The Carleton-Guilford Eclipse Expedition of 1900

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"The great astronomical event of the year, at least so far as can be predicted, is to be the total eclipse of May 28,"

- Goodsell Observatory astronomer Herbert Couper Wilson, *Popular Astronomy*. May 1900

During the spring of 1900, American astronomers mobilized a coordinated effort to observe the solar eclipse that was to track across the southeastern United States on May 28th. George Ellery Hale of Yerkes Observatory, serving as Secretary of the Eclipse Committee of the American Astronomical and Astro-physical Society, led efforts to see as much astronomical apparatus placed in the shadow of the moon as possible, and to put forth a clear set of observing objectives.

Hale's eclipse circulars were sent to astronomers and observatories across the nation, and were published in the technical journal of the field, the *Astrophysical Journal*, as well as in *Popular Astronomy*, which, as its name suggests, was geared toward a broader audience.

The eclipse track traversed the U.S. from New Orleans to Norfolk, with major parties setting up to observe all along the path. Harvard Observatory chose an Alabama station, Lick Observatory sent a group to Georgia, the U. S. Naval Observatory dispatched parties to North Carolina and Georgia, and President McKinley and members of his cabinet cruised down the Potomac on the *USS Dolphin* to watch the eclipse from a vantage point near Norfolk. Several dozen institutions put expeditions in the field, ranging from single persons with modest equipment to major undertakings that occupied large tracts of land on which tons of apparatus were assembled. For the major expeditions, the small town of Wadesboro, NC, was the focal point of astrophysical eclipse efforts. Large groups from the Smithsonian Institution, Princeton University, the British Astronomical Association, and the University of Chicago's Yerkes Observatory occupied Wadesboro for weeks, erecting sheds and tents over several acres of the town and filling them with all manner of equipment.[1]

With so many major expeditions in the field, it is interesting that the first post-eclipse report to appear in the pages of *Popular Astronomy* was from a small, modestly outfitted group that observed the eclipse from Southern Pines, NC. This group could claim only one research astronomer, and in a time when expeditions of major institutions and observatories involved complex apparatus, multi-faceted observing programs, and many support staff, its make-up and ambitions harked back to expeditions of decades earlier, such as the eclipses of 1869 and 1878, also seen on American soil. During those eclipses most of the observing parties were small groups that included assorted "men of science" and their wives. Mostly small instruments were used, and as many observers were set to the task of sketching the corona as were attempting to photograph it.[2]

The lead eclipse article in the June-July 1900 issue of *Popular Astronomy*, opened with a detailed eight-page description of the joint expedition of Carleton and Guilford Colleges, before spending four pages briefly summarizing results of the various Naval Observatory parties and the Wadesboro groups. A photograph accompanying the article, captioned "The Carleton and

Guilford College observing parties at their station Near Southern Pines, N.C., May 28th, 1900", shows nearly two dozen persons, accompanied by a few telescopes, standing in the fenced yard of, or sitting on the roof of, a large farm house. The image is much more reminiscent of the photos of modestly outfitted mid-nineteenth century eclipse expeditions than of the ambitious institutionally-supported stations at nearby sites in North Carolina in 1900. The post-eclipse report also reveals that the observing program used by the Carleton-Guilford party could have come right out of the 1869 or 1878 efforts.

It is not surprising that *Popular Astronomy* would lead with this report. The journal was published out of Carleton College, of Northfield, Minnesota, by their observatory director, William Wallace Payne. Carleton's Goodsell Observatory was one of the first significant astronomical facilities in the American Midwest. It boasted a 16.2-inch Clark refractor and provided time service for thousands of miles of railroad in the region in the late nineteenth century. Payne came to Carleton in 1871, established an astronomy course, purchased basic equipment with his own funds, and erected the school's first observatory in 1878. (The new observatory was opened in 1887 and named for Charles M. Goodsell in 1891.) In 1882 Payne began publishing *The Sidereal Messenger*. He established the journal *Astronomy & Astrophysics* in 1892 with G. E. Hale, but a split with Hale in 1893 led to separate publication of *Popular Astronomy* (by Payne) and *the Astrophysical Journal* (by Hale).[3]

