July Skies over the Pinnacles

July 2021

July 1	Last Quarter	
July 10	New Moon	\bigcirc
July 17	First Quarter	
July 24	Full Moon	

July's four principal phases of the moon

Saving a Grand Old Telescope

It doesn't seem so long ago when I first visited the Berea College Observatory. That was in 1974. Named for beloved mathematics professor Gilbert Roberts, the facility boasted a 5-year old telescope which had recently seen service for research at Washington State. Through the efforts of a Berea Alumnus, the college acquired this telescope for a fraction of it's value. There I stood after a winding trek upward *above* the top floor of the Hall Science Building, standing next to Dr. Thomas Strickler and Dr. Smith T. Powell was a ton of animated art known as the 16-inch Boller and Chivens telescope.

I was thrilled that my labor assignment might include the occasional command of a true research telescope. As a teen-aged amateur astronomer I had made and used lots of telescopes, including a vintage 1880 telescope in Cincinnati that was once offered as a donation to Berea College. Now I entered a new league! During the next four years I conducted numerous public 'stargazes' using the Boller and Chivens. I even did some minor research. This may seem strange when one considers that I was an Industrial Arts major.

The Boller and Chivens company, founded in 1946, made research grade telescopes used in observatories throughout the world. Berea's possession of one of these placed us in elite company. Constructing telescopes as large as 100 inches in aperture, our model was one of the smallest made. Here is a list of other institutions which owned "Baby Bollers", according to company records.





Size Comparison of Typical Boller and Chivens Telescopes

Since 1972, Our Boller and Chivens telescope served over two generations of Berea students providing many with their first glimpse of the Moon, planets and other celestial wonders. It's impossible to say how many young people gained a broader concept of our place in the Cosmos while peering through the eyepiece. Many research projects were also undertaken. In 2007, Dr. Powell obtained a grant to upgrade the aiming capabilities of the telescope by installing a new computer control system that would allow it to be operated remotely, either from a 4th floor control room or from sites across the world, via internet connection. This was to be Dr. Powell's final gift to the college near the end of a career at Berea which inspired so many to pursue science as a career and as a way to clearly see the world.

In March of this year, I received an email from Dr. Tracy Hodge expressing her concern that the Hall Science Building was scheduled for demolition and that, inexplicably, plans had not been made to preserve the Boller and Chivens telescope. Knowing my Berea and astronomy connections, Dr. Hodge granted me permission to try to find a new recipient of the telescope. I put the word out to every astronomy connection I had, including posting a notice about the telescope's uncertain future to a virtual gathering site for amateur and professional astronomers, called *Cloudy Nights*.

In short order, I heard from dozens of interested persons from around the country and Canada. All expressed concern and all urging me to do all I could to preserve this priceless treasure. The Boller and Chivens company ceased operations 30 years ago and replacement of their instruments, if lost, is impossible. Then in April, I heard from a Canadian semi-professional astronomer who was willing to pay the \$15,000 cost to rent a crane to remove both the observatory dome and telescope from the condemned science building. From Pennsylvania, Mark Sproul, a fellow amateur astronomer, came forward to assist with technical issues and to take the dome home for restoration and re-use.

I am grateful for the selfless efforts of the many people who did the hard work to prepare the telescope and dome in their safe escape from the wrecking ball. Mark Sproul made the long trip in his RV and trailer to help prepare the telescope and to disassemble the observatory

dome. Don Cardwell provided vital assistance in removing the mile or so of cabling between the control room and telescope and for providing much of the photographic record of our work.

I happily single out Howard Carlberg for doing most of the hard demanding work in preparing the telescope for safe transport. Howard's son, Bryce arranged for even more help when heavy components had to be removed from the telescope and dome. At right, Howard is making sure that bolts, used to assemble the telescope mount to the base can be loosened later for transport.





A Boller and Chivens advertisement image of a telescope similar to Berea's instrument

Berea's telescope as it appeared prior to disassembly.



Following is a collection of images to illustrate the saving

of the Boller and Chivens telescope and it's protective observatory dome. Photo credits: Don Cardwell, Howard Carlberg and the author.



Wearing a mask to protect from possible histoplasmosis exposure from bird droppings, I inspect the optical components prior to disassembly

The telescope uses a design where a large curved mirror at the bottom of the tube collects light, then sends the light to a second mirror seen here reflected in the large mirror. The second mirror then reflects that light back down through a hole in the large mirror. The light is focused behind the telescope tube where it reaches an eyepiece or camera.



Telescope Disassembly



The front segment of the tube is removed.



With the middle part of the tube removed, the next task was to remove the objective mirror. The long black 'snorkel' is a light baffle to keep stray light from interfering with the focused light.



With the mirror pointed 'up', many hands are needed to lift down the 150-pound housing.

Easy does it!



Safely on the observatory floor, the baffle is removed.

Moved down one level, the primary mirror and it's cell are placed in a sturdy box for shipment.



Howard discovers that the box won't go through the door! More tools needed...

Now, the telescope mounting is ready for the crane.







