Temecula Valley Astronomer

The monthly newsletter of the Temecula Valley Astronomers Dec 2015

Events:

General Meeting : No Meeting in December

Next General Meeting : Monday, Jan 4, 2016 at the Temecula Library, 30600 Pauba Rd, Rm. B at 7 pm.

For the latest on Star Parties, check the web page.

NASA APOD: M45: The Pleiades Star Cluster
Image Credit & Copyright: Marco Lorenzi (Glittering Lights)

WHAT'S INSIDE THIS MONTH:

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

Like us on Facebook

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

President: Mark Baker 951-691-0101 <shknbk13@hotmail.com>
Vice President: Chuck Dyson <mrplegia@gmail.com>
Past President: John Garrett 951-609-3021 <garrjohn@gmail.com>
Treasurer: Curtis Croulet <calypte@verizon.net>
Secretary: Deborah Cheong <geedeb@gmail.com>
Club Librarian: Bob Leffler 951-541-5400 <bobjleffler@msn.com>
Facebook: Tim Deardorff 951-775-1036 <tim-deardorff@yahoo.com>
Star Party Coordinator and Outreach: Deborah Cheong <geedeb@gmail.com>

Address renewals or other correspondence to:
Temecula Valley Astronomers
PO Box 1292
Murrieta, CA 92564

Mailing List: tvastronomers@googlegroups.com
Website: http://www.temeculavalleyastronomers.com/

Temecula Valley Astronomer
The monthly newsletter of the Temecula Valley Astronomers Dec 2015

Cosmic Comments – December/2015
by President Mark Baker

I have taken some time of late to wander through the JPL and NASA websites and have thoroughly enjoyed the journey. Both have exceptional and quality videography related to their specific and joint missions. I was inspired by Paul Kreitz's presentation on the History of Mars Exploration so started looking into the related missions. But there is such an extensive library of subjects to peruse and purvey that I think there is something for everybody, from novice to highly experienced and technical.

So next time you sit down at the keyboard, take a side trip in their websites…but be warned, you might just get all consumed and completely lose track of time!! Enjoy

Clear, Dark Skies my Friends…

TVA Apparel
by Mark Baker

Following is the "maximum" cost list for TVA apparel, including tax, based on a minimum order of twelve(12) total pieces. The more we order at a given time, the lower the cost will be...note 2X and larger sizes will be slightly extra.

```
Tee's, short sleeve $13.00            Tee's, long sleeve $15.25
Ladies V-neck, short sleeved $17.25   Crew neck sweat shirt $16.25
Pullover Hoodie   $21.75              Zip-up Hoodie $27.00
Polo Shirt, cotton blend $17.25
```

Let me know **style, size, and quantity**...all shirts are Black at this time. They can be paid for when they are picked up. We hope to get an order in by 12/20/15 so we can have them back by the 1/4/16 meeting... This is a good way to show some Club spirit, as well as advertise your love for things Celestial...thank you!!

Front

Back

Looking Up – December 2015
by Curtis Croulet

Last Quarter Moon is December 2 at 11:40 AM; **New Moon** is December 11 at 2:29 AM; **First Quarter Moon** is December 18 at 7:14 AM; and **Full Moon** is December 25 at 3:11 AM.

The **Winter Solstice**, when the Sun is as far south as it can go, occurs at 1:48 AM, December 22. This is also the "shortest day of the year," meaning the hours of continuous daylight are the shortest. The earliest sunset and latest sunrise do not, however, occur at the solstice. The earliest sunset at our latitude is about December 7, and the latest sunrise is about a month later.

We will have no bright planets available for evening star parties for several months.

Mercury will be in the evening sky all of December, but you won't have a good view of it until the second half of the month.

Venus and **Mars** are both in the pre-dawn sky. **Venus** begins December at magnitude -4.2, dimming slightly to -4.1 by the end of the year. **Mars** averages around mag +1.4. Opposition for Mars is May 22, 2016.

Jupiter creeps into the late evening sky, setting at 10:30 PM on the last day of December. Opposition is March 8, 2016.

Saturn becomes a pre-dawn object during December.