Herbert Couper Wilson, a former Carleton student, joined the Goodsell staff in 1887, and served as Director/Editor after Payne retired (1908-1926). Wilson spent his preparatory and college years at Carleton, then went to the Cincinnati Observatory in 1880, where he worked under Ormond Stone. When Stone resigned in 1882, Wilson effectively directed the facility until a permanent Director could be found. After earning his Ph.D. in 1886 (the first such degree granted by the University of Cincinnati), he spent a year at the Naval Observatory working as a computer for the Venus Transit Commission, before returning to Carleton, where he assumed direction of both the Goodsell Observatory and *Popular Astronomy* after W. W. Payne's retirement. He was the astronomer in charge for the 1900 eclipse expedition. It was the first of four such ventures he attempted.[4]

The driving force behind the Carleton expedition, however, was not one of the astronomers, but rather Rev. Arthur Haydn Pearson, a professor of chemistry (though some reports associate him with the philosophy and Biblical departments). Pearson was active in Congregational and educational circles throughout the northern Midwest. He married Alice Armsby, a Professor of Latin at Carleton, in 1885, and the two were fixtures in the Northfield scene for all the time they lived there.[5] He had shown prior interest in eclipses – for the annular eclipse of 1885 March 16, which was 74% obscured at the Carleton campus, he "was able to jury-rig a camera to the Clark telescope to photograph a partial solar eclipse".[6]

Wilson wrote Hale on April 14th asking for information about American eclipse parties for inclusion in *Popular Astronomy*. In the letter he suggested to Hale that they were hoping to have the May issue ready within a week, and indicated that Goodsell Observatory expedition plans were "very uncertain as yet," adding "[i]f we go it will be determined in a few days." Hale responded on the 19th, and his summary information appeared in the "General Notes" section of the May publication. Also in that issue was a short note about the tentative Carleton plans, but the best they could say at time of publication was that they planned to travel to "a point probably in North Carolina."[7]

This last minute planning did not please Payne, who described the situation in his annual report to the President for 1900 as follows,

> It has been often asked why the Director of the Observatory did not accompany the expedition. The real reason should be stated, though it is given with reluctance. The facts are, Professor Pearson assumed the leadership of the party and planned for it several weeks beforehand. He selected the place for observation and secured the funds for the trip. He invited persons to join the party as assistants and chose the railroad route to be taken from Chicago to North Carolina. The Director of the Observatory did not wish to go under such circumstances, because the planning of the expedition, in his judgment, was indefinite, uncertain and unbusinesslike up to the day of starting; and also because the funds were certainly not sufficient to add a fourth member to the party and have the increased expense provided for.[8]

The total cost of the expedition was $216 as noted by Payne in his report. Remarkably, $150 of this was pledged by the Carleton junior class. According to Wilson's account of the expedition, the juniors had been studying Princeton astronomer C. A. Young's textbook and donated the funds to make sure Carleton was represented at the eclipse. Unfortunately, their funds didn't allow one of their own to attend. It is interesting to contrast this case with that of the senior class of the Citadel, who also studied Young's manual. They were sent by their institution to spend a few days in Wadesboro, NC, where they observed the eclipse and met Professor Young himself.[9]

How Carleton and Guilford came to partner for the eclipse expedition is an interesting example of the application of personal connections. There no hint of a Guilford College expedition in the published pre-eclipse summaries of plans of eclipse parties, or in the reports of the various expeditions in the *Astrophysical Journal* post-eclipse. As Secretary of the Eclipse Committee, Hale received hundreds of letters related to the eclipse, but none of his correspondence in the archives of the Yerkes Observatory indicates that anyone from Guilford inquired about the eclipse or informed him of any plans. There is no record of turn-of-the-century Guilford subscriptions to *Popular Astronomy* or *Astrophysical Journal*, so it cannot be assumed that Guilford faculty read the advance notes about eclipse plans.[10]

