President's Message

The March BAS board meeting will be held on Wednesday, March 4, 2020 at 7:00 pm, at the Anser Charter School at 242 E 42nd St, Garden City. The board meeting will be preceded by the ISP Planning Committee meeting at 6:30 pm. All BAS members are welcome to join in to see how club activities are planned. The BAS membership meeting will be held on Friday, March 13, 2020 at 7:00 pm, in the Math Room at Anser Charter School. This month’s guest speaker will be a surprise.

Our Astronomy 101 Class covering “Telescopes & Binoculars” will be held at 6:00 pm in the Spanish Room at Anser Charter School. The Astrophotography class will be held in the Math Room at Anser Charter School also at 6:00 pm.

For anyone who missed it last month, the Idaho Star Party™ (ISP) has been scheduled for the weekend of September 18th & 19th. Campsites are now available in the “A” loop at the Eagle Cove campground at Bruneau Dunes State Park. If you want to get a campsite in our exclusive group area, the March BAS meeting is the time to do it. Bring your checkbook, Idaho Park Passport sticker and Idaho RV sticker numbers, plus expiration dates for both. No sticker number equals no camping discount. We are still working on a guest speaker for ISP but hope to announce one soon.

Our observing season opening camping trip, the BAS Messier Marathon is coming up the weekend of April 17th & 18th, at the Eagle Cove campground, Bruneau Dunes State Park. This is an informal event with no registration required other than making your own campsite reservation through Idaho Parks. There are still plenty of campsites available for this event but the roomier sites will be filling up first. Make your reservation now to get the spot you want. We have a BAS potluck dinner planned for this event on Saturday evening, April 18th.

The Observatory at Bruneau Dunes State Park has announced that they will begin their public observing season on Friday, March 20th. I encourage all current BAS members to spend an evening or two volunteering at the observatory as it helps both the observatory and BAS, plus you get to spend time on the big 25” scope when the crowds are gone. Please e-mail me for more info.

The number of active memberships in BAS has dropped. Please consider renewing for 2020. The cost is still a low $25/family for the year. Make sure you keep receiving your membership benefits, including priority access to ISP campsites, opportunities to join our camping weekend events, access to closed BAS meetings (pizza party and holiday party), and club visits to a local planetarium.

Get out there, explore your universe.

David Olsen, President
Boise Astronomical Society
**March 2020 Calendar**

<table>
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<th>Sun</th>
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|     |     | First Quarter Moon | **BAS Board Meeting**<br>6:30 pm<br>Anser Charter School |     | **BSU Physics 1st Friday**<br>"Fast Radio Bursts etc."
Dr. Ben Margalit 7:30 pm |     |     |
|     | 8   | 9   | 10  | 11  | 12  | 13  |
|     |     | Worm Moon<br>7:42 pm |     |     | **also on Fri ➔ Astronomy 101**<br>"Telescopes & Binoculars"<br>6:00-6:45 pm<br>Anser Charter School | **National Pi Day** |     |
|     |     | Visible 100%<br>Age: 14.49 Days |     |     | **BAS Member Meeting**
Guest Speaker Loretta Cannon
"Life in Space"
7:00 pm<br>Anser Charter School |     |     |
| 14  | 15  | 16  | 17  | 18  | 19  | 20  |
|     |     | Last Quarter Moon | The waning crescent moon is joined by three planets – Mars, Jupiter, Saturn. |     |     | **Star Party**
Dedication Point
(dress in layers) |     |
|     |     | Visible: 49% ↓<br>Age: 22.23 Days |     |     |     |     |
|     | 21  | 22  | 23  | 24  | 25  | 26  |
|     |     |     |     | New Moon<br>Visible 0% ↑<br>Age: 0.09 Days |     |     |
|     | 27  | 28  | 29  | 30  | 31  |     |
|     |     |     |     |     |     |     |

**Coming in April** . . . . .

Venus passes through the Pleiades on April 3rd.

BAS Messier Marathon at Bruneau Dunes State Park, April 17th & 18th with a potluck on the 18th, contact Dr. Irwin Horowitz for details on the potluck.
Join the Boise Astronomical Society – Membership has its privileges
link: https://www.boiseastro.org/

Hello and welcome to our club! We hope you enjoy our newsletter, from current news and celestial events to a cosmic challenge and a bit of space history.

