Temecula Valley Astronomer

The monthly newsletter of the Temecula Valley Astronomers Feb 2016

Events:

General Meeting : Monday, Feb 1, 2016 at the Temecula Library, 30600 Pauba Rd, Rm. B at 7 pm.

Following President Mark Baker's comments, Chuck Dyson will present "What's Up". Then Mark will return with a presentation on the James Webb Space Telescope. Learn about the telescope and its capabilities and find out what this thing called a Lagrange Point is all about.

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

Clavius crater – Named for the Jesuit priest Christopher Clavius. Who is Clavius? Look at Curtis' "Looking Up" article. LROC image NASA photo.

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.

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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/

Cosmic Comments – February/2016
by President Mark Baker

The Search for Planet 9 is now in full swing… the visible proof that a smallish Jovian sized gas planet is lurking out in the Kuiper Belt has become the latest gauntlet for amateur astronomers to pick up. What a great project for an observatory complex to take on…especially one that can observe, image, and even perform spectroscopy like I hope we have in place this year. But even if we are too late for this one, there are still a myriad of projects that we can be a part of.

The possibilities excite me…

But in the meantime, we should be getting more specific data on rough orbit and location if you are of a mind to shed first "light" on this object…and have first shot at naming it even!!! I think Bob is a good name…could be fun.

Clear, Dark Skies my Friends…

TVA Apparel
by Mark Baker

We reached our ordering goal and the order just might be ready by the February meeting.

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Looking Up – February 2016
by Curtis Croulet

Last Quarter Moon is January 31 at 7:28 PM; **New Moon** is February 8 at 6:39 AM; **First Quarter Moon** is February 14 at 11:46 PM; **Full Moon** is February 22 at 10:20 AM.

Mercury is a pre-dawn object most of February, although very low in the final few mornings. The best evening apparition of Mercury in 2016 will be in April.

Although **Venus** is already well past greatest western elongation in the morning sky, its approach to the Sun seemingly takes forever, because **Venus** is moving away from us. Superior conjunction, when **Venus** is furthest from us on the far side of the Sun, doesn't occur until June 6. **Venus** remains at about mag -3.9 the entire month.

Mars rises as early as 12:30 AM on February 1 and about 15 minutes before midnight on February 29. Opposition for **Mars** is May 22, 2016.

Jupiter rises around 8:20 PM on February 1 and around 6:15 PM on February 29. Opposition is March 8, 2016.

Saturn is still a morning object. Opposition is the night of June 2-3.
It's getting a bit late in **Neptune**'s annual cycle to see it in the evening sky, although you might try early in the month. It sets a bit after 7 PM on February 1. On the other hand, **Uranus** is still a viewing possibility in the evening sky all month. They are in Pisces and Aquarius, respectively.

Pluto reached conjunction with the Sun on January 6. Wait until late spring for this one.
There are no good **meteor showers** in February.

Comet: C/2013 US10 (Catalina), more easily known as **Comet Catalina**, is in the circumpolar northern sky now. For its location, go to either *Sky & Telescope* magazine, December 2015, p.45, for a good chart, or go to www.skyandtelescope.com/observing/ and look for the link to "Comet Catalina Sails into Northern Skies." The comet is currently 6th magnitude, difficult for the naked eye, but easy in ordinary binoculars.

Let's look up.

Be sure to look for Canopus, second brightest star in the night sky, near the southern horizon on February evenings.

Now let's look at our calendars.

2016 is a leap year. That means we add an extra day (called a "leap day") to the second month, giving February 29 days instead of the usual 28. We add an extra day to February in every year divisible by 4, except those years that end in 00 but which aren't divisible by 400. Thus, 2012 was a leap year, 2016 is a leap year, and 2020 will also be a leap year, etc.

However, 1900, which was not divisible by 400, was not a leap year, and neither was 1800. 2000 was divisible by 400. Therefore, 2000 was a leap year, but 2100 will not be a leap year. All of this is according to the Gregorian Calendar, which was adopted in 1582. It's named after Pope Gregory XIII. The Gregorian Calendar was a corrected version of the Julian Calendar, which was adopted in 45 BC. The early Julian Calendar made very third year a leap year, and this wasn't changed to every fourth year for several decades. The Romans mucked about with their calendar much more extensively than we have space to describe. Prior to the Julian Calendar, not all calendar years had the same number of days, and extra days were added to some months on a non-systematic basis. The Romans numbered their calendar years from the dates of accession of emperors, much as the Japanese number their traditional calendar years from the accession of the ruling dynasty.

