

# September Skies over the Pinnacles

September 2021

## September's four principal phases of the moon

September 7	New Moon	
September 13	First Quarter	
September 20	Full Moon	
September 29	Last Quarter	

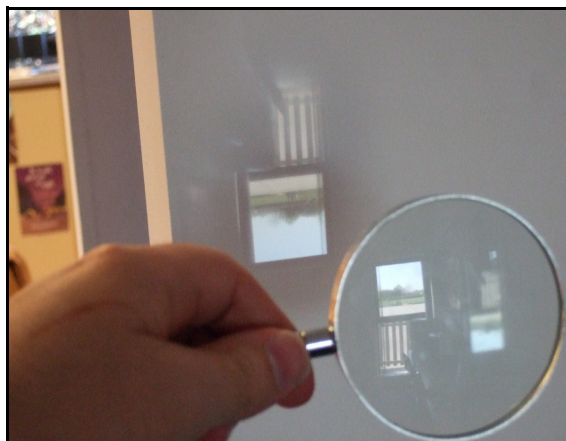
## Telescopes

If you read the July installment of "Skies" you know that many people put in a great deal of work to save the college's old observatory and telescope before it was demolished with the rest of the old Hall Science Building. You may ask the question, "Why save the telescope?". For me, the monetary value or the uniqueness or quality of the telescope had little to do with it. The reason the Boller and Chivens telescope needed to be saved is that much valuable work can still be accomplished with it.

A telescope pointed at something in this world might be called an invasion of privacy. A telescope aimed into the night sky represents acknowledgment of our tiny but important place in the Cosmos. It says that we want to know more about the origins of universe and our place in it.

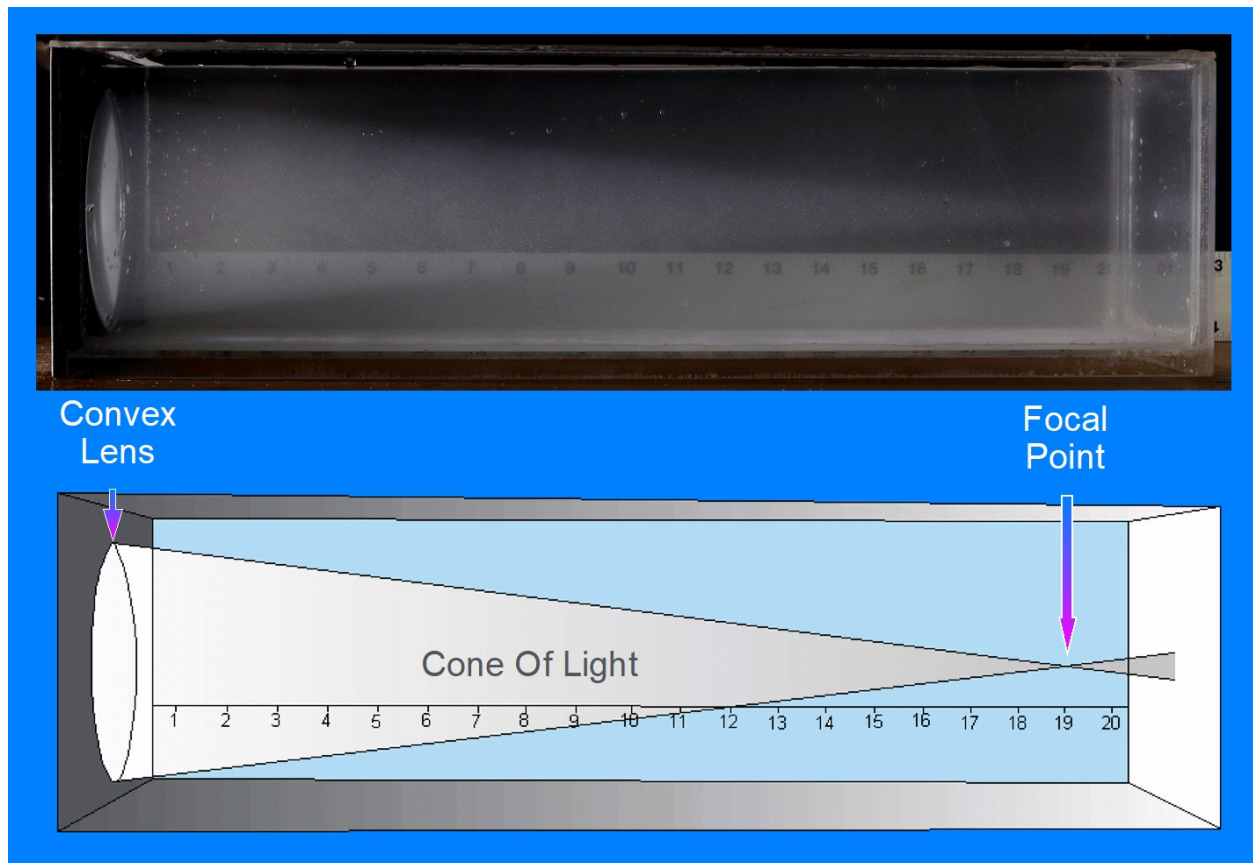
So how do telescopes work? The basics are pretty simple. First you take a lens that is fatter in the middle than it is at the edges. This is called a **convex lens**. Project an image with that lens and then magnify the projected image with another convex lens.

