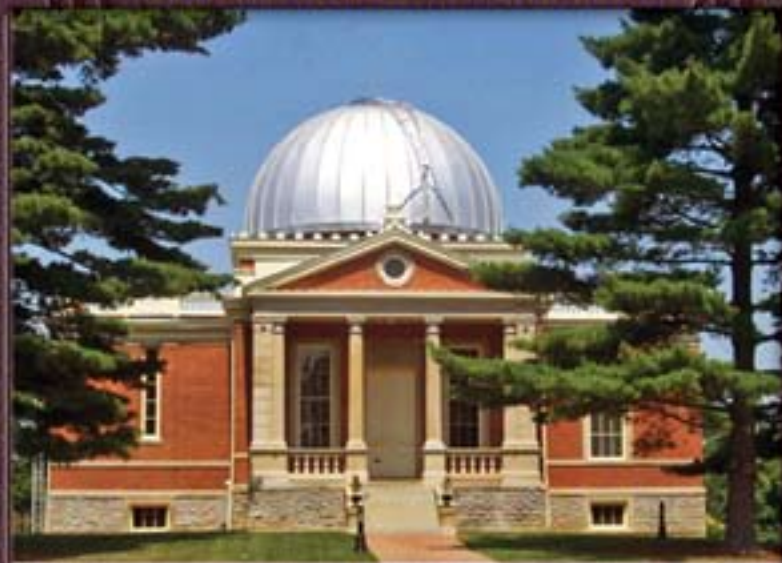


*THE
CINCINNATI OBSERVATORY*



*Birthplace of American
Astronomy*

*3489 Observatory Place, Cincinnati, Ohio 45208
(513) 321-5186 www.cincinnatiobservatory.org*

This booklet is dedicated to the memory of Paul D. Nohr who worked tirelessly at the Observatory from the late 1970's until his untimely death in June 2006. Astronomer, teacher, master engineer and tinkerer, humorist and friend to all; it's no wonder many here called him a "national treasure". His gentle teaching style made learning a treat for everyone from the children he loved to introduce to astronomy to the FOTO members who wouldn't miss one of his classes. He refurbished both of the Observatory's telescopes to their present glory so they can continue to share the night sky for generations to come. The Universe is truly a better place for Paul having been here.

Mission Statement

The Cincinnati Observatory Center (COC) will promote the study and practice of astronomy among a broad audience, and assist professional and amateur astronomers, schools and universities to further their educational efforts on behalf of astronomy. While fulfilling this mission, the COC will maintain the integrity and heritage of an historic nineteenth century observatory, including relevant artifacts illustrating the history of astronomy and its relationship to broader fields of science throughout the years.

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THE CINCINNATI OBSERVATORY CENTER *Birthplace of American Astronomy*



This historical journal chronicles the humble beginnings, growth and accomplishments of the Cincinnati Observatory. Along with stewardship of the buildings and telescopes, each director added to the study of Astronomy as a shining star of discovery, innovation and technology in his own way.

We hope you'll enjoy discovering more about the rich history of the Cincinnati Observatory, the Birthplace of American Astronomy.

This journal belongs to:

Date of my visit:

Name of my astronomer:

What I saw:

Ormsby MacKnight Mitchel and the founding of the Cincinnati Observatory

Director 1842-1862



Ormsby MacKnight Mitchel

The history of the Cincinnati Observatory begins with Ormsby MacKnight Mitchel, founder and first director.

Born in 1809, Mitchel entered the United States Military Academy (West Point) at the age of 15 and graduated in 1829, 14th in his class.

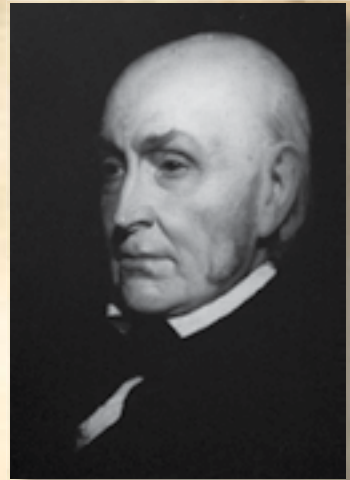
When the Cincinnati College reopened in 1836 after a fire, Mitchel began teaching mathematics, civil engineering, mechanics and astronomy.