We meet on the 2nd Friday of each month in rooms at the Anser Charter School at 202 E 42nd St, Garden City. Our meetings feature an interesting program or presentation and the opportunity to spend time with other astronomy enthusiasts.

A star party is a gathering of amateur astronomers for the purpose of observing the sky

Observing the night sky is always an exciting journey but having others to share the experience with makes it even better. We typically have two Star Parties each month around the New Moon; refer to the calendar on page 2 of this newsletter or join our online Group (see below) for scheduled dates. We usually meet up at Dedication Point, which is on Swan Falls Road, about 16 miles south of Kuna. During the summer months, we move to a dark sky site at Granite Creek near Idaho City. These events are free and you don’t have to bring your own telescope. Those who bring a telescope are more than happy to share views. Star Parties may be planned around a specific celestial event or just on a clear night. Either way, observing together gives everyone an opportunity share knowledge, meet new people, and gain experience in stargazing that otherwise may not have been possible.

How to Join the Boise Astronomical Society

Annual dues are $25 per Household for the calendar year running from January 1 to December 31. Click here to print the membership application form: https://www.boiseastro.org/uploads/1/2/2/0/122041477/new_member_application_2018.pdf.
This includes all family members living at the same address. Mail your application and dues to us at: (and please make checks payable to)

Boise Astronomical Society
PO Box 7002
Boise, Idaho 83707

Membership entitles you to attend all BAS Star Parties, educational outreach programs and membership/guest speaker meetings. Your literary contributions are welcomed and encouraged. Owning a telescope is NOT a requirement of joining the club. Membership also includes, but is not limited to:

2. Discounts on subscriptions to Astronomy and Sky & Telescope magazines.
3. Volunteer star party opportunities.
4. Camping and star party opportunities.
5. First opportunity at Idaho State Parks (ISP) campsite reservations.
6. Field trips to area planetariums.

Join us on Groups.io

We encourage you join our online Group as this is how we communicate between our monthly meetings. It’s easy and it’s free. To start, use this link to create an account: https://groups.io/register. Of the (3) account-creation methods shown, we recommend that you enter your current email address and create a password; this will ensure that you’ll get real-time ‘Go/No-Go’ notices for Star Parties. The link to our group is https://groups.io/g/BoiseAstro. Please keep all postings on BAS-related topics. Please ensure all conversations follow civil discourse and are related to astronomy.

You are also most welcome to join our Facebook group, whether you are a member or not. Please keep conversations and postings (including sales) to a civil discourse and be related to astronomy. Also, we are now using Twitter, although sparingly.
There’s no article this month, so here’s some Astronomy news.

*Did you hear . . .*  

. . . that **Voyager 2 experienced a potentially catastrophic event?** On Jan 28th, NASA reported that an autonomous fault protection routine was triggered.  

“On Saturday, Jan. 25, Voyager 2 didn’t execute a scheduled maneuver in which the spacecraft rotates 360 degrees in order to calibrate its onboard magnetic field instrument. Analysis of the telemetry from the spacecraft indicated that an unexplained delay in the onboard execution of the maneuver commands inadvertently left two systems that consume relatively high levels of power operating at the same time. This caused the spacecraft to overdraw its available power supply. The fault protection software routine . . . appears to have turned off Voyager 2’s science instruments to make up for the power deficit. . . . Voyager engineers have successfully turned off one of the high-power systems and turned the science instruments back on but have not yet resumed taking data.” As of Feb 5th, science data is being gathered and communicated to Earth.

. . . that **March 14th is National Pi Day?** (divide the circumference of a circle by its diameter to get 3.1415926535 etc.) Each year NASA creates an “illustrated Pi Day math challenge that features real-world problems [that] NASA scientists and engineers solve to explore Earth and space.” NASA will post this year’s online challenge on March 6th. Click here now to see previous challenges AND click back here on March 6th. Answers to the 2020 Challenge will be released on March 16th. [https://www.jpl.nasa.gov/edu/nasapidaychallenge/](https://www.jpl.nasa.gov/edu/nasapidaychallenge/)

Here is another website for Pi Day: [https://www.piday.org/](https://www.piday.org/)

For a fictional theory about Pi, read *Contact* (1985) by Carl Sagan.