The impetus for the Guilford presence at Southern Pines for the eclipse is attributable to Carleton's Pearson. He was putting together a course of lectures on social ethics, and through his discussion of the topic with Dr. Alfred H. Lindley, a Minneapolis-based Quaker doctor who had moved there from North Carolina, the connections were made for the Southern Pines expedition site. The details of their discussions are not preserved, but if Pearson talked of the eclipse that his colleagues at Carleton were promoting in their journal, Dr. Lindley certainly would have recognized that the path of totality passed across family land in North Carolina. Pearson wrote in his report to the Carleton President,

> Incidentally, an effort to secure additional illustrative material [for the course] led to the eclipse expedition to North Carolina. Through the kindness of Dr. A. H. Lindley of Minneapolis expressed in a letter from him to his cousin, Mr. J. Van Lindley of Pomona, North Carolina, an offer was received from the latter for the use of his large fruit farm situated midway between Pinehurst and Southern Pines, N.C., for the purposes of an eclipse expedition from Goodsell Observatory.[11]

John Van Lindley was a longtime Guilford College Trustee. He was born in Monrovia, Indiana, but lived in North Carolina most of his life, where his family owned a nursery business that became quite successful under his leadership. The Lindley nurseries featured several farms around the state, including a large property he purchased in Southern Pines in 1893. He was also successful in other ventures – his Pomona Terra Cotta Company made the sewer pipes for

the city of Greensboro, and land he donated to the city is now home to an arboretum and a park that bears his name.[12]

Both the Lindley cousins had been students at New Garden Boarding School, a Quaker school that was the precursor to Guilford College. At the onset of the Civil War, Alfred H. Lindley and another former classmate, Dr. Nathan Branson Hill, moved from North Carolina to Minnesota, where they opened a medical practice. The Hill family had been active in the Underground Railroad, and the pressures of the war drove them north. They were part of an influx of Quakers to the Minneapolis area in 1861.[13]

Once contact was made with the Guilford Trustee, information about the Carleton expedition passed to George White, the Guilford astronomy instructor, and plans were hatched to go to the Lindley orchard in Southern Pines to view the eclipse. George Wilson White came to Guilford in 1893. In addition to astronomy, White taught courses in mathematics, surveying, and business. He was also Treasurer of the college for over two decades, and in this position was known for his precise and methodical way with figures – prior to his tenure most accounts at the school had been kept by memory. White's colleague in the physical sciences faculty, Robert N. Wilson, taught physics and chemistry, and the two of them led the Guilford eclipse party.[14]

With the Guilford-Carleton Southern Pines collaboration thus established and the day of eclipse approaching, the Carleton party made their way to North Carolina by rail, with free passage over the Chicago Great Western Railway between Northfield and Chicago. They traveled with Yerkes Observatory astronomers G. E. Hale and E. B. Frost from Chicago to Wadesboro, NC, arriving on May 16th and picking up some suggestions for spectroscopic observations of the eclipse from the Yerkes astronomers before traveling north to Guilford College.[15] From the accounts available, it seems that the funds from the Carleton junior class paid not only for an eclipse expedition, but also for a lecture tour by Professor Pearson. His report to the president indicates that he managed to arrange a series of lectures in Greensboro, High Point, and Southern Pines during the trip, with his rousing "Vitality of Americanism" being the primary oratory. In an unprecedented arrangement, Pearson gave this presentation as a pre-commencement address at Guilford on May 21st, the day before students were to graduate. The impact of his presentation was such that Guilford President Lewis Lyndon Hobbs resolved, as noted in his report on the year for the *Guilford Collegian*, that similar inspirational lectures be scheduled for the week of commencement in coming years. At least one member of the Guilford Board of Trustees was so impressed by the Carleton party that he expressed to Pearson an interest in hiring a Carleton graduate for the faculty (though there is no record of such a hire in the years after the eclipse), and Pearson even managed to procure $10 from the Guilford College Trustees to pay for his expenses traveling between Greensboro and Southern Pines. They only appropriated $25 for the whole Guilford party.[16]

