, "The Observatory," CV-CUA, 34.  
293 Lawrence H. Brown, "Shadows --- And A Doubt," *Shadows,* May 1923, 1-2, 42.
... saving of an accused man from sentence to the penitentiary by an accurate calculation of time from the shadow on a photograph." The note did not mention that Rigge only saved the man from a Nebraska penitentiary, and that Erdman was sent back to a Utah penitentiary after winning his case in Omaha.

The fame for Creighton seems to have been fleeting though: an article on establishing a time based on shadows in a picture in the *Publications of the Astronomical Society of the Pacific* in 1936 made no mention of Rigge or Omaha.

**Cobwebs and Conferences**

The year 1910 also brought some technical problems for Rigge and the Creighton Observatory. On August 2, 1910 the Fauth transit lost some of its "cobwebs." In a scientific eyepiece, the field of view is crossed by thin filaments which were used as measuring devices to mark the passage of a star. Some filaments were wire, some threads, but many were actual spider silk. These "cobwebs" were important to the use of the telescope because without them, the scope was more or less for sightseeing only. William recorded, "The result was a general tie-up of the Observatory, except sightseeing with the equatorial. The transit was dead, the chronograph idle, and the clocks could not be trusted." Father Rigge turned to a trusted Jesuit friend who was working in the observatory with him for July and August 1910, Father Herman Tenk. Father Tenk had spent the summers of 1905 and 1906 at the Creighton Observatory as well, but proved invaluable in the summer of 1910 by replacing the cobweb in the reticule of the

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transit instrument and also the cobweb in the theodolite which had been unused for more than two years for the same reason.\textsuperscript{298}

Other Jesuit astronomers also visited Rigge at Creighton in the fall of 1910. Father Richard Cirera, director of the Ebro Observatory, near Tortosa, Spain, stopped by August 22 and 23 while in transit to the International Solar Conference at Mount Wilson Observatory in California. On September 15, Father Aloysius Cortie, known for his work on the connection between sun spots and terrestrial magnetism, stopped in at Creighton on his return trip from the same conference at Mount Wilson. On March 2, 1911, the mountain came to Omaha, or at least an engineer from Mount Wilson. George W. Ritchey, one of the engineers who worked on the sixty-inch and hundred-inch telescopes at Mount Wilson gave a lecture on the construction of the observatories. Local visits also continued. On November 29, 1912, Professor Swezey visited Creighton again to examine the transit instrument. He was working on getting a transit for the observatory at the University of Nebraska in Lincoln.

Rigge also continued his affiliation with scientific societies and presented papers at the annual meetings. In December 1913, at the A.A.S. meeting in Atlanta, Georgia, Rigge read two papers on his work with the Naval Observatory wireless time signals and his panoramic photographs from the observatory. William found both the personal relationships society’s publications useful. “While personal acquaintance with those who are working in the same field is the greatest advantage to be gained from membership in scientific societies, the next, . . . [is] from the periodicals they publish.”\textsuperscript{299} In August 1915, Rigge traveled to California to deliver a paper on the solar eclipse of 1916. While

\textsuperscript{298} Ibid.
\textsuperscript{299} Ibid., 46.
in California, he visited the Panama Pacific Exposition and the Lick and Mount Wilson Observatories.  

**Longitude by Wireless**  
Determination of position by use of the stars was of most practical use by mariners. The U.S. Naval Observatory began experimenting with the transmission of wireless (radio) signals in 1904. In 1908, the French began experimenting with longer range transmissions from a high powered transmitter on the Eiffel Tower. The US countered in 1909 by contracting for a 100-kilowatt transmitter to be built, enabling the Navy to transmit signals more than 3,000 miles. To complement the transmitter, one 600-foot tower and two 450-foot towers were completed on the grounds of Fort Meyer in Arlington, Virginia in 1912.

In October 1912, Commander Henry-Hughes Hough of the U.S. Navy requested a direct determination of the difference of longitude between the U.S. Naval Observatory and the Paris Observatory using wireless signals, the first such direct determination between the two observatories, and the longest determination of distance (3,840 miles) through use of a wireless signal. This request was presented to the French at the Conférence Internationale de l’Heure in Paris and French authorities agreed to the experiment. A French team sent over in March 1913, received the first test signals in Washington.

In October 1913, the two observatories began exchanging official radio signals. The Paris Observatory used the Eiffel Tower as its transmitting and receiving antenna.

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300 Ibid.
and the Naval Observatory used a naval radio tower in Arlington, Virginia. After several weeks of attempts, on November 20 the exchange worked well for the first time and “the beats of the Paris clock, as transmitted by wireless, were compared with the Washington clock for several minutes.” The exchanges continued through March 1914 to give the astronomers ample data for determining the difference in longitude.