. . . that **recent analysis of data** captured last year by NASA’s *New Horizons* spacecraft **reveals Arrokoth** in sharp detail? The 36-kilometer Kuiper belt object “is extremely red, probably because cosmic rays have blasted its surface to create red organic molecules.” Read *Nature* notification here: [https://www.nature.com/articles/d41586-020-00419-4?utm_source=Nature+Briefing&utm_campaign=ffdd77be74-briefing-dy-20200214_COPY_01&utm_medium=email&utm_term=0_c9dfd39373-ffdd77be74-44810581](https://www.nature.com/articles/d41586-020-00419-4?utm_source=Nature+Briefing&utm_campaign=ffdd77be74-briefing-dy-20200214_COPY_01&utm_medium=email&utm_term=0_c9dfd39373-ffdd77be74-44810581)

The Kuiper belt object Arrokoth, imaged by NASA’s New Horizons mission. Credit: NASA/Johns Hopkins University Applied Physics Laboratory/Southwest Research Institute/Roman Tkachenko

. . . about **Betelgeuse** last month? Read the February issue of *Skywatcher* for a fascinating article regarding the star’s fading brightness. Well guess what? *Nature* reported in late February that our fading star has begun to brighten again. Here is the link: [https://www.nature.com/articles/d41586-020-00561-z](https://www.nature.com/articles/d41586-020-00561-z)
Clyde Tombaugh was born on February 4, 1906 in Streator, IL. By 1922, his family was living on a farm in Burdett, Kansas. His interest in other worlds began when he was young. In his autobiography\(^1\), he notes that as early as sixth grade he was wondering about the geography on distant planets. His father bought him his first telescope, a 2¼-inch from the Sears Roebuck catalog. Tombaugh read everything he could on astronomy. And he made his own telescopes, including grinding the lenses. The image at left, taken from Wikipedia, shows Tombaugh with one of his homemade telescopes in 1924. Using these scopes, he made detailed drawings of his observations, including images of Mars and Jupiter.

At the same time that Tombaugh was making observations, he was reading everything he could find on astronomy. He read about Percival Lowell's prediction of a yet-to-be-discovered planet beyond Neptune, a prediction based on observations of Neptune’s orbit that indicated the gravitational pull of a substantial body, a theoretical Planet X. Lowell died in 1916 without having found the elusive 9th planet. [FUN FACT: The actual calculations were done by mathematician/computer Elizabeth Williams, another ‘hidden figure’ of history. Even those two English prats Watson & Crick based their Nobel-prize winning ‘discovery’ on the exhaustive x-ray crystallography work of Rosalind Franklin, which eventually killed her. You must be alive to be recognized for a Nobel.] Tombaugh also read about the Lowell Observatory in Flagstaff, Arizona which Lowell started in 1894. Though doubtful of being able to afford college, Tombaugh was eager to contribute to the field. He sent some of his detailed Mars drawings to the astronomers at Lowell. Interestingly, he received a response in 1928, an invitation to come work at the Observatory as an assistant.

In January 1929, Clyde Tombaugh began work at the Lowell Observatory. His assignment: use their brand new 13” telescope and look for the proposed planet beyond Neptune – Planet X. Most every night, for almost a year, Tombaugh sat in the unheated observatory dome, exposing photographic plates while the telescope was aimed at a specific small area of the sky (based on Lowell’s (Williams’) calculations). Because the light reaching Earth from Planet X was expected to be incredibly faint, each plate required a 60+ minutes exposure. During this hour, Tombaugh had to carefully ensure the telescope remained focused on the target location while the Earth slowly moved. Clear, moon-free nights found Tombaugh at the telescope. Cloudy, moonlit nights found Tombaugh developing and analyzing the plates. In order to identify a point of light as Planet X, he used a blink comparator, invented in 1904 by physicist Carl Pulfrich in Germany. Two images taken of the same piece of night sky, but days apart, are placed in the instrument. The astronomer can then ‘blink’ rapidly between the two images looking for a point of light which ‘moves’ position against the background stars. The image at right from Wikipedia shows the instrument used at Lowell Observatory.

