Temecula Valley Astronomer

The monthly newsletter of the Temecula Valley Astronomers Nov 2017

Events:

General Meeting : Monday, Nov 6, 2017 at the Temecula Library, Room B, 30600 Pauba Rd, at 7 pm. Vice President Skip Southwick will do the "What's Up". Dennis Mammana will present "Electric Sky: The Story of the Northern Lights". Ray Stann will supply refreshments.

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

The Cassini spacecraft's dive in between Saturn's rings (www.vox.com)

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).

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Cosmic Comments – Nov/2017
by President Mark Baker

The demise of the Cassini probe was one I'm sure some of you followed closely, and all of you were aware of. Lost in the termination of an incredibly successful NASA mission may be the reason behind burning it up in Saturn's atmosphere, however.

Although our decontamination processes have improved tremendously, at the time that Cassini and Huygens were launched such procedures were often an afterthought. Huygens was given special attention, however, as it was to land on Titan and that team thought it better to be safe than sorry…

And as I stated, intense attention to the eradication of "stowaway" microbes and bacteria is the rule and law of the last decade. Which brings us to another deterrent to Manned Space Exploration, at least until we fully understand the environments we will be sending humans into…the worst possible carrier of detrimental organisms to a pristine world that may harbor life of its own is Man himself!!! Humans have them by the millions and more importantly, we need the vast majority of them to maintain our own health…so simple sterilization is not an option. But one of the greatest underlying fears of human expansion off planet is that we do find Life somewhere (or everywhere) and, through accident or by intent, whole ecosystems are eradicated!! As we know from our own experiences here on Earth, unprotected entities do not last long when "plague" sweeps through their living spaces, and it is probably the same "out there"…

So this is why extra caution is given to getting us off planet, even though that's what it takes to expand our presence into the Universe. We want to get out there as a positive benefactor to all other World's, not as a virulent carrier of disease and death…

I so enjoy being a part of this organization and the good it truly does in our communities. I'm also grateful for the manner TVA stimulates such considerations for even little green men!!! I am proud to know you all.

Clear, Dark Skies my Friends…

Note from the Editor

Clark Williams has stepped up to fill the mighty big shoes of Curtis Croulet and write a monthly ***Looking Up Redux*** column. Thanks to Clark (and to Skip for his ***What's Up*** at the meetings) for keeping us "up" on what is going on "up" there.

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Looking Up Redux – Novemberby Clark Williams

Moon Phases for the month by date:

2017-11-03 Friday @ 22:24:02 PDT FULL – ***The Hunter's Moon***
2017-11-10 Friday @ 12:37:40 PST LAST QTR
2017-11-18 Saturday @ 03:43:17 PST FIRST QTR
2017-11-26 Sunday @ 09:04:05 PST SECOND QTR
Perigee comes on 2017-11-06 at 17:09 PDT
2017 has: (12) new moons, (13) 1st Qtr moons, (12) Full moons,
(12) 3rd Qtr moons, (0) Blue moons and (0) Black moons

Fall Back (turn your clocks back 1 one hour) 2017-Nov-05 Sunday 02:00:00

Luna & Terrestrial Lore:

Every Full Moon has a name. In fact several names. There are the indigenous people's names as well as Western European names, Asian names, Inuit names, Arabic names and more. The English (read German) names we use today are more often than not derived from pagan names, celebrations or gods. We see this kind of thing in the "English" names of the days of the week:

- Sun's day
- Moon's day
- Tues' day from Old English *Tiwesdæg* and Middle English *Tewesday,* meaning "Tīw's Day", the day of Tiw or Týr, the god of single combat, victory and heroic glory in Norse mythology which itself is a translation interpreting the Latin *dies Martis* (Mars' day).
- Woden's day from Old English *Wōdnesdæg* and Middle English *Wednesdei*, "day of Woden". In other languages, such as the French *mercredi* or Italian *mercoledì*, the day's name is a calque of *dies Mercurii* "day of Mercury".
- Thor's day from Old English *Þūnresdæg* and Middle English *Thuresday* (with loss of -n-, first in northern dialects, from influence of Old Norse *Þorsdagr*) meaning "Thor's Day". It was named after the Norse god of Thunder, Thor.
- Freyja's day from the Old English *Frīġedæġ,* meaning the "day of Frige", a result of an old convention associating the Old English goddess Frigg with the Roman goddess Venus, with whom the day is associated in many different cultures. The same holds for *Frīatag* in Old High German, *Freitag* in Modern German, and *vrijdag* in Dutch.
- Saturn's day. The Romans named Saturday *Sāturni diēs* ("Saturn's Day") no later than the 2nd century for the planet Saturn, which controlled the first hour of that day, according to Vettius Valens. The day's name was introduced into West Germanic languages and is recorded in the Low German languages such as Middle Low German*sater(s)dach*, Middle Dutch *saterdag* (Modern Dutch *zaterdag*) and Old English *Sætern(es)dæġ* and *Sæterdæġ.*

In the Romance Languages the names of the days of the week tend to be from Greek and Roman equivalents. The names of the Full Moon's are a hodgepodge of various gods, celebrations, and stories just as the names of the days of the week.

The Full moon closest to the autumnal equinox (which happened last month on October 5th) is called the *Harvest Moon*. The Full moon following the *Harvest Moon* is called the *Hunter's Moon*.

So why is this important? Every full moon rises about sunset. Since Harvest and Hunter full moons are closest to the autumnal equinox the ecliptic makes a shallow angle with the horizon so the time between rises and sets shortens. On an average the moon rises in the sky about 50 minutes later each day. Because of the narrow angle the ecliptic makes with the horizon line in the middle latitudes the moon rises about 30 to 35 minutes later each day. This means the time between moonrises is shorter than usual. In the Northern Hemisphere the moon will appear to rise in the sky more quickly than usual for a few days, clustered around the autumnal equinox. This year it is the *Hunter Moon's* turn to be that focal point.

You should be able to get some lovely moonrise photographs with closely spaced images clustered around sunset on the 2nd thru the 5th.

Supermoon:
Since Perigee happens this month you will hear the term “supermoon” thrown about. In modern day usage a supermoon is the full moon closest to lunar perigee. This year that will be the *Hunter's Moon*. If you keep track of this kind of thing, this is the closest “supermoon” since 1948.

Planets:

- **Mercury:** Mercury reaches its greatest eastern elongation of 22.0 degrees from the Sun on November 24th. 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.
- **Venus:** Two of the brightest celestial objects in our skies will have a super close encounter at dawn on November 13th. Venus and Jupiter will have a spectacularly close conjunction very low in the eastern sky. The two worlds will appear to be separated by only 18 arc-minutes, or about the apparent width of a half-lit moon. Since this conjunction event will take place low on the horizon, the planets will be fighting for attention with the glare of the morning twilight and binoculars will make viewing much more enjoyable.
- **Jupiter**: (See Venus)

Meteors:

- The Taurids either is a time traveling device shaped liked a London Police phone booth or a minor meteor shower producing only about 5-10 meteors per hour. If it is the latter it is unusual in that it is created by two different streams: Asteroid 2004 TG10 and Comet 2P Encke. This shower happens yearly from around September 7 to around December 10. It should peak in 2017 on the night of November 4th. Glare from the full moon will block out all but perhaps the

brightest meteors. If you are patient beyond all reasonableness, you may be able to catch a few good streaks. Best viewing as with any shower will be just after midnight from a dark location far away from city lights (the antarctic falls to mind). Radiation point will be from the constellation Taurus, but meteors can appear anywhere in the sky.