Uranus and **Neptune** are well-placed for evening viewing in Aquarius and Pisces, respectively. **Pluto** is too close to the Sun and not visible.

The best of the annual meteor showers is the **Geminid Meteors**, best seen on the nights of December 13-14 and 14-15. The Moon will not interfere with the best viewing, which is after midnight. Both nights should be equally good.

Let's look up.

Well up in the December evening sky at sunset is the constellation Taurus, the bull. When I see Taurus, I see a prominent V-shaped asterism, the Hyades and Aldebaran, which represent the head of the bull. Taurus has two long horns, one of which joins the star pattern of Auriga, the charioteer. At this time of year, Taurus is looking down at the eastern horizon. Mythologically, Taurus is one of the oldest of the constellations. The Greeks considered Taurus to be the god Zeus as he had shape-shifted himself into a bull. But the identification of the constellation as a bull is much older than the Greeks. At least one archaeologist considers

one of the paintings in the caves at Lascault, France, to represent Taurus. The cave paintings are an estimated 17,000 years old.

Taurus is part of the zodiac, the twelve constellations along the ecliptic, which marks the annual path of the Sun through the sky. During ancient Egyptian times, the Sun was in Taurus at the Vernal Equinox. Precession has pushed the point of the equinox into Aries. Vigilant readers will note that I have intentionally excluded a thirteenth constellation from the zodiac, the summer constellation Ophiuchus, whose official boundaries extend across the ecliptic. That's a topic for another time.

In the shoulder of the bull are the Pleiades, probably the best-known of all open clusters. Anybody who has set up their telescope for a public outreach event during the late autumn and winter months has had the experience of someone pointing straight up and asking, "Is that the 'Little Dipper?'" To be sure, the Pleiades are a better "Little Dipper" than Ursa Minor. No, they're not the "Little Dipper," but the Pleiades are one of the most striking asterisms in the sky. The bright stars we see are part of an open cluster of hundreds of young, hot, blue stars, all formed within the past 100 million years. Most of the stars lie well beyond the "Little Dipper" asterism. Long exposure images show the Pleiades to be embedded in tenuous nebulosity. The nebulosity was once thought to be remnants of the nebula out of which the Pleiades formed, but we now know that the cluster is simply passing through a much larger area of unrelated nebulosity. The Pleiades average about 444 light years away from us.

A persistent puzzle about the Pleiades is, why are they called the "Seven Sisters?" Most eyes can only see six bright stars in the "little dipper" asterism. Young eyes might see two or three more. The Greeks regarded the Pleiades as the seven daughters of Atlas and Pleione. Some people have suggested that there really were seven bright stars, but one has faded during the past three millennia. As far as I know, there is no direct evidence for a seventh star similar in brightness to the six we see now. The probable but rather unsatisfying explanation is that the Greeks weren't particularly fussy about matching the exact number of visible stars to the number of Atlas's daughters.

The magnitude 0.87 red-giant star Aldebaran lies at one end of the V-shaped Hyades cluster. In mythology, Aldebaran marks the bull's right eye. But the alignment of Aldebaran in front of the Hyades is nothing more than a chance configuration. Aldebaran is about 65 light years away, whereas the Hyades are 153 light years away. One interesting factoid about Aldebaran is that between 420 thousand and 210 thousand years ago, Aldebaran was the brightest star in the Earth's sky. At its brightest, 320 thousand years ago, Aldebaran was magnitude -1.54, a bit brighter than Sirius is now. Aldebaran is receding from us faster than any other first magnitude star.

The Hyades are the closest of all open star clusters. Their distance has been accurately pegged at 153 light years. The Hyades cluster has been intensively studied as part of the cosmological distance ladder. Knowing the exact distance to the Hyades allows us to determine the absolute magnitudes of its individual stars, which then allows us to estimate the distance to more distant clusters with stars of the same spectral class.

Taurus has always been one of my favorite constellations, as its appearance in the evening sky signals the arrival of other winter constellations.

Clear skies.

