Temecula Valley Astronomer

The monthly newsletter of the Temecula Valley Astronomers Jan 2021

Events:

Virtual meeting via Zoom on 4 January at 7PM. Join your fellow astronomers for What's Up, IFI and a Gallery. Watch your club email for meeting ID and password.

Until we can resume our monthly meetings, you can also interact with your astronomy associates on Facebook or by posting a message to our mailing list.

Mosaic of Sol Invictus in Mausoleum M in the Vatican Necropolis. Source: Wikipedia.

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.

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
by President Mark Baker

2019 was a banner year for Astronomy in general and for the TVA as well…and 2020 WAS looking to continue that trend. And then a pandemic got in the way…

But that doesn't mean the TVA just curled up and hibernated…!!! We found a way to meet, albeit virtually, via Zoom. We opened up more avenues for Outreach by expanding our website and Facebook page visibility… and then, of course, we bucked the trend of "hiding away" and held Friday night Star Parties at South Coast Winery that were unqualified successes, all while maintaining protocols and social distancing!!!

And in spite of COVID, great things occurred in Science, in general… so no, Space Research and Science did not die, but in fact, it burgeoned, if anything. And yes, Astronomy led the way, whether Atmospheric, Low Earth Orbit, Lunar, Planetary, and/or Deep Space…whether provided by professionals and/or amateurs. It's still a team effort across ALL demographics…

Every meeting we held, regardless of format, every Star Party we conducted, every school we supported, was part of the much bigger picture and WE still got to inspire many to jump in, Look Up, and get involved…for me, that is always the fun part!!!

So here's to an awesome 2021, where TVA will hopefully get to partake and enjoy the fruits of our labors, even if vicariously… and yes, the mantra still holds - "The Stars Are Calling, So We Must Go"!!!

Clear, Dark Skies my Friends…

Editor's Note
by Mark DiVecchio

After many years of assembling the Temecula Valley Astronomer, it is time for me to step away. I have told President Baker that the April 2021 newsletter will be my last.

This is your chance to step in and make the newsletter better than it was. But more importantly, to give back to the TVA and to make its future birght.

Mark DiVecchio

Looking Up Redux
compiled by Clark Williams

from these sources:
SeaSky.org
Wikipedia.com
in-the-sky.org
The American Meteor Society, Ltd.
cometwatch.co.uk
NASA.gov
TVA App (2.0.1296)
FullAndNewMoon App (2.0)
Starry Night Pro Plus 7 (7.6.3.1373)
SkySafari 6 Pro (6.1.1)
Stellarium (0.18.2)
timeanddate.com/astronomy
https://www.fourmilab.ch/earthview/pacalc.html

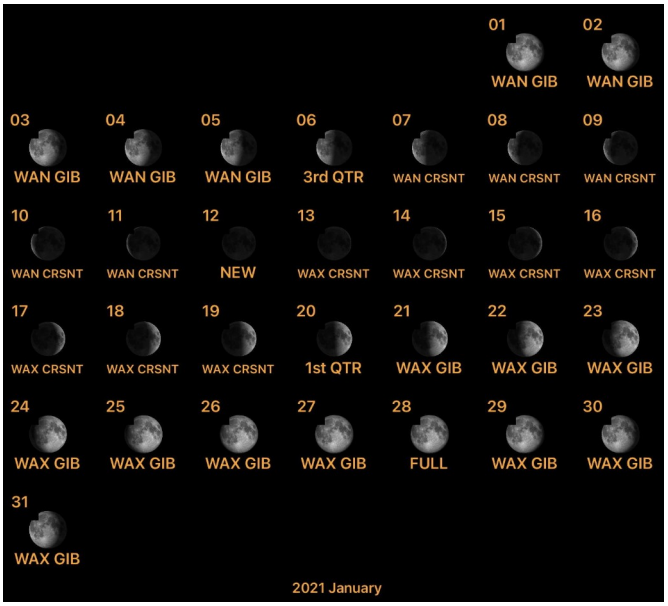
ALL TIMES ARE LOCAL PACIFIC TIME UNLESS NOTED OTHERWISE