- The Leonids is a shower of average frequency producing up to 15 meteors per hour at its peak. This shower's frequency is harmonic in its peak production at about every 33 years when the frequency can increase to hundreds of meteors per hour. That last of these occurred in 2001. The Leonids is produced by dust left over from comet Tempel-Tuttle. The shower runs annually between November 6th through the 30th. It peaks in 2017 on the night of the 17th. The moon will be nearly new and should not be a problem this year. It should be a good show. Best viewing, as always, will be from a dark location after midnight. Meteors will radiate from Leo.

Deep Sky:

- Algol – Named for the Arabic “al-guhl” (transliteration) meaning 'demon' although “thief-in-the-night” might be a better translation. This is a binary system consisting of Algol A and Algol B. The dimmer of the two stars is Algol B. We call binary systems like Algol eclipsing binaries. You can get a great view of this by viewing this animation on Wikipedia . What you're seeing is Algol B's orbit carrying it in front of and eclipsing Algol A. This happens about every 2.87 days. The eclipse lasts for approximately ten-hours. You can see this variable star dim and brighten with the naked eye on dark nights but any small scope or binoculars will improve your results. Here are some Algol minima times for November (local times and all are Pacific Standard Time).

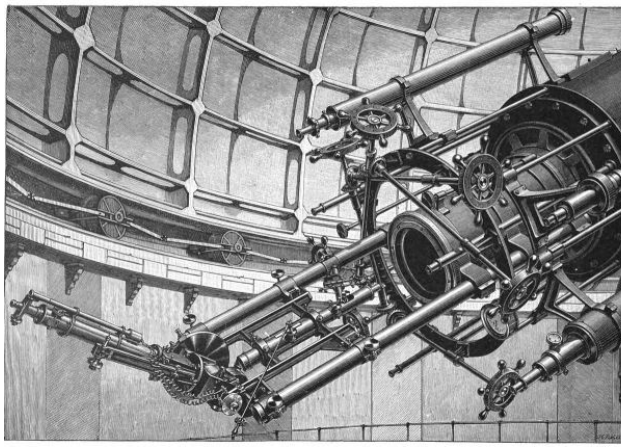
Algol minima:
11/22/2017 @ 05:00 am
11/25/2017 @ 01:49 am
11/27/2017 @ 10:38 pm
11/30/2017 @ 07:27 pm

Random Thoughts
by Chuck Dyson

In one of my talks to the students in the Astronomy Clubs, I intend to be quite controversial as I will suggest to the students, over half of who are female, that women really can't do science. After the hubbub dies down I will then ask the students to name some famous female astronomers, after all this is the astro club, and see if they can come up with any names.

Actually I will be looking to see if anyone knows of Cecilia Payne-Gaposchkin. The main reason I want the students to think about her is because we will be studying habitable planets and to find and identify a habitable planet first it has to be orbiting a star that is going to be stable for some period of time, hopefully billions of years. For the longest period of time all that we really knew about stars was that they had brightness differences and they had color differences. In 1609 Galileo pointed a small telescope at the stars and things started to change.

As changes go things are moving fairly slowly until the early 1800's and that's when things really started to happen. Joseph Fraunhofer started to make better optical glass and bigger batches of it too and then invented polishing machines to give superior surfaces to his improved optical glass. However, no matter how smooth you make the surfaces or how high the glass quality is with just a single piece of glass there will be chromatic aberration at the telescope focal point. What the heck as long as Fraunhofer is on a roll and he really understands how different glasses work form the work of John Dolland in the 1750's he combines two different types of glasses using his superior formulation for the flint glass along with his improved polishing techniques and creates the Fraunhofer crown and flint doublet for refractors AKA the achromatic telescope that is still in use today. Fraunhofer also realizes that the more he knows about light in general and starlight in particular the better he will be able to design his lenses to eliminate even more of the chromatic aberration, enter the stellar spectroscope (see drawing at right) and with it astronomers have the instrument they will need to study the stars in detail. As a side note I showed the picture of the refractor with the Brashear spectroscope attached to it to my steam punk art/culture friends and they went nuts and demanded that I tell them where they could get one, sadly I had to tell them that if they wanted one they would have to make it themselves.