Comparing the beats gave a precise measure of the difference between the two. From this information and knowledge of transmission times and other regular deviations, observers calculated a more precise distance between Paris and Washington. They then compared this answer to the best-known difference before the transmission to determine the precision of previous measurements. Wireless signals were a revolution in astronomy which allowed observatories to determine their position conveniently, relatively quickly, and more precisely.

This exchange of signals had been widely publicized. The Naval Observatory sent out a circular, received at Creighton August 25, 1913, noting that from October 1 to April 15, Washington and Paris planned to exchange a series of wireless time signals. As the signals were not directional, any astronomer with a wireless receiving apparatus within receiving distance of either of these stations would be able to receive the signals for themselves and determine their own longitude with increased precision.

Father Rigge, always looking for a good advertisement for the university and the observatory, consulted with Dr. F. H. Millener, the “wireless wizard” of Omaha, to build

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305 Rigge, Memoirs, "The Observatory," CV-CUA, 35.
a radio receiver. Millener suggested an expensive and elaborate antenna for receiving signals. Rigge did not have the funds or the energy to build the system. Serendipitously, shortly afterward he was given a complete wireless receiving outfit by George G. Gerhard, a local amateur. With the help of another amateur radio enthusiast, William Reinhardt, Rigge strung four wires from the top of the college tower to other parts of the roof. With this basic setup Rigge was able to hear signals “from Sayville in Long Island, Key West in Florida, a Gulf boat, San [sic] Houston in Texas, Fort Leavenworth in Kansas, and Prince Rupert on the Canadian Pacific coast.” This assembly also allowed Rigge to receive the time signals from Arlington, though not from Paris.

Rigge reported in Woodstock Letters that he hoped soon “to be able to detect a difference in time of 1/100 of a second.” A promotional brochure about the observatory notes Rigge’s participation in the wireless time signal experiment. “On December 8, 1913, January 23, February 2 and 3, 1914, the longitude of our Observatory was redetermined by means of the special wireless signals sent out from Arlington every day for several months.” William Rigge again tied Creighton to the USNO and this time to an international experiment as well.

Creighton was not the only observatory which took advantage of this opportunity to work with the Naval Observatory. Six other American observatories reported results from the experiment to the Naval Observatory. All seven observatories were noted

306 Ibid.
308 “New Wireless Station,” Creighton Courier, Nov. 15, 1913. Courtesy CLIC-AP.
311 Observatories reporting data to the Naval Observatory included Case in Cleveland, Ohio; Columbia University in New York City, New York; Creighton University in Omaha, Nebraska; Drake University in
with their difference in longitude from Washington in the official report on the project in the 1916 Appendix to *Publications of the United States Naval Observatory*. \(^{312}\)

Unfortunately, after conferring with the Naval Observatory, it appears that Rigge made a “systematic error” leading to results less accurate than those taken by telegraph in 1887. \(^{313}\) While the research aspect seems to have failed in its goal, the observatory again gained wide recognition for its collaboration with the Naval Observatory. Though some on campus developed the wireless system further, Rigge notes in his memoir he used the wireless for time signals only. Even though the technology continued to develop and Rigge could have worked further with the wireless in his later years, he professed, “Speeches and music and singing and the like are too monotonous for my taste.” \(^{314}\)

Rigge presented the results of the experiment at the 1913 meeting of the A.A.A.S. \(^{315}\) The publicity this project gained for the Creighton Observatory was noted in the *Creighton Courier*, which mentioned a *Popular Astronomy* article written about the project by Father Rigge, as well as seven other articles written by him for the publication in 1913. \(^{316}\)

**Continued Teaching and Research**

Creighton University allowed more classes to fall into the elective category in the 1914-1915 school year. Students were allowed to take eight hours of electives in their junior year and eleven hours per week in their senior year. Options for electives included:

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Des Moines, Iowa; Elgin in Elgin, Illinois; the Illinois Watch Company in Springfield, Illinois; and Flower Observatory at the University of Pennsylvania in Philadelphia, Pennsylvania.

312 Hoodgewerff, E100.


314 Ibid.


316 "Observatory Publicity," *Creighton Courier*, Dec. 15, 1913. Courtesy CLIC-AP.
Mathematics, Physics, Chemistry, Astronomy, Geology, Biology, Political Economy, History of Philosophy, Pedagogy, Languages, Public Speaking, and Mechanical Drawing. Still only one class was available for astronomy, the same class which had been available since 1902.

