

Temecula Valley Astronomer

The monthly newsletter of the Temecula Valley Astronomers

January 2015

Events:

General Meeting : Monday, Jan 5, 2015 at the Temecula Library, 30600 Pauba Rd, Rm. B at 7 pm.

We will have our usual What's Up by Tim Deardorff, an outreach report by John Garrett and several special presentations by Mark Baker.

For the latest on Star Parties, check the [web page](#).



APOD: [M42: Inside the Orion Nebula](#) -
Image Credit: R. Villaverde, Hubble Legacy Archive, NASA

WHAT'S INSIDE THIS MONTH:

Cosmic Comments
by President Mark Baker
MOON StrucK – Article 2
by Art Cobb
Looking Up
by Curtis Croulet
Quiz Answer
Tidbits
Art's Night Out
by Art Cobb

Send newsletter submissions to Mark DiVecchio (markd@silogic.com) by the 20th of the month for the next month's issue.

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General information:

Subscription to the TVA is included in the annual \$25 membership (regular members) donation (\$9 student; \$35 family).

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Cosmic Comments – January/2015 **by President Mark Baker**

Let there be lights in the firmament of the heaven to divide the day from the night; and let them be for signs, and for seasons, and for days, and years:

And let them be for lights in the firmament of the heaven to give light upon the earth: and it was so.

... two great lights; the greater light to rule the day, and the lesser light to rule the night: the stars also.

... set them in the firmament of the heaven to give light upon the earth,

And to rule over the day and over the night, and to divide the light from the darkness: and it was good.

Regardless of beliefs, I'm sure we ALL can agree we are glad they are there for us to ponder and wonder on... and it IS good!!!

Clear and Dark Skies, my friends...



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MOON Struck

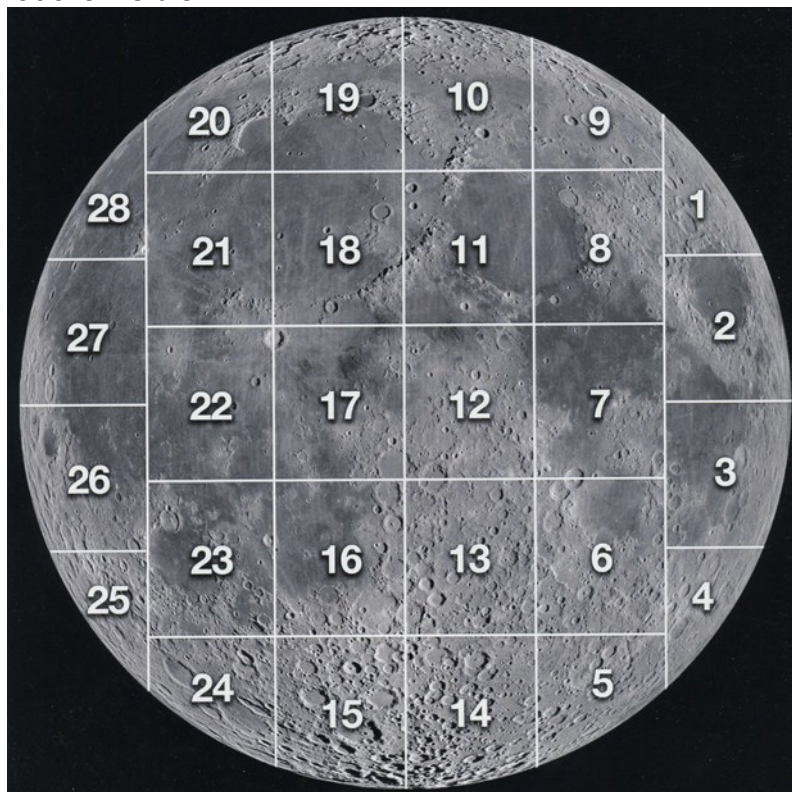


Article 2

In my last article I began to describe some of the basic details concerning the moon including its phases and three of its main objects that we can see; craters, lava flow formations and surface fracturing. Within these objects are other formations we can see; such as mountains, ridges and rays from debris. I'll describe these as we observe them.