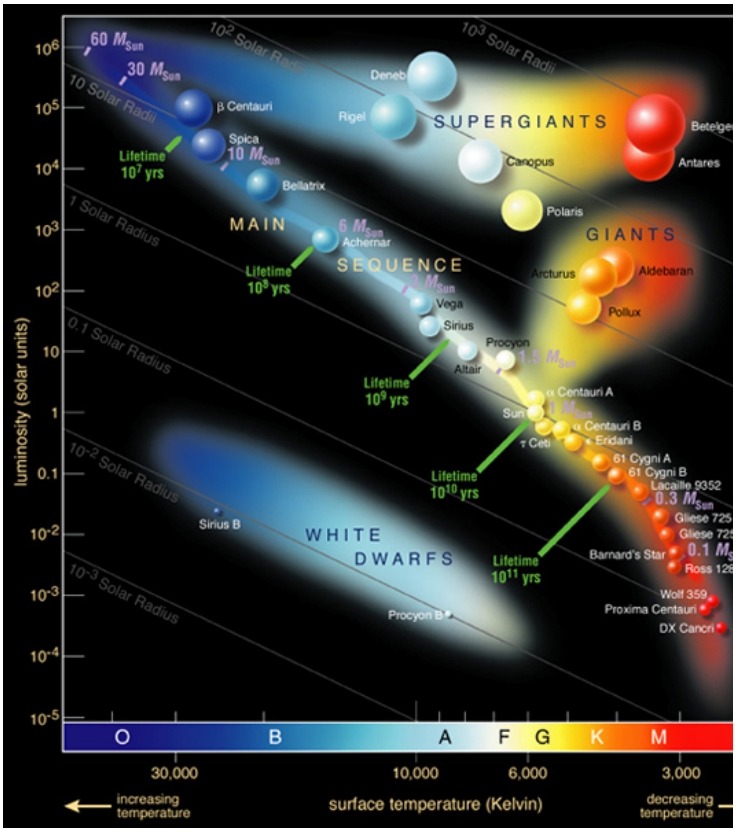


A spectroscope at the back end of an early Brashear refractor

The ability to use the spectroscope to determine what elements were in stars would have to wait until 1859 when Kirchhoff and Bunsen would learn how to read the messages written in the spectral lines. Before astronomers could read the spectral lines they were able by parallax to measure the distances to the closest stars and this is critical to knowing what a star's intrinsic brightness is another

words how bright is it at the surface and because almost 50% of stars are binary stars and some of those binary stars have orbital planes that are in line with the Earth by knowing the distance to them and using Newtons equations for orbiting bodies you able to work out the mass of each star and by watching the dip in the light curve as the stars eclipse each other and knowing the orbital velocity you are able to determine the size of each star. By knowing the size and temperature of a star you are now able to calculate the total energy output of the star. The lives of the stars are now open to astronomers now but what to do with the data, how to organize it, and what is it telling us? There are two approaches taken to data collection. At the Harvard observatory director Edward Charles Pickering had his graduate students collecting, with the new photographic techniques, all of the stellar spectra that they could and then in a radical break from tradition Pickering hires women to do the data analysis and this does several things, first it allows Harvard to accumulate a massive data bank of stellar spectra, second it results in the women doing the data reduction and analysis to see several patterns arising in the growing data bank and they are able to publish several seminal papers in astronomy (the Cepheid variable analysis and the classification of the stars into the O.B.A.F.G.K.M. system). Third this act by Pickering opens the door to women in astronomy in an academic capacity, but not all the way open not by a long shot.