Mitchel was such an enthusiastic speaker that he was asked to give

a series of astronomy lectures to the general public. These talks proved so popular with Cincinnatians that Mitchel proposed the establishment of the Cincinnati Astronomical Society.

Mitchel raised money to build the nation's first public observatory by selling shares in the Cincinnati Astronomical Society for \$25, a considerable investment in the 1840's. He then traveled to Europe and purchased the Merz und Mahler telescope, the second largest telescope in the world at the time, for \$7500.

The original Observatory was built atop Mt. Ida, a hill just east of downtown Cincinnati. In 1843, Mt. Ida was renamed Mt. Adams when former president John Quincy Adams came to Cincinnati for the express purpose of laying the cornerstone of the Observatory. Adams would later say this was the most memorable achievement of his life.



John Quincy Adams

Significant research was conducted at the Observatory, including cataloguing double stars. Mitchel was one of the first astronomers to determine that Antares in the Constellation Scorpius was actually a double star. He also discovered a formation on Mars' South Pole that now bears his name (the Mountains of Mitchel). Mindful of the shareholders, Mitchel opened the

Observatory for public stargazing one night a week.

By the 1850's, Cincinnati was a rapidly growing industrial city. Soft coal was the predominant fuel; the resulting oily, sooty haze soon made Mt. Adams an impractical place for astronomy.

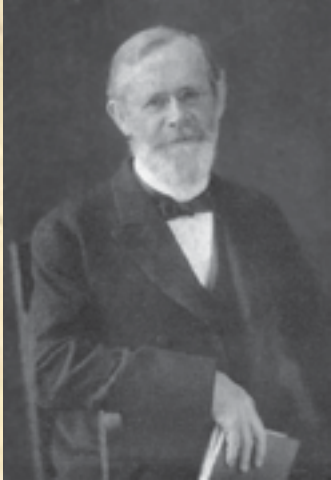
Mitchel eventually left Cincinnati for Albany, New York, where he was instrumental in the establishment of the Dudley Observatory.

Antares

The Constellation Scorpius

Cleveland Abbe and Meteorology

Director 1868-1871



Cleveland Abbe

In 1868, the wealthy stockholders of the Cincinnati Astronomical Society privately paid Harvard-trained astronomer Cleveland Abbe to become the Observatory's new director.

As Abbe quickly encountered the same pollution problem as his predecessor, he turned to his other interest - meteorology. Using the new technology of the day, Abbe would telegraph western frontier cities, such as Kansas City and Denver, recording their weather conditions. By tracking systems as they moved across the country, he soon realized Cincinnati would have

much the same weather two to three days later. In doing so, Abbe was the first American to actually predict the weather! His reports were published in a local newspaper and even noticed in Washington D.C.

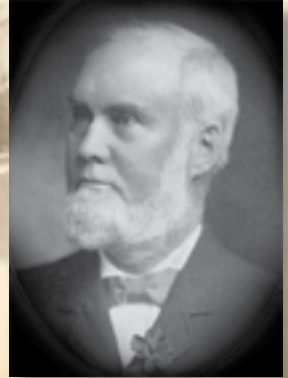
The War Department in Washington recognized that Abbe's experience in meteorology would make him useful in planning battles. Abbe resigned from the Observatory in 1871, later founding the National Weather Service.

A New Home: Moving with the Times

Progress and Growth

circa 1880's Observatory with Time Ball

The mid 1860's was a golden age for Cincinnati. Numerous colleges, medical schools and libraries were founded, affordable newspapers flourished, and prison reforms were established.