I will include an overall full moon map divided into sections that will allow me to help you find various objects as we progress forward. Each of the objects I point out will have a section picture for close up reference. These pictures are from the "Lunar Reconnaissance Orbiter" captured in December of 2010.

Below is a map of the moon identifying the major "Mares" on the moon as well as some of the major craters that are visible.



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The next object that I will describe for you is a “Mare”. The visible dark areas of the moon are known as Mares. The Latin definition for Mare is “Sea”. These dark areas have been formed by volcanic eruptions from either large impacting objects or from below surface eruptions. In either case, lava has flowed onto the surface and leveling out while cooling. After these areas have cooled down, as the moon itself had cooled down, numerous other objects have hit the moon in these “Mare” areas resulting in numerous craters, fractures, mountains and ridges.

Below is a photograph I took of the first quarter moon in December. (First try using my wife’s Canon T5i at ‘prime focus’). I do hope to improve my pictures as time goes by. Look at the index map above and locate section 9. I will point out a few objects from my photo that you can clearly see and identify from the picture of section 9, I’ve included on the next page.



Before I locate the first object, I must identify the line that forms between the light and dark of the moon. This line of demarcation is commonly called the “**Terminator**”. So, when I use this term in the future, you’ll know what I’m talking about. You’ll find that most of the objects are better seen along the ‘terminator’. In this area along the moon’s edge, more shadows are apparent, giving you more ridge and wall detailing.

Look at the right side of my picture above and locate the top line. This line is pointing to a fairly large ‘complex crater’ called **Atlas**. This crater you can also find on the LRO picture of section nine below.

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LRO Picture, section 9

You'll notice in the LRO picture that Atlas has a nice ridge or wall around the crater with what appears to be small mountains in the center. These mountains are usually formed from the energy of the high impact of an object hitting the moon's surface, forcing large rock formations to be dislodged and pushed upward during impact. If lava flow results from the impact, then the lava may fill in the floor of the crater and cover any dislodged rock substance, leaving a smooth surface in the middle of the crater. Look at the next line down on my picture. You will notice that it is a smaller crater than Atlas and it is called **Hercules**. As you examine this crater

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on picture LRO section 9, you'll see that it is formed about the same as Atlas, with a smooth floor as a result of lava flow. There is a small protrusion in the middle of the floor that looks like a bolder. If lava had not flowed into the bottom of this crater, it may have looked a lot like Atlas. This crater has had another impact from a smaller object sometime after Hercules was first formed.

The third line from the top on my picture points to a large "Mare" called '**Mare Serenitatis**'. I will look at this area in my next article. There are few interesting objects that we can see and discuss then.

For now, look at the fourth line down that points to a small faint crater. This appears to be crater '**Cepheus**'. This is another 'complex' crater that has large rock remnant in the center. It appears to have some lava flow filling the floor. You can see these details in LRO picture section 9, again.

Well, we've got a start at looking at some of the objects on the moon that are fairly visible. We'll continue on in my next article.

Enjoy your viewing.

Art Cobb



Looking Up – January 2015 by Curtis Croulet

Full Moon is on January 4 at 8:53 pm; **Last Quarter Moon** is on January 13 at 1:46 am; **New Moon** is on January 20 at 5:14 am; and **First Quarter Moon** is on January 26 at 8:48 pm.

Mercury will be in the southwestern evening sky during the first half of January. Depending upon when you look, Mercury will be to the lower right or to the right of **Venus**. Venus is about mag -3.9. The two inner planets will be closest to each other on the evening of January 10, but there will be no conjunction. Mercury will not quite reach the same right ascension as Venus.

Mars begins January in Capricornus. Around January 8 it crosses into Aquarius. On January 19 Mars is in conjunction with **Neptune**, which is solidly in Aquarius. On that date, a low-powered eyepiece in a telescope will easily include both planets. This should be viewed early in the evening, say, 6 to 6:30 pm. The actual conjunction will be around 2:30 pm in the afternoon.