A rising star in all of this new type of astronomy is a young American astronomer, Henry Norris Russell, from Princeton University. Russell is young, energetic, and very bright and he does three things; works to improve the quality of the instruments of the day and the quality of the data, captures his own spectra, and finally does his own data analysis. Russell is getting the best data possible and by analyzing it himself sees the patterns in the data that Pickering's students are missing; now there is one other person also working this way and that is Ejnar Hertzsprung and although he is working separately from Russell they publish their data at almost the same time and thus the graph that eventually comes out of this data is today called the H-R Diagram (see drawing at right). In 1920 the prevailing theory on how stars form and what they are made of was that the stars form from the same collapsing nebula that creates the planets and are thus made of the same material and have the same overall composition as the planets, other words they are just big hot rocks.



H-R Diagram

When Russell and the other astronomers turn their spectroscopes to the stars they actually do see all of the elements that are on Earth in the spectra of the stars. Even though

Russell and others can determine the elements in the stars they have no way of determining how much of each element in in the stars but with all of the evidence pointing toward the hot rock theory of stars this seems like a small matter indeed. Russell looking at his H-R Diagram thinks that he sees an explanation for how stars are born, live, and die. Russell's idea becomes known as the Russell theory of stellar evolution and if he is right the theory will make him one of the greatest astronomers of all time. Russell's idea is simple when you look at the H-R Diagram you see the very large low temperature stars in the right corner of the diagram and as the stars compress they go to the left side of the diagram, get hotter as they compress, eventually says Russell all of the gas is compressed and the star undergoes a phase change from a gas to a solid and starts to cool down in a process that takes billions of years, if it helps you to understand how this process could work, well, our little Earth still has a central core that is hotter than the surface of our Sun. In the end says Russell stars become cold, dark lumps of ordinary matter.

In 1900 Cecilia Payne is born and at the age of four her father dies leaving the family with very limited resources; however, with scholarships and grants Cecilia manages to go to Cambridge University as a botany student but she happens to attend a lecture by Arthur Stanley Eddington and falls in love with astronomy in general and astrophysics in particular. Cecilia add physics to her other majors, she has three, and soon Eddington realizes that she is an outstanding student and mentors her. Although Cecilia graduates she is not given a degree because women in the UK are not given degrees at this time, it is not until 1948 that Cambridge gives degrees to women, so Cecilia realizes that she has no academic future in the UK and gets grants that allow her to go and study in America. She goes to Radcliffe College and that college is associated with Harvard and this gives her access to the Harvard College Observatory. At the Harvard Observatory Pickering has retired and the new director is Harlow Shapley and he has benefited greatly from the work of the computers, Shapley used Henrietta Swan Leavitt's Cepheid variable star data to measure the size of our galaxy, and is quite keen on having more women to work for him. Cecilia goes to work in the Harvard computer group and continues her graduate work at Radcliffe; Shapley, recognizing her talent, encourages her to write a doctoral thesis and Cecilia does.

Meanwhile back in the UK (If this is beginning to sound like a soap opera well it sort of is but in this case it is life imitating art, if one can be so bold as to call a soap opera art), Eddington is using is using a new math technique developed by the Indian astrophysicists Meghnad Saha and Irving Langmuir that permits one to determine the amount of each element that is in the stellar atmosphere. Eddington is looking for the evidence that will show where in the stellar life cycle the gas star becomes a rock star, pun intended, and can find no such point. This is a problem for the Russell theory but not as much of one as you might think because it is the first attempt to find the transition point and first attempts often fail, but it is not good news either. Back at Harvard Cecilia is working on her doctoral thesis and guess what she is working on stellar atmospheres, probably picked up the Saha-Langmuir equations and the ability to use them from Eddington, and her work shows that stars are almost completely composed of Hydrogen and Helium. Shapley, who is Cecilia's advisor and not too sure of what to make of this paper sends a copy to Russell for review and comment, now this is where the stories diverge, if you read an account from Princeton or from a fan of Russell then Cecilia Payne barely exists. Russell offered no suggestions and Payne decided on her own, because of the

