

Williams College's Hopkins Observatory: the oldest extant observatory in the United States

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Abstract

The Hopkins Observatory, built at Williams College in 1836-8, is the oldest astronomical observatory extant in the United States. Founded by Professor Albert Hopkins and built together with his students, it still contains the oldest known Alvan Clark telescope. Some of its historic instruments are mounted in its wings, known as the Mehlin Museum of Astronomy, and its central internal domed-ceiling room is the Milham Planetarium.

Key Words: *history, observatories, Williams College, Alvan Clark*

1 INTRODUCTION

Williams College was founded in 1793 as an enlargement of the Free School founded in 1791 with money from the will of Ephraim Williams. Williams, a soldier, had died in 1758 in the French and Indian war. Astronomy first appeared with Professor Chester Dewey, who taught at Williams from 1809 to 1836. It was taught as part of the junior-year (3rd year) course in Natural Philosophy. Much of the chronology here reported, from Dewey through Hopkins and on into the 20th century, comes from Milham (1937a). See also Milham (1937b).

As Milham relates, the Board of Trustees of Williams College, as reported in their minutes for 1802 September 1, voted "... to procure a telescope for the college apparatus." But this telescope, presumably portable, did not lead immediately to a permanent installation. By 1806, Williams College had a "three foot reflecting telescope, with two eye pieces," in its inventory (Williams College, 1806). A planetarium, actually an orrery, was on the list for the previous year's purchases.

2 ALBERT HOPKINS AND ASTRONOMY AT WILLIAMS

Astronomy's major impetus at Williams resulted from the appointment of Albert Hopkins (Figure 1), a member of the Williams College class of 1826 and who began as Tutor at Williams in 1828. Though in astronomical history he is noted for the foundation of the Hopkins Observatory, he is best known as the brother of the educator Mark Hopkins, who was president of Williams from 1836 to 1872. When James Garfield, the only Williams College alumnus ever to become President of the United States, spoke at Williams College in 1871 as a U.S. Representative, he famously said, "Give me a log hut, with only a simple bench, Mark Hopkins on one end and I on the other, and you may have all the buildings, apparatus and libraries without him." (Garfield was President in 1881; he was assassinated, dying only months after taking office.) "Mark Hopkins and his log", as the story is often oversimplified, is well known in American education as a symbol of good, personal teaching.

In 1834 June, the Board of Trustees of Williams College decided that Professor Hopkins should travel to Europe to improve scientific education at Williams. Accordingly,



Figure 1. Albert Hopkins

... the sum of \$4,000 has been raised by subscription by the Alumni of the college and other liberal patrons of the institution, to be applied to the purchase of Philosophical and Chemical apparatus, to be applied to the use of the institution, and that it will be necessary to send an Agent to Europe to purchase the same, recommended to the Board that Prof. Albert Hopkins have permission to be absent for that purpose from the 1st day of September next to the first day of May following and that during that time he be allowed his salary as usual he paying all his expenses during his absence. (Milham, 1937b)

Milham reports that Hopkins sailed on 1834 September 18 on the packet-ship *Hibernia* for Liverpool and returned in 1835 May. The astronomical apparatus he brought back included a 9-cm (3.5-inch) Troughton and Simms transit, a Molyneux and Cope mercury-compensated regulator, a Troughton and Simms rule, and a Herschelian reflector of 10 feet focal length. All but the last are still in the collection of the Hopkins

Observatory, and are displayed in it in the Mehlin Museum of Astronomy. The transit was used in one of the wings of the observatory, mounted on marble piers that are now in storage. No doubt, the apparition of Halley's Comet of 1835 reinforced Hopkins's desire to erect an observatory building. Also in 1835, Hopkins took undergraduates to Nova Scotia on the first such undergraduate scientific expedition in American education, a type of undergraduate involvement that still continues at the Hopkins Observatory in particular and Williams College in general.

Hopkins and his students began constructing a permanent observatory in 1836. Quarrying began in the autumn. Milham (*ibid.*) elaborates:

... the records of the trustees show that the observatory cost \$2,075, that \$1,200 was voted by the trustees, that \$400 was contributed by friends, and that Professor Hopkins himself gave \$475. The students too helped and in those days they often turned out almost in a body to help build the observatory which was to mean so much to them and the college.

The centre of the Hopkins Observatory is a domed room on the ground floor, entered on both the north and south sides. Mehlin (1962) reports that gold stars were pasted to the ceiling to mark out the constellations, making it perhaps the earliest American example of what we today call a planetarium: "Strips of paper, marked off in degrees or hours, indicated the ecliptic, equator, and other circles on the ceiling sky."

The Hopkins Observatory was dedicated on 1838 June 12. Figure 2 shows a woodcut of the observatory from the cover of the catalogue of courses for the following academic year, 1838-1839. Hopkins is newly listed as Professor of Natural Philosophy and Astronomy.

Rudolph (1956) reports that Hopkins, in a newspaper clipping from 1841, stated:

... the leading idea ... which lay at [the Hopkins Observatory's] foundation, was *that nature is to be studied rather than books*. Why, Albert made explicitly clear in the address which he delivered at the dedication of the observatory. In their worship of the practical, he declared, men were losing sight of the moral. Education itself was being subverted by a prevailing notion that it was intended to whet the intellect, sharpen mental powers, and prepare 'for action, action, action.' To counteract these influences, he confessed, he had decided that what Williams College needed most was an astronomical observatory, where the students could elevate their thoughts 'toward that fathomless fountain and author of being, who has constituted matter and all its accidents as lively emblems of the immaterial kingdom.'

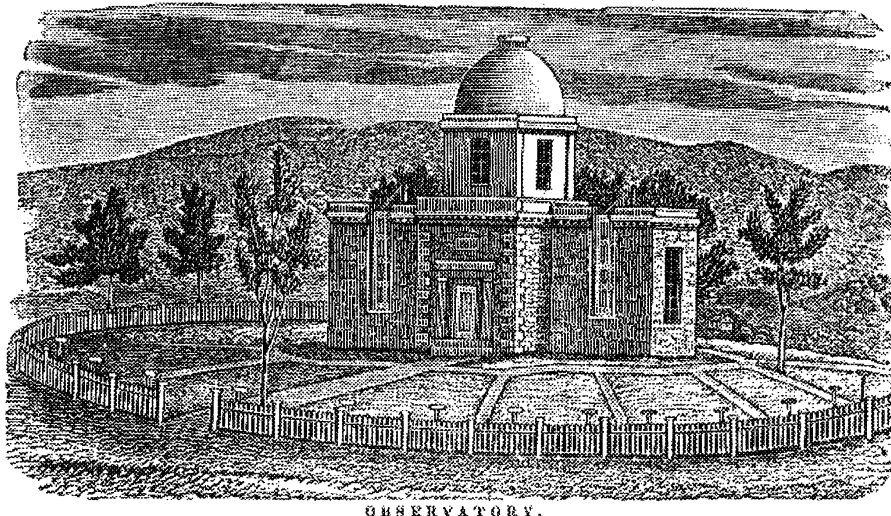


Figure 2. The Hopkins Observatory, a woodcut from the Williams College catalogue from 1838-9