A magnifying glass is a good example of the use of a convex lens to, well, magnify!



You can also use a magnifying glass to project an image. Here we see at left a magnifying glass projecting the image of a window. You can see the window reflected on the near side of the lens.

I remember hearing that a **convex lens** 'bends' light into a cone with the big end of the cone at the lens and that the point at the small end of the cone is called the **focal point**. But I wanted to see this cone of light so that I could believe what I was being told. So I built a clear plastic box with a convex lens cemented in one end and filled it with water. Then I put some baking soda in the water to make it a little cloudy so that maybe I could see this cone. Then I took a bright flashlight and shined it into the lens. Look at the cone that appeared!



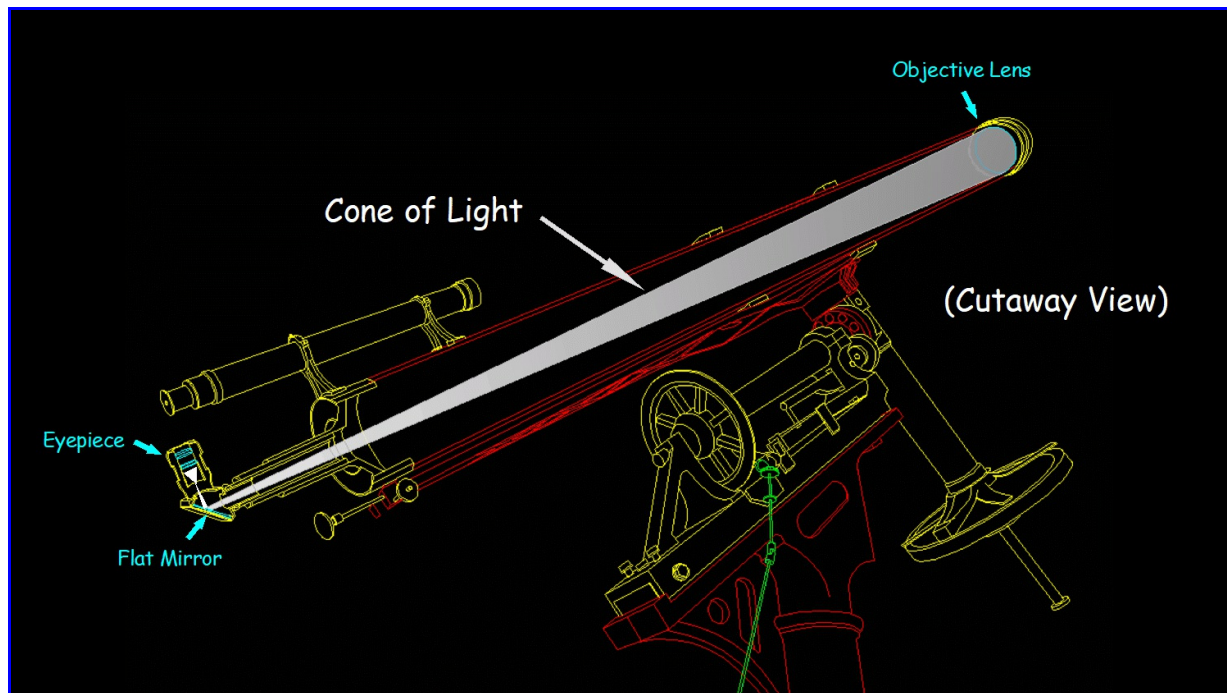
In the picture above that my lens has a **focal length** of 19 inches. That's where the projected image would be. Let's get back to see how a telescope works.