quality of her data, not to include it in the thesis. If one reads an account of the events leading up to the exclusion or the downplaying of the stellar gas evidence from Harvard or a Cecilia supporter the story is quite different and Russell is supposed to have advised her and Shapely that the results were just too radical to be included and oh by-the-by it gave Russell four years to work on the problem and in 1929 claim to have discovered the true composition of stars and add a side note that Cecilia Payne had alluded to the Hydrogen and Helium in her doctoral thesis. It may help you decide who is more truthful if you realize that Russell looking at Cecilia's paper and knowing of Eddington's paper would realize that these two papers together would make his stellar theory as dead as news form last weeks newspaper. Unfortunately this was not to be the only time that Cecilia Payne was "requested" to bury her research In a subsequent paper she showed that interstellar dust both reddened and dimmed the light coming from distant stars and thus needed to be accounted for in ones calculations. This finding of the effect of dust would throw much of Shapley's, her boss, work on stellar distances into doubt and so Shapely "requested" again that she bury her work and only after several papers on the same subject were out was she allowed to publish. Yet again when Cecilia discovered the how to read the changes in the stellar spectrum that indicated the magnetic field strength of a star she was "requested" to bury her work. Why would Shapely do this and why would Cecilia put up with this? For Shapely the answer is easy Cecilia was not listed as a professor in the Harvard catalogue and her courses were not in the catalogue so she was not paid as a professor but as an adjunct person out of the equipment budget at a rate way below that of a professor and if she had published several seminal papers the pressure would have been on Shapely to promote her. For Cecilia with no title and no real recognition to be terminated from her position would have made her a non-person in the academic community and in addition she would lost her access to the treasure trove of the Harvard spectroscopic archives and it is speculated that it was the desire to have access to this data that made her endure such miserable treatment. It was not until the 1950's that the winds of change started to blow for Cecilia and in short order she was made a full professor with tenure and then promoted to the directorship of the Harvard Observatory, a position in which she discharged her duties in exemplary fashion. In 1976 three years before her death Cecilia Payne-Gaposchkin is awarded the Henry Norris Russell Lectureship award the ultimate irony.