Father Rigge was listed as the Director of the observatory in the full-page catalog description of the observatory. Interestingly though, on the page of the catalog listing the faculty at Creighton, William is listed as, “Rev. William F. Rigge, S.J. – Physics, Astronomy, and Curator of the Observatory.” The title of curator made the observatory seem closer to a museum than an active scientific laboratory. Rigge made sure to change it back for the 1916-17 catalog and those published until his death. Those catalogs named him as the “Director of Observatory.” Rigge’s title in the catalog also changed reflecting the focus of his duties.

In the 1909-10 catalog Rigge was listed as “Professor of Analytical Geometry, Physics, Mechanics, Astronomy, Calculus.” In the 1910-11 catalog he was listed as “Professor of Calculus, Physics, Astronomy.” In 1912-13, he was “Professor of Physics, Astronomy, Geology.” The 1915-16 catalog lists Rigge as “Professor of Physics, Astronomy and Curator of the Observatory.” In 1916-17 he was back to “Professor of Physics, Astronomy and Director of the Observatory.”

Rigge taught astronomy only one summer session in 1913. The catalog lists two classes, “Elementary Astronomy” and “Advanced Astronomy,” both of which were taught six hours a week and utilized the observatory. Most of the summer school students

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318 Ibid., 30.
319 Ibid., 34-36.
320 Ibid., 5.
were nuns looking to further their education. Rigge noted that he found the summer astronomy classes too taxing. He did teach physics in the summers, but did not include astronomy among the topics.

A second class in astronomy was introduced to the regular school year in the 1918-19 school year. According to the Creighton University Bulletin for 1918-19 two courses were offered, “Descriptive Astronomy” and “Spherical and Practical Astronomy.” In the same year, the observatory lost some prominence in the catalog. In catalogs prior to 1919, the description of the observatory ran at least a full page. In the 1918-19 catalog the description of the observatory is reduced to a single paragraph. The reduction could possibly be due to the increased need for course listing space in the catalog, it could also be a sign of the reduced importance of the observatory on campus.

The same two courses in astronomy remain listed in the bulletin until Rigge’s death in 1927. According to his memoir and several of his obituaries, Rigge stopped teaching in 1922, so it is unclear who taught the astronomy classes listed in the catalogs, if indeed they were taught at all. Though Rigge had been ailing for five years, no professor had been tapped to assume the role of director of the observatory. The observatory itself was not equipped to support research in the “new astronomy,” astrophysics. As such, filling his position was not an urgent task for the university president, Rev. William J. Grace, S.J. There were also few Jesuit astronomers available to post in a small observatory in the middle of a growing city. Grace noted the difficulty in finding a replacement, “There doesn’t seem to be any one to succeed Father Rigge. . . .

321 Rigge identifies the students as nuns. They likely taught as well, probably in a primary or secondary school.
322 Rigge, Memoirs, “The Observatory,” CV-CUA, 42.
323 Creighton University, Creighton University Bulletin (Omaha, Neb.: Creighton University Press, 1918), 42.
We just simply lack the teachers to spare one for the observatory.” Georgetown Observatory, the premier Jesuit observatory in the United States was even having difficulty finding astronomers. It was also the only other active Jesuit Observatory in the U.S. in 1927. Father Rigge, in his memoir written just before his death, lamented that few of his advanced students continued in astronomy even at the teaching level. “But alas! Not one of them persevered. And while Superiors and myself have been looking about for years to find some one on whom my mantle could fall, my successor has not yet loomed above the horizon.” It was not for lack of searching that Creighton could not find an astronomer.

Further Recognition for Creighton

Father William Rigge had intended to take a series of panoramic photos of the city from campus since he first arrived at Creighton University in 1878. He was finally able to do so with the help of a new staff member, Alphonse R. Schmitt, in 1913. On June 8, Schmitt and Rigge took eight panoramic photos of the city, one each in the cardinal directions and halfway between each cardinal point. These photographs were taken from the observatory. The photos were not as good as Rigge had hoped for. Schmitt retook the photos on August 22, 1913. Rigge then took the good photos and added the circles of the celestial sphere to give viewers an idea of the scope of the circular measure of the sky. He then used the photos to garner publicity for the observatory and college by presenting them as a teaching technique at the Atlanta meeting of the Astronomical and Astrophysical Society of America in December 1913. He also sent the photos for

325 Ibid.
publication in *Popular Astronomy*, May 1914, under the title “Astronomical Panoramic Views from a City Observatory.”

Visitors continued to come to Creighton to see Rigge and his observatory. On June 6, 1915, Professor Joel Stebbins, a former student of Professor Swezey in Lincoln who later directed the Illinois State Observatory and the Washburn Observatory in Wisconsin, stopped in to see Rigge.