Jupiter is now a practical object for late evening viewing. It rises around 8 pm on January 1 and around 5:40 pm on January 31. Opposition is on February 6, 2015. Jupiter is in westernmost Leo, and it's unmistakable, due to its brilliance at magnitude -2.5. You may

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notice that Jupiter is now in retrograde motion. It's moving "backwards" – westward, rather than eastward. The Earth is overtaking Jupiter, like two cars on a curved racetrack.

Saturn is a pre-dawn object. The ringed planet rises around 3:48 am on January 1, and around 2 am on January 31. It's in Libra.

Uranus is an evening object in Pisces. **Pluto** is out of reach now in the daytime sky. We have an observable comet, **C/2014 Q2 (Lovejoy)**. When I viewed it around 11:30 am on December 19, it was visible in binoculars as a rather faint, fuzzy spot in Columba. Columba is the little constellation south of Orion and Lepus. At the time I viewed Comet Lovejoy, the rear leg of Canis Major pointed almost directly at the comet. Images have shown a tail. Comet Lovejoy is rapidly moving northward. By January 1 it'll be in western Lepus. *Sky & Telescope's* website has a chart of its position through the end of December. Comet Lovejoy is expected to top out at somewhere around 5th magnitude in late December and early January.

Let's look up.

Specifically, let's look at the Great Nebula in Orion, M42.

M42 is probably the best-known of all winter deep-sky objects. To the naked eye it's visible as a slight haze around the middle star of Orion's sword. In binoculars it's clearly identifiable as a nebula. As you go to larger and larger apertures, M42 shows more and more detail. A 12-inch telescope, for example, shows a swirling cauldron, with an extended loop that circles around the southwest side of the nebula, enclosing a darker lagoon. But even a small telescope shows some structure in M42. Maybe you can glimpse the dark projection, sometimes called the Parrot's Beak, into the heart of the nebula from the northeast.

Just beyond the tip of the Parrot's Beak is the most famous of all multiple stars: Theta Orionis, better-known as the Trapezium. A small telescope should easily resolve the four bright stars that form the irregular quadrilateral shape of the Trapezium. Adjacent to the southernmost and westernmost stars are two 11th magnitude stars. The bright stars of the Trapezium have been given letters in order of brightness: A, B, C, and D. The 11th magnitude stars are the E and F stars. Also in the area are two 16th magnitude stars, G and H, but those are beyond the grasp of all but the largest amateur telescopes.

During the few clear nights of the current December, I spent considerable time viewing this area with my new TEC 140 refractor (140mm aperture, or 5.5-inch). The Trapezium is a good test of seeing conditions (i.e., steadiness of the air). In poor seeing, the Trapezium stars become blurry, and you can actually see them moving around. In good seeing they not only sit still, but suddenly the E and F stars will become visible. They were tiny, distinct points in my TEC 140. The difficulty in viewing them comes not so much from their faintness (any 3 or 4 inch scope easily shows mag 11 stars), but because the bright nebulosity reduces their contrast against the sky, and poor seeing may blur them into the adjacent bright stars. Trapezium star F is more difficult than star E.

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One of the most amazing things about the Orion Nebula is that Galileo apparently never saw it, in spite of the fact that he reportedly studied the area of Orion rather closely. None of the ancient sources mention it. Al Sufi, who recorded the Great Nebula in Andromeda (M31) in AD 905, never saw the Orion Nebula. Robert Burnham Jr., in *Burnham's Celestial Handbook* (1978), and Stephen James O'Meara, in *Deep-Sky Companions: The Messier Objects* (1998), credit the French astronomer, Nicholas Peiresc, with the nebula's discovery in 1611 (*Wikipedia* says 1610). Charles Messier observed the nebula in 1769. He said Christian Huygens discovered it in 1656. Messier was wrong about Huygens being the discoverer, but it's interesting to note that Huygens said the nebula "cannot be well-observed except with large telescopes." That seems to say something about the quality of Huygens' telescopes.