On January 21, 1930, though Tombaugh took images, they were blurred due to high winds that buffeted the telescope. Luckily, he took images of the same piece of sky again on the 23rd and the 29th. It wasn’t until February 18th that Tombaugh was able to analyze these images. And suddenly, on one of those January plates, there ‘it’ was – a faint speck of light that ‘moved’. He looked at other plates at the same piece of sky, double-checking what he saw for almost an hour before he knew he’d found Planet X. It wasn’t announced officially until March 13, 1930, a day which marked what would have been Percival Lowell’s 75th birthday.

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**About the Author:** Loretta J Cannon is a 3rd generation Idahoan. She earned both of her Bachelor degrees (Anthropology, Microbiology) from Boise State University, her Masters degree (Physical Anthropology) from Arizona State University, and completed four years towards a PhD in Microbiology & Biochemistry. These days she devotes her time to science writing & editing and real estate. She can be reached at LorettaJCannon@gmail.com. This article is copyright 2020 by Loretta J Cannon, excepting the referenced material; any errors are solely the author’s.
Dim Delights in Cancer
by David Prosper

Cancer the Crab is a dim constellation, yet it contains one of the most beautiful and easy-to-spot star clusters in our sky: the Beehive Cluster. Cancer also possesses one of the most studied exoplanets: the superhot super-Earth, 55 Cancri e. Find Cancer’s dim stars by looking in between the brighter neighboring constellations of Gemini and Leo. Don’t get frustrated if you can’t find it at first, since Cancer isn’t easily visible from moderately light polluted areas. Once you find Cancer, look for its most famous deep-sky object: the Beehive Cluster! It’s a large open cluster of young stars, three times larger than our Moon in the sky. The Beehive is visible to unaided eyes under good sky conditions as a faint cloudy patch but is stunning when viewed through binoculars or a wide-field telescope. It was one of the earliest deep-sky objects noticed by ancient astronomers, and so the Beehive has many other names, including Praesepe, Nubilum, M44, the Ghost, and Jishi qi. Take a look at it on a clear night through binoculars. Do these stars look like a hive of buzzing bees? Or do you see something else? There’s no wrong answer, since this large star cluster has intrigued imaginative observers for thousands of years.

55 Cancri is a nearby binary star system, about 41 light years from us and faintly visible under excellent dark sky conditions. The larger star is orbited by at least five planets including 55 Cancri e, (a.k.a. Janssen, named after one of the first telescope makers). Janssen is a “super-earth,” a large rocky world 8 times the mass of our Earth, and orbits its star every 18 hours, giving it one of the shortest years of all known planets! Janssen was the first exoplanet to have its atmosphere successfully analyzed. Both the Hubble and recently-retired Spitzer space telescopes confirmed that the hot world is enveloped by an atmosphere of helium and hydrogen with traces of hydrogen cyanide: not a likely place to find life, especially since the surface is probably scorching hot rock. The NASA Exoplanet Catalog has more details about this and many other exoplanets at bit.ly/nasa55cancri.

Look for Cancer in between the “Sickle” or “Question Mark” of Leo and the bright twin stars of Gemini. You can’t see the planets around 55 Cancri, but if skies are dark enough you can see the star itself. Can you see the Beehive Cluster?

How do astronomers find planets around other star systems? The Night Sky Network’s “How We Find Planets” activity helps demonstrate both the transit and wobble methods of exoplanet detection: bit.ly/findplanets. Notably, 55 Cancri e was discovered via the wobble method in 2004, and then the transit method confirmed the planet’s orbital period in 2011!

Want to learn more about exoplanets? Get the latest NASA news about worlds beyond our solar system at nasa.gov.

The constellation Cancer the Crab may not be much to look at, but it holds some fascinating objects within its emaciated body. Case in point: **Arp 82**, the 82nd entry in Halton Arp's *Atlas of Peculiar Galaxies*. Made up of NGC 2535 and NGC 2536, Arp 82 is a strange pair that seems to be experiencing a galactic version of arrested development. As galaxies formed in the early universe, theory says that massive amounts of nebulosity came together in quick succession, triggering vast expanses of rapid star formation. Then, as each galaxy aged, the rate of star formation slowed.