Times are given in 24-hour time as: (hh is hours, mm minutes, ss seconds)
- hh:mm:ss or hhmmss
- hhmm+ (time of the next day)
- hhmm− (time of the previous day)
- hhmm (seconds not shown)
- yyyymmddThhmmss (Full date as: year month day Time separator hours minutes seconds)

Moon Phases for the month by phase:

Wednesday	**the 20^{tht}**	**@ 1302 FIRST QTR in PISCES**
Thursday	**the 28th**	**@ 1117 FULL in CANCER**
Wednesday	**the 6th**	**@ 0138 THIRD QTR in VIRGO**
Tuesday	**the 12th**	**@ 2101 NEW in SAGITTARIUS**

Apogee comes on 2021-01-21 @ **0512 – 404,360 km (251,257 mi)**
Perigee comes on 2021-01-09 @ **0740 – 367,389 km (228,285 mi)**



2021 has: (12) new moons, (12) 1st Qtr moons, (12) Full moons, (13) 3rd Qtr moons (0) Blue moons and (0) Black moons

Daylight Savings: Starts: 2021-Mar-14 : Ends: 2021-Nov-07

Luna: Luna is nearly Full on the 1st of the month. Luna rises at **1932**, transits at **0242+** and sets by **0946+**. Luna by mid-month is a Waxing Crescent, 10% illuminated. Rising at **0857** and setting in the evening at **1952**. By the-end-of-the-month Luna is Waning Gibbous, 85% illuminated rising at **2038**, transiting at **0306+** setting by **0930+**.

Highlights: (distilled from**: SeaSky.org** and **Clark's planetary Orrey** program[s]**)**

January 2, 3 - Quadrantids Meteor Shower. The Quadrantids is an above average shower, with up to 40 meteors per hour at its peak. It is thought to be produced by dust grains left behind by an extinct comet known as 2003 EH1, which was discovered in 2003. The shower runs annually from January 1-5. It peaks this year on the night of the 2nd and morning of the 3rd. The waning gibbous moon will block out most of the faintest meteors this year. But if you are patient, you should still be able to catch a few good ones. Best viewing will be from a dark location after midnight. Meteors will radiate from the constellation Bootes, but can appear anywhere in the sky.

January 12 - New Moon. The Moon will located on the same side of the Earth as the Sun and will not be visible in the night sky. This phase occurs at 21:02. This is the best time of the month to observe faint objects such as galaxies and star clusters because there is no moonlight to interfere.