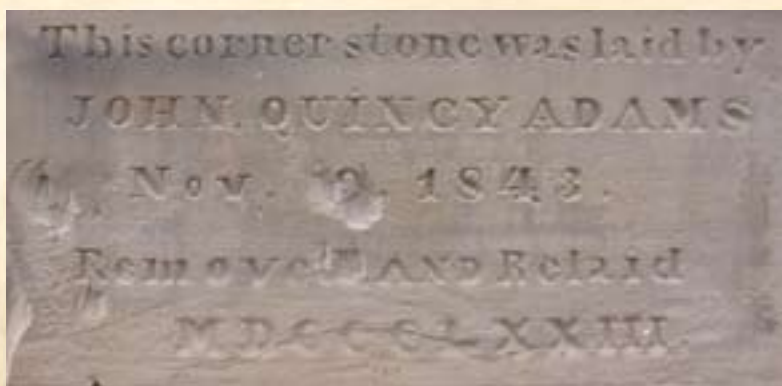
Samuel Hannaford

Many civic leaders felt that the great city of Cincinnati should have its own university, and so the University of Cincinnati was established. The Cincinnati Astronomical Society, having decided to close the Mt. Adams Observatory, donated the Merz und Mahler telescope, a significant scientific library and astronomical equipment to the city with the understanding that this legacy would be given to the University of Cincinnati and a new Observatory would be built.

Five miles northeast of the original Mt. Adams location, rural Mt. Lookout was the perfect spot for the new Observatory to escape the city's pollution. Built in 1873 on four acres of land donated by Board member John Kilgour, Kilgour also underwrote much of the construction of the new Observatory with a \$10,000 donation. The architect of the Mt. Lookout Observatory was Samuel Hannaford, who would later design Cincinnati's famed Music Hall.



*1842 Mt. Adams Observatory
Birthplace of American Astronomy*



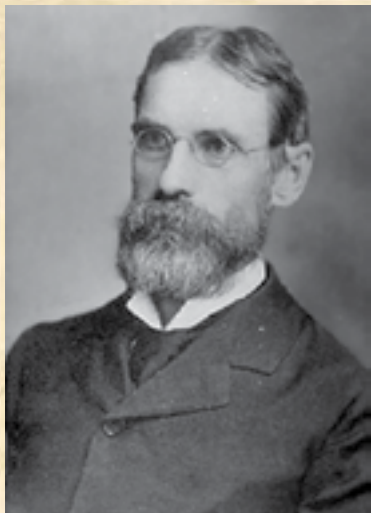
*Original Mt. Adams cornerstone.
Relocated to Mt. Lookout site 1873*



1845 Merz und Mahler Telescope, purchased 1842 by Mitchel

Ormond Stone

Director 1875-1882



Ormond Stone

Ormond Stone became the first director at the new Cincinnati Observatory in Mt. Lookout. Stone had worked as an assistant at the U.S. Naval Observatory and was recommended by Simon Newcomb, the noted astronomer and director of the U.S. Naval Observatory.

Stone believed that since the University of Cincinnati was a city-owned institution, and since UC owned the Observatory, indirectly, the Observatory belonged to the people of Cincinnati. Accordingly, he continued Mitchel's tradition of

public access to the Observatory via his Visitor's Nights. Any citizen could visit the Observatory by putting in an application with the University.

Stone achieved other milestones as well during his directorship: instituting a program of charting newly discovered southern double stars (again furthering Mitchel's work), establishing "standard time" for commerce and railroad schedules, and installing the Observatory's Time Ball.

Stone left Cincinnati in 1882 to become director of the University of Virginia's Leander McCormick Observatory.

Dr. Jermain Gildersleeve Porter

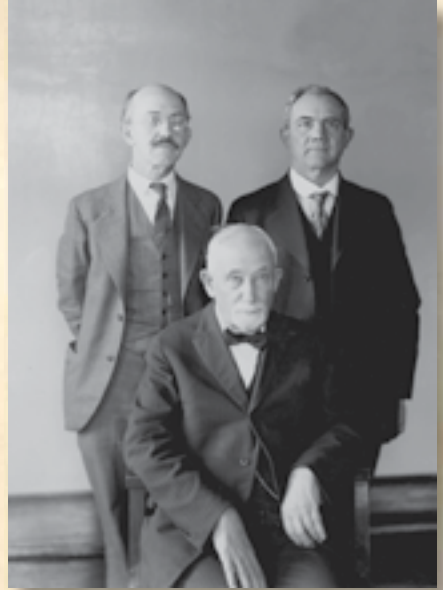
Director 1884-1930

Dr. Porter replaced Ormond Stone in 1884 and served as director for the next forty-six years.