### Arp 82

10- to 14-inch (25-36 cm) telescopes

<table>
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<tr>
<th>Target</th>
<th>Type</th>
<th>RA</th>
<th>DEC</th>
<th>Constellation</th>
<th>Mag</th>
<th>Size</th>
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<tr>
<td>NGC 2535</td>
<td>Galaxy pair</td>
<td>08h 11.2m</td>
<td>+25° 12.4'</td>
<td>Cancer</td>
<td>13.3</td>
<td>3.3'x1.8'</td>
</tr>
<tr>
<td>NGC 2536</td>
<td></td>
<td>08h 11.3m</td>
<td>+25° 10.8'</td>
<td></td>
<td>14.7</td>
<td>0.9'x0.7'</td>
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Evening star map. Credit: Map adapted from *Star Watch* by Phil Harrington
Finder chart for this month's Cosmic Challenge

Not to worry, however; NGC 2298 will be around for a while longer. You can take your time finding it. To starhop its way, begin your quest at Aludra [Eta (η) Canis Majoris], the tail star of the Large Dog. Slipping 3° southward, brings a right triangle of three bright stars into view, accompanied by many fainter points that collectively form the little-known star cluster **Collinder 140**. Its large size and sparseness masked the cluster's true nature until 1931, when Swedish astronomer Per Collinder included it as number 140 in his catalog. As I wrote in my [February 2015 column](https://www.centerforastronomy.com/archives/2015/02/cosmic-challenge-february-2015.html) here on CN, Collinder 140 is an easy target through just about any binocular. Its 30 stars range in brightness from 5th magnitude to fainter than 9th and span about 3/4°. Arizona deep-sky observer Steve Coe suggests the nickname "The Tuft" because of its location at the very tip of the dog's tail.

Two images of the colliding galaxies NGC 2535 (top/larger) and NGC 2536 (bottom/smaller), known collectively as Arp 82.

As we study individual stars within each galaxy, we find few that are greater than about 2 billion years old. That's a small fraction of the universe's estimated age of 13.7 billion years. Apparently, before the galaxies swung past each other about 2 billion years ago, they were both mostly nebulosity. Only after the gravity of one galaxy swirled up the material in the other was star formation accelerated. A second close passage around 2 million years ago resulted in a second burst of activity. Why the galaxies in Arp 82 didn't begin to form stars earlier like other galaxies remains the stuff of future studies.

To see this unusual pair for yourself, begin at 4th-magnitude Kappa (κ) Geminorum and scan eastward about one finder field to 6th-magnitude Psi (ψ) Cancri. Arp 82 is 21’ southeast of Kappa, next to a line of 12th- and 13th magnitude stars. That line of stars makes an excellent reference to estimate the apparent size of each galaxy as well as their separation. In photos of the area, the full span of NGC 2535, arms included, matches the length of that line of faint stars very closely, although in deep photos, the spiral arm opposite NGC 2536 actually curves completely around the northwestern end of the line. Whether or not that effect can be seen visually, however, remains doubtful.

The view through my 10-inch reflector at 106x is an interesting study in surface brightness versus magnitude. Although NGC 2535 has the brighter magnitude value, its larger apparent size causes the resulting surface brightness to be lower than "fainter" NGC 2536. As a result, NGC 2536, although nearly stellar in appearance at that magnification, impresses me as a bit brighter. Larger NGC 2535 appears slightly oval and oriented northeast-southwest. Its weak concentration only hints as a centralized core, although photos show a sharp nucleus surrounded by an active ring of star formation. Despite the complex nature of its spiral arms, no hint of structure was seen with the 10-inch. Indeed, even my 18-inch offered little help beyond brightening up the galaxies some. Perhaps even larger instruments can reveal the complex nature of these galaxies that images show so spectacularly.
Arp 82 as seen through the author's 10-inch (25 cm) reflector.

Good luck with this month's Cosmic Challenge!

Until next month, remember that half of the fun is the thrill of the chase. Game on!

About the Author: Phil Harrington writes the monthly Binocular Universe column in Astronomy magazine and is the author of 9 books on astronomy. Visit his web site at www.philharrington.net to learn more.