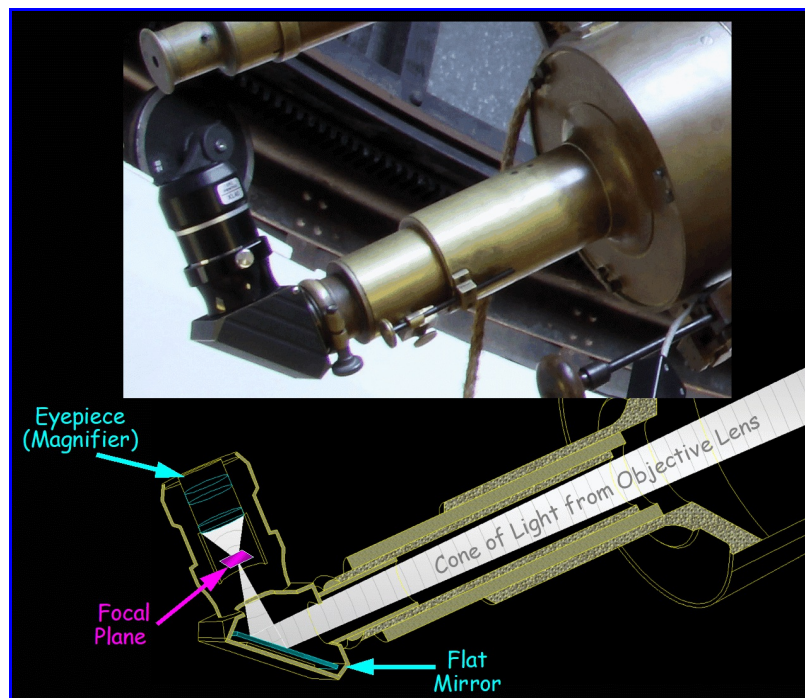
This is a picture of the great Merz und Mahler telescope at the Cincinnati Observatory. It has a big convex lens in the upper end of the wooden tube and an eyepiece that you look through is at the lower end. This telescope is 176 years old!



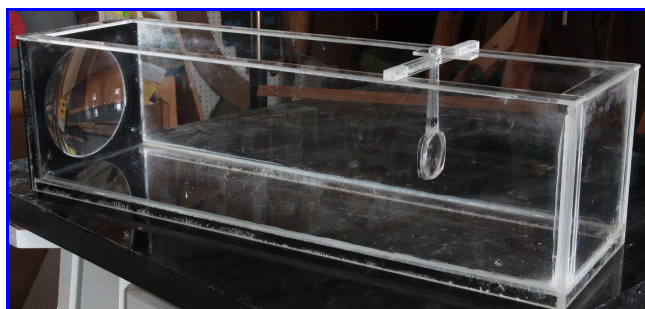
Below is a cutaway that shows how the cone of light from this telescope's big lens, called an **objective lens**, travels down the hollow wooden tube to another lens, called an **eyepiece**. The eyepiece actually uses several lenses to magnify the image made by the **objective lens**.



This telescope uses a flat mirror to bounce the cone of light to the side, into the eyepiece. That's just to keep you from getting a stiff neck when you look at the stars with this telescope. The **objective lens** (the big lens at the front of the tube) has a **focal length** of 191 inches.



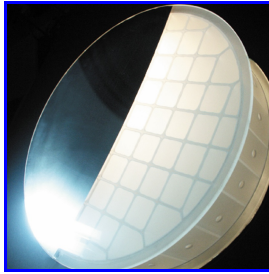
The focal plane lies at the focal point.