During his tenure, the main focus of the Observatory was the classical work of studying the proper motion of the stars. Within the astronomy community, the Cincinnati Observatory gained worldwide recognition for its calculations on the movements of the stars.

In 1894, Porter was awarded the Comet Medal from the *Astronomical Journal* for a comet discovered with an instrument made in the Observatory's workshop.

Porter was also skilled at raising funds for new projects at the Observatory. In 1904, for \$9500, he purchased a 16" diameter refracting telescope from the premier U.S. telescope makers of the day, Alvan Clark & Sons.



*Left: Everett I. Yowell,
Right: Elliott Smith,
Jermain G. Porter (seated)*

Porter raised enough money to build another observatory on the property. The original Merz und Mahler telescope, now the smaller instrument, was moved to this new building. By 1910, this smaller building was expanded to house a library and classroom. It was dedicated as the Mitchel Building, in honor of the Observatory's founder.

During Porter's directorship, the annual number of visitors rose from about 800 to 2,000 (in 2005, the Observatory averaged 20,000 visitors). With the opening of the Mitchel Building, Porter also maintained the tradition of public viewing which first began at the original 1845 Mt. Adams Observatory.



Mitchel Building under construction 1904

Dr. Everett I. Yowell

Director 1930-1940 and 1943-1946

Dr. Yowell was a Cincinnati native whose family had lived for four generations within walking distance of the Observatory. Yowell became an assistant astronomer at the Observatory in 1897, but left in 1900 when the University of Cincinnati cut the salaries of astronomical staff members. He returned in 1909 and succeeded Porter as Director of the Observatory in 1930.

Taking the helm at age 60, Yowell was hampered by the aging equipment, a lack of funding, and worsening city air and light pollution. As Porter had before him, he and astronomer Elliott Smith taught courses at the University of Cincinnati (UC), including graduate level classes in physics and math. Paul Herget, the graduate assistant at the Observatory at the time, also taught several courses.

A typical day at the Observatory would include Yowell's checking the master file of observations on all stars ever recorded (The Astronomical Catalogue) to see which observations were still needed to complete the file and which ones made at the Observatory were satisfactory for the Catalogue. The actual observing was done with the 16" Alvan Clark telescope. Any extra time during the day not spent planning observations or teaching classes was spent giving speeches to groups such as the Kiwanis Club, Watchman's Union and various ladies groups.

In 1932, Dr. Yowell secured a University grant of \$500 to lead an expedition to observe the August solar eclipse in North Stradford, Maine. The Observatory station Yowell set up there was visited by over one hundred people, forty of them Cincinnatians. Frustrating their elaborate preparations, clouds prevailed in the skies, disappointing the astronomers. The expedition demonstrated once again the large popular support for astronomy in Cincinnati.

Dr. Yowell retired in 1940 after reaching the mandatory retirement age of 70.

Dr. Elliott Smith

Director 1940-1943


Although not appointed Director until 1940, Dr. Smith was no stranger to the Observatory. Smith came to Cincinnati in 1907 from the Lick Observatory in California and Dr. Porter immediately put him in charge of the Fauth Meridian Circle. Working as a team, Smith, Yowell and Porter made the meticulous observations of the positions of stars with the Meridian Circle, while Smith alone calculated the observations for inclusion in the Catalogue.

Smith continued this work from 1930 to 1940 during Dr. Yowell's directorship. Additionally, he maintained the Observatory clocks necessary for accurate time measurement of his meridian circle observations. Dr. Smith's computing duties lessened somewhat when assistant astronomer (and future director) Paul Herget was assigned to the Observatory in 1931.

When Dr. Smith assumed the directorship in 1940, he began phasing out the meridian circle work that had been limited by the lack of funding due to the Great Depression and the instrument's old age. Smith undertook the systematic final observations for The Astronomical Catalogue which detailed recorded results from the Observatory since 1922.