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All times, unless otherwise noted, are UT (subtract 7 hours and, when appropriate, 1 calendar day for MDT)

3/1 The Moon is 0.1 degree south of asteroid 4 Vesta, with an occultation occurring in Hawaii, Micronesia, northwest Melanesia, eastern Indonesia, and northern and western Australia, at 6:00; the Moon is 7.0 degrees southeast of the bright open cluster M45 (the Pleiades or Subaru) at 22:00
3/2 The Lunar X (the Purbach or Werner Cross), an X-shaped illumination effect involving various rims and ridges between the craters La Caille, Blanchinus, and Purbach, is predicted to be fully formed at 0:11; the Moon is 3.3 degrees north of the first-magnitude star Aldebaran (Alpha Tauri) at 15:00; First Quarter Moon occurs at 19:57
3/4 The Moon is 1.3 degrees southeast of the bright open cluster M35 in Gemini at 10:00; the Moon is at the ascending node (longitude 95.8 degrees) at 15:00
3/5 The Moon is 8.8 degrees south of the first-magnitude star Castor (Alpha Geminorum) at 19:00
3/6 The Moon is 1.4 degrees north-northeast of the bright open cluster M44 (the Beehive Cluster or Praesepe) at 23:00
3/8 Daylight Saving Time (DST) begins today; the Moon is 3.6 degrees north-northeast of the first-magnitude star Regulus (Alpha Leonis) at 11:00; Neptune is in conjunction with the Sun (30.924 astronomical units from the Earth, latitude -1.1 degrees) at 12:00; Venus (magnitude -4.3) is 2.2 degrees north-northwest of Uranus (magnitude +5.9) at 16:00
3/9 Mercury is stationary in right ascension, with prograde (direct) motion to resume, at 8:00; Full Moon (known as the Crow, Lenten, and Sap Moon) occurs at 17:48
3/10 The Moon is at perigee, subtending 33’ 28” from a distance of 357,122 kilometers (221,905 miles), at 6:30
3/11 The Sun enters Pisces at longitude 351.6 degrees on the ecliptic at 17:00
3/12 The Moon is 6.8 degrees north-northeast of the first-magnitude star Spica (Alpha Virginis) at 1:00
3/14 Asteroid 27 Euterpe (magnitude +9.4) is at opposition at 18:00
3/15 The Moon is 6.7 degrees north-northeast of the first-magnitude star Antares (Alpha Scorpii) at 6:00
3/16 Last Quarter Moon occurs at 9:34; Mercury is at the descending node through the ecliptic plane at 20:00
3/17 A double Galilean satellite shadow transit (Io’s shadow follows Ganymede’s) begins at 17:43
3/18 The Curtiss Cross, an X-shaped clair-obscur illumination effect located between the craters Parry and Gambart, is predicted to be visible at 3:11; the Moon is 0.7 degree south of Mars, with an occultation occurring in Kerguelen Island, Antarctica, South Georgia, and southern South America, at 8:00; the Moon is 1.5 degrees south of Jupiter at 10:00; the Moon (magnitude -9.0), Mars (magnitude +1.0), and Jupiter (magnitude -2.0) lie within a circle with a diameter of 1.6 degrees at 10:00; the Moon is 0.9 degree south of Pluto, with an occultation occurring in most of Antarctica, at 15:00
3/19 The Moon is 2.1 degrees southeast of Saturn at 1:00
3/20 Venus is at perihelion (0.7184 astronomical units from the sun) at 3:00; the northern hemisphere vernal equinox occurs at 3:50; the Sun’s longitude is 0 degrees at 3:50; Mars (magnitude +0.9) is 0.7 degree south of Jupiter (magnitude -2.1) at 6:00
3/21 The Moon is 3.4 degrees southeast of Mercury at 21:00
3/23 The Moon is 3.8 degrees southeast of Neptune at 3:00
3/24 Mercury is at greatest western elongation (28 degrees) at 2:00; New Moon (lunation 1203) occurs at 9:28; the Moon is at apogee, subtending 29’ 23” from a distance of 406,692 kilometers (252,707 miles), at 15:23; a double Galilean satellite shadow transit (Io’s shadow follows Ganymede’s) begins at 19:37; Venus is at greatest eastern elongation (46 degrees) at 22:00
3/27 The Moon is 3.8 degrees southeast of Uranus at 1:00; Venus is at dichotomy (50% illuminated) at 1:00; Mercury is at aphelion (0.4667 astronomical units from the Sun) at 5:00
3/28 The Moon is 6.5 degrees southeast of Venus at 16:00
3/29 The Moon is 6.7 degrees southeast of M45 at 4:00; the Moon is 0.2 degree south of asteroid 4 Vesta, with an occultation occurring in northern Polynesia with the exception of Hawaii, Micronesia, the Philippines, portions of southeast Asia, Indonesia, and the southern Indian Ocean, at 7:00; the Moon is 3.5 degrees north of Aldebaran at 22:00
3/31 The Lunar X (the Purbach or Werner Cross) is predicted to be fully formed at 13:25; the Moon is 1.0 degree southeast of M35 at 17:00; the Moon is at the ascending node (longitude 92.7 degrees) at 17:00; Mars (magnitude +0.8) is 0.9 degree southeast of Saturn (magnitude +0.7) at 18:00; a double Galilean satellite shadow transit (Ganymede’s shadow follows Io’s) begins at 19:37