Professor Pearson clearly projected himself as the expedition leader during the trip, and he must have cut quite a figure. He was quoted in several regional newspapers as an eyewitness to the eclipse, describing the beauty of the corona, but none of these papers carried comments from Wilson, the astronomer in charge (though the *Raleigh News & Observer* noted that Pearson was in the company of "one of the most scientific observers in the world"). An article (unrelated to the eclipse) in the *High Point Enterprise* briefly reviewed one of Pearson's "Vitality" lectures.[17]

Guilford commencement was on May 22nd in 1900, and a few days later a group of Guilford staff and students, accompanied by Lindley and the Carleton party, set out from Greensboro to journey "across the country eighty miles to have the rare experience of seeing the flash of the corona in all its glory" in Southern Pines.[18]

The town of Southern Pines, NC, located in the central Sandhills region of the state, was incorporated in 1887. It was intended as a fruit-growing center, and when Lindley purchased several hundred acres outside of town in 1893, he established a peach orchard there that eventually boasted 60,000 trees.[19] Over twenty persons associated with the Guilford-Carleton eclipse party at the Lindley farm can be identified from the published accounts. George White's description of the Guilford party mentions nine students (though not by name), and a list of seven faculty, staff, and trustees: himself and his wife, John van Lindley, R. N. Wilson, instructor of chemistry Ada M. Field, Samuel H. Hodgin, the college's Dean of Men, and J. W. Cook. H. C. Wilson's account of the group for *Popular Astronomy* includes five of the students by name, and from within his report of the observations and White's account of the action, eight Guilford students are identified: Lacy Barbee, Hinton Buchan, Thomas Hinton, Richard and Walter Hobbs, Bernard Leavitt, Homer Ragan, and Emmitt Shepard. The Carleton party consisted of only four persons: Wilson, "Mrs. Clements of Faribault," and Pearson and his wife.[20]

Once the day of the eclipse dawned, Carleton's H. C. Wilson took over the show, with Pearson and the Guilford crew in support. He had authored an article for the May issue of *Popular Astronomy* on eclipse observations, and the plans of the Carleton and Guilford parties followed in accordance with the article. The four main prongs of the investigation, as derived from the eclipse supplement to the *American Ephemeris* for 1900, were (1) sketches of the corona with the naked eye, (2) observations of shadow bands, (3) photographs of the corona, and (4) observations of contact times. This simple program, easily applied by casual observers, contrasts sharply with the more heavily astrophysical 12-point program distributed as an eclipse committee circular by Hale.[21]

The morning of the eclipse was clear through nearly the entire shadow path across the southeastern U. S., and good conditions prevailed at Southern Pines. At 8:46 a.m. an order for silence was called on the observing grounds in preparation for totality. Lacy Barbee counted down to the predicted second contact – the beginning of totality, and Carleton's Wilson called out the moment of contact (8:46:14), after which Guilford's R. N. Wilson counted off the 94 seconds of totality, while Emmitt Shepard noted the time on the chronometer.

Once the shadow of the moon was upon them, the party set about at their duties. H. C. Wilson captured four images ranging in exposure from one to thirty seconds using the Goodsell Observatory's 8-inch Clark photographic refractor. He also used two photographic cameras to obtain a pair of 93-second exposures of the corona. W. W. Payne would later remark that these images showed "more detail in the inner and outer part of the Corona of the Sun than we have ever seen in photographs before." Meanwhile, A. H. Pearson put the suggestions of Frost and Hale into practice, taking four exposures of the flash spectrum with a prismatic camera constructed on site, and Guilford's White obtained four short-exposure images through his 3-inch visual telescope. Though nowhere near the quality of the Carleton exposures, White deemed them "good photos for amateur work" with an untested instrument, and used one to illustrate his report in the *Guilford Collegian*.[22]

The rest of the group occupied itself with other projects. Homer Ragan, Thomas Hinton, and Walter and Richard Hobbs spread a white sheet on the ground for recording the shadow bands that appear before and after totality, but they found that the white sandy ground showed the wavering figures just as easily. The Guilford students dutifully followed Wilson's plan for recording the orientation and speed of the rapidly moving shadow patterns. The women of the party, Mrs. White, Mrs. Couts, and Miss Field, along with Professor Hodgin, under the direction of Mrs. Pearson, used white crayons and blue paper to sketch the corona visually.[23]