Father William Rigge built his professional relationships by continuing to publish and present papers. In 1916 Rigge joined the Société Astronomique de France. His primary motivation for joining was their publication *L’Astronomie*. He attended the A.A.S. meeting in New York City at the end of December 1916 and presented nine drawings of the solar eclipse whose central line would pass through the South Pole on December 13, 1917.

Father Rigge continued throughout his life to explain astronomical phenomenon to the public. His audience was most attentive when certain destruction was upon the planet. As with the Halley’s Comet stories, William debunked other scares relating to astronomy. In 1919 the *Omaha World-Herald* and the Omaha Chamber sought William Rigge’s advice on a celestial prophecy of a Professor Porta and the Hearst Newspapers (*Omaha Bee* included). Professor Porta claimed a wayward star would bounce off our sun and crash into the earth bringing the world to an end on December 17, 1919. “In the first place Father Rigge of Creighton college, says he never heard of Porta … [and that he]

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329 Rigge, Memoirs, "The Observatory," CV-CUA, 47.
surely is a bum astronomer.” He told a committee of the Omaha Chamber of Commerce that the sun had many years left and also laughed away an astrological myth saying that, “Venus, Saturn, Mars and Jupiter are grouped together at the present time for social purposes and not for devilment.”

William Rigge continued his participation in scholarly activities and in 1920 joined the newly formed American Meteorological Society. He also changed his memberships and subscriptions because the field of astronomy was changing, moving toward physics after Albert Einstein’s theories and away from pure mathematics. As a member of the A.A.S., Rigge received the Astrophysical Journal. In 1922, he decided to cancel his subscription because the articles were too technical for use at Creighton. He instead switched his membership to the Astronomical Society of the Pacific, which he claims was “within my understanding” and also a dollar cheaper. The Journal of the Astronomical Society of the Pacific was addressed more to educators and amateur astronomers.

He notes in his autobiography that he read scientific papers at conferences until 1922. His local lectures also stopped at the same time. He reports his failing health precluded any further attendance at meetings or lectures after August 1922. He did continue to publish and gave interviews on the radio. On December 7, 1922, Rigge took part in the Creighton University radio extension course lectures from the Omaha Grain Exchange on station WAAW. He explained Albert Einstein’s theory of relativity in

332 Ibid.
333 Rigge, Memoirs, "The Observatory," CV-CUA, 47.
334 Ibid.
335 Ibid.
layman’s terms using an example of feeling the wind in a car.\footnote{"Prof. Rigge Discusses the Einstein Theory," \textit{Omaha World-Herald}, December 8, 1922. DCHS Archives clipping file.} His publications were his legacy though. Over his career, William Rigge published more than 500 works ranging from a one hundred-word article to an 80 thousand-word book.\footnote{Rigge, Memoirs, "The Observatory," CV-CUA, 52.} He has two books to his credit, both published near the end of his life. He recalled in his memoir, his “enforced leisure” in 1922 gave him the time to write the books.\footnote{Ibid.} He used his professional contacts to make the works better. For his book on the graphic construction of eclipses and occultations he contacted Professor Edison Pettit, a native Nebraskan, of the Mount Wilson Observatory for a review of the work.\footnote{Edison Pettit, personal letter from Pettit to Rigge, November 23, 1925, Box 3, Folder 43, Edison Pettit Papers, The Huntington Library, San Marino, California. Retrieval of photocopies by library staff.} In his spare time, William invented a machine to do the mathematical curve work he had spent much of his life conducting. Named the Invented Harmonic Curve Machine, it could draw more than a million curves and was an early form of computer. Creighton records note that the university should publish the book which described the machine once they determined if it would “add to the prestige of Creighton University & of the Society in general.”\footnote{J.J. Driscoll, S.J., \textit{House Consultors Minute Book}, Feb. 14, 1926.} Rigge’s book was published, giving him further prestige in mathematical circles. Though his focus on mathematics in the later part of his life shows he did not change with the profession of astronomy toward physics and instead maintained his lifelong concern with the mathematics of the celestial sphere.

Even into the last month of his life, Rigge continued to host prominent astronomers at Creighton. March 14, 1927, H. H. Turner, Director of the Oxford Observatory, stopped in to see Father Rigge during a layover in Omaha while on his way
to California.\textsuperscript{341} Turner was on his way to receive the Bruce Medal from the Astronomical Society of the Pacific.

Father William Rigge died at Saint Joseph’s Hospital, Creighton University’s hospital, on March 31, 1927, at age 69. As the primary driving force behind the use and promotion of the Creighton Observatory, Rigge left a dated building, antiquated equipment, and no successor. Though the teaching role of the observatory continued off and on for a few more years, the observatory brought little prestige to the university. The next mention of the observatory outside Omaha was a listing in a 1947 catalog of observatories, which listed Creighton University Observatory as “inactive.”