In 1943, two months shy of the centennial of the Cincinnati Observatory, Dr. Smith died suddenly at the age of 68. Dr. Yowell was temporarily rehired. Yowell completed the calculations for the star catalogue that Smith had nearly finished and made preparations for the Observatory's upcoming centennial celebration which was held November 7-10, 1943.

The American Astronomical Society held its annual meeting in Cincinnati that year to commemorate this milestone. President Franklin D. Roosevelt was among those who sent their congratulations. During this period, Dr. Herget had been assigned to the Navy for the duration of World War II. Herget's considerable computing skills led him to develop a method for tracking enemy submarines. In 1943, he returned for the centennial and was named Observatory Director, contingent upon completing his military service which occurred in 1946.



Cincinnati Observatory circa 1910

Dr. Paul Herget

Director 1943-1978



Paul Herget

Dr. Paul Herget quickly realized that the site of the Cincinnati Observatory was no longer ideal for observations because Cincinnati's industrial growth had surrounded the Mt. Lookout neighborhood.

With his considerable mathematical talents and a cutting-edge interest in the application of electric punch-card computers to generate orbit calculations, Herget

took the Observatory in a new direction. The Cincinnati Observatory's new role as the Minor Planet Center plotted and published the orbits of asteroids and comets for researchers worldwide. Herget became the internationally recognized leader in this field.

Herget took great pride in the buildings and activities of the Observatory. Like the directors before him, Herget strongly supported public use of the Observatory. Amateur astronomers came to grind telescope mirrors and public tours were held on a regular basis. Herget regretted that the Minor Planet Center would not continue at the Observatory after his retirement. Herget began working toward the establishment of National Historic Landmark status for the Observatory, but did not live long enough to see this fulfilled in 1997.



Paul Herget at early computer

In 1979, the UC Physics department took over the Observatory. In 1999, the Cincinnati Observatory Center (a not-for-profit organization) was formed to preserve the Observatory's heritage. On October 24, 2004, the main building of the Cincinnati Observatory Center was renamed the Herget Building in Dr. Herget's honor.



National Historic Landmark Plaque

Romance at the Observatory

Science and astronomy were not the only passions of our directors.

Dr. Yowell loved to tell the story of how he met his future wife, Elizabeth Carrington, in 1911 when she came to the Observatory to replace another mathematics major, Louise Strautman, whom Dr. Smith had just married.

Years later, Dr. Herget married his high school sweetheart, Harriett Louise Smith, the daughter of Dr. Smith. The path from the Observatory to their house was the wedding aisle and the front porch was the altar.



The Cincinnati Observatory circa early 1900's

The Observatory's Telescopes: The Porter Garden Telescope

circa 1923

Russell W. Porter (no relation to director Jermain Porter) was an innovative American telescope maker and artist who created instruments that were as ornamental in the garden as they were functional.

Envisioned as a permanent outdoor fixture like a sundial, ready for viewing at a moment's notice, it encouraged an active interest in amateur astronomy.

All parts are cast in bronze to withstand any weather. The names of Kepler, Newton, and Galileo are cast into the base of the telescope, symbols of the solid foundations they created in astronomical thought. The Porter Garden Telescope is a 6" f/4 Newtonian reflector. Eyepieces gave magnifying powers of 25, 50 or 100 times. A bowl of bronze lotus leaves supports the 6" primary mirror as the telescope is pivoted to different parts of the sky. Reaching out from the side of the lotus bowl, a slender bronze leaf curves upward to the secondary prism and eyepiece. Porter later helped design the 200" Mount Palomar telescope.



The Meridian Circles (Telescopes)

The principal work performed at the Observatory was Proper Motion studies which determine the apparent position of the stars. Since each star is in motion with respect to every other star, the principal stars would be measured repeatedly every decade or so looking for deviations in their recorded positions.

The 3.5" diameter Buff and Berger Meridian Circle was acquired in 1885 and mounted on a stone pier. The drum chronograph that sat nearby was a time-recording device. A pendulum clock was housed in a wooden cabinet behind the circle. The clock provided precise timings for the observations.