If I place a magnifying glass behind the big lens in the plastic lens box seen above, we also have...  
... a telescope!

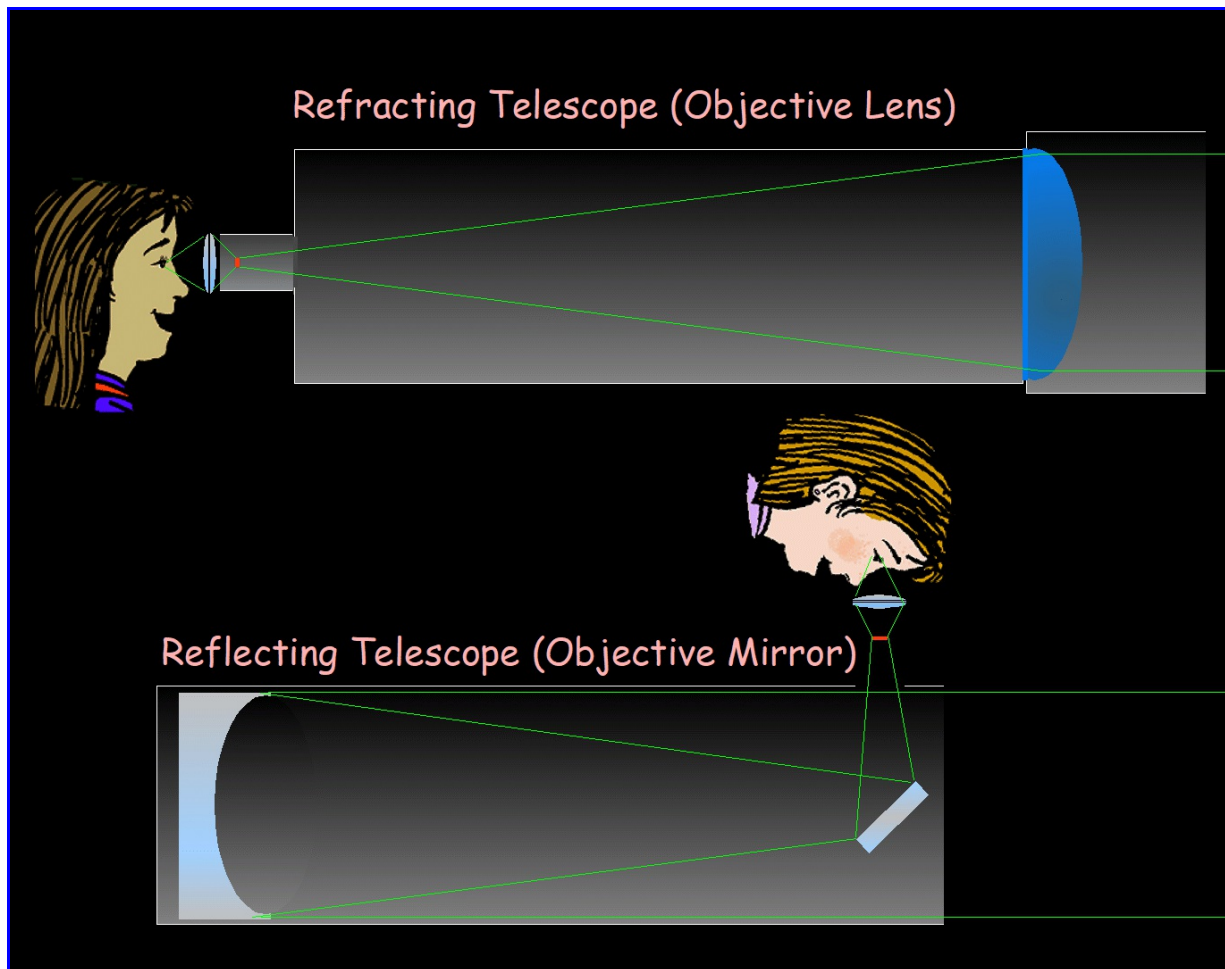


Most large telescopes use a dish-shaped or concave mirror instead of a convex lens to project the image that is magnified by the eyepiece.



