

Star Gazer News

Astronomy News for Bluewater Stargazers
Vol 10 No. 7 July 2016

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Summer Solstice

Even though the weather forecast for Jun 20 was for hot, hot, hot and probable thunderstorms, the summer solstice event went ahead at Keppelhenge. The strong breeze at the site helped keep things cool but also blew clouds past the Sun so shadows were intermittent. Images here show the sky conditions to have been partly cloudy but there were enough breaks in the overcast to allow key observations to be made, even the transit of the pointer stone shadow was observed long enough to get the message of the motion of the Sun at its highest elevation of the year. Thanks to Joan and Dave Skelton for organizing the Tai chi group visit and to Julian Delf for contributing images. Other members of BAS (Bill Klein, Lorraine Rodgers. and Glenn Keitch) were there as well lending general support. More images pg 3.



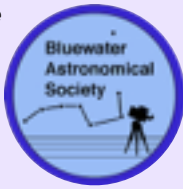
Joe Btfsplk, a character in the comic strip L'il Abner by Andy Capp was found in many Canadian papers and, while I grew up with it, I can't say any of the characters caught my fancy. But a recent incident when clouds moved in and prevented viewing reminded me of Mr. Btfsplk. Furthermore there is a saying that I am starting to hear more often that if you want a nice rain (because your gardens are getting dry), just schedule an astronomy event. Often times the clouds are only partial, and cover only the astronomical object of interest. Such are the meteorological vagaries of living where we do between massive bodies of water.



Image left by John H.

Image above by Julian Delf.

Disclaimer: S G N reports on the activities of the Bluewater Astronomical Society (formerly Bruce County Astronomical Society) but any opinions presented herein are not necessarily endorsed by BAS. See the BAS website at www.bluewaterastronomy.com for up-to-date details relating to BAS events. The BAS weblog is back, with articles of immediate interest written by various BAS members. SGN is produced and edited by me, John Hlynialuk. I am solely responsible for its content. Your original articles, images, opinions, comments, observing reports, etc., are welcome. I reserve the right to edit for brevity or clarity. Errors or omissions are entirely mine although I strive for accuracy in star events, etc. I will not publish your emails or other materials without your specific permission to do so. No part of this publication shall be reproduced in any form whatsoever without the editor's consent. However, the Sky Calendar and Feature Constellation pages are free to copy. Feel free to forward this issue in its entirety to friends. Email comments and/or submissions to stargazerjohn@rogers.com



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Whispering Pines Dark Sky Weekend

Whispering Pines Campground is offering BAS campers accommodations again this year for a weekend of sharing views with our telescopes. Camping starts Friday night and continues through Saturday and overnight to Sunday morning.



Contact Greg Rodgers wpc@campontario.net asap to reserve a spot.

BAS & Astronomy Events in July

Event times in DST with 24-h clock unless indicated otherwise

- Jul 1 to 3 (Fri to Sun) Bruce Pen National Park Dark Sky Weekend (camping starts Thu night Jun 30)
- 4 Mon NM
- 6 Wed Regular Meeting at **ES Fox Observatory**
Movie Night, Public Welcome
- 8 Fri Grey Roots Public viewing (starts at dark)
Public Welcome
- 9 Sat Fox Dark of Moon Viewing night (BAS members and guests)
- 11 Mon FQ
- 19 Tue FM
- 23/24 Sat/Sun Whispering Pines Stargazing Weekend
BAS presents the stars to campers
- 26 Tue LQ
- 27 Wed 15:32 Delta Aquariid Meteor Shower: 20 ZHR

Don't forget to register for STARFEST at www.nyaa.ca asap. Fee goes up July 1.



The Webster 28-inch is always a big attraction at any star party and this will be the second occasion this year when it will be available for the general public (as well as BAS members) for viewing. You can bet that after the main crowd has gone to their trundles, there will still be the diehards climbing the steps to have a look. In spite of a gibbous moon rising around 11 pm, the MW centre is dead centre above the southern horizon around midnight and will offer many clusters and nebula to spot with the big mirror.