Rothenberg (1986) writes:

I have studied the history of Hopkins observatory and its first director, Albert Hopkins. In my dissertation (1974), I contend briefly that Hopkins's career was representative of an entire generation of teachers of astronomy at American liberal arts colleges, trained during the period 1818-1834, and active through the Civil War and beyond. Subsequent research has given my view of that generation more depth and breadth but has not changed my conclusion. What does distinguish Hopkins from most of his contemporaries was his ability to leave behind a permanent physical legacy – the observatory.

Rothenberg (ibid.) further suggests that Hopkins was "... a representative of the generation of professors who changed the way astronomy was taught at American liberal arts colleges and helped set the stage for the great growth in American astronomical research during the second half of the nineteenth century."

Hopkins was a minister, and his interest in astronomy was related to his interest in religion (Rudolph, 1956). The inscriptions over the north and south doors of the Hopkins Observatory (Figure 3) reveal this connection, and respectively, read: "Lift up your eyes on high and behold who hath created these" and "For thus saith the Lord, yet once, it is a little while, and I will shake the heavens, and the earth, and the sea, and the dry land."



Figure 3. The Hopkins Observatory, a nineteenth-century photograph, from 1859. The identities of the individuals are unknown. Gift of John S Sheldon '05.

3 NATHANIEL HAWTHORNE VISITS WILLIAMSTOWN

In 1838, the author Nathaniel Hawthorne, noted not only for his *Tanglewood Tales* set about 40 km south of Williamstown but also for *The Scarlet Letter*, travelled into northern Berkshire County. The entry for July 26 states,

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Left Pittsfield about eight o'clock in the Bennington stage, intending to go to Williamstown I pointed to a hill at some distance before us, and asked what it was. 'That, Sir, said he, 'is a very high hill. It is known by the name of Graylock.' He seemed to feel that this was a more poetical epithet than Saddleback, which is a more usual name for it.

Graylock, or Saddleback, is a quite respectable mountain; and I suppose the former name has been given it, because it often has a gray cloud, or lock of gray mist, upon his head; it does not ascend into a peak, but heaves up a round ball, and has supporting ridges on each side. Its summit is not bare, like Mt Washington, but covered with forest. The driver said, that several years since the students of Williams' [*sic.*] college erected a building for an observatory on the top of this mountain, and employed him to haul the materials for constructing it; and he was the only man that had ever driven an ox-team up Graylock. (Hawthorne, 1838).

The story apparently deals with an observing tower on top of Mt. Greylock; Albert Hopkins participated in building a second tower in 1841. It was used for meteorological observing (Burns and Stevens, 1988). The story does not match the construction of the Hopkins Observatory on the Williams College campus, at an altitude of only a few hundred meters and far below the summit of Mt. Greylock (as it is now spelled) at 1064 m. (Mt. Greylock is the highest mountain in Massachusetts.) Further, the entry is only about a month after the dedication of the Hopkins Observatory, which would therefore have been current news at the time of Hawthorne's visit.

4 THE OLDEST EXTANT OBSERVATORY

Milham (1937a:11-28) addresses at length the question of which American observatory is the oldest. He considers eleven observatories, "... all fully erected and equipped before 1840":

The David Rittenhouse Observatories at Norriton from 1769 and at Philadelphia from before 1786 to 1796. The Observatory of the College of William and Mary before 1789. William Cranch Bond's Observatory at Dorchester from 1823 to 1839. Yale Observatory in the Athenaeum Tower from 1830. The Observatory of the University of North Carolina at Chapel Hill, North Carolina, from 1831 to 1838. The private Observatory of Wilkes and Gilliss or the Depot of Charts and Instruments at Washington from 1833 to 1842 [which became the U.S. Naval Observatory; see Rothenberg (1993)]. The Observatory of Wesleyan University at Middletown, Connecticut, from 1836. The Hopkins Observatory of Williams College from 1838 on. The Observatory of Western Reserve College at Hudson, Ohio, from 1838 on. The Observatory of Miami University at Oxford, Ohio, 1838 to 1840. Harvard College Observatory at Dana House from 1839 on. All of these were temporary or makeshift observatories or of fairly short duration with the exception of two. These are the Hopkins Observatory of Williams College and the Observatory of Western Reserve College ... [now part of Case Western Reserve University] which followed it by less than a year. Both of these are still in existence in essentially their original condition. The Hopkins Observatory of Williams College is thus the oldest extant Astronomical Observatory in America. The reader is left to judge which was the first Astronomical Observatory in America.

Murphey (1987) speaks of Elias Loomis, who went from Yale to Western Reserve College and "... had a 37-by-16 foot observatory built by September 1838. Williams College in Williamstown, Mass., completed its observatory three months earlier, making [the] Loomis [Observatory] the second-oldest in the country." Yowell (1943) gives 1845

January for the Cincinnati Observatory's telescope. See Musto (1967) for a discussion of the construction of various observatories in the early nineteenth century and their sources of financial support. He also discusses the reasons for the lack of Federal support, and how the enthusiasm created by the Comet of 1843 (for which see also Olson and Pasachoff, 1997) led to the formation of the Harvard College Observatory through private subscription.

Milham (1950) describes how meteorological observations, already being made in Williamstown, were transferred to the Hopkins Observatory in 1838, where they continued under the direction of Hopkins until 1872.

Through another Williams College professor, Ebenezer Emmons, Williams College has a link to the formation of the American Association to the Advancement of Science (AAAS). The AAAS developed from the Association of American Geologists, which formed at a meeting at Emmons' home in Albany in 1838 (Schneer, 1971). The current Hopkins Observatory Director is now Chair of the Astronomy Division of the AAAS.

5 ALVAN CLARK AND HIS TELESCOPES

The original Williams College telescope, now lost, was replaced in the Hopkins Observatory in 1852. Mehlin (1962) reports that "The only clue to its fate is a note in the trustees' records of 1852 that reads, 'Professor Hopkins may exchange the old telescope for the bones of some animal found in Pennsylvania.'"