The easiest way to lift out the telescope was to first remove the dome.



The crane makes easy work of lifting the 2800 pound observatory dome.





Once on the ground, the dome is stabilized and inspected.

In order to prevent damage to the telescope mounting, it had to be lifted in two parts. As soon as the dome was on the ground, Howard made a speedy trip up to the observatory to remove the bolts which held the two parts together. (Remember the first picture?)





Finally, the two parts of the telescope are lifted free of the building.



Safe on the ground. Left to right: Mark Sproul, the author, Don Cardwell and Howard Carlberg.



From the building's fourth floor the telescope's computer control equipment, including nearly a mile of data cables, joined the telescope on the ground. Here, Don begins the task by identifying each cable.





On the next day all of the telescope parts are prepared for pickup.



In the rain, of course!



Mark drove to Berea to both assist with the recovery of the Boller and Chivens telescope and to recover the observatory dome to be reused at site in New Mexico. An amateur astronomer who has built many telescopes and even a large observatory dome, himself, Mark is also a can-do guy for the U.S. Naval Academy. He plans to deploy this dome for use at a facility where Naval Academy cadets can remotely observe the sky via the internet as part of their training.

The Berea dome is 14-1/2 feet in diameter which makes it too large to transport on the highway without a special permits. I took the above picture after I arrived at our worksite behind the old science building. When I arrived around 9:30AM, Mark had already begun taking the dome apart by removing the shutter which is closed to protect the telescope and opened to allow a view of the night sky.



Nothing left but wheels and the track and they are next to go!



All the pieces were loaded onto Mark's large trailer for transport and restoration.

I've told you what the plans were for the observatory dome. Now I'll tell you what awaits the Boller and Chivens telescope. As you read this, the telescope is being cleaned and readied for its next big adventure. The new owner, Peter Ceravolo, is a semi-professional astronomer who has contributed to a number scientific research projects. He is excited to engage the telescope in a number of studies which demand a telescope of the highest caliber. Among these will be a detailed imaging survey of distant interstellar clouds. But there are other projects planned.

Despite data gathered from a number of unmanned spacecraft which have visited the outer solar system, much is still unknown about the densities of the atmospheres of the planets Uranus and Neptune. When the orbits of these giant planets cause them to pass between us and a distant star, light from that star dims in such a way that permits detailed examination of the density of that planet's atmosphere. Through a process called photometry, changes in the light intensity from the 'eclipsed' star can be precisely measured.

Most exciting to me is that our old telescope may join a network of other research-quality instruments to track asteroids which pose a future risk of striking the Earth. These Near Earth Asteroids (NEA's) pose such a potential danger that the U.S. military has committed significant funds toward their detection and (hopeful) deflection.

Science takes hard work and creativity. I am so grateful to Richard Dodd and Jordan Kelley of Berea College, the astronomers who came forward to accept the Boller and Chivens telescope and dome and especially for the hardworking volunteers who came together, suffered heat, rain and barked knuckles to create a happy ending to this chapter in the scientific history of Berea College.



Left, Peter Ceravolo and his wife Debra, standing with their restored German Zeiss Coude' telescope.

Right, the new home for Berea's Boller and Chivens telescope.



June Star Party

The weather didn't look promising for our June 19 star party and we were contemplating cancelling the event but a visit to the Clear Sky Clock website for Berea: https://www.cleardarksky.com/c/BereaKYkey.html?1

indicated some clearing of the clouds for the evening. This site gives a generally reliable 'cloud forecast' for 48 hours ahead, so I consulted with Director Wendy Warren and took my 12-inch reflecting telescope to the Forestry Outreach Center parking lot at dusk. Despite a veil of clouds, a small but enthusiastic crowd of visitors were treated to detailed views of the gibbous Moon and visitors learned about some of the lunar features. We will plan to have at least one star party each month so watch for announcements of future events. We may even have some daytime solar viewing events in the future.

Attractions in July

July 2 (Binocular Alert!) Dusk mashup! Look low near the western horizon to catch the bright planet Venus. Now look about one finger-width left and up and you'll catch the red planet Mars. The "twin" stars Castor and Pollux can be seen to the right, just before they slip out of sight until next spring.



- **July 5** Well, nothing really to see here, it's just that Earth is at it's farthest distance from the Sun. But it's nice to know that the Earth's orbit around the sun is not circular but oval-shaped, or elliptical.
- July 7 (Early-riser alert) We have another chance to see the Moon between the horns of the constellation Taurus, the Bull. Readers might recall a similar event in April. This view may be inspiration for the Egyptian god, Apis.



July 12 (Binocular Alert!) At Dusk, look for the planets Mars and Venus looking very close together with the pretty crescent Moon overseeing the spectacle.



July 21 Catch the planet Venus as it gets cozy with the star Regulus, at the heart of the constellation Leo the Lion. Just above is the 'backward question mark (?)' of Leo's mane.



July 28-29 Set your alarm for about 3AM to catch the Southern Aquariid Meteor Shower.