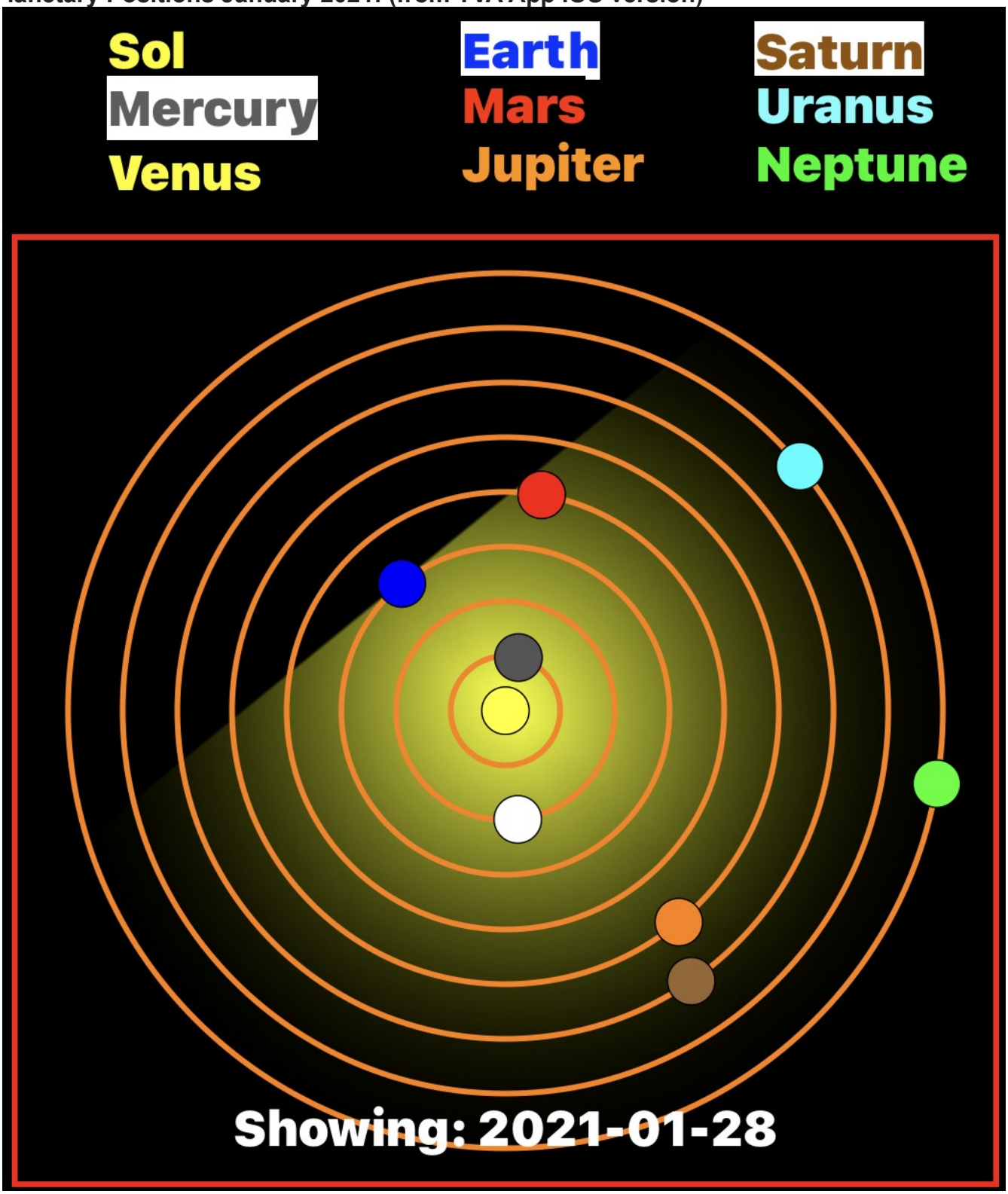
January 24 - Mercury at Greatest Eastern Elongation. The planet Mercury reaches greatest eastern elongation of 18.6 degrees from the Sun. This is the best time to view Mercury since it will be at its highest point above the horizon in the evening sky. Look for the planet low in the western sky just after sunset.

January 28 - Full Moon. The Moon will be located on the opposite side of the Earth as the Sun and its face will be will be fully illuminated. This phase occurs at 11:17. This full moon was known by early Native American tribes as the Wolf Moon because this was the time of year when hungry wolf packs howled outside their camps. This moon has also been know as the Old Moon and the Moon After Yule.

Algol minima: (All times Pacific Time)

01/03/2021	1155
01/06/2021	0844
01/09/2021	0533
01/12/2021	0222
01/14/2021	1321
01/17/2021	2001
01/20/2021	1650
01/23/2021	1339
01/26/2021	1029
01/29/2021	0718

Planets:
Planetary Positions January 2021: (from TVA App iOS version)