Warner and Ariail (1995) relate how Williams College commissioned Alvan Clark, a young optician from Cambridgeport, Massachusetts (now part of Cambridge), to make a telescope. Clark took the opportunity to strike out in business for himself, leading to the firm that was to make refracting telescopes in the 19th century up to and including the 40-inch (1-m) telescope at the Yerkes Observatory, that is still the largest refractor in the world. The Hopkins Observatory telescope was "... financed by Amos Lawrence, a Boston industrialist who had been a principal benefactor of the College and who had devoted much of his wealth to improving the 'character' of the citizenry through education."

Though there might have been one earlier telescope, the list of Warner and Ariail shows that the Hopkins Observatory's 18-cm (7 $\frac{1}{8}$ -inch) refractor is certainly one of the first telescopes Clark made and is probably the earliest Clark telescope now surviving. The rotunda, a cylindrical structure that was a forerunner of today's telescope domes (and which we will call a dome), has a very narrow slit and is thus difficult to rotate in synchrony with the telescope's tracking. Thus, though the telescope is occasionally looked through, it is not in regular use. The dome still rotates with a mechanical crank at the floor level linked with a corner-turning gear to the gear that rotates the dome itself.

The telescope objective, a doublet, was restored by Dennis di Cicco in the period 1974 onward, and a videotape exists showing its disassembling. More recent work on restoration, mainly of the tube and drive, has been carried out by Williams College students Kevin Reardon (1992), Christina Reynolds (1997), and James Bates (1998). Bates concentrated on putting together a tracking drive from the several partial drives and gear trains existing; the dates of the various drives are unknown (Figure 4).

6 RALPH WALDO EMERSON AND THE HOPKINS OBSERVATORY

On 1865 November 14, the philosopher/essayist Ralph Waldo Emerson visited the Hopkins Observatory. In his journal, he wrote:

I saw tonight in the Observatory, through Alvan Clark's telescope, the Dumb-Bell nebula in the Fox and Geese constellation;
 the four double stars in Lyra;
 the double stars of Castor;
 the 200 stars of the Pleiades
 the nebula in (Perseus?)

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Mr. Button, Professor Hopkins' assistant, was our star showman, and [Mr] J. H. Stanbrough and [blank] Hutton, who have been my committee of the "Adelphic Union", inviting me here, carried me thither. I have rarely been so much gratified....

Of all tools, an observatory is the most sublime. And these mountains give an inestimable worth to Williamstown and Massachusetts. But for the mountains, I don't quite like the proximity of a college and its noisy students. To enjoy the hills as a poet, I prefer the simple farmers.

The dim lanthorn which the astronomer used at first to find his object glasses, &c. seemed to disturb & hinder him, preventing his seeing his heavens, &, though it was turned down lower & lower, he was still impatient, & could not see until it was put out. When it had long been gone, & I had looked through the telescope a few times, the little garrett at last grew positively lightsome, & the lamp would have been annoying to all of us. What is so good in a college as an observatory? The sublime attaches to the door & to the first stair as you ascend; that this is the road to the stars. Every fixture & instrument in the building, every nail & pin has a direct reference to the Milky-Way, the fixed stars, & the nebulae. & we leave Massachusetts & the Americas & history at the door, when we came in. (Allardt *et al.*, 1982; quoted in Milham, 1937a).



Figure 4. The Clark refractor, installed in 1852. It is the oldest known Alvan Clark telescope.

7 LATER HISTORY

Edward Morley of the Williams College class of 1860, renowned especially for his later collaboration with A A Michelson in their joint experiment that demolished the idea of the luminiferous ether, was the first to make a good determination of the latitude of the

Hopkins Observatory (Milham, 1937a). He learned his experimental technique and the concept of accuracy of observation under Albert Hopkins in the course of his work, which involved mounting the meridian circle outside the observatory. Thus the Hopkins Observatory and Albert Hopkins can be placed in a chain that led to Einstein's special theory of relativity.

In 1866, David Dudley Field and his family established a Chair of Astronomy in memory of his daughter. Hopkins died in 1872 and was succeeded as Field Memorial Professor by Truman Henry Safford (Figure 5) in 1876. In the interim four years, Safford had been Lecturer in Astronomy for one year and Charles A. Young, later professor at Princeton and famous as a textbook author, had been Lecturer in Astronomy for two years. Safford had been known as a child prodigy and a prodigious computer. A primitive oil of Safford as a child, once in the collection of Harvard University, now hangs in the Hopkins Observatory.

Before he came to Williams, Safford had been director of the Dearborn Observatory. He specialized in star positions. In 1882, the original Troughton and Simms transit was succeeded by a larger and much more elaborate meridian circle, by Repsold. Donated by Field, it has a 11-cm (4.5-inch) objective, and is $f/12$. Because of trees on the horizon, it was installed in a new structure made of sheet iron, the Field Memorial Observatory. This transit is also in the Mehlin Museum, at the side of the old meridian transit room and next to the Molyneux and Cope regulator with which it was used. The Repsold meridian circle has finely engraved silver inserts for the elevation angles, and candle holders to aid with illuminating them. The astronomer would have called out the times at which stars crossed a cross-hair on the meridian, and his assistant would have noted the time from the clock. "The clock is an old and good one by Molyneux and Cope; and is amply sufficient for work of this kind." (Safford, 1888b).



Figure 5. Truman Henry Safford. He used his children as assistants, whom he paid five cents a night (information from Louis Safford (THS's grandson) and his wife, Midge, 1998).

It is from observations like these that it was noted that individual astronomers called the transits slightly differently, perhaps some lagging and some leading the actual transit. Such observations led to the development of the personal equation, which, in turn, led to the development of the science known today as psychology. The debt to astronomy is noted in some contemporary psychology textbooks. I like to think of psychology, therefore, as one of several spin-offs of astronomy.

Safford (*ibid.*) used the new equipment to amass the data that were used in the *Williams College Catalogue of North Polar Stars for Epoch 1885.0*. Even at that time, it was noted that the site of the Hopkins Observatory was not a desirable observing location (see Figures 6 and 7). A new site was thus used for a metal building, the Field Memorial Observatory, and the Repsold meridian circle was installed in it. "It [The Field Memorial Observatory] is not in the same situation as the Hopkins Observatory, built in 1836-38; the older house is now too thickly surrounded with trees; it serves as a location for the older instruments, and is in many ways useful, while it is desirable to preserve it as long as possible as a picturesque and historic landmark." Safford presided over the fiftieth anniversary of the dedication of the Hopkins Observatory, at which time he summarized the relevant history (Safford, 1888a).