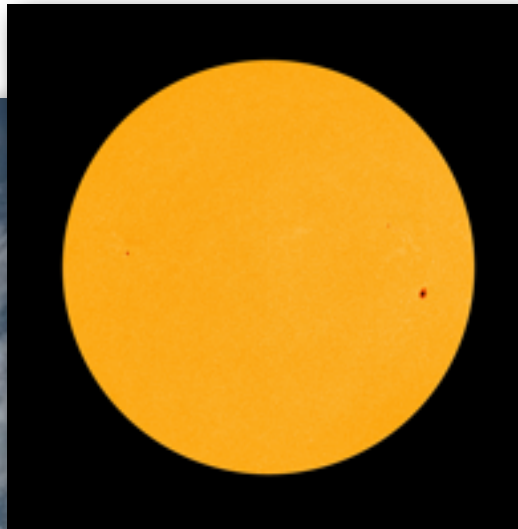
Image left was taken at Starfest (the first visit for Webster in 2012) and with a dew-free night, the cover was not used. Distortion in the image is due to the lens used - a wide-angle fisheye. Note the "BAS red-light cafe" c/o Brett at the lower left. Image by John H. Canon 50D, 10 mm lens at f/2.8, ISO 1600, 30 s exposure.

Summer Solstice (part 2)

The Summer Solstice celebration has become a regular destination for local Tai chi groups. Some from as far away as Stayner arrived even though the weather called for thunderstorms. This year another group who did not care to identify themselves also did some meditation during solar noon. The leader is seen in the centre of the image right in green robes. Image by John H.



Julian Delf imaged the Sun centered on the disc used to create a unique analemma. See more at http://www.steveirvine.com/analemma_pattern.html



There was only one lonely sunspot on the Sun to observe, and one tiny one that quickly disappeared. Two days later there were no spots to see and the Sun was officially declared "spotless" for the second time this year. This is apparently a sign that the current solar minimum has pretty much arrived. Not much of a surprise as the incidence of aurora has dropped significantly and if there are alerts they are generally for higher latitudes. Image from Big Bear Solar Observatory.

Summer Solstice Full Moon

A rather rare FM occurred on the night before and after the solstice which officially occurred at 6:34 pm Jun 20. Image by John H. at right was taken the evening of June 20 when the FM rose above the trees on top of the escarpment. Image is a crop from a 400 mm telephoto ISO 1600, exp =1/5000 s, f/6.3. Canon 60Da.



Ingredients for life spotted on Comet 67P/

The amino acid glycine has been discovered in the comet 67P/Churyumov-Gerasimenko, suggesting that the ingredients for early life may have been delivered to Earth by comets, rather than being created on our planet. More intriguingly, it also suggests similar comets could also have delivered life elsewhere in the universe – an encouraging sign for those looking for life on other planets.

The first life on Earth is thought to have appeared around 3.7 billion years ago. However, up until 3.8 billion years ago, the Earth was too hot to retain the volatile elements needed to produce life – including water. "100 million years is a very short time to make an ocean, and then to create organic molecules in the ocean, and finally to form a living cell," says space researcher [Kathrin Altwegg](#) of the University of Bern in Switzerland.

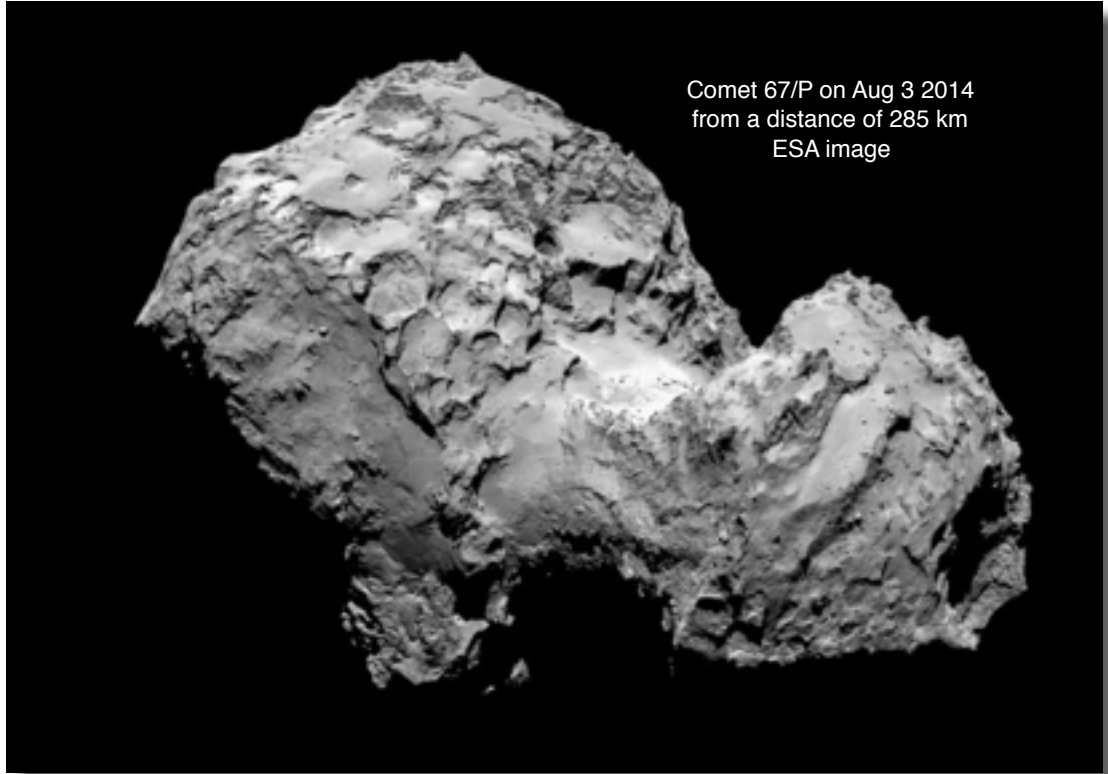
Scientists have suggested that the process could have been speeded up if organic molecules such as amino acids – the building blocks of proteins – had formed in one of the dark molecular clouds that give birth to stellar systems, and had been delivered to Earth ready-made by comets or meteorites. "We know that comets impacted at that time because you see it in the craters of the Moon," explains Altwegg.