Our Solar System Is *Almost* Normal, But Not Quite
by Ethan Siegel

It was just over 20 years ago that the very first exoplanet was found and confirmed to be orbiting a star not so different from our own sun. Fast forward to the present day, and the stellar wobble method, wherein the gravitational tug of a planet perturbs a star's motion, has been surpassed in success by the transit method, wherein a planet transits across the disk of its parent star, blocking a portion of its light in a periodic fashion. Thanks to these methods and NASA's Kepler spacecraft, we've identified many thousands of candidate planets, with nearly 2,000 of them having been confirmed, and their masses and densities measured.

The gas giants found in our solar system actually turn out to be remarkably typical: Jupiter-mass planets are very common, with less-massive and more-massive giants both extremely common. Saturn—the least dense world in our solar system—is actually of a fairly typical density for a gas giant world. It turns out that there are many planets out there with Saturn's density or less. The rocky worlds are a little harder to quantify, because our methods and missions are much better at finding higher-mass planets than low-mass ones. Nevertheless, the lowest mass planets found are comparable to Earth and Venus, and range from just as dense to slightly less dense. We also find that we fall right into the middle of the "bell curve" for how old planetary systems are: we're definitely typical in that regard.

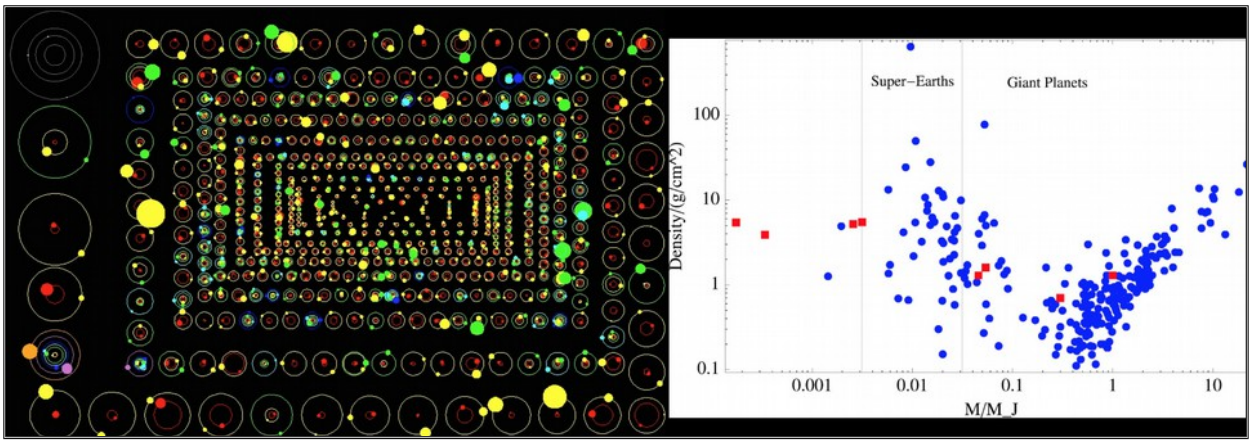
But there are a few big surprises, which is to say there are three major ways our solar system is an outlier among the planets we've observed:

- All our solar system's planets are significantly farther out than the average distance for exoplanets around their stars. More than half of the planets we've discovered are closer to their star than Mercury is to ours, which might be a selection effect (closer planets are easier to find), but it might indicate a way our star is unusual: being devoid of very close-in planets.

- All eight of our solar system's planets' orbits are highly circular, with even the eccentric Mars and Mercury only having a few percent deviation from a perfect circle. But most exoplanets have significant eccentricities, which could indicate something unusual about us.

- And finally, one of the most common classes of exoplanet—a super-Earth or mini-Neptune, with 1.5-to-10 times the mass of Earth—is completely missing from our solar system.

Until we develop the technology to probe for lower-mass planets at even greater distances around other star systems, we won't truly know for certain how unusual we really are!



Images credit: NASA / Kepler Dan Fabricky (L), of a selection of the known Kepler exoplanets; Rebecca G. Martin and Mario Livio (2015) ApJ 810, 105 (R), of 287 confirmed exoplanets relative to our eight solar system planets.

This article is provided by NASA Space Place.
With articles, activities, crafts, games, and lesson plans, NASA Space Place encourages everyone to get excited about science and technology.
*Visit **spaceplace.nasa.gov** to explore space and Earth science!*

The TVA is a member club of The Astronomical League.