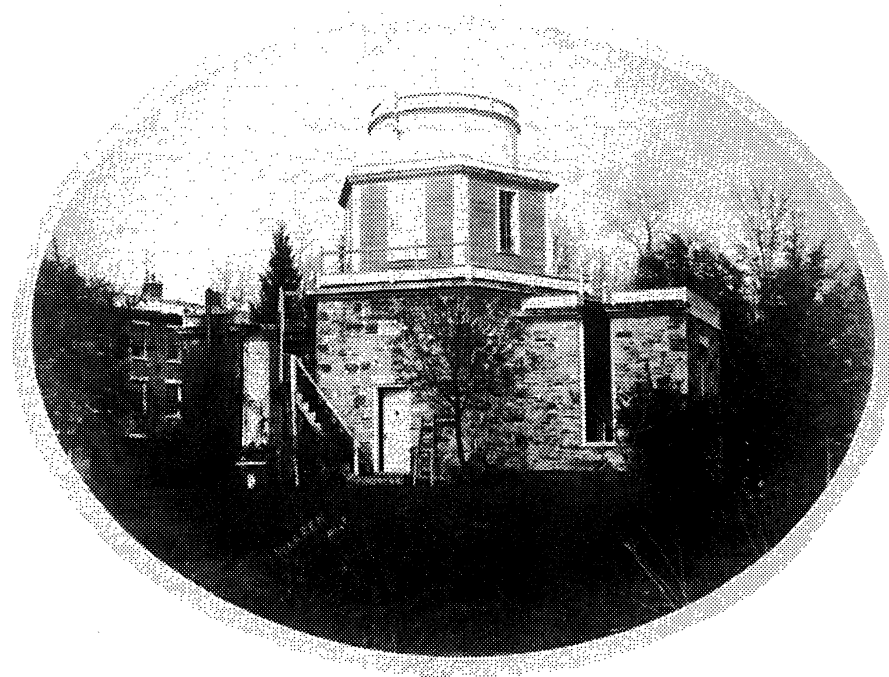


Figure 6. An early photograph of the Hopkins Observatory, from 1865. One of the inscriptions is visible over the portico. The photograph is credited to Geo K Warner.

Willis Isbister Milham (Figure 8) succeeded to the Directorship in 1902 and became the longest-serving director; his term lasted 40 years (Table 1). Milham was more of a meteorologist and horologist than an astronomer. In Milham (1950), he described the history of meteorology at Williams College. Mehlin (1962) writes:

He wrote a long-used textbook on meteorology in 1912, and his *Time and Timekeepers* of 1923 was published in popular form in 1941. An extremely orderly individual, Professor Milham was said to use the bell that ended class as the punctuation for the final sentence of his lecture! His 47 years of teaching at Williams was the longest for any faculty member except Mark Hopkins.

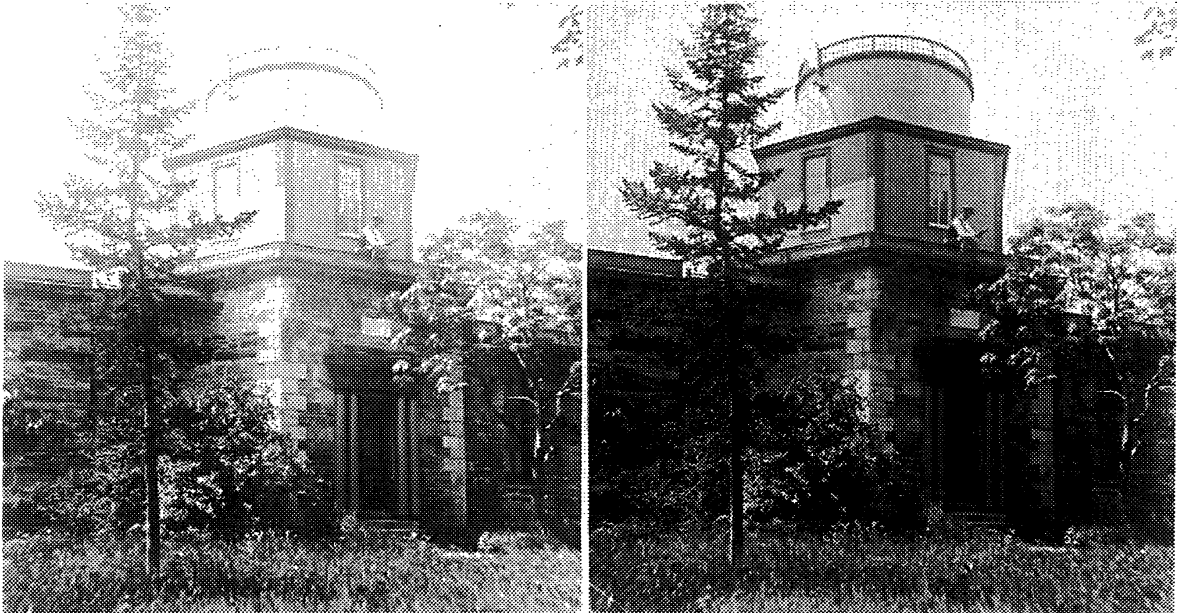
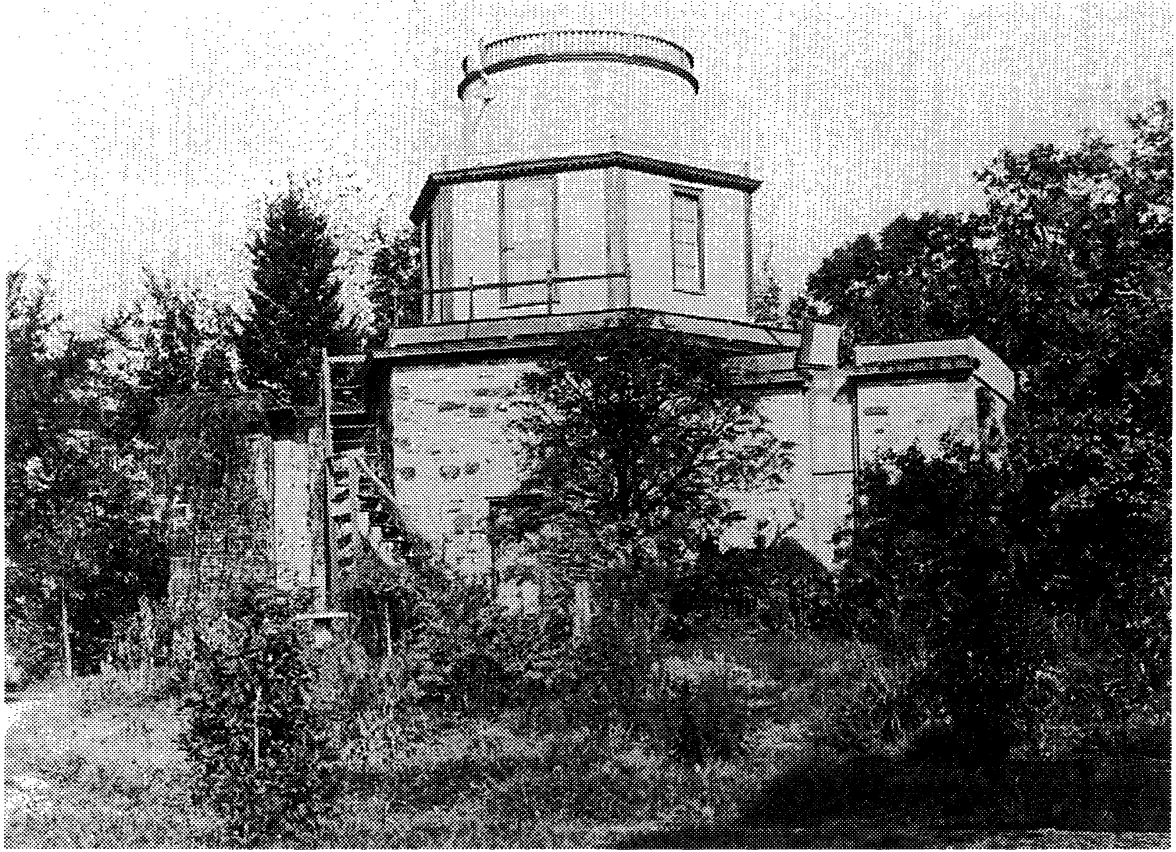