**The Observatory, Post Rigge**

One of Rigge’s former students did eventually take Rigge’s position, when no one else could be found. William C. Doyle, a Jesuit scholastic, took over the observatory in September 1927.\textsuperscript{342} He was young, but not yet a priest, and had only studied astronomy for a few years. In April 1928 he spoke at an assembly to find out if there were enough students interested in Astronomy for a class in the fall of 1928.\textsuperscript{343} It seems there were not, as there are no astronomy instructors listed in the bulletin for 1928-29. Doyle continued to be listed as the Director of the Observatory in the *Catalogus Provinciae Missourianae* until 1930.\textsuperscript{344}

In the 1929-30 bulletin, “Descriptive Astronomy” was split into two sections, “101” and “102,” and “Spherical and Practical Astronomy” was changed to “Practical

\begin{footnotes}
\item[341] “Father Rigge’s Guest,” *Province News-Letter* (St. Louis, Mo.: St. Louis University, 1927), 59. Publication was printed for private circulation in the Missouri and Chicago Provinces of the Society of Jesus, accessed at the Midwest Jesuit Archives in St. Louis, Mo.
\item[342] “New instructors added to faculty,” *Creightonian*, September 27, 1927. Courtesy CLIC-AP.
\item[343] “Prof. Doyle speaks at Arts assembly,” *Creightonian*, April 3, 1928. Courtesy CLIC-AP.
\item[344] Societatis Jesu, *Catalogus Provinciae Missourianae: Ineunte Anno MCMXXX* (Chicago: Loyolaea, 1930), 36.
\end{footnotes}
Astronomy.” Doyle is listed as “Instructor of Mathematics,” but probably also taught astronomy if it was offered. Though the astronomy field was moving toward the physics discipline, Creighton astronomy remained wedded to mathematics.

Doyle is not listed in the following year’s bulletin, though the three classes remain in the course listings. Father John Prince Markoe, S. J., came to Creighton in September 1930 to assume directorship of St. John’s Hall. He is listed in the *Catalogus Provinciae Missourianae* as the Director of the Observatory for the academic year 1930-31.

Markoe came late to the Jesuits, after graduating from the US Military Academy at West Point where he studied “math, math and more math” during his freshman year. His background in the army made him a solid candidate to begin teaching astronomy and astronomical mathematics right away in the fall of 1930 at the request of the teachers of the Omaha school system. His education at West Point would have likely included a number of mathematics classes to include ballistics and other higher mathematics. He used the observatory as well, inviting anyone interested in visiting the observatory to look through the telescope Wednesday evenings. Sometimes as many as 150 people attended these “visitors’ classes.” He was surely an able professor and affable enough to invite people to the observatory, but teaching and astronomical tasks were duties he.

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347 “Several Changes Made in Faculty,” *Creightonian*, Sept. 18, 1930. Courtesy CLIC-AP.
348 Societatis Jesu, *Catalogus Provinciae Missourianae: Ineunte Anno MCMXXXI* (St. Louis, Mo.: Wellington, 1931), 27.
351 Ibid.
352 Leo Sonderegger, “If you know that,” *Creightonian*, March 5, 1931. Courtesy CLIC-AP.
performed begrudgingly. He was unable to view the Leonid meteor shower on November 20, 1930, a date on which the shower was exceptional. He was unfortunately in the hospital recovering from an operation. Markoe had been sent to Omaha from St. Louis because of his activities supporting integration between the black and white communities of St. Louis. He did not stay at Creighton long during this first assignment, and a biography of his life does not even mention the move. Father Markoe is listed as “Assistant Professor of Mathematics” in the 1931-32 bulletin, though not in the following year. The classes remain, though it is unclear which of the mathematics instructors may have taught astronomy, if it was offered. The science of astronomy had likely moved past that which a mathematics professor would have known and moved more toward the physics department; though no physics professor was noted as teaching astronomy either. Astronomy seems to have fallen away rather than transfer to a new department. The position of Director of Observatory for Creighton is not noted in the 1932 Catalogus Provinciae Missourianae, nor in any of the issues in the decade after 1932. The position seems to be officially laid aside after 1931.

Some students were still interested in the observatory and the mathematical aspects of Rigge’s teaching lived on. On May 19, 1932, the Mathematics Club of Creighton University heard a lecture from Mr. Zimmerman, S.J., on “Harmonic Curves.” They also heard a lecture on “Principles of astronomy” from Mr. Wendell A. Dwyer after which he took the club to the observatory for an explanation of the apparatus.