Contamination woes

In 2009 astrobiologist [Jason Dworkin](#) of NASA's Goddard Space Flight Center in Maryland and colleagues reported that samples collected from the Wild 2 comet by NASA's Stardust mission contained glycine. However, this was contested because the samples had to be returned to Earth for analysis, and they showed evidence of contamination. Amino acids have also been detected in meteorites, but here too it is difficult to confirm that they have extraterrestrial origins – although isotopic ratios have suggested this is the case.

In the new research, Altwegg and colleagues analyzed dust from the envelope of 67P/Churyumov-Gerasimenko using the mass spectrometer ROSINA (Rosetta Orbiter Spectrometer for Ion and Neutral Analysis) onboard the European Space Agency's [Rosetta](#) spacecraft. The spectrometer ionizes incoming molecules and continuously measures the mass-to-charge ratios of the resulting molecular fragments. The researchers found that several of these molecular fragments matched products formed by the break-up of glycine. This was surprising, say the researchers, because glycine is not very volatile, so they had not expected any glycine present in the comet to be released into the gas cloud surrounding it. Further analysis suggested that it had been attached to the dust particles in the ice.

The team found no evidence of more complex amino acids. This was expected because only glycine can form without liquid water. "It's catalytic chemistry in the ice," explains Altwegg. Interestingly,



Comet 67/P on Aug 3 2014
from a distance of 285 km
ESA image

ROSINA also revealed phosphorus – an atom also essential for the formation of life – among the material. "The Earth has phosphorus, that's clear – and had phosphorus all along; but if you bring the organics and the phosphorus in one ship, then it's more likely that they react together," Altwegg says.

"Important discovery"

"I think it's a very important discovery using an impressive instrument and is a wonderful confirmation of the work that we demonstrated on Stardust," says Dworkin, who was not involved in the research. He says, however, that it will "absolutely not" settle the question of the ultimate origin of life on Earth, and questions the notion that only glycine can form without liquid water. "We synthesized a number of amino acids without exposure to liquid water [in our laboratory]," he says.

Planetary scientist [Hal Weaver](#) of Johns Hopkins University in the US says that, although most scientists will probably not be surprised by the confirmation that comets contain glycine, the research is "a nice affirmation of what was found in the Stardust samples". "What I'd really like to do next is to bring a sample of the nucleus of a comet back to Earth so it can be analysed in detail," he adds.

Meanwhile, Altwegg's team continues to study the ROSINA data. "I think that, in the end, we can show that everything you need to develop life is in a comet – just not life itself," she says. She adds that the findings have significant implications for the probability of finding extraterrestrial life. "If you form glycine and it ends up in a comet, you can imagine that it can go anywhere in the universe," she says.

The research is described in [Science Advances](#).

About the author

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Article from Physics World (www.physicsworld.com)

Did Life on Earth Get a Kickstart from Solar Superflares?

A stormy young Sun may have provided the early Earth with the ingredients and climate needed to kick-start life. That's the claim of NASA scientists, who say that powerful solar eruptions may have warmed the Earth at a time when the Sun was relatively cool. They also say that the Earth's life-giving supply of nitrogen was synthesized by energetic particles from the Sun.

Having a clear idea of the necessary conditions for life to emerge on Earth is a key scientific goal – both to trace our own origins and to better gauge which of the many thousands of known exoplanets may hold life. A particular sticking point in developing a clear picture of Earth's early evolution was that four billion years ago, when life-friendly conditions were developing, the young Sun wasn't luminous enough to warm our planet. Despite its storminess, the Sun was 30% dimmer then than it is today.