Figure 7. The Hopkins Observatory, nineteenth-century photographs. *Top*: north side with sundial amongst vegetation, 1874. *Bottom*: a stereogram pair. Credited to J L Lovell.



Figure 8. a, Willis Isbister Milham. b, with some of his clock and sundial collection.
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His horological interest no doubt led him to supervise the time on the gymnasium clock at the head of Spring Street on the Williams College campus, a custom that became linked to the Directorship until the death of his successor.

Table 1. Directors of the Hopkins Observatory.

Name	Years as Director	Duration
<i>Albert Hopkins</i> Born 1807 July 14; graduated Williams College 1826; died 1872 May 24. Spouses: Louisa Payson Hopkins, Elizabeth Kilby Hopkins.	1836-1872	36 years
<i>Truman Henry Safford</i> Born 1836 January 6; graduated Harvard 1854; died 1901 June 12. Spouse: Elizabeth Bradbury Safford.	1876-1901	25 years
<i>Willis Isbister Milham</i> Born 1874 February 11; graduated Williams College 1894, Ph.D. Strasbourg 1901; died 1957 March 23. Spouse: Betsey Morgan Fairweather.	1902-1942	40 years
<i>Theodore Grefe Mehlin</i> Born 1906 June 13; graduated Duke University 1927, Ph.D. Yale 1935; died 1971 December 5. Became Field Memorial Professor as of 1950. Spouse: Helen M. Roche Mehlin.	1942-1971	29 years
<i>Jay Myron Pasachoff</i> Born 1943 July 1; graduated Harvard College 1963, Ph.D. Harvard 1969. Became Field Memorial Professor as of 1985. Spouse: Naomi Schwartz Pasachoff.	1972-present	26 years
Acting director:		
<i>Karen Beth Kwitter</i> Born 1951 March 20; graduated Wellesley College 1972, Ph.D. UCLA. Spouse: Steven Souza.	Occasionally	(5 years)

In 1942, Theodore G. Mehlin (Figure 9) became director. "U.S. Navy personnel were instructed in the astronomy department during the war years," he wrote (Mehlin 1962). "In 1951, the college provided new quarters consisting of a lecture room, laboratory, darkroom, two offices, and an observing deck." This facility was an addition to the Thompson Physical Laboratory, on another part of the Williams College campus.

8 MOVING THE OBSERVATORY

The Hopkins Observatory was erected in the centre of what is now known as the Greylock Quadrangle at Williams College. To complete the quadrangle, given the existence of East College and Fayerweather Hall to the west and the new Berkshire Hall (now Fitch) and Currier Hall to the east, the building was moved to the south end in 1908. *The Williams Alumni Review* of June 1909 reported: "A substantial terrace of brick and stone joins the old Observatory to the buildings on either side of it, thus completing the symmetry of this latest addition (the quadrangle) to the College campus." (New Berkshire Quadrangle, 1909). In this move, the Observatory was rotated slightly to make it in line with campus buildings instead of oriented north-south. The meridian slit in the east wing was skewed to accommodate the angle (see Figure 10).

From 1882 to 1895, the Field Memorial sheet-iron observatory had been more used than the Hopkins Observatory, and had the Repsold meridian circle in it. It was little used because of Safford's illness after 1895, and equipment was moved from it in 1908. The Repsold meridian circle remained in it until 1927, when the site was sold and the sheet-iron observatory demolished.