- **Mercury:** Mercury is a morning object all month. Mercury is trailing Sol all month. You're pretty much out-of-luck all month if Mercury is your thing.
- **Venus:** Is the Morning Star in the beginning of the month, rising at **0524** preceding sunrise at **0652**. Venus is approaching the Sun during January. By mid-month Venus rises at **0547** followed by Sol at **0651**. By the 31st Venus is rising at **0603**. followed by sunrise at **0644.**
- **Mars:** Mars is rising during the afternoon on the 1st of the month, but should be visible by about **1745**. Mars will transit at **1843** and doesn't set until **0118+**. There will be a nearly full moon rising by **1932**. By mid-month Mars is rising during the morning hours, transiting at **1812** and setting at **0055+**. End-of-month finds the Warrior rising at **1051**, transiting at **1742 and** setting by **0032+**.
- **Jupiter:** On the first of the month you may be able to pick Jove out after sunset about 1745. Jupiter will set by 1831 and it will be low on the Western horizon. This will hold true though the rest of the month. The Moon will rise after Jupiter sets on the 1st. By mid-month Jupiter is lost to the Sun and a young moon. Come the end of month Jupiter is lost to the Sun.
- **Saturn:** Saturn is leading Jupiter and the two are close on the sly. See Jupiter for Saturn's information.
- **Uranus:** If Jove and Saturn are gone from the night sky this month Uranus and Neptune are perfect jewels. On the first Uranus rises at **1239**, transits at **1919** and sets by **0159+**. The apparent magnitude is 5.72 so we're on the ragged edge of being naked-eye visible. The Astronomer's Bane will be to the east but doesn't rise until **1932**. By the ides Uranus is visible around **1745** transiting at **18124** and setting by **0103+**. End of the month and the "sky god" is visible about **1830**, and setting by **0001+** while a Waning gibbous 85% illuminated Moon glares away 89° to the east. Luna does not rise until **2038** giving you some time to spend marveling at Uranus.
- **Neptune:** Neptune is leading Mars and Uranus. Neptune is rising mid-morning in the beginning of the month, transiting at **1620**, setting by **2209**. There is a near Full Moon but it doesn't rise until **1932**. By the 15th Neptune is should be visible by about **1740** and setting at **2115**. By the end of the month Neptune should be visible by **1755** and setting by **2015**. The Moon doesn't rise until **2038**.
- **Pluto:** Is lost to the Sun all month.

Asteroids:

- Still a dearth of asteroids. I searched for asteroids in 2021 with a reasonable magnitude; say less than or equal to +10 in January there are a few beyond the regulars: Juno, Vesta. Hebe, Eros and Herculina. So consult your local planetarium software for more or try: https://www.asteroidsnear.com/year?year=2021

  (1) Ceres Dwarf Planet in Aquarius 1st -- 31st rising: mag 9.4 – is the largest and most massive asteroid in the inner Solar System.
  (16) Phyche Asteroid in Taurus 1st – 31st rising: mag 10.8 – Psyche is one of the ten most massive asteroids in the main belt, and is the most massive M-type asteroid.
  (8) Flora Asteroid in Aries 1st – 31st rising: mag 10.3 – a large, bright main-belt asteroid.

Meteors:

- See Highlights above for more details. (SeaSky.org**)** (American Meteor Society)

Comets: come in various classifications:

- 1) Short Period comets – further broken down into:
  - Halley Type: The Halley Types are believe to come from the Kuiper Belt and have periods in excess of 20-years.
  - Jupiter Type: The Jupiter types have a period less than or equal to 20-years.
  - Short period comets have a near circular orbit or an elliptical orbit. The latter being far more common.
- 2) Long Period comets – thought to originate from the Oort cloud these comets have periods of over 200 years and have random inclinations around the celestial sphere.

Deep Sky:

Notes:

L/Z abbreviation for ALT/AZ
R/D abbreviation for Right Ascension/Declination
α is right ascension
δ is declination
In each case, unless otherwise noted, you should look for the following on or about the 15th Day of January 2021 at 2100 PDT and you will have about 20 minutes of viewing time total.