Cool and stormy

"Back then, Earth received only about 70% of the energy from the Sun than it does today," says solar scientist Vladimir Airapetian at NASA's Goddard Space Flight Center in Maryland. "That means Earth should have been an icy ball. Instead, geological evidence says it was a warm globe with liquid water. We call this the 'faint young Sun paradox'."

Another problem is that a key component for the building blocks for life is nitrogen (N) – but at that time, only unreactive molecular nitrogen (N₂) was present in the atmosphere. A very energetic process would have been necessary to break apart the molecular nitrogen into atomic nitrogen, allowing it to recombine into more biologically suitable forms. The latest research by Airapetian and colleagues shows that charged particles from the solar storms could have both broken apart the nitrogen and provided the heat required for life.

For clues on how the young Sun behaved, scientists study Sun-like stars in our galaxy at different ages. Apart from confirming that the young Sun would have been relatively faint, the studies also show that young stars frequently produce powerful flares. These are giant bursts of light and other radiation that are similar to the flares we see on the Sun today. Flares are often accompanied by huge clouds of solar material, called coronal mass ejections (CMEs).

Superflare showers

NASA's Kepler mission has found Sun-like stars that are young, and many of these are seen to produce "superflares" – enormous explosions so rare today that we only experience them once every

100 years or so. But Kepler's data show these young stars producing as many as 10 superflares a day. Based on these observations, Airapetian and colleagues say that clouds of charged particles ejected due to a young Sun's stormy outbursts triggered changes in the early Earth's atmospheric chemistry.

The team simulated superflares and found that they would have distorted the Earth's magnetic field – which was also weaker at the time – by creating large gaps around the poles. These gaps provided gateways for the energetic solar particles to penetrate the atmosphere. "Our calculations show that you would have regularly seen auroras all the way down in South Carolina," says Airapetian.



Solar Superflare: artists impression

Hotting up

The charged particles would travel down the magnetic-field lines and collide with the molecular nitrogen as well as the carbon dioxide, which was split into carbon monoxide and oxygen. The free nitrogen and oxygen atoms would have then combined to form nitrous oxide (N₂O) – a powerful greenhouse gas – and hydrogen cyanide (HCN). N₂O is 300 times more powerful at warming the atmosphere than carbon dioxide. The team's calculations showed that if even 1% of the gas in the atmosphere was N₂O, it would be sufficient to warm up the Earth's

surface to a temperature that could support liquid water, as well as the beginnings of life. "Changing the atmosphere's chemistry turns out to have made all the difference for life on Earth," says Airapetian.

The researchers also believe that the HCN could have provided a nitrogen source for biological molecules such as amino acids. Indeed, the daily dose of solar particles may also have provided the huge amount of energy needed to create complex molecules such as RNA and DNA that eventually seeded life.

At the same time, constant solar showers and radiation could also rip off a planet's atmosphere if its magnetosphere is too weak. Determining where the balance lies will help us to determine which extrasolar star systems could potentially harbour life. "We want to gather all this information together to help search for habitable planets around stars near our own and throughout the galaxy," says team-member William Danchi. Working with others in related fields, the researchers hope to come up with a "robust description of what the early days of our home planet looked like – and where life might exist elsewhere".

The work is published in *Nature Geoscience*.

About the author

Tushna Commissariat is a reporter for physicsworld.com

Pluto From Really Close Up

The *New Horizons* mission, which conducted its historic flyby on July 14th, 2015, has yielded a wealth of scientific data about Pluto. This has included discoveries about Pluto's size, its mountainous regions, its floating ice hills, and (more recently) how the dwarf planet interacts with solar wind – a discovery which showed that Pluto is actually more planet-like than previously thought.

But beyond revelations about the planet's size, geography and surface features, it has also provided the most breathtaking, clear, and inspiring images of Pluto and its moons to date. And with this latest release of images taken by the *New Horizons*' Long Range Reconnaissance Imager (LORRI), people here on Earth are being treated to be the best close-up of Pluto yet.

These images, which were taken while the New Horizon's probe was still 15,850 km away from Pluto (just 23 minutes before it made its closest approach), extend across the hemisphere that the probe was facing as it flew past. It shows features ranging from the cratered northern uplands and the mountainous regions in Voyager Terra before slicing through the flatlands of "Pluto's Heart" – aka. Tombaugh Regio – and ending up in another stretch of rugged highlands.