Our current system of counting years from the presumed birth of Jesus Christ was created by Dionysius Exiguus in AD 525. He left no clue as to how he estimated the year of Christ's birth. His system of counting years wasn't widely adopted in Europe until after AD 800. "AD" stands for "anno domini," or "year of our Lord." Extending back into time, years prior to the presumed birth of Jesus Christ have been designated "BC," from the English "Before Christ." Exiguus's system didn't include a zero year, so year 1 BC was followed by year AD 1. Since the Gregorian Calendar is now used worldwide, there's been a general move away from the religion-based abbreviations AD and BC to CE ("common era") and BCE ("before common era"), respectively.

All of this begs the question: why do we need leap years and leap days? For convenience, most years have 365 days. But the "tropical year," the length of time between astronomical events such as vernal equinoxes, is about 365.242189 days. I have to say "about," because it varies slightly from year to year. So every fourth year we add an extra day to the year (February 29) to allow the tropical year to catch up with the calendar year. This is what the Julian Calendar did. But adding the extra day to every fourth year was slightly too much of a good thing, and the tropical year fell behind the calendar year by about one day every 128 years. By 1582, the accumulated error was 11 days, which meant that important religious events were occurring 11 days earlier than when the Julian Calendar was adopted.

Something had to be done. In 1582 Pope Gregory XIII consulted his mathematician, Christopher Clavius. He's the guy for whom one of the largest craters on the Moon is named. Gregory decided to immediately strike 10 days from the calendar. Thursday, October 4, 1582, was followed by Friday, October 15, 1582. Then he changed the system of adding a leap day every fourth year to exclude those years ending in 00, except when those years were also divisible by 400.

The Gregorian Calendar was quickly adopted in Catholic countries, but it wasn't adopted in England and its colonies until 1752. It wasn't adopted in Russia until 1918, and not in Greece until 1923. Even with these corrections, a residual error of one day will accumulate by the next millennium, which will require another correction, if the Gregorian Calendar is still in use at that time.

Clear skies.

The Loneliest Galaxy In The Universe
by Ethan Siegel

Our greatest, largest-scale surveys of the universe have given us an unprecedented view of cosmic structure extending for tens of billions of light years. With the combined effects of normal matter, dark matter, dark energy, neutrinos and radiation all affecting how matter clumps, collapses and separates over time, the great cosmic web we see is in tremendous agreement with our best theories: the Big Bang and General Relativity. Yet this understanding was only possible because of the pioneering work of Edwin Hubble, who identified a large number of galaxies outside of our own, correctly measured their distance (following the work of Vesto Slipher's work measuring their redshifts), and discovered the expanding universe.

But what if the Milky Way weren't located in one of the "strands" of the great cosmic web, where galaxies are plentiful and ubiquitous in many different directions? What if, instead, we were located in one of the great "voids" separating the vast majority of galaxies? It would've taken telescopes and imaging technology far more advanced than Hubble had at his disposal to even detect a single galaxy beyond our own, much less dozens, hundreds or millions, like we have today. While the nearest galaxies to us are only a few million light years distant, there are voids so large that a galaxy located at the center of one might not see another for a hundred times that distance.

Image credit: ESA/Hubble & NASA and N. Gorin (STScI); Acknowledgment: Judy Schmidt, of the loneliest void galaxy in the known: MCG+01-02-015.

While we've readily learned about our place in the universe from observing what's around us, not everyone is as fortunate. In particular, the galaxy MCG+01-02-015 has not a single known galaxy around it for a hundred million light years in all directions. Were you to draw a sphere around the Milky Way with a radius of 100 million light years, we'd find hundreds of thousands of galaxies. But not MCG+01-02-015; it's the loneliest galaxy ever discovered. Our Milky Way, like most galaxies, has been built up by mergers and accretions of many other galaxies over billions of years, having acquired stars and gas from a slew of our former neighbors. But an isolated galaxy like this one has only the matter it was born with to call its own.

Edwin Hubble made his universe-changing discovery using telescope technology from 1917, yet he would have found absolutely zero other galaxies at all were we situated at MCG+01-02-015's location. The first visible galaxy wouldn't have shown up until we had 1960s-level technology, and who knows if we'd have continued looking? If we were such a lonely galaxy, would we have given up the search, and concluded that our galaxy encompassed all of existence? Or would we have continued peering deeper into the void, eventually discovering our unusual location in a vast, expanding universe? For the inhabitants of the loneliest galaxy, we can only hope that they didn't give up the search, and discovered the entire universe.

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