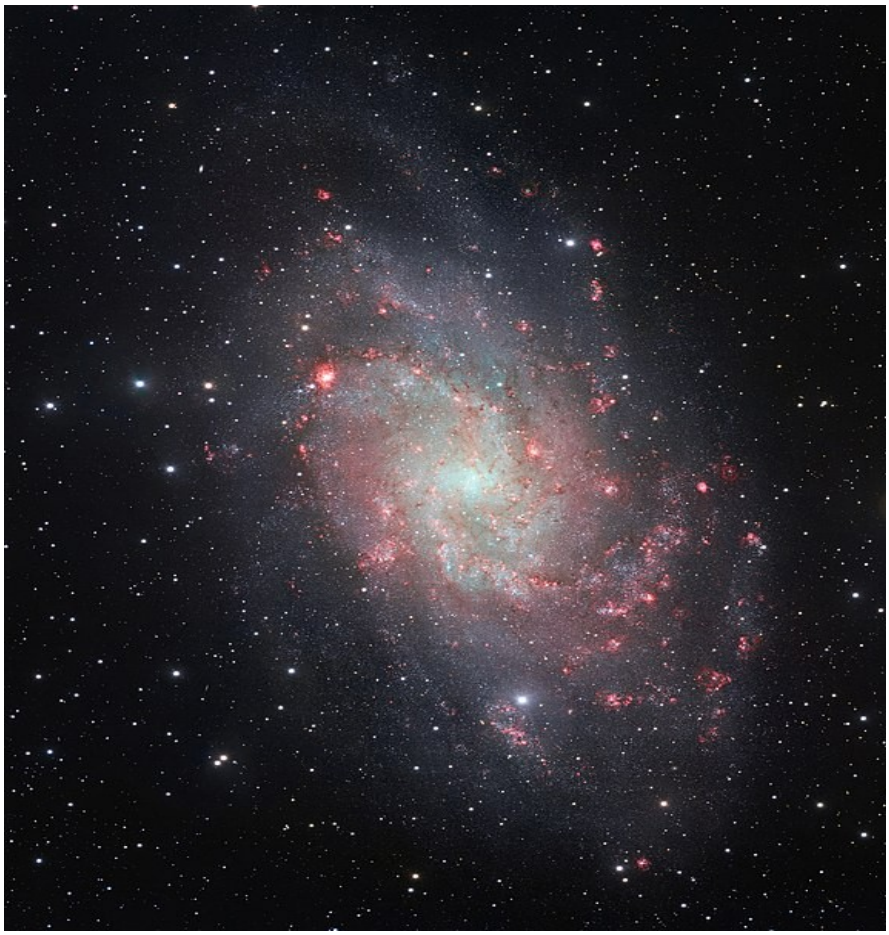
- NGC 2264

By ESO/PESSTO/S. Smartt - http://www.eso.org/public/images/potw1335a/, CC BY 4.0, https://commons.wikimedia.org/w/index.php?curid=28062885

Messier 74 (also known as NGC 628 and Phantom Galaxy) is a spiral galaxy in the constellation Pisces. It is at a distance of about 32 million light-years away from Earth. The galaxy contains two clearly defined spiral arms and is therefore used as an archetypal example of a grand design spiral galaxy. The galaxy's low surface brightness makes it the most difficult Messier object for amateur astronomers to observe. However, the relatively

large angular size of the galaxy and the galaxy's face-on orientation make it an ideal object for professional astronomers who want to study spiral arm structure and spiral density waves. It is estimated that M74 is home to about 100 billion stars (Wikipedia)

- **Triangulum Galaxy**



By ESO - http://www.eso.org/public/images/eso1424a/, CC BY 4.0, https://commons.wikimedia.org/w/index.php?curid=34571682

- The Triangulum Galaxy is a spiral galaxy 2.73 million light-years (ly) from Earth in the constellation Triangulum. It is cataloged as Messier 33 or NGC 598. The Triangulum Galaxy is the third-largest member of the Local Group of galaxies, behind the Milky Way and the Andromeda Galaxy. It is one of the most distant permanent objects that can be viewed with the naked eye.

  The galaxy is the smallest spiral galaxy in the Local Group and is believed to be a satellite of the Andromeda Galaxy or on its rebound into the latter due to their interactions, velocities, and proximity to one another in the night sky. It also has an H II nucleus.. (Wikipedia)

January is great for both viewing and imaging. Spend some time outside with your scope. Winter objects are here.

For now – Keep looking up.