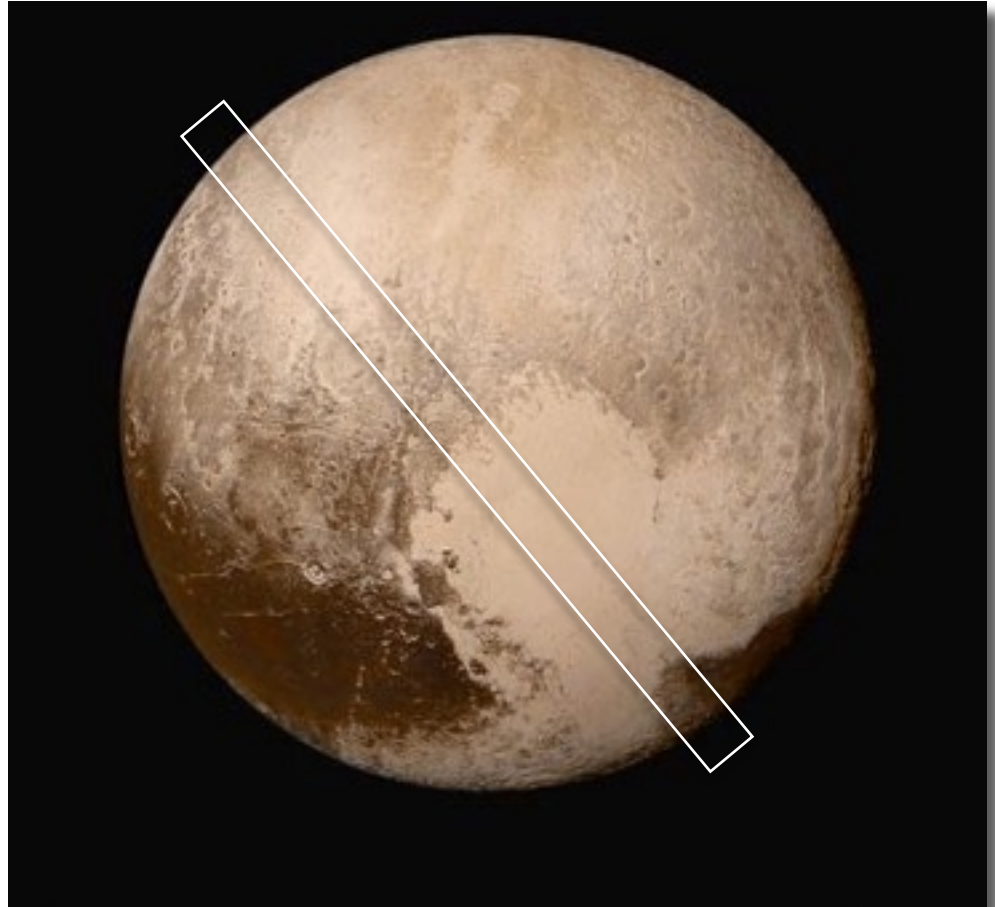
The width of the strip varies as the images pass from north to south, from more than 90 km across at the northern end to about 75 km at its southern point. The perspective also changes, with the view appearing virtually horizontal at the northern end and then shifting to an almost top-down view onto the surface by the end.

The crystal clear photographs that make up the mosaic – which have a resolution of about 80 meters per pixel – offer the most detailed view of Pluto's surface ever. With this kind of clarity, NASA scientists are able to discern features that were never before visible, and learn things about the kinds of geological processes which formed them.

This includes the chaotic nature of the mountains in the northern hemisphere, and the varied nature of the icy nitrogen plains across Tombaugh Regio – which go from being cellular, to non-cellular, to a cross-bedding pattern. These features are a further indication that Pluto's surface is the product of a combination of geological forces, such as cryovolcanism, sublimation, geological activity, convection between water and nitrogen ice, and interaction between the surface and atmosphere.

Alan Stern, the principal investigator of the *New Horizons* mission and the Associate Vice President of Research and Development at the Southwest Research Institute, was especially impressed with this latest find. As he told Universe Today via email:

"This new high resolution image mosaic is the complete highest resolution strip of images New Horizons obtained, and its both eye candy gorgeous and scientifically rich. Think about it— one flyby and we have this mosaic, plus so much more; no dataset like this existed on Mars until we'd flown half a dozen missions there!"