353 “Fr. Markoe ill while meteoric showers occur,” Creightonian, Nov. 20, 1930. Courtesy CLIC-AP.
354 Smith.
355 Societatis Jesu, Catalogus Provinciae Missourianae: Ineunte Anno MCMXXXII (St. Louis, Mo.: Wellington, 1932).
Markoe kept his ties with the university, though not in a teaching capacity until after World War II. He is listed as a “former mathematics instructor” in a Creightonian article from 1933.\(^{357}\) It is unclear if anyone took over the duties at the observatory in an unofficial capacity. An article written in the Creightonian only a decade after Markoe took the reigns of the observatory declared that Father Rigge was the last to use the observatory, forgetting both Markoe and Doyle.\(^{358}\) The observatory found only occasional attention in the 1940s. Brother Bombore, a religious brother, used the observatory to study the sun - though other students just used it for shade in the summer.\(^{359}\) In the early days of World War II it was dubbed the “little Maginot line” after noting that it bore a strong resemblance to “those ill-fated, turret-top, camouflaged outposts dotting the now-beaten French territory.”\(^{360}\) Sadly the observatory was used about as often as the defeated Maginot Line.

The 1941-43 bulletin notes, “No major is offered in Astronomy. The courses offered in this department belong to the free electives and may be taken only in Junior or Senior year.”\(^{361}\) Father John Markoe returned to Creighton University again in 1946 after several moves and after serving a tour as an army chaplain in North Africa during World War II. Markoe was “not overly fond of teaching.”\(^{362}\) His work load included teaching eighteen hours of mathematics and astronomy to more than 400 students. Father Markoe began looking for some way to pursue his passion of work on behalf of black Americans.

\(^{357}\) “A Soldier and a Lawyer,” The Creightonian, January 19, 1933, 2. Courtesy CLIC-AP.
\(^{358}\) “Lat Shoots Stars at Noon,” Creightonian, December 18, 1940. Courtesy CLIC-AP.
\(^{359}\) Ibid.
\(^{360}\) Ibid.
\(^{361}\) Creighton University, The Creighton University, 1941-1943, (Omaha, Neb.: The Creighton University Press, 1941), 54.
\(^{362}\) Smith, 96.
He began working with a group of students who had formed a club to fight prejudice.\textsuperscript{363} With this group and later through additional efforts Father Markoe became active on a national level supporting racial integration. While a notable and meaningful accomplishment, his work as director of the observatory was soon pushed aside and forgotten. Markoe remained at Creighton until his death in 1967, but the observatory had fallen into disuse long before then. Astronomy faded from the course listings shortly after World War II. The 1945-46 bulletin does not mention astronomy.\textsuperscript{364}

In 1954, the Creighton Prep Astronomy Club, under the guidance of the Reverend John G. Auer, S.J., renovated the observatory for its own use and as a showplace of Creighton’s scientific history. Creighton University President the Very Reverend Carl M. Reinert announced plans to make it available to the public as a “permanent museum” honoring Father Rigge.\textsuperscript{365} The club planned to man the observatory nightly making it available to Creighton University and Prep students as well as area science classes by invitation.\textsuperscript{366}

The Creighton College Observatory suffered a fate similar to many other Jesuit observatories in the mid-twentieth century. The strict lines between science and religion which began to blur mid-century and the Second Vatican Council of 1965 began to open the Catholic Church to some aspects of the modern world. Strong interest in the observatories faded, and many were abandoned or handed over to others.\textsuperscript{367} A focus on

\textsuperscript{363} Smith, 96-99.
\textsuperscript{364} James M. Vosper, \textit{A History of Selected Factors in the Development of Creighton University} (Ph.D. Dissertation: University of Nebraska, 1976), 89.
\textsuperscript{365} “Observatory at Creighton will be available to public,” \textit{Omaha World-Herald}, Nov. 14, 1954, a.m. edition. DCHS Archives clipping file.
\textsuperscript{366} \textit{Ibid}.
\textsuperscript{367} Udías, 14.
social justice, like the work of Father Markoe, drew resources away from science in general.

**Conclusion**

The Creighton University Observatory served the institution well. While many students learned the practical aspects of astronomy within its walls and Rigge used its instruments to conduct some basic research, the great value of the observatory to the university came in its ability to increase the stature and prestige of the university on the local, national, and international levels.

Astronomy classes at Creighton did not change much with the addition of the observatory. The *Ratio Studiorum* did not leave room for significant change. Changes to the *Ratio* resulted from national trends, not additional equipment. The catalogs of St. Mary’s College in Kansas show the same result: astronomy classes used the same textbooks and were described the same way without regard to the availability of an observatory on campus. The research conducted from the observatory was primarily mathematically based and did not require an observatory. While its observatory was an excellent tool, Creighton did not produce any well known astronomers, other than Rigge.