Random Thoughts – Can Somebody Please Create a Reasonable Calendar!

by Chuck Dyson

It seems as though if you are a big “G” or little “g” god or any form of sky deity, the people on Earth absolutely must worship/venerate/honor you on a specific day and no other. Otherwise, famine, flood, drought, or fleas will be your lot for your failure. This situation quite naturally has created a need for some sort of a calendar to tell us when the big days are so that we may perform the appropriate actions to appease those who live on high as it were.

In order not to freeze, fry, drown, dry-up, or get eaten by fleas, it was obvious to our ancestors that they needed to get to work on a reliable and accurate calendar.

The Sumerians were the first to have a recognized regular calendar that was based on the lunar cycles. Their calendar was 12 months of 29 or 30 day cycles that started with the first sighting of the new moon. This gave them a year of about 354 days, just a little short of 365.25. So every three years or so they threw in an extra month; the goal was to keep the calendar in sync with the spring rising of the rivers so that crops could be planted and irrigated easily. Eventually the calendar days changed to 12 months of 30 days each with 5 days of festival added on at the end of the year, a little whoopee time. Eventually the Sumerians settled on a calendar of 12 months of thirty days each with five extra days added on each year (whether it is days, weeks, months, or years that are added on, they are called intercalary or epagomenal times). The lucky numbers for the Sumerians were 6 – 12 – 60 and it is thought that this is where we get our 12 hours of AM tine and 12 hours of PM time and our 60 minute hour and 60 second minute. In 499 BC the Sumerians recognized a relationship between the sun and the moon that is every 19 solar years, exactly equals 235 lunar cycles, and this allows for some astronomical predictions to be made and is called a lunisolar calendar. Note: Today we also use the Saros cycle. This is that every 223 synodic months equals 18 years, 11 days, 8 hours and is used to predict the time and place of lunar and solar eclipses.

Hot on the heels of the Sumerians were the Egyptians who were also eager to get into the calendar business. Their calendar was three seasons of 120 days each. Each season had four months of 30 days. Each month had three weeks of ten days (a long work week!). And, of course, the Egyptian calendar always needed five or six intercalary days added on to make it fit with the actual year. The major purpose of the Egyptian calendar was to inform everyone when to expect the next flooding of the Nile and the start of the planting season. Everyone was happy with this until 238 B.C. when Ptolemy III decides that he has a better calendar idea and puts out the word on his new 365 ¼ day annual calendar in the form of a granite stele that we now call the Canopus Decree. The calendar a total flop but in order to be certain that all people get the word, this stele and others are all engraved in the three main scripts of the time (Greek, Demonic, and Hieroglyphs) and it is this stele and others, notably the Rosetta Stone, that enable scholars in the 1700’s to decipher the Egyptian Hieroglyphs.

The Romans, lovers of math all, practically turned calendar design into an art form; one historian describes the Roman calendars as simply an awful mess. The original calendar had ten months and a year of 304 days with 61 days in January and February that were just there.

An “improved” calendar was adopted that had twelve months and 355 days in it but soon got into trouble; so, the Romans added an extra month every 2 to 3 years with 27 or 28 days in it so that every 24 years the average year for that period would be 365 ¼ days. Finally in what is today recognized as 46 B.C. Julius Caesar says “Hey! This guy Ptolemy III had a great idea for a calendar, so we are going to adopt it.” The Julian Calendar takes effect in 45 B.C.. The new calendar moves the date of the winter solstice from December 25 to December 21, but everyone still celebrates the big Roman winter holiday of Solis Invictus on Dec 25. Because the population is broke and hungover from the December 25th party it is almost impossible to get people to celebrate the birth of Jesus on January 6th. What to do? In 325 A.D. Emperor, and head of a big chunk of the Church, Constantine I declares December 25Th the actual birth date and January 6th to be the Epiphany or revealing of the true nature of Jesus; nicely played Constantine, nicely played.