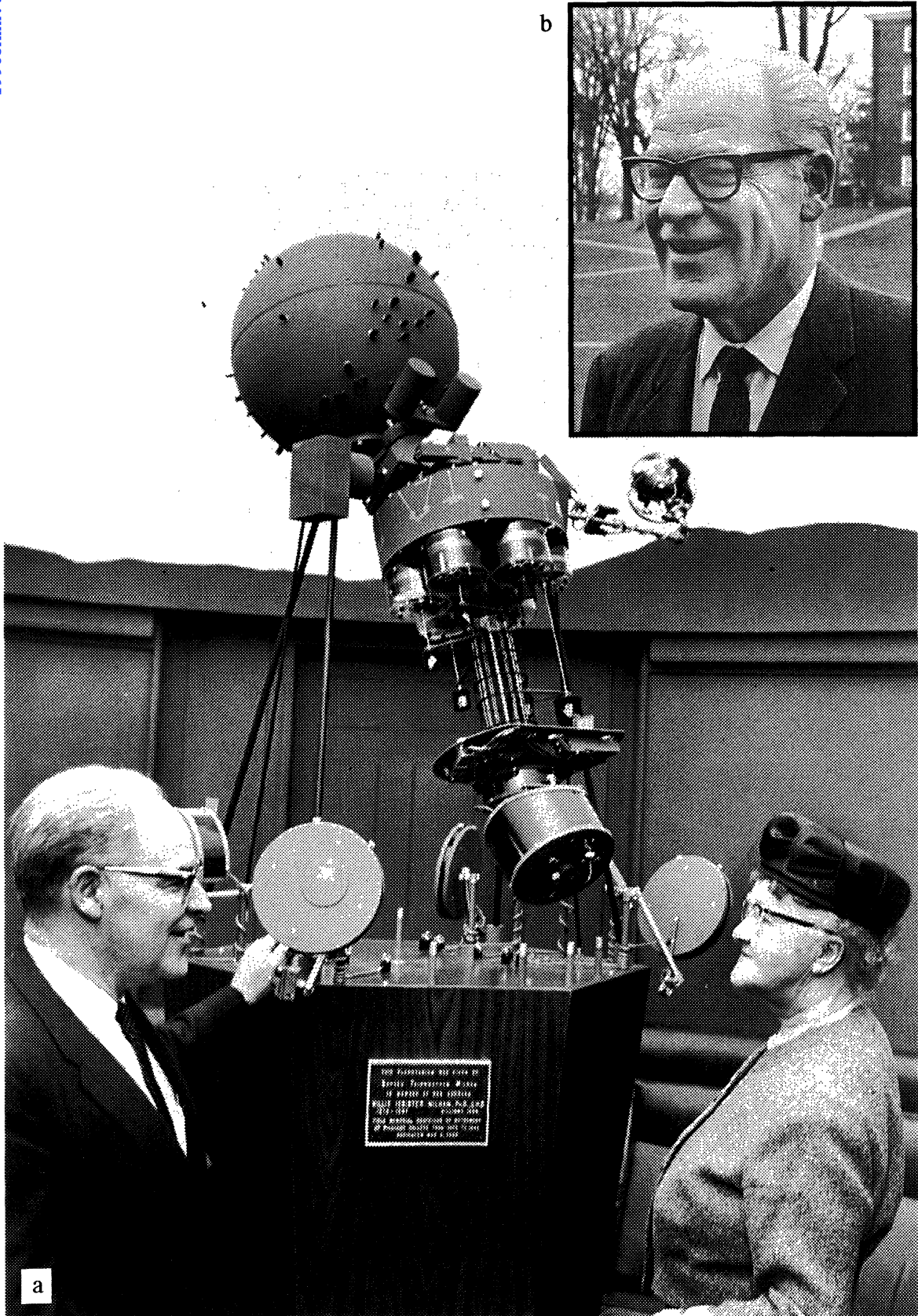


Figure 9. a, Theodore G Mehlín at the dedication of the planetarium in 1963, posing with the widow of Prof. Milham. b, Mehlín in 1969, outside West College (1793), Williams College's oldest building. Photograph by William H Tague, Williams College.

The Observatory was moved once again in 1961 (Mehlin 1962), this time to its current resting place at the north end of the Berkshire Quadrangle. Another dormitory, Prospect Hall, was erected at the south end, where the Observatory had been. Mehlin reported that the structure was 254 tons and was moved 350 feet northward:

First, a two-layer grid of steel I-beams was placed as a platform under the observatory, which was then inched along twin sets of steel rails. The propelling power came from two heavy jacks, pressing against blocks wedged to the rear ends of the rails. Later, a winch was added to pull from the front, supplementing the jacks.

In 1963, Mehlin oversaw the installation of a Spitz A3P planetarium (Figure 9a) in an internal domed rotunda in the center of the Hopkins Observatory, under the telescope. This planetarium is still in use today, seating up to about 40 people. A mountain skyline of the horizon as seen from the site was cut out of wood and installed.

The wings of the Hopkins Observatory were converted into a museum in 1973 in honour of Mehlin. David Mehlin, his son, was the architect.

9 THE MODERN ERA

Mehlin, in 1971, prepared for his retirement, and I was appointed to the Directorship, to begin 1972 July 1. Unfortunately, Mehlin died in late 1971, before he could enjoy his retirement.

My directorship began, even before classes, with a total eclipse expedition to Prince Edward Island in 1972 July, including four Williams sophomores, two of whom are now