M42 lies at a distance of about 1300 light years. It's really just one of the bright parts of a vast nebulosity that engulfs much of Orion. M42 is a star-forming region. The Trapezium stars are young, only a few million years old. Before the mid-1800s, many astronomers regarded nebulae as nothing more than unresolved star clusters. In 1864 the English astronomer William Huggins looked at the spectrum of the planetary nebula NGC 6543. With the assistance of his neighbor, chemist William Allen Miller, Huggins concluded that M42 consisted of luminescent gas, whereas the Great Nebula in Andromeda showed a spectrum characteristic of stars. Therefore the two "nebulae" must be fundamentally different. Huggins later looked at M42 and reached the conclusion that it, too, was luminescent gas, not a star cluster. This was one of the first steps in expanding our cosmology to include star systems beyond our own Milky Way galaxy.

M42 is now high in the east in early evening.

Clear skies.



Quiz Answer from the last Newsletter

We talk about the moon's near side and far side so we would expect that we can see 50% of the moon's surface from the Earth. But we can actually see about 59% of the surface. Why?

Libration is the slight rocking of the Moon when viewed from the Earth. Three types of lunar libration – in longitude, in latitude and diurnal is what permits more than half of the moon to be visible.

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Tidbits

This thread was recently posted to the Palomar Observatory Docent email list:

From: **Kin Searcy**
Date: **Fri, 19 Dec 2014 15:30:16 -0800**
Subject: **[pods] Dome Flats [1 Attachment]**

Check out the HPWREN image of the 200-inch taking dome flats a few minutes ago.

Kin



From: **Tiffany Duncan**
Date: **Fri, 19 Dec 2014 20:16:23 -0800**
Subject: **Re: [pods] Dome Flats**

What are dome flats?

Tiffany

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From: **Curtis Croulet**
Date: **Fri, 19 Dec 2014 21:31:38 -0800**
Subject: **Re: [pods] Dome Flats**

Tiffany, when you shoot your pictures, have you ever seen instances where the corners are darker than the middle? It's most apparent in pictures with wide-angle lenses that include a large expanse of sky. This effect of darker corners is called vignetting, and it's a natural effect when creating any image through a lens or mirror. The corners and edges get less illumination than the middle. In the old days, with film cameras, often the edges were *lighter* than the center, due to light bouncing off the interior of the camera. Also there may be dust on the sensor or on the lens, and these cause shadows. In film days there wasn't much you could do about dust or vignetting on the negative, so these the dust defects were usually manually spotted out with a fine paint brush on the final prints. In the old days of commercial film photography, people with steady hands and a good eyes (usually women) were employed to do this spotting of prints. Portrait studios were usually more aggressive with this spotting of prints, so as to smooth out wrinkles and skin blemishes. Darker or lighter corners and edges were corrected by dodging or burning parts of the final print.

These defects show up in astro images, too. With CCD cameras, we take a set of pictures of a patch of blank sky or of an evenly-illuminated panel or wall, and then we apply these "flats" or "flat frames" to the image of the galaxy, nebula, whatever, to remove the dust shadows and uneven sky. Computer software does the magic to remove these defects from the image. We use a set of flat frames, because the individual frames vary a bit, and combining several to create a "master flat" evens out the differences. When I shoot my images, I shoot pictures of a patch of sky at dusk or dawn to create my flat frames. These are called "dusk flats" or "dawn flats" or sometimes simply "sky flats."

Flats frames can also be created by shooting an evenly-illuminated wall or a lit-up patch on the interior of a dome. In years past, when I was shooting monochrome CCD images at Terry Ostahowski's place in Anza, I shot my flats off an illuminated door. That became impractical when I started doing color, because I needed flats for each of my color filters, and the illuminating mercury-vapor light produced almost no red.

That white patch at the top of the 200-inch dome is Palomar's equivalent to my illuminated door. The flat frames produced off this illuminated white patch are called "dome flats." I once asked Jean about sky flats vs. dome flats, and she told me they did whatever the astronomer wanted.