Above: Images snapped by New Horizons' Long Range Reconnaissance Imager (LORRI) while the probe was still on approach to Pluto were combined with color data from the Ralph instrument to create this global view of Pluto. [The long rectangle indicates the approximate area of the hi-res strip mosaic next page.-ed] Credits: NASA/JHUAPL/SwRI

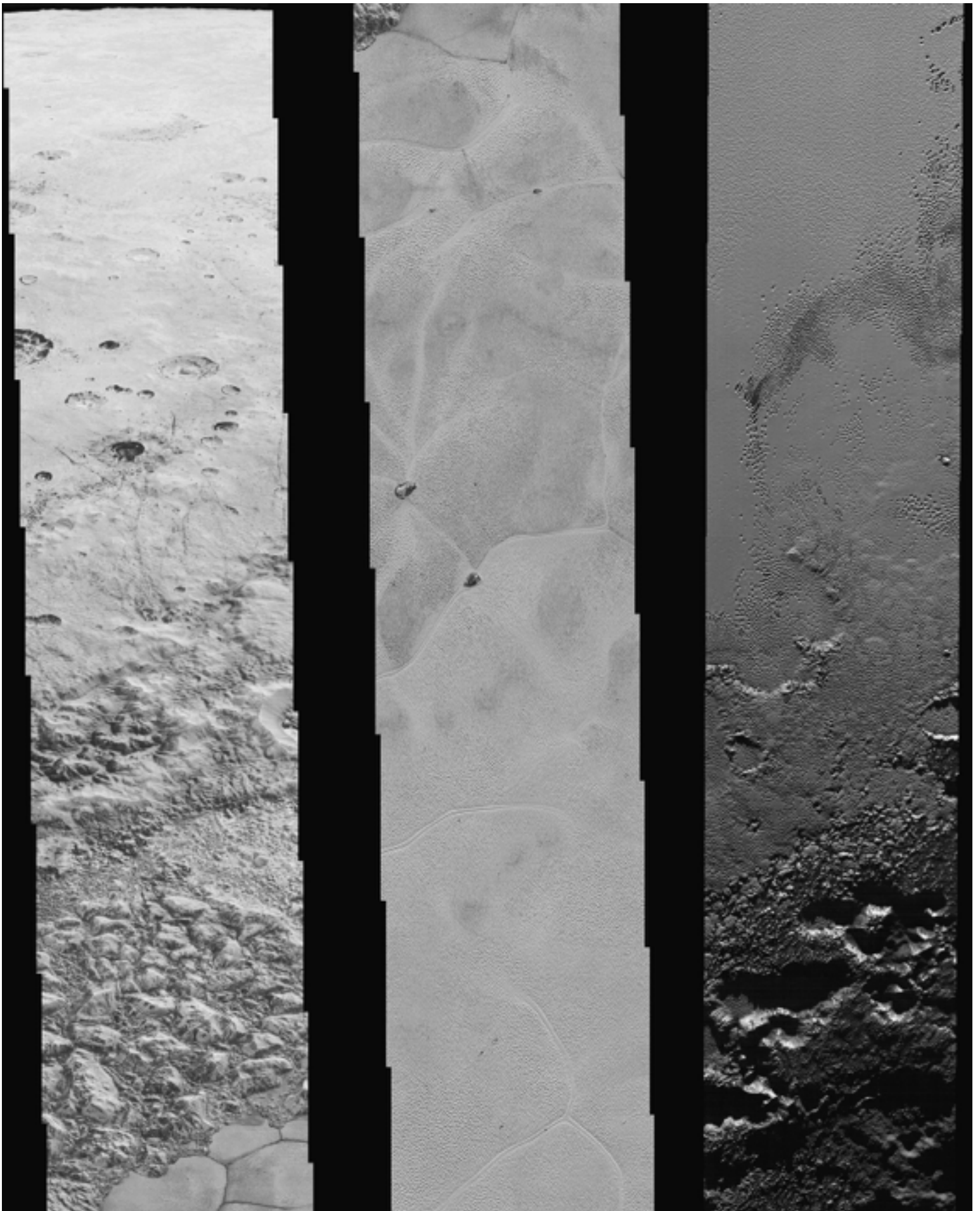
The most distant flyby in the history of space exploration, and yet we've obtained more from this one mission than multiple flybys were able to provide from one of Earth's closest neighbors. Fascinating! And what's more, new information is expected to be coming from the *New Horizons* probe until this coming October. To top it off, our scientists are still not finished analyzing all the information the mission collected during its flyby.