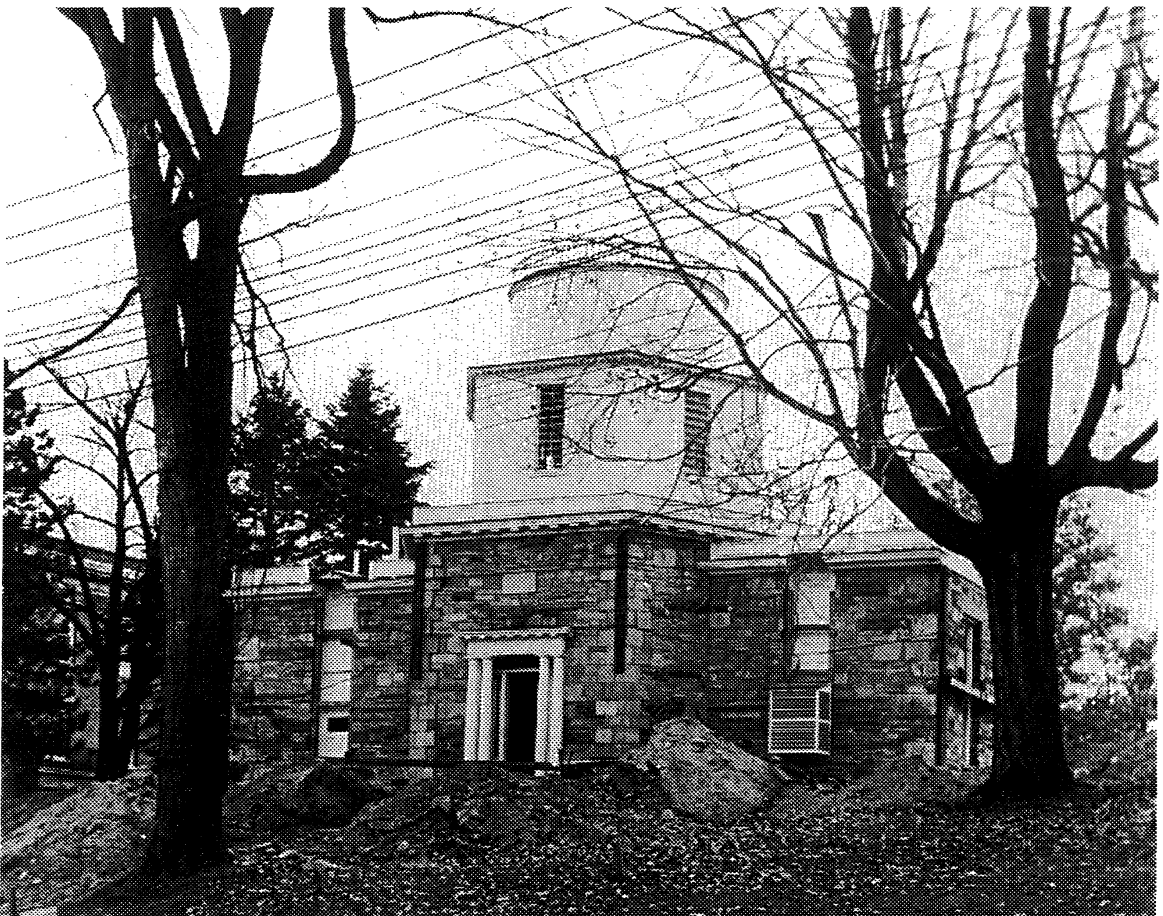


Figure 10. The Hopkins Observatory, moved in 1908 and 1961.

professors of astronomy and a third who served for a time Director of the Fels Planetarium. Inclusion of students on solar eclipse expeditions has been a hallmark of my tenure. Another continuing project has related to observational cosmology through studies of interstellar deuterium. The history of astronomy has been another thread, most recently leading to the publication of a book on comet images in British art and science (Olson and Pasachoff, 1997).

A major in astronomy and physics, jointly between the Astronomy and Physics Departments, had been approved but not activated until my arrival. It is now known as 'Astrophysics', and a separate 'Astronomy' major has been started within the Astronomy Department alone. The increase in student enrolment in astronomy courses and the growth of apparatus led to the appointment of first, a part-time Instructor and Observatory Supervisor in 1974, a position that has continued with varying status until this day. Then a half-time additional faculty position, shared with the Physics Department, was awarded to John Lathrop. This position was later converted to a full-time astronomy position, and is held by Karen B Kwitter, now Professor of Astronomy and occasionally Acting Director of the Hopkins Observatory. She specializes in spectroscopic observations of planetary nebulae. Visiting professorships have been held, during leaves by Professors Pasachoff or Kwitter, by Thomas Balonek, now at Colgate University; David Friend, now at the University of Minnesota; James Voelkel, now at the Dibner Institute for the History of Science at MIT, and Marek Demianski, of the Copernicus Astronomical Institute in Poland. Demianski, who has returned several times, held a Bernhard Visiting Professorship on one of the occasions. An Instructor/Observatory (or Observing) Supervisor position has existed since 1974. Several individuals have also been appointed Associates of the Hopkins Observatory, either coordinated with their instructorships or professorships or because of their participation in research projects, such as J Phil Schierer of Tektronix, Inc., who participated in various eclipse expeditions, and now Bryce A Babcock, staff physicist and Coordinator of the Bronfman Science Center at Williams.

The sesquicentennial of the Hopkins Observatory occurred in 1988 (A College's 'Road to the Stars' ..., 1988; Pasachoff *et al.*, 1988). It was marked by an official cancellation of the United States Postal Service, and by International Astronomical Union Colloquium #105 on the Teaching of Astronomy (Pasachoff and Percy, 1990) – see Figure 11. An exhibition of astronomical art was held at the Clark Art Institute in conjunction with the colloquium (Fernandez *et al.*, 1990).

The major change in equipment came in 1991, with the installation of a DFM 0.6-m (24-inch) professional-grade telescope in a dome on top of the Thompson Physical Laboratory (Figure 12). It was largely funded by the Kresge Foundation, with matching funds from the Keck Foundation and Williams College sources. A substantial upgrade to the telescope was funded by the National Science Foundation in 1995.

Williams College has remained a 'small college', not choosing to become a university. It has 2,000 students, all undergraduates (except for two special programmes) and a faculty of about 175. Of overriding importance now for astronomy students and faculty is Williams College's participation in the Keck Northeast Astronomy Consortium, an eight-college group funded by the W M Keck Foundation. Members, besides Williams, are Wellesley, Middlebury, Colgate, Wesleyan, Vassar, Swarthmore, and Haverford. The other members of the Consortium are also small colleges, a type most prevalent in the north-east United States. The original Keck grant included a CCD detector and related workstation running IRAF (Image Reduction and Analysis Facility software out of the National Optical Astronomy Observatories); an NSF grant has since provided a workstation upgrade as well as additional graphics terminals. Much of the continuing Keck grants pay for student participation in research, including summer jobs at other institutions in the Consortium for students from any given institution, and a student research symposium each fall. See, for example, symposium proceedings edited by Pasachoff (1983) and Balonek (1997).



Figure 11. The group picture taken at the 58th meeting of the American Astronomical Association, held in Williamstown in 1937 September.