The observatory provided a laboratory for student astronomy, and a platform for research.

While teaching and research are noble pursuits, the prestige earned by Rigge through the observatory is the lasting legacy of the Creighton University Observatory. The associations, visitors, and publications which connected Creighton to the wider scientific world developed the prestige of the institution. The observatory was a permanent fixture on campus used to exemplify Creighton’s dedication to science. Its existence drew William Rigge back to Creighton and gave him a platform from which to perform on the local, national, and international stages. The observatory drew
astronomical recognition to Creighton. Rigge, through the observatory, enhanced the reputation of the university through presentations, publications, and personal interaction. His actions, along with the existence of the observatory, benefited the university by drawing positive attention to Creighton as a center of scientific studies in the West.
APPENDIX A
Creighton University Observatory

Timeline of Significant Events

1878 – Creighton University founded in Omaha

1883 – Scientific instruments ordered for Creighton University

1884 – Scientific instruments arrive including a tripod mounted 5-inch refractor

1885 – Joseph Rigge, S.J. arrives to teach at Creighton University

1886 – Creighton Observatory completed
  - William Rigge determines position using theodolite on summer visit
  - Money donated for transit instrument
  - First popular publication for William Rigge

1887 – Creighton Observatory position determined using signals from USNO
  - Transit building constructed, transit instrument mounted
  - Observatory position determined using triangulation with Coast Survey marker

1894 – Joseph Rigge departs Creighton for Latin America

1896 – William Rigge, S.J., arrives at Creighton University to teach

1897 – First scientific publication for William Rigge

1900 – Eclipse trip to Washington, GA
  - Creighton University mentioned on the floor of the US Senate
  - Aided the University of Nebraska Observatory in position determination

1910 – Halley's Comet passes Earth
  - Shadow court case begins
  - Creighton front lawn lowered 10 feet

1921 – William Rigge stops teaching

1927 – William Rigge dies

1927 – William C. Doyle, S.J., takes over observatory

1930 – John P. Markoe, S.J., takes over observatory

1932 – Position of Director of Observatory not noted in *Catalogus Provinciae Missourianae*
Glossary

Aurora tube – “A tube, of uranium glass preferably, through which discharges from an induction coil are transmitted to produce the optical effect of aurora.”368

![Figure 6 - Creighton University Aurora Tube?, on display in the Physics Department, Rigge Science Building (JPG, 871KB)](image)

Astronomical eyepiece - A standard astronomical eyepiece which presents an inverted image.

![Terrestrial Eyepiece and Astronomical Eyepiece](image)

Astronomical spectroscopy – "The use of spectrographs in conjunction with telescopes to obtain observational data on the velocities and physical conditions of astronomical objects.”369

Clock Error – "no clock is perfect, and it is therefore necessary to determine the error and rate of the clock daily, and in all our observations to make an allowance for

the error of the clock. The error of a clock at any time is its difference from true sidereal time. The rate of the clock is the change of its error in 24 hours." 

Diagonal eyepiece – "A plane mirror or prism face mounted near the eyepiece of a telescope at an angle to the light path, to redirect the light for convenience of observation or to reduce the intensity of the image of the sun so that it can be observed directly." 

Diurnal motion – apparent daily motion of the stars across the sky due to the earth’s rotation.

Ephemeris – "astronomical ephemeris is a table that gives the positions of a celestial body at given times." From 1855-1960, the American Ephemeris and Nautical Almanac was published by US Nautical Almanac Office.

Equatorial – “A telescope mounted for adjustments in the altitude and azimuth; clockwork gives the motion in right ascension.”

Equatorial mounting – "A telescope mounting in which one axis of rotation (the polar axis) is aligned parallel to the Earth’s axis, and the other (the declination axis) is aligned at right angles to this axis, in the plane of the celestial equator. Rotation about the polar axis allows the telescope to be pointed toward celestial bodies that have different right ascensions or hour angles, while rotation about the declination axis enable the telescope to be swiveled perpendicular to the celestial equator in the direction of increasing or decreasing declination."
**Figure 8** – Depiction of an equatorial mounting in relation to the earth (Line Drawing)

**Figure 9** – Photo of Creighton Observatory equatorially mounted telescope – photo courtesy Creighton University Archives (JPG, 14KB)

**Geisler [Geissler] tube** – "An instrument in which light is produced by an electric discharge in rarefied air and gases. The colors are varied by using different gases."