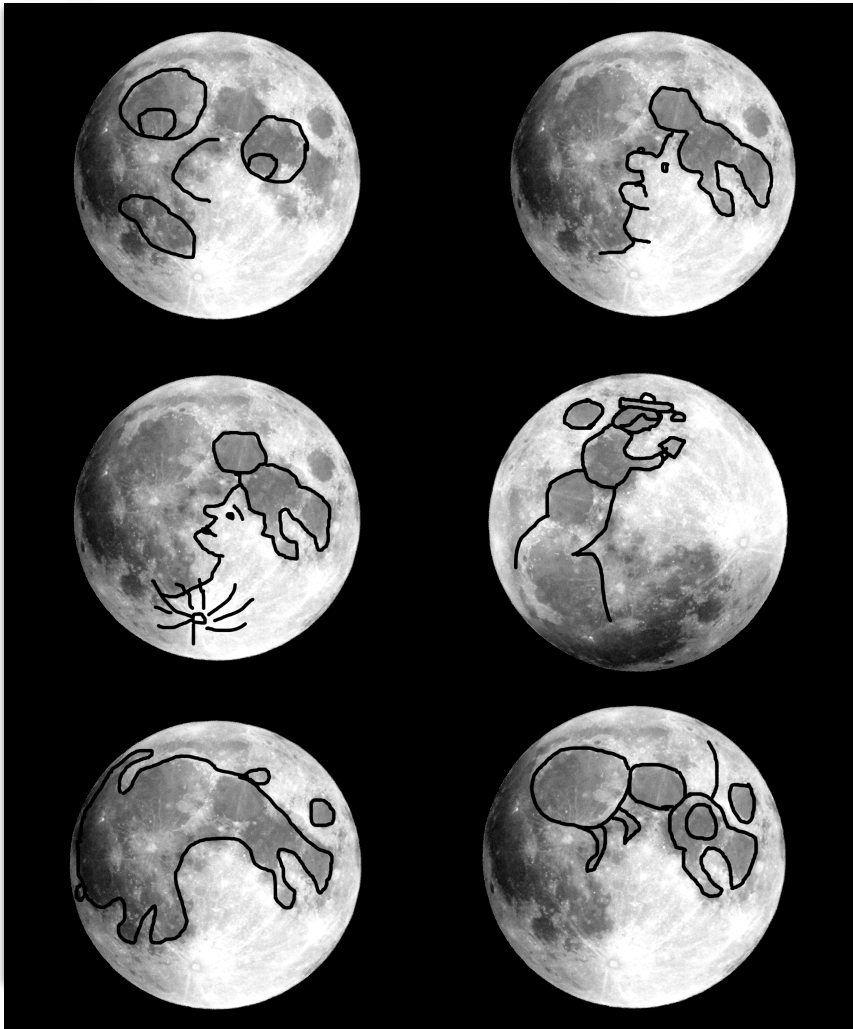
The full-resolution image can be viewed [here](#), and be sure to enjoy this NASA video of the mosaic as well (link at bottom of page).

A portion of the hi-res strip is shown on the next page. The file is whimsically named the "nh-fullresolutionnoodle".

If the links in the text above did not work copy this into the search window of your browser: www.nasa.gov/sites/default/files/thumbnails/image/nh-fullresolutionnoodle.jpg

The video is here: www.nasa.gov/mission_pages/newhorizons/videos/index.html

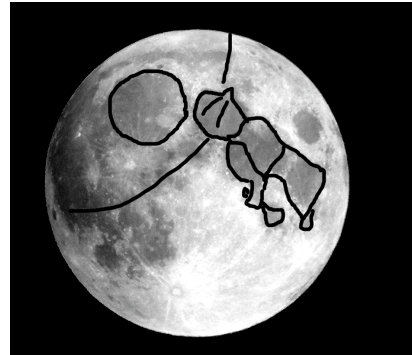




Recently, the planets have drawn our observing attention and the perennial standby has taken a back seat. But when Mars, Saturn and Jupiter are no longer visible later in the year, we always have the Moon. Here are a couple of lunar observing projects that you might try when you get the urge to look at something else other than deep sky objects. One can be done with the naked eye or binoculars and the other requires a telescope at medium power. See pg 15 for a normal moon map.

**Moon Observing Project 1:
Faces and characters: Full Moon**

We often hear about a “Man in the Moon” (that’s “in” not “on”) in some moon-related stories. I have always had trouble actually picking him out, but the traditional features that outline the face are Mare Imbrium for the left eye, Mare Tranquilitatus for the right eye and the lower part of Oceanus Procellarum for the mouth. I have outlined those in the image top left. (It reminds me a bit of Charlie Brown). The other faces (L to R) from the Man



in the Moon are the Old Hag, a Pretty Lady, a Librarian, a Rabbit, an Angry Ant, and my all-time favourite, the Chinaman holding a bag of rice looking at the setting Sun or Moon. (Image left). They’re all there, just use your imagination.

Moon Observing Project 2: Alphabet Moon Soup

A recent article in SGN (Sep 2015) showed an image of the Lunar-X and Lunar-Y which was recorded by a visitor to the Fox with a simple cell phone camera. That feature was noticed visually by our intrepid telescope guide who recognized the X right away and then found the Y on the image later. Serendipity!