The Julian calendar will rattle on for another 200 years when, because it uses a 365.25 day length of the year when the actual time is 365.24 days, it will slowly slip out of sync with the seasons and various groups of churches will all be celebrating Easter on different days Pope John I requested one Dionysius Exiguus to straighten things out and predict the correct date of Easter for the next 95 years. Dionysius produces the requested charts with Easter on them and produces a set of rules for determining Easter that everyone can follow. The Julian calendar was dated from the first year of Emperor Diocletian’s rule and he was the last emperor to persecute the Christians and Dionysius takes it upon himself to calculate the birth date of the Jesus and declares it to be 522 years ago and the calendar date is then labeled as 522 A.D. and that is the start of the A.D. and B.C. dating of our calendar.

The Dionysius “fix” of the calendar lasts just about 1000 years but after that, date slippage and political slippage demanded a “fix”. Demanded!, I say. Let us look at what lead to Pope Gregory XIII’s 1582 “fix”.

Things started to go a little crazy in 1054 with the “Great Schism”. This is when the Roman Catholic and the Eastern Orthodox churches went their separate ways never to see eye to eye again. The next shock is the Black Plague from 1346 to 1353 with several cameo appearances until 1720 and this wipes out around 50% of all people in Europe, you can bet that the Church was trotting out the Book of Job to explain why such bad things were happening and it was not the Church’s fault. The Plague had two great effects on society. First because the labor pool was gone, everything was in short supply including scribes to write books and this was what encouraged Johannes Gutenberg to invent the movable type printing machine in 1350. Second the flow of money into the Church dropped off considerably. In order to revive the income stream the Church decides to step up the sale of pardons; you have been a bad person, but, you can buy your way out of it. With indulgences, you are going to be a bad person; but, you can pay your way forward out of it. The actions of the Church do not sit well at all with one Geoffrey Chaucer and he starts writing a series of short stories some of which are highly critical of the Church. Chaucer is counseled by the Church and he changes his tone, somewhat. Unfortunately by this time everyone who is anyone owns a printing press and although the initial books printed were bibles, the market was soon saturated and now everything and anything is being printed including, in 1479, Canterbury Tales as a book and everyone who can read has access to Chaucer’s criticisms.

As the Canterbury Tales pot is cooling off, a young priest who is also unhappy with indulgences in 1517 nails his ninety-five thesis to a church door and the printers again have a field day "EXTRA! Read all about it Father Martin Luther blasts Church". The church demands that Luther recant, he says "NO" and in 1521 he is excommunicated and the Protestant Church is formed. Are things going to finally calm down for the Church? In 1527 King Henry VIII requests a divorce from Pope Clement VII and the Pope says NO and in 1534 Henry makes himself head of the now Protestant Church of England, another bad day for Rome.

Are we finally done with the ecclesiastical shocks to Rome? Just one more and then I promise we will discuss it as we work on the calendar. To correct and improve the Julian calendar, Pope Gregory XIII enlists the help and advice of the church canon (the educated administrators) and they work on two problems. The first is how out of sync the calendar is and how to correct it. The second is how to build a better calendar could make better predictions about when the holy days will fall. For the first, the researchers tell Gregory XIII that the Julian calendar is ten days off the real date; no problem says Gregory and decrees that in 1582 the day after Thursday the 4th of October will be Friday the 13th not the 5th; problem solved!. And, yes, Gregory's solution was that simple and that direct.

As to the problem of calendar drift, no problem, with better instruments and observations the actual time of a solar year was calculated to about four decimal places and an improved leap year system devised. The issue of better predictions was solved by a church canon in Poland named Nicholas Copernicus who wrote a preliminary paper around 1511 titled *Commenatariolus* (Little Commentary) and everyone agrees that if we take the theoretical Copernicus idea that the sun is at the center of the solar system, we can make this theoretical system work much better than the old one. Copernicus is strongly encouraged to flesh out and expand on his theory. In 1543 as Copernicus is dying, the book that the culmination of his work is published and it is titled *De revolutionibus orbium coelestium* (On the Revolutions of the Heavenly Spheres) and it is immediately apparent that the book is many things but a theoretical description of the solar system it is not; Copernicus is saying "this is the real deal folks". Gregory does two things. The first is to tell everybody to put that book in a bottle and cork it up NOW! As we all know that didn't work because the genie was out of the bottle already. The second was in 1582 to authorize, fund, and staff Specola Vaticana (Vatican Observatory) Gregory decided that from now on there would be professional science people at the Vatican to keep the Pope informed as to what these crazy people were doing and what its implications were.