**Figure 10** - Creighton University Geissler Tube, on display in the Physics Department, Rigge Science Building (JPG, 27KB)

**grating spectroscope** – "a spectroscope which employs a transmission or reflection grating to disperse light, and usually also has a slit, a mirror or lenses to collimate the light sent through the slit and to focus the light dispersed by the grating into spectrum lines, and an eyepiece for viewing the spectrum."

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Helioscope – "An instrument for viewing the sun."\(^{377}\)

Figure 11 – Creighton Observatory helioscope - photo courtesy Creighton University Archives (JPG, 15KB)

Leyden jar – An early form of battery in which an electrical charge could be stored for discharge.

Personal Equation – "A systematic observational error due to the characteristics of the observer; the uncertainty in reading made by an observer may be ascertained by a statistical analysis of the observer's readings."\(^{378}\)

Ratio Atque Istitutio Studiorum Societatis Iesu (Ratio Studiorum) – the core curriculum of Jesuit schools.

Refractor or Refracting Telescope – "A telescope in which a lens gathers light and forms a real image of an object."\(^{379}\) Light enters the larger lens, is refracted toward the smaller lens (the eyepiece), then the latter refracts the light again creating a magnified image of the object.

Figure 12 – Diagram of a refracting telescope (Line Drawing)


Reticle or reticule - a series of lines in the eyepiece of an optical instrument used for determining the position of the objects being observed.

Sidereal Clock – a clock which represents sidereal time.

Sidereal Day - "A sidereal day. The time of one complete revolution of the firmament is called a sidereal day. This interval is divided into 24 sidereal hours, each hour into 60 minutes, and each minute into 60 seconds. Since the celestial sphere turns through 360 degrees in 24 sidereal hours, it turns through 15 in one sidereal hour, and through 1 in four sidereal minutes."  

Sidereal Time – "a time system based on the rotation of the Earth measured relative to the background stars. In normal usage the term refers to the time taken by a planet to complete one orbit of the Sun … In the case of the Earth, this period of time is referred to as the sidereal year and is equal to 365.2564 mean solar days.”

Solar Clock – a clock representing solar time.

Solar Time – "a time system based on the rotation of the Earth measured relative to the Sun; the time kept by a sundial. When corrected for irregularities in the solar motion, solar time is called 'mean solar time.'” Most clocks in everyday use display solar time.

Terrestrial eyepiece – An eyepiece for a telescope which presents an erect image to the observer instead of an inverted image.

Figure 13 – Depictions of the view through a terrestrial eyepiece and an astronomical eyepiece (Line Drawing)

Theodolite (also altazimuth) – "An optical instrument used in surveying which consists of a sighting telescope mounted so that it is free to rotate around horizontal and

vertical axes, and graduated scales so that the angles of rotation may be measured; the telescope is usually fitted with a right-angle prism so that the observer continues to look horizontally into the eyepiece, whatever the variation of the elevation angle.\textsuperscript{383}

**Transit Instrument** - "a telescope, mounted upon an axis, at right angles to the tube, which axis occupies a horizontal position, and points east and west. The tube of the telescope, when horizontal, will therefore be directed north and south; and if the telescope be revolved on its axis through 180 degrees, the central line of the tube will move in the plane of the meridian, and may be directed to any point on the celestial meridian."\textsuperscript{384}

\[\text{Figure 14 – Creighton Observatory transit instrument – photo courtesy Creighton University Archives (JPG, 34KB)}\]
APPENDIX C
Bibliography


Chandler, W. E. *Congressional Record*. April 11, 1900.


Creighton College. *Catalogue of Creighton College, 1886-87*. Omaha, Neb.: Gibson, Miller & Richardson, 1887.


Georgetown University. *Georgetown University, 1895-‘96*. Privately printed, [1896?]. Accessed in the Georgetown University Archives.


Mihelich, Dennis. *The History of Creighton University 1878-2003*. Omaha, Neb.:

Miller, Howard Smith. *Dollars for Research: Science and its Patrons in Nineteenth-


Harper & Brothers, [1911?].


Rigge, William F. “Some disagreeable effects of publishing a sequel to the chapter ‘Writing’ in his Memoirs.” Rigge files, Creighton University Archives.


Rigge, William F. "The Driving Clock and the Clamp and Slow-Motion Screws of an Equatorial," *Popular Astronomy*, Nov. 1912.


St. Mary's College. *Catalogue of St. Mary's College, St. Mary's, Kansas, For the Academic Year 1881-82.* St. Louis, Mo.: Continental Printing Co., 1882. Accessed at the Midwest Jesuit Archives, St. Louis, Mo.


St. Mary's College. *Catalogue of St. Mary's College, St. Mary's Kansas, 1893-1894.* St. Louis, Mo.: Little and Becker Printing Co., 1894.