Objective mirrors are easier to make than lenses and they have other advantages over lenses.

Here's an illustration that compares how both types of telescopes work.



This is a picture of my old friend, Dick, with a great big reflecting telescope that he built.

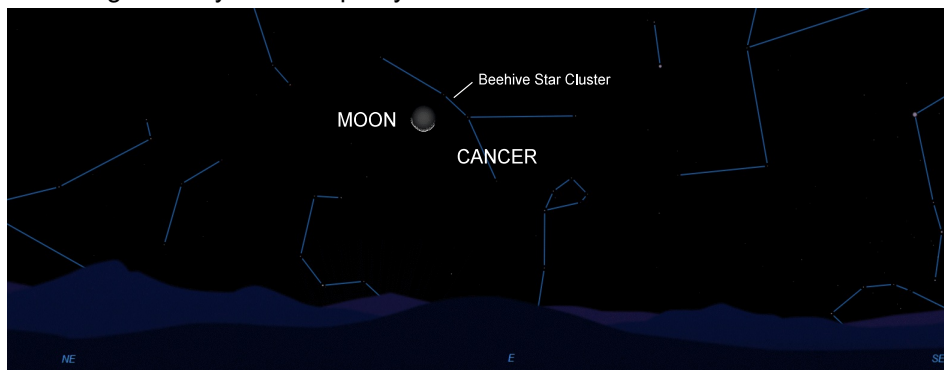
## Attractions in September

### All Month

If you can get to a spot far away from city lights on a very clear night you might just be able to catch a eerie soft glow tilted to the right above the eastern horizon in the sky before dawn. If you see it, congratulations! You've seen the **Zodiacal Light**. No, it has nothing to do with silly astrology. The glow is from interplanetary dust and it best seen between now and mid October.

### September 4

Get up early, grab your binoculars and catch the slender crescent Moon about three fingers away from the pretty cluster of stars that are called the "Beehive".

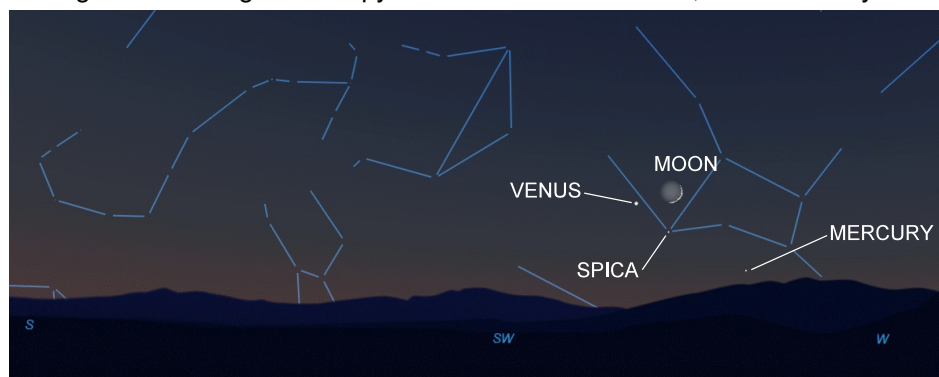


### September 5

Catch two gems of the western sky in the evening as Venus glides past the beautiful blue star known as Spica. There will be only a finger-width between them!

### September 9

Again, look low to the west at dusk as the Moon joins Venus and Spica to make a striking trio. You might even spy a 4<sup>th</sup> member lower down, that's Mercury!



### September 15

Jupiter and Saturn are joined by the Moon in a line. **Join us at the Forestry Outreach Center at 7PM for a short talk and to view the Moon and planets through some large telescopes!**

### September 22

Today is the Autumnal Equinox. The sun shines directly down on the heads of folks living on the equator at noon and we experience equal periods of day and night. Welcome fall!

### September 26

Get up before dawn to catch the Moon putting in another appearance in the constellation, Taurus the Bull. It will be right between the bright red star, Aldebaran and the beautiful cluster of stars called the Pleiades.