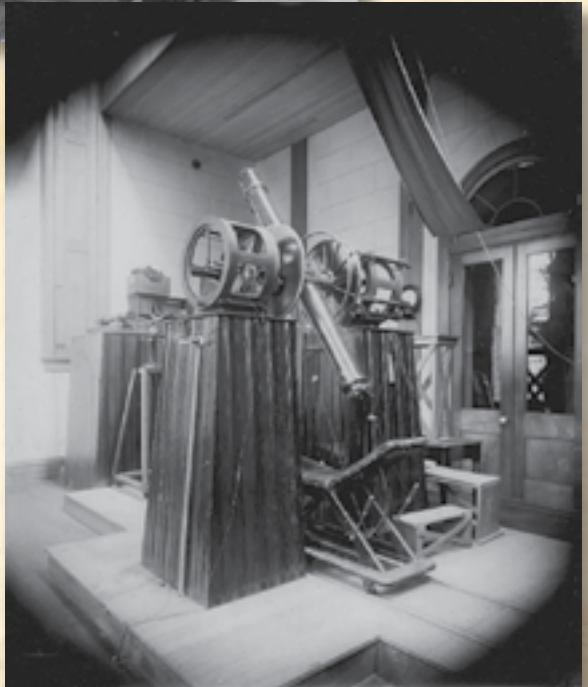
The 5" diameter Fauth Meridian Circle was added in 1887-1888. Mounted between two cast iron piers framed with wood, the telescope swept along only the north-south line, known as the meridian. To use the instrument, the astronomer would recline on a couch mounted on trolley wheels which were guided by rails in the floor. A round "slave" clock hung on the front of the pier. When the target star drifted on to the eyepiece's cross-hair, the astronomer pressed a key which recorded the exact time on the chronograph.

Two collimating telescopes were positioned on either side of the Circle. They were used to precisely align the Meridian Circle north and south.

To make room for Dr. Herget's computers the meridian circles were placed in storage. The concrete pads they once rested on are still visible today. Pending funding, the circles will be restored and displayed as part of the Observatory Center's museum collection.



*Drum
Chronograph,
Buff & Berger
Meridian Circle
on pier and
4" Clark
Comet Seeker
Telescope*




Fauth Meridian Circle

12" Merz und Mahler Telescope

In 1842, Ormsby MacKnight Mitchel purchased this telescope for the Cincinnati Observatory from the Merz und Mahler company in Munich, Bavaria. A refractor telescope with an equatorial mount, when the 12" Fraunhofer-design lens was installed, it was the second largest telescope in the world (Nicholas I, the Russian Czar owned the largest).

The final cost of the telescope with eyepieces and accessories was about \$10,000 in 1842 dollars.

The telescope was originally mounted in the Observatory on Mt. Adams and later moved to the Mt. Lookout Observatory in 1873. In 1904, this telescope was relocated to the Mitchel Building, where it is used routinely today.

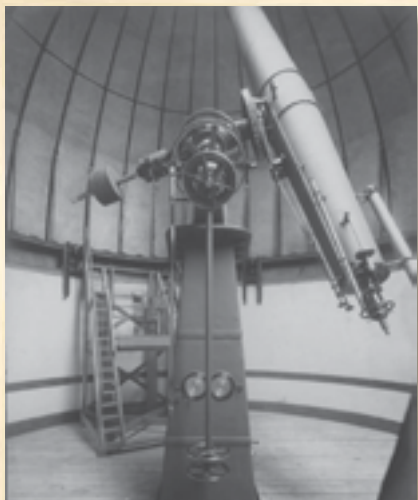


After searching vainly in London and Paris, Mitchel found in Munich a lens of a nearly a foot in diameter and arranged that "the glass should not be sold until I could be heard from after my return to Cincinnati."

16" Alvan Clark & Sons Telescope

The 16" Alvan Clark & Sons refractor telescope is located in the dome room of the Herget Building.