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Curtis Croulet
Anza, California



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Art's Night Out

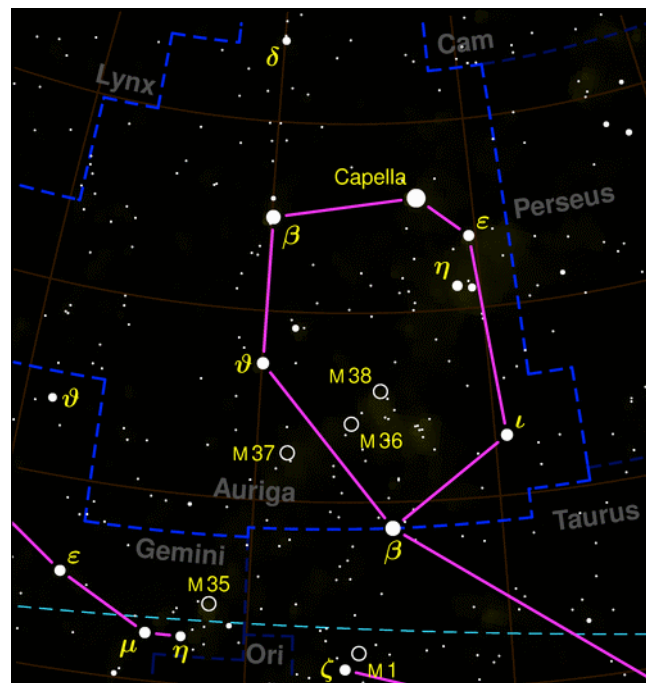
Article 155 January 2015

Happy New Year!! Another whirlwind of a year has gone by. I am happy to say that I was able to attend and enjoy our astronomy club meetings more this past year than in previous years of recent. I would like to say for not just myself, but for all the members; a great "thank you" to our past board of officers for their marvelous efforts in running our club. And, good luck and great success to our incoming board.

I am also amazed in how fast the past several years have gone by. This is my 155 article that I am writing. It seems as though I just got involved in astronomy. Many wonderful memories do I have of nights viewing with other club members, exciting star parties, and more than interesting club meetings. This hobby has truly been fulfilling to me, as I know it has been to many others.

In the recent "Reflector" magazine there is an announcement concerning a new viewing certificate that is available to Astronomical League members. It is called "Two in the View". This consists of visually seeing, sketching and identifying at least 100 of 110 listed doubled objects. These objects range from seeing two 'open star clusters' or an 'open star cluster' and a 'galaxy', or a 'nebula' and an 'open star cluster', and so on. There is a list of 110 such groupings of objects with coordinates, magnitudes and in what constellation they are found. The recommended size of telescope to locate a good number of these items is 10 inch or larger. I've looked at the list and do realize that some of them are beyond my current telescope's magnitude ability. However, there are several within my viewing ability that I can start on. I'm sure that I can get most of them if not all of them in good dark sky locations. Check it out on astroleague.org for yourself.

Okay, for tonight's viewing, let's take a look at the constellation Auriga or "**The Charioteer**". Auriga is high in our night sky, just above the constellation Orion. Auriga is identified by its 'irregular pentagon' shape of five more visible or prominent stars. The brightest of these five stars is Capella, facing north. To the east of Capella is star Beta. Looking towards the S/E at about the same distance that is between Capella and Beta, you'll see star Theta. And then looking south at a little farther distance is star Beta-Taurus (a part of the constellation Taurus). Towards the N/W at about the same distance as between Capella and Beta is star Iota. These are the five main



Constellation Auriga

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stars that make up the 'irregular pentagon' asterism in Auriga. I will use this asterism to identify a few nice open clusters for us.

As a reminder: an '*open star cluster*' is a group of stars forming a mass of stars that set themselves apart from the rest of the night sky stars in our view. They usually are shaped as ovals or discs, and sometimes more common objects. These stars are not related to one another by any force or common attraction. They just appear as being close by our visual position in relationship to their location in the universe. They do travel through our sky in the same location as do the remaining stars and objects we see.

First, find stars Theta and Beta-Tau again on the eastern side of the asterism. Using a pair of binoculars (if you have them with you) or your telescope, look half-way between these two stars and west about 2 degrees. You will see a nice mass of stars forming M-36 open star cluster. M-36 is the smallest of three fairly visible open star clusters in this area of Auriga. It has about 60 visible stars that can be viewed using a fairly good telescope.