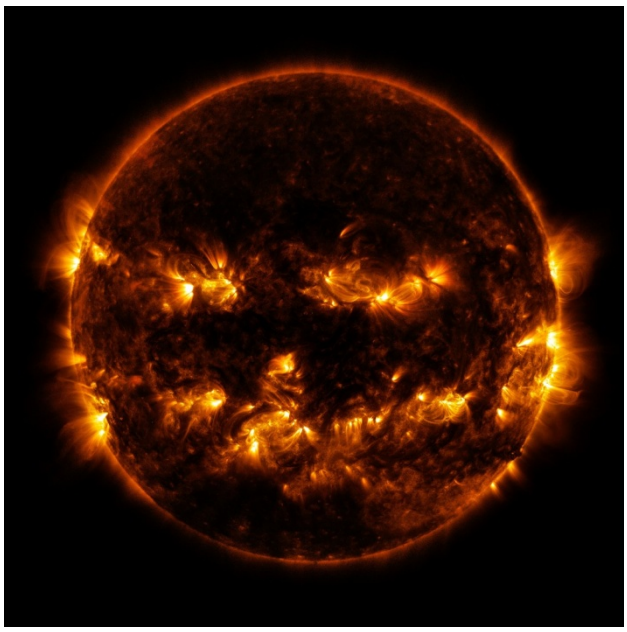
Cheers
Chuck

NASA SpacePlace

Spooky in Space: NASA Images for Halloween

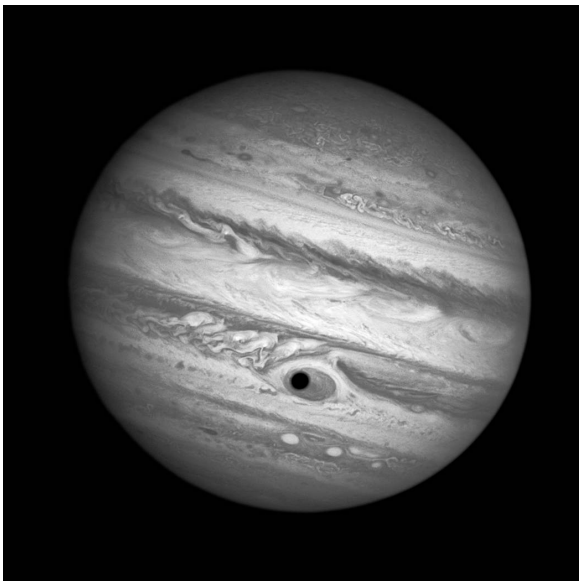
By Linda Hermans-Killiam

Have you ever seen a cloud that looks sort of like a rabbit? Or maybe a rock formation that looks a bit like an elephant? Although you know that a cloud isn't *really* a giant rabbit in the sky, it's still fun to look for patterns in images from nature. Can you spot some familiar spooky sites in the space images below?



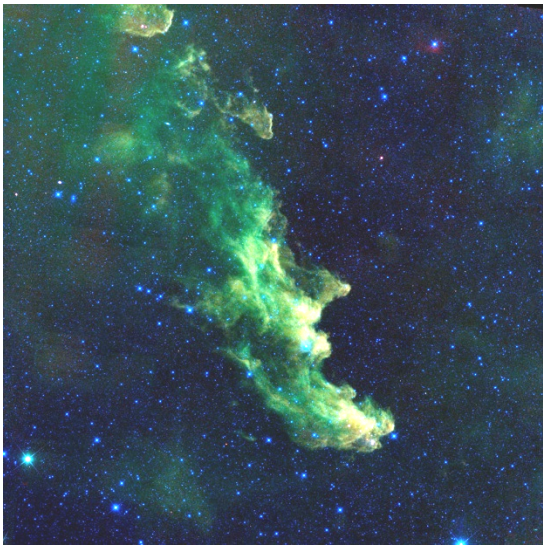
Credit: NASA/GSFC/SDO

This might look like the grinning face of a jack-o'-lantern, but it's actually a picture of our Sun! In this image, taken by NASA's Solar Dynamics Observatory, the glowing eyes, nose and mouth are some of the Sun's active regions. These regions give off lots of light and energy. This causes them to appear brighter against the rest of the Sun. Active regions are constantly changing locations on the Sun. On the day this image was captured, they just happened to look like a face!



Credit: NASA/ESA/A. Simon (Goddard Space Flight Center)

This is a Hubble Space Telescope image of Jupiter. Do you notice something that looks like a big eye peeking back at you? That's actually the shadow of Jupiter's moon Ganymede as it passed in front of the planet's Great Red Spot. Jupiter's Great Red Spot is a gigantic, oval shaped storm that is larger than Earth and is shrinking. It has been on Jupiter for several hundred years, and its winds can swirl up to 400 miles per hour!



Credit: NASA/JPL-Caltech

Can you see the profile of a witch in this image? This image, from NASA's Wide-Field Infrared Survey Explorer, shows the Witch Head nebula. The nebula is made up of clouds of dust heated by starlight. These dust clouds are where new stars are born. Here, the dust clouds happen to be in the shape of an open mouth, long nose and pointy chin.

Credit: NASA/JPL-Caltech/Univ. of Wisc.

The Black Widow Nebula looks like a giant spider in space. It is a huge cloud of gas and dust containing massive young stars. Radiation and winds from these stars push the dust and gas around, creating a spider-like shape. This image is from NASA's Spitzer Space Telescope.

Credit: NASA/JPL-CALTECH/MSSS

Did a skeleton lose one of its leg bones on Mars? Nope! It's just an image of a Martian rock. NASA's Curiosity rover captured this image. The rock was probably shaped to look this way over time by wind or water. If life ever existed on Mars, scientists expect that it would be small organisms called microbes. So, it isn't likely that we'll ever find a large fossil on Mars!

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