There were others who came to the Lindley site to observe. White's report mentions that among the spectators were J. W. Cook and a Miss Couch (probably Wilson's "Mrs. Couts" above). Two other observers came upon the party as totality approached, according to White. They were Austin P. Nichols and a Mr. Kelly, both of Massachusetts. Kelly assisted with the photography, while Nichols is not listed in any reports as being involved with any specific observations. He did, however, contribute a report for the *Evening Gazette* of Haverhill, Mass., which Wilson included verbatim in his expedition write-up for *Popular Astronomy*.

> The sky rapidly darkened, except that around the horizon were tints of orange, and to the southwestward the country was wrapped in the gloom of the approaching shadow. Time! called the man at the telescope, and the eclipse was upon us.
>
> In an instant everything was transformed. The darkness was not intense, it was about that of late twilight, and the hands of a watch could easily be made out. Everyone was busy at their appointed task, not a sound was heard but the calling of the seconds by the timekeeper. Only 94 of them, and so much must be done in that brief time.[24]

The Carleton party returned home, the expedition having been a general success, especially given the criticism that Payne expressed. Pearson, who had experienced poor health for some years, suffered a physical breakdown of some sort during the fall of 1900 and resigned his position. He and his wife moved to Mexico to establish the American School in Guadalajara, Mexico shortly after this incident, but returned to Northfield twelve years later.[25]

From the point of view of the Guilford party, the eclipse was the great astronomical event of the year and it led White to remark, "A great deal of interest has been created in the subject of astronomy at Guilford College, and we look forward to the day when an observatory with a large telescope shall stand on Guilford campus. Guilford deserves it!" But Guilford would have to wait a long time for that day to come. With the construction of the Frank Family Science Center in 2000, and the opening of the Cline Observatory atop it, with its 0.4-meter Ritchey Chrétien reflector, the telescope White envisioned for Guilford was finally in place – a century after the eclipse.[26]

The scope of the Guilford-Carleton expedition was small, especially compared with the major operations staged in the same region. For most of the party, the point of the expedition was simply to "have the rare experience of seeing the flash of the corona in all its glory," and any real scientific applications were undertaken only through the efforts of H. C. Wilson. But because of the Carleton connection, the story of this small party of eclipse-chasers was at the leading edge of published accounts. The first images associated with the great American solar eclipse of 1900 seen by readers of *Popular Astronomy* in June of that year were from this unheralded and largely forgotten partnership between Carleton and Guilford Colleges.