Next, look N/E about two more degrees and you'll see another nice open star cluster called M-38. M-38 is a little larger in size and has about 100 visible stars that make up this cluster. The darker and clearer the night sky, the more of the stars in any of the open clusters become visible in good telescopes.

Next on our list is the open star cluster m-37. This cluster is found by looking back at the half-way point between Theta and Beta-Tau and then look S/E about 2 degrees. You should see it. This one is a little brighter and larger than M-38. It has about 150 stars making up its mass of stars.

These clusters make a good candidate for viewing them in the same field of view, using a pair of binoculars. I can also pick them out with the un-aided eye in really dark skies like Anza or the outer desert areas.



M-36

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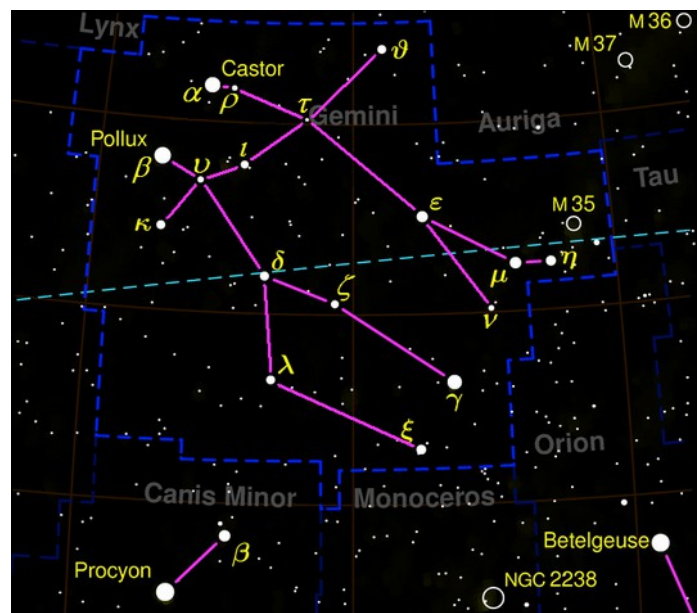


M-38



M-37

Just south of Auriga is the constellation Gemini. Gemini is also known as “The Twins”. As you look at these stars, you’ll see two brighter stars facing N/E. These are stars Pollux to the east and Castor to the N/W. To the south, S/W of these two stars run a line of stars forming the two bodies of “The Twins”. The line of stars coming from Castor heads out to almost the upper portion of Orion. At the end of these stars, you’ll see that there are three of them that curl up or towards the N/W. If you take a pair of binoculars or your scope and look just north of the last star, you can see a nice group of stars forming and open star cluster called M-35. This one is much brighter and larger than M-37 in Auriga. It has about 500 stars that form this ball of stars. It has a much smaller open star cluster just south of it called NGC2129. This one is small and has a low surface brightness. Because of this, you’ll need your telescope to see this, in most cases. I have been able to see this using my binoculars in Anza on a good dark night.



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Take a look at star Castor again. This one just happens to be a 'double star'.

Double stars are also known as 'binary star systems'. In this star system there is one star that is called the 'primary star'. It appears to be stationary while another star or multiply stars rotate around this star. These stars then move through our universe together. I have identified the 'binary star systems' before. Look at Castor using your telescope. Castor is a bright star at about 1.9 magnitude in brightness. Its' companion star (the one that rotates around it) is about half as bright at magnitude 3. These two stars are separated by 4.5 arc seconds. This puts the separation within our viewing ability. See how you do.

Next, look down the line of stars coming from star Pollux. The first visible star is star Wasat or Delta. This is another 'double star'. Even though less bright than Pollux, it is still seen with the naked eye. It will take a dark night to split the two stars using a pair of binoculars, you should see them both using your telescope. The primary star is a magnitude 5 and the companion is a magnitude 8, which puts it within our viewing limits. The separation between these two stars is 7 arc seconds, which should also be visible.

Well, I think that will do it for tonight. Hope you enjoyed the viewing.

Until next time, Art