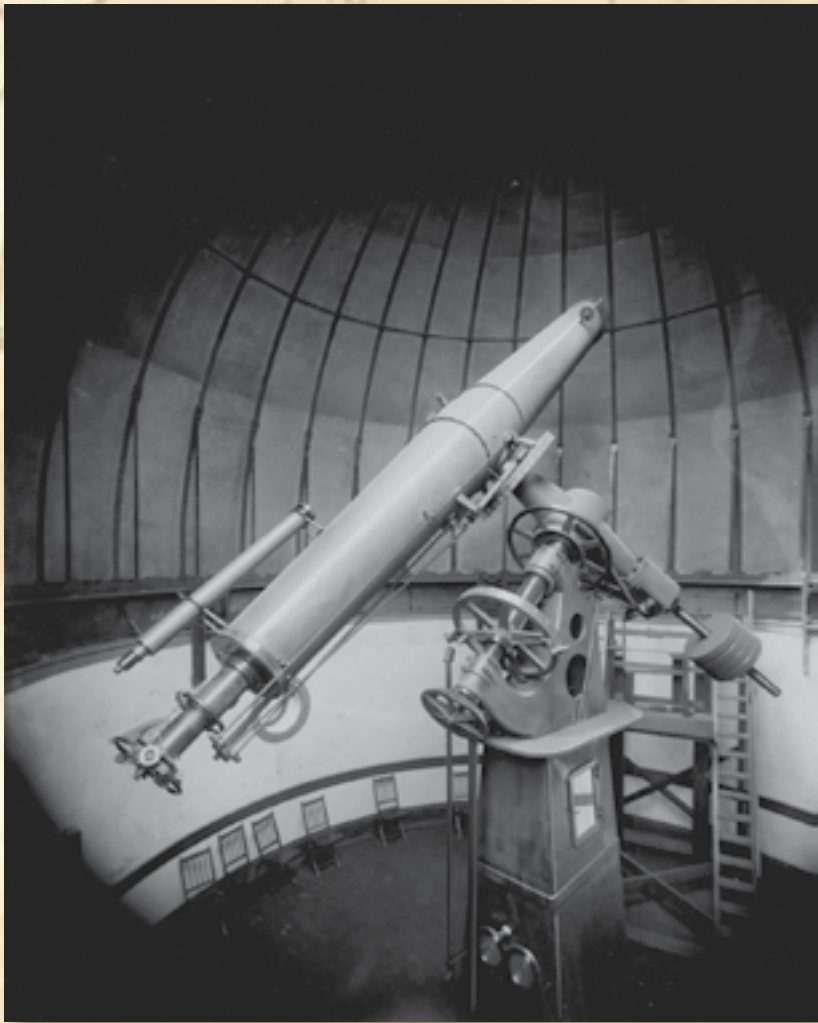
The Clarks were the premier refractor telescope makers in the world. Constructed in the Clark's workshop in Cambridgeport, Massachusetts, the telescope was delivered to the Observatory in February 1904.



Alvan Clark Telescope

The crown and flint glass elements of the lens are separated by nearly two inches, allowing ventilation of the lenses through a sliding shutter which facilitates the thermal stability of the lenses. The image quality of the telescope is so superb that it is capable of resolving (visually separating) double stars to its theoretical limit.

To follow celestial objects from east to west across the sky the telescope is driven by a mechanical clockwork powered by a 350-pound weight. From dusk until dawn neighborhood children assisted the astronomers by pointing the 1,200 pound telescope, winding the clockwork every 30 minutes or so and repeatedly hand cranking the dome into position. For this, they were paid twenty-five cents a night. The clockwork tracked the stars and planets so accurately it was never replaced and is still in use today.



1904 Alvan Clark & Sons Telescope

Other Observatory Treasures

The Planet Walk:

A made-to-scale representation of our solar system, demonstrating the relative distances from our Sun to the planets. Using our scale, each foot is equal to 8.2 million miles.

Once you've reached Pluto, imagine venturing off to our nearest star system, Alpha Centuri (a mere 25 trillion miles away) which at our scale would be located in Joplin, Missouri, 580 miles from here!