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Notes

[1] G. E. Hale, Plans of American Eclipse Parties", *Astrophysical Journal,* 11, 314 (May 1900); *Raleigh News & Observer*, 27 May 1900.
[2] For examples of reports from the earlier eclipse parties, see "Reports of the Total Solar Eclipse of July 29, 1878 and January 11, 1880", *Astronomical and Meteorological Observations During the Year 1876 at the United States Naval Observatory*, Part II, Appendix III, Washington, D.C., 1880.
[3] "A Science Not Earthbound: A Brief History of Astronomy at Carleton College," online at http://www.carleton.edu/departments/PHAS/astro/pages/hisindex.html. (Visited 2 Jan 2007); E. A. Fath, "William Wallace Payne," *Popular Astronomy*, Vol. XXXVI, No. 5, p. 267 (May 1928); C. H. Gingerich, "Herbert Couper Wilson", *Popular Astronomy*, Vol. XLVII, No. 5, p.232 (May 1940).
[4] Gingerich,C., "Herbert Couper Wilson".
[5] Rev. Arthur H. Pearson," faculty card, Carleton College Archives; "Beloved Pioneer Teacher is Dead," *Northfield News*, 17 February 1933, p.1.
[6] The Story of Goodsell, Page Six, Online at https://apps.carleton.edu/campus/observatory/history/story/six/, (page updated 1 July 2015, visited 24 May 2020).
[7]Wilson to Hale, 14 April 1900, Director's Correspondence, Box 18, Folder 3, Yerkes Observatory Archives; Wilson, H. C, "The Total Solar Eclipse, May 28, 1900," *Popular Astronomy*, Vol. VIII, No. 6, p. 240 (May 1900).
[8] Payne, W. W., Annual Report on Mathematics & Astronomy (Appendix to Carleton President's Report), 1900.
[9] Payne, Appendix to President's Report, 1900; Wilson, H. C, "The Total Solar Eclipse, May 28, 1900"; O. J. Bond to S. P. Langley, 9 May 1900, SI Archives, Record Unit 31, Box 24; W. W. Smoak Diary, A1997.8, Box 1, Folder 3, Citadel Archives.
[10] *Ap. J.* 11, 314; there are no letters from Guilford in the Director's Correspondence for 1899-1900 in the Yerkes Observatory Archives.
[11] Pearson, A. H., Annual Report of Philosophy Department (Appendix to Carleton President's Report), 1900
[12] "Lindley, John Van", *Dictionary of North Carolina Biography*, Vol. 4, L-O, Powell, W. S. ed., Chapel Hill: University of North Carolina Press, 1996.
[13] McCarthy, Anne L., The Hill Family of Chowan County North Carolina, Online at http://olympus.as.arizona.edu/~mccarthy/JILL/The%20Hill%20Family.htm (visited 21 Dec 2006).
[14] Gilbert, Dorothy Lloyd, *Guilford, a Quaker College*, Guilford College, 1937; Stoesen, Alex, *Guilford College: On the Strength of 150 Years*, Guilford College, 1987.
[15] Wilson, H. C., "The Total Solar Eclipse, May 28, 1900."
[16] Payne and Pearson, Appendices to President's Report, 1900; Wilson, H. C., "The Total Solar Eclipse, May 28, 1900"; Hobbs, L. L., "The Year's Work at Guilford College," in *The Guilford Collegian*, Vol XII, No. 9 (1900), p. 259;
regarding the faculty hire, there is no record of any Carleton graduate in the list of past faculty in the Guilford Centennial alumni directory; Minutes for 1900 May 22, Guilford College Board of Trustees, Guilford College Archives.
[17] *High Point Enterprise*, 1 June 1900, p. 1; *Raleigh News & Observer*, 29 May 1900, p.1.
[18] White, G. W., "The Carleton-Guilford Eclipse Expedition to the Lindley Farm, Near Pinehurst, N.C.," in *The Guilford Collegian*, Vol XII, No. 9 (1900), p. 263.
[19] Branson's 1898 Moore County N.C. Business Directory, p. 51. A sizeable portion of the Lindley farm is still intact in 2008, but the house in the expedition photo is no longer there.
[20] White, G. W., "The Carleton-Guilford Eclipse Expedition to the Lindley Farm, Near Pinehurst, N.C"; Wilson, H. C, "The Total Solar Eclipse, May 28, 1900"; *Alumni directory: students of New Garden Boarding School and Guilford College, 1837-1937*, Guilford College (1937).
[21] Wilson, H. C, "The Total Solar Eclipse, May 28, 1900"; Hale, G. E., "Eclipse Problems," Ap. J. 11, 47 (1900).
[22] Wilson, H. C., "The Total Solar Eclipse, May 28, 1900."; White, G. W., "The Carleton-Guilford Eclipse Expedition to the Lindley Farm, Near Pinehurst, N.C."
[23] Wilson, H. C., "The Total Solar Eclipse, May 28, 1900."
[24] Wilson, H. C., "The Total Solar Eclipse, May 28, 1900"; White's report notes in his report that they "joined the party a few minutes before totality."
[25] "Alumni – 1877" in *Biographical Record of Amherst College Grads and Non-Grads 1871 – 1896*, online at http://www.distantcousin.com/yearbooks/ma/amherst/bio1871_1896/Page.asp?Page=097; "Beloved Pioneer Teacher is Dead", Northfield News, 17 February 1933, p.1.

[26] White, G. W., “The Carleton-Guilford Eclipse Expedition to the Lindley Farm, Near Pinehurst, N.C.”