Gregory made so many changes to the Julian calendar that all agreed that the calendar would now be called the Gregorian calendar. The new calendar was immediately accepted by all parts of the Catholic church, like they had a choice. Catholic countries adopted it within two years and Protestant countries took up to a century, but as the world prepared to launch itself into the industrial revolution it had the calendar that it needed. Did all this ever solve the problem of when we should celebrate Easter? Hell no, but then God works in mysterious ways, doesn't he just.

Cheers, Chuck

Check Your Sky's Quality with Orion!
by David Prosper

Have you ever wondered how many stars you can see at night? From a perfect dark sky location, free from any light pollution, a person with excellent vision may observe a few thousand stars in the sky at one time! Sadly, most people don't enjoy pristine dark skies – and knowing your sky's brightness will help you navigate the night sky.

The brightness of planets and stars is measured in terms of **apparent magnitude**, or how bright they appear from Earth. Most visible stars range in brightness from 1st to 6th magnitude, with the lower number being brighter. A star at magnitude 1 appears 100 times brighter than a star at magnitude 6. A few stars and planets shine even brighter than first magnitude, like brilliant Sirius at -1.46 magnitude, or Venus, which can shine brighter than -4 magnitude! Very bright planets and stars can still be seen from bright cities with lots of light pollution**.** Given perfect skies, an observer may be able to see stars as dim as 6.5 magnitude, but such fantastic conditions are very rare; in much of the world, human-made light pollution drastically limits what people can see at night.

Your sky's **limiting magnitude** is, simply enough, the measure of the dimmest stars you can see when looking straight up. So, if the dimmest star you can see from your backyard is magnitude 5, then your limiting magnitude is 5. Easy, right? But why would you want to know your limiting magnitude? It can help you plan your observing! For example, if you have a bright sky and your limiting magnitude is at 3, watching a meteor shower or looking for dimmer stars and objects may be a wasted effort. But if your sky is dark and the limit is 5, you should be able to see meteors and the Milky Way. Knowing this figure can help you measure light pollution in your area and determine if it's getting better or worse over time. And regardless of location, be it backyard, balcony, or dark sky park, light pollution is a concern to all stargazers!

How do you figure out the limiting magnitude in your area? While you can use smartphone apps or dedicated devices like a Sky Quality Meter, you can also use your own eyes and charts of bright constellations! The Night Sky Network offers a free printable Dark Sky Wheel, featuring the stars of Orion on one side and Scorpius on the other, here: bit.ly/darkskywheel. Each wheel contains six "wedges" showing the stars of the constellation, limited from 1-6 magnitude. Find the wedge containing the faintest stars you can see from your area; you now know your limiting magnitude! For maximum accuracy, use the wheel when the constellation is high in the sky well after sunset. Compare the difference when the Moon is at full phase, versus new. Before you start, let your eyes adjust for twenty minutes to ensure your night vision is at its best. A red light can help preserve your night vision while comparing stars in the printout.

Did you have fun? Contribute to science with monthly observing programs from Globe at Night's website (globeatnight.org), and check out the latest NASA's science on the stars you can - and can't - see, at nasa.gov.

The Dark Sky Wheel, showing the constellation Orion at six different limiting magnitudes (right), and a photo of Orion (left). What is the limiting magnitude of the photo? For most observing locations, the Orion side works best on evenings from January-March, and the Scorpius side from June-August.

This article is distributed by NASA Night Sky Network The Night Sky Network program supports astronomy clubs across the USA dedicated to astronomy outreach.
Visit https://nightsky.jpl.nasa.org to find local clubs, events, and more!

The TVA is a member club of The Astronomical League.