Happy Birthdays
Nicolas-Louis de Lacaille (1713-1762) Caroline Herschel (1750-1848) Josef von Fraunhofer (1787-1826)
Walter Baade (1893-1960)
The Sun, the Moon, & the Planets

The Moon is 6.4 days old, is illuminated 32.3%, subtends 29.8 arc minutes, and is located in the constellation of Aries at 0:00 UT on March 1st. The Moon attains its greatest northern declination (+23.4 degrees) for the month on March 5th and greatest southern declination (-23.4 degrees) on March 18th. Longitudinal libration is at a maximum of +7.5 degrees on March 16th. It’s at a minimum of -7.8 degrees on March 5th. Latitudinal libration is at a maximum of +6.5 degrees on March 24th and a minimum of -6.5 degrees on March 11th. Favorable librations occur for the following craters: Inghirami (March 8th), Pingré (March 9th), Casatus (March 10th), and Boguslawsky (March 11th). The largest Full Moon of the year occurs on March 9th. Large tides will take place in the days following the Full Moon. New Moon occurs on March 24th. The Moon is at perigee (at a distance of distance 56.00 Earth-radii) on March 10th and at apogee (at a distance of 63.76 Earth-radii), the farthest of the year, on March 24th. The Moon will occult asteroid 4 Vesta on March 1st and March 29th and Mars on March 18th from certain parts of the world. Browse http://www.lunar-occ...ota/iotandx.htm for information on lunar occultation events. Visit https://saberdoesthe...does-the-stars/ for tips on spotting extreme crescent Moons and http://www.curtrenz.com/moon06.html for Full Moon data. Consult http://time.unitar...moon/where.html or download http://www.ap-i.net/avl/en/start for current information on the Moon. See https://svs.gsfc.nasa.gov/4768 for a lunar phase and libration calculator and https://svs.gsfc.nasa.gov/4768 for the Lunar Reconnaissance Orbiter Camera (LROC) Quickmap. Click on https://www.calendar...ndar/2020/march for a lunar phase calendar for this month. Times and dates for the lunar crater light rays predicted to occur this month are available at http://www.lunar-occ...o/rays/rays.htm

The Sun is in Aquarius on March 1st at 0:00 UT. It enters Pisces on March 11th. The Sun crosses the celestial equator at 3:50 UT on March 20th, bringing spring to the northern hemisphere. At the equinox, the Sun is located in Aries and has a longitude of zero degrees.

During March, Mercury increases in brightness from magnitude +3.7 to magnitude 0.0. It shrinks in apparent size from 10.6 arc seconds to 6.7 arc seconds but increases in illumination from 4% to 62%. Mercury is stationary on March 9th, is at the descending node on March 16th, reaches greatest western elongation on March 24th, and is at aphelion on March 27th. The Moon passes less than four degrees southeast of Mercury on March 21st. Southern hemisphere observers are favored during this apparition.

Venus increases in magnitude from -4.3 to -4.5 and increases in angular size from 18.8 arc seconds to 25.2 arc seconds during March. It decreases in illumination from 63% to 48%. The brightest planet is 50% illuminated on March 26th. Venus is located in eastern Pisces in early March, passes through Aries, and finishes the month in western Taurus a few degrees below M45 (the Pleiades). Venus is at perihelion on March 19th and is at greatest eastern elongation on March 24th, at which time it will be 19 degrees north of the Sun in declination. The waning crescent Moon passes seven degrees south of the planet on March 28th.