The Herget Building Clock Room:

From regulating the telescope's drive mechanisms, plotting accurate star positions, and maintaining railroad schedules, precise timekeeping was fundamental to the Observatory. The



Reifler Clock

Reifler primary and slave clocks from 1907 and 1908 were housed in the Observatory's basement where thick insulated doors protected the clocks from extremes in temperature and humidity. To alleviate differences in air pressure, the master clock was housed in a 4-foot tall glass bell jar where the air was pumped out to adjust the pendulum's swing. By adding tiny weights to the pendulums, time could be further regulated to hundredths of a second. To avoid disturbing the clocks, they were read via a small window behind another insulating door.

The Mitchel Building Comet Dome:

This cone-shaped dome was added to the Mitchel Building around 1910. This unique observatory housed a portable telescope used to search for comets. Searching for comets is generally done near the horizon, so unlike the other two domes, there was no need to have a wide slit open all the way to the top of the dome.

The Cincinnati Observatory Center Today

*"Everything you ever wanted to know about astronomy,
but were afraid to ask"*



Education Outreach:

The Cincinnati Observatory Center provides day and evening classes and programs for students of any grade level. Set in a fully functional 19th century observatory, yet using the best modern tools, our instructors are experienced in engaging students of all ages.

Astronomy Evenings:

The Observatory Center offers classes, programs and telescope viewing on most Thursdays, Fridays and Saturdays, as well as special events throughout the year. Call the Observatory at (513) 321-5186 or visit www.cincinnatiobservatory.org for the current schedule of events.

History Tours:

History tours are given of the buildings, telescopes and grounds on select Sundays each month. Tours are also available by reservation at other times for groups of all types.

Friends of the Observatory Membership:

Membership benefits include monthly meetings with presentations; classes and workshops for all levels; telescope loans; advanced research projects; and dark sky site viewing. FOTO volunteer opportunities are available to help support the Observatory's public programming, aid in historical research, and in many other areas.

Now you know the story of the Observatory from Ormsby MacKnight Mitchel's original idea to John Quincy Adams' dedication, from the move to Mt. Lookout, to the role the Observatory has played in both local and scientific communities.

And the story continues today. You've learned that for over the past 160 years the beautiful and amazing Merz und Mahler telescope has educated and enchanted generations in our community. This unique telescope has inspired science and mathematics education while dazzling visitors with the wonders of the night skies.

Half a century ago, at the age of 5, a young visitor looked through this very telescope and saw his future:

"...The world opened up for me that night. We need to make sure we have even more of those opportunities for little kids while their eyes and minds are open."

Astronomer Dr. Alan Dressler of the Observatories of the Carnegie Institution of Washington

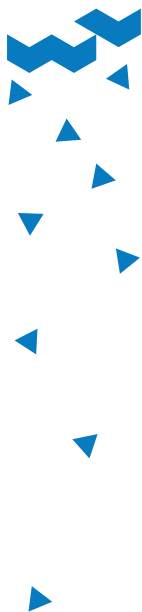
Stars and moons, comets and galaxies dance across the skies for scientists and teachers, families and scout troops, school children and grandparents. Add in the lovely grounds and the restored buildings of the Cincinnati Observatory Center, plus the Merz und Mahler telescope, it's no surprise that the most common sound heard at the Observatory is "Wow." Many of the FOTO volunteers think this expression of wonder and astonishment is the most frequently uttered word under the dome.

The Cincinnati Observatory Center is an irreplaceable asset in our Community. Your financial support by purchase of this book and/or a donation to the Observatory, at the highest financial level you can consider, is crucial to the ongoing campaign to keep this unique treasure open.

Thanks to wide ranging support from the community - donors, history buffs, preservationists, educators, kids and families - the Observatory has grown from 1,200 visitors in 1997 to over 20,000 currently. While we continue to develop innovative community education programs, we unquestionably consider one of our strongest assets to be the Friends of the Observatory members,

We look forward to seeing you again soon at the Cincinnati Observatory Center!

(513) 321-5186 www.cincinnatiobservatory.org



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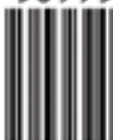
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