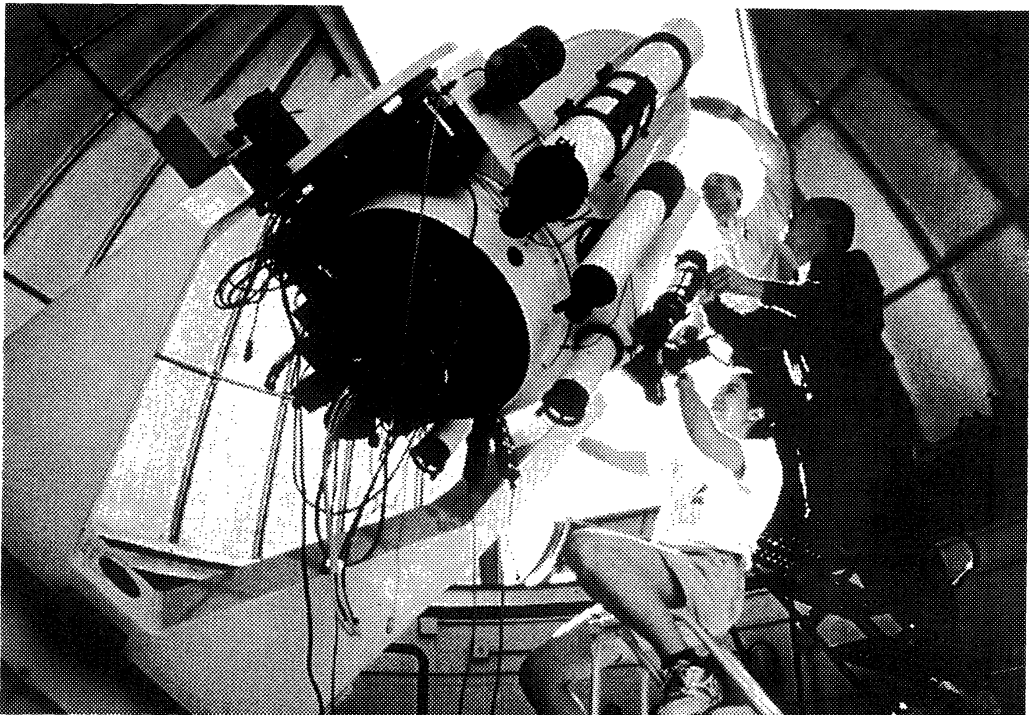


Figure 12. Jay M Pasachoff with Instructor/Observing Supervisor Stephen Martin and undergraduate Christina Reynolds. The photograph was taken in 1997 for a Williams College admissions brochure.
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With its activities at several sites, including the planetarium and museum in the original 1836-8 building, in addition to telescopes and teaching facilities nearby and field sites for expeditions, the Hopkins Observatory enters the new millennium as a vibrant organization dedicated to teaching and research.

For further contemporary information, see <http://www.williams.edu/Astronomy> and the yearly Observatory Reports in the *Bulletin of the American Astronomical Society*.

10 ACKNOWLEDGMENTS

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12 REFERENCES

- A College's Road to the Stars for 150 Years. *The Chronicle of Higher Education*, July 20 (1988).
- Allardt, L., Hill, D.W. and Bennett, R.H. (eds.), 1982. *The Journals and Miscellaneous Notebooks of Ralph Waldo Emerson. Volume xv*. Belknap Press of Harvard University Press, Cambridge (MA), pp. 78-79.
- Balonek, T. (ed.), 1997. *Keck Northeast Astronomy Consortium Student Symposium*. Colgate University, Hamilton.
- Burns, D.E. and Stevens, L.R., 1988. In *Her Excellent Majesty: A History of Mount Greylock*. Berkshire County Land Trust and Conservation Fund, Pittsfield, pp. 44-47.
- Cohen, I.B. (ed.), 1980. *Aspects of Astronomy in America in the Nineteenth Century*. Arno Press, New York.
- Fernandez, R., Pasachoff, J.M. and Volz, R., 1990. Urania Observed. In J.M. Pasachoff and J.R. Percy, (eds.), *The Teaching of Astronomy* (Proceedings of the 105th colloquium of the International Astronomical Union, Williamstown, Massachusetts, 26-30 July 1988). Cambridge University Press, Cambridge
- Hawthorne, N., 1838. Take a ride from Pittsfield to North Adams: in 1838. *The Advocate, Williamstown, MA*, 1995 January 4, pp. 1,9. Reprinted from R. Nunley (ed.), 1992. *The Berkshire Reader*. Berkshire House Publishers, Stockbridge, pp. 183-4, 194. Reprinted, in turn, from R. Stewart (ed.), 1932. *"The American Notebooks" of Nathaniel Hawthorne*. Yale University Press, New Haven.
- Mehlin, T.G., 1962. Williams College renovates Hopkins Observatory. *Sky and Telescope* 23:67-69.
- Milham, W.I., 1937a. Early American Observatories. *Popular Astronomy* 45 (November 9, and December 10), offprint. Read at the meeting of the American Astronomical Society at Williams College, September 8-11, 1937. Offprint also reprinted in Cohen (1980).
- Milham, W.I., 1937b. *The History of Astronomy in Williams College and the Founding of the Hopkins Observatory*. Williams College, Williamstown.
- Milham, Willis I., 1950. *Meteorology and Meteorological Observations in Williams College*. Williams College, Williamstown,
- Murphey, F., 1987. Harvard prof talks at observatory fete. *Akron Beacon Journal*, October 26.
- Musto, D.F., 1967. A Survey of the American Observatory Movement, 1800-1850. *Vistas in Astronomy* 9:87-92.
- New Berkshire Quadrangle. *The Williams Alumni Review*, June 9 (1909).
- Olson, R.J.M. and Pasachoff, J.M., 1997. *Fire in the Sky: Comets and Meteors, the Decisive Centuries, in British Art and Science*. Cambridge University Press, Cambridge.

- Pasachoff, J.M. (ed.), 1993. *Keck Northeast Astronomy Consortium Student Symposium*. Williams College, Williamstown.
- Pasachoff, J.M., Kwitter, K.B. and Friend, D., 1988. Paper presented at the American Astronomical Society meeting in Austin, Texas. Abstract in *Bulletin of the American Astronomical Society* 19:1065 (1988).
- Pasachoff, J.M. and Percy, J.R. (eds.), 1990. *The Teaching of Astronomy* (Proceedings of the 105th colloquium of the International Astronomical Union, Williamstown, Massachusetts, 26-30 July 1988). Cambridge University Press, Cambridge.
- Rothenberg, M., 1986. Private communication, June 11.
- Rothenberg, M. (ed.), 1993. Observers and theoreticians: astronomy at the Naval Observatory, 1845-1861. In L. Doggett, and S. Dick (eds.). *Sky With Ocean Joined*. U.S. Naval Observatory, Washington, pp. 29-43.
- Rudolph, F., 1956. *Mark Hopkins and the Log*. Yale University Press, New Haven. Reprinted Williams College, Williamstown, 1996.
- Safford, T.H., 1888a. *A Discourse Read June 25, 1888, to Commemorate the Fiftieth Anniversary of the Dedication of the Hopkins Observatory of Williams College*. Williams College, Williamstown. Offprint also reprinted in Cohen (1980).
- Safford, T.H., 1888b. *The Williams College Catalogue of North Polar Stars, Right Ascension for 1885.0*. Williams College, Williamstown.
- Schneer, C.J., 1971. Ebenezer Emmons, in *Dictionary of Scientific Biography*, pp. 363-365. [Note that none of the Hopkins Observatory Directors appears in the DSB.]
- Warner, D.J. and Ariail, R.B., 1995. *Alvan Clark & Sons, Artists in Optics*. Second Edition. Willmann-Bell, Richmond.
- Williams College, 1806. *List of the Articles Belonging to the Apparatus of Williams College*, MS in Williamsiana, Williams College. Cited in Donald deB Beaver, *Science at Williams: The First Two Hundred Years; A Bicentennial Overview*. Williams College, Williamstown, 1995.
- Yowell, E.I., 1943. One Hundred Years at the Cincinnati Observatory. *Sky and Telescope*, 26:3-5.



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