Mars brightens to magnitude +0.8 and increases in angular size to 6.4 arc seconds. The apparent brightness of Mars exceeds magnitude +1.0 on March 12th. The waning crescent Moon passes less than one degree south of Mars on March 18th and will occult Mars from some parts of the world. Mars passes within one degree of Jupiter on March 20th and within one degree of Saturn on March 31st. The Red Planet lies between the two gas giants on the morning of March 26th. Mars departs Sagittarius and enters Capricornus on March 30th.

Jupiter increases in brightness from magnitude -2.0 to magnitude -2.1 and grows in apparent size from 34.2 arc seconds to 36.9 arc seconds this month. The waning crescent Moon passes less than two degrees south of the planet on March 18th. Jupiter and Mars are separated by just 42 arc minutes on the morning of March 20th. Transits by Callisto take place on March 14th and March 31st. Double Galilean shadow transits take place on March 17th, March 24th, and March 31st. Data on these and other Galilean satellite events is available online at http://www.shallowsky.com/jupiter/ and https://skyandtelesc...watching-tools/ and on page 51 of the March 2020 issue of Sky & Telescope. Click on http://www.skyandtel...watching-tools/ or consult pages 50 and 51 of the March 2020 issue of Sky & Telescope to determine transit times of the central meridian by the Great Red Spot. Additional information on Jupiter can be found at https://curtrenz.com/jupiter.html

During March, Saturn’s equatorial diameter measures 16 arc seconds. Its rings span 37 arc seconds. Saturn exits Sagittarius and enters Capricornus in the middle of the month. The waning crescent Moon passes about two degrees south of the Ringed Planet on the morning of March 19th. Click on https://curtrenz.com/saturn.html for a wealth of information on Saturn. For information on the major satellites of Saturn, browse https://skyandtelesc...watching-tools/
Neptune is in conjunction with the Sun on March 8th and will not be visible again until April.

Pluto is not a viable target this month.

For more on the planets and how to locate them, browse http://www.nakedeyeplanets.com/

The zodiacal light should be visible in the western sky after sunset from dark locations after March 11th. An article on the zodiacal light can be found on pages 48 and 49 of the March 2020 issue of Sky & Telescope.

Comets

Comet C/2017 T2 (PanSTARRS) brightens as it travels northeastward through Cassiopeia during March. It passes about two degrees northwest of IC 1805 (the Heart Nebula) on March 7th. However, moonlight will interfere with observing the comet until March 13th. Visit http://cometchasing.skyhound.com/ and http://www.aerith.net/future-n.html for additional information on comets visible this month.

Asteroids

Asteroid 4 Vesta shines at eighth magnitude as it travels northeastward through western Taurus this month. The main belt asteroid passes close to a sixth-magnitude field star on March 11th and again on March 26th. Asteroid 27 Euterpe (magnitude +9.4) is the brightest asteroid reaching opposition this month. Asteroids brighter than magnitude +11.0 that are also at opposition this month include 516 Amherstia (magnitude +10.7) on March 1st, 115 Thyrna (magnitude +10.9) on March 7th, 78 Diana (magnitude +10.6) on March 16th, and 71 Niobe (magnitude +10.7) on March 27th. Consult http://britastro.org/s_asteroid.html for finder charts and http://www.curtrenz.com/asteroids.html to learn more about a select number of asteroids.

You are welcome to access the Cloudy Nights site for many more details from Dave Mitsky.  
https://www.cloudynights.com/topic/696510-march-2020-celestial-calendar/

NOTEs from the Editor:

Well, that’s it for our March newsletter. I’ve put the beautiful picture of the evening sky you’ve come to expect on the last (next) page of the newsletter. We have David Olsen, our delightful president, to thank for these beautiful pictures each month.

For those of you who are taking Leif Edmondson’s Astrophotography classes, please consider submitting your cosmic photos for publication in our newsletter!

If any of you are worried about the new coronavirus (covid-19), I have been thinking about out how to best protect my 93 yr old mother and myself (an asthmatic). In my research of reputable sources, here are two excellent sites for information, both of which are updated daily. CDC summary: https://www.cdc.gov/coronavirus/2019-ncov/summary.html


The best protection includes: accurate information, get your flu shot, wash your hands (for 20 seconds), don’t touch your face when you’re out and about in public, and STAY HOME IF YOU ARE SICK.
Mercury rising above the eastern horizon before dawn on March 23, 2020.