But there is a literal alphabet soup on the Moon, all rather whimsical but catalogued diligently by several informal groups of lunar observers. One such provides a list on the website in the box below which challenges us to spot as many as we can, not for any records but to just sharpen our lunar observing skills.

If you get them all, you will have added to your life list the following 20 lunar letters and numbers: B, D, H, J, K, L, N, O (that one is easy!), Q, T, V, W, the famous Lunar-X, and a Lunar-Z. There are also the numbers 2 and 8, a question mark (?) and three Greek letters, mu, pi and phi! Check the link provided below for accurate co-ordinates for where these are located. Good luck! The Lunar-Pi is illustrated at right.

<http://the-moon.wikispaces.com/A+B+C+shaped+features>

Rima Conon zig-zags across the middle of the image below in the northern fringes of Sinus Fidei (Bay of Faith) near the Apollo 15 landing site. Crater Conon is 90 km due north of Rima Conon and not seen below. The Pi symbol is south of Rima Conon and was noticed by lunar imager Stefan Lammel. The Pi is a curious system of odd-shaped rilles that seem to be an extension of a larger depression to the Pi’s left. **Credit: NASA (Apollo 17)**



The Poetic Experience of Astronomy

“All things await the sensitive and imaginative mind which may be aroused to pleasurable emotion, at the sight of them. That is beauty.”

Painter Robert Henri *“The Art Spirit”*

David Eicher, editor of Astronomy magazine, recounts what happened to him when he was shown a globular cluster (M13) for the first time through a telescope. His experience is described in Timothy Ferris’s excellent book *“Seeing in the Dark”* (Simon and Schuster, 2002, ISBN 0-684-86579-3)

David explains :

“I came away from that night reeling with excitement, as if I’d suddenly been let in on a closely guarded secret. I hadn’t changed. The world around me hadn’t changed. I was keenly aware, as never before, that out beyond the blue sky lay vast numbers of stars and countless worlds unseen. I couldn’t help feeling differently. I had the whole Universe on my mind.”

Certain experiences, like Eicher’s, are pivotal in shaping a person’s interest and direction in life. Eicher’s life was changed and the M13 “deep sky” experience motivated him to create a magazine, called Deep Sky Monthly, when he was only 16 years old. Later, David became the editor-in-chief of Astronomy magazine. He has written, or edited, 21 books on astronomy and American history. In 2015, he produced a video series, on YouTube, entitled *“The Real Reality Show”*, which concerned the realities of astronomy and



Image above: A Young David Eicher

astrophysics. In 2016, he began work on a major book on galaxies using the latest scientific knowledge and understanding.

I think our emotional connection to the natural world runs deep and is a universal human trait. Eicher’s “WOW” experience changed the direction of his life. People become fascinated with astronomy because their first visual experiences with astronomical objects can generate this sense of wonder. For most people, the first sight of the rings of Saturn, or the swirls of gas in the Orion Nebula, or the terraced slopes of the lunar crater Copernicus generates the “WOW” emotion. This first hand experience is personal and can be quite beautiful. I like to refer to it as the “poetic experience” of



Image above: M13 by Doug Cunningham TAK FSQ 106 Canon 60Da 150 s exposure.

amateur astronomy. For some, the experience is transformative and leads to a lifetime love affair with the stars. There are probably as many descriptions of beauty as there are individual observers, but the actual experience itself, and the sense of wonder that it creates is probably universal. I suspect that symmetry has something to do with it. The Hindu had a name for experiencing natural beauty, calling it a “Darshan” experience. They describe it as a kind of “two way seeing”, where the observer, in experiencing the natural beauty, sees into the mind of God and vice versa, thereby perceiving beauty and, as it were, an ultimate truth. Maybe John Keats, from our Western tradition, had it right when he wrote:

*Beauty is truth, truth beauty,” – that is all
Ye know on earth, and all ye need to know.*

“Ode on a Grecian Urn” by John Keats

I have had many “Darshan”, or poetic, astronomy experiences and each one I’ve described in my astronomy journals. In many respects, these experiences have, after the fact, motivated concrete actions on my part. Sometimes these actions result in the purchase of a new piece of astronomy equipment ... and my wife, Paula, will certainly give witness to that ! One example readily comes to mind.

During the summer of 1978, John Hlynialuk, with his wife, Rebecca, and their first child, Christopher, along with Paula, myself, and our daughter, Christy, drove to Springfield, Vermont, to attend the annual Stellafane Convention. This Convention, like Starfest, has a bit of everything for the amateur astronomer; amateur telescope making competitions, engaging astronomy talks in a huge tent, meeting old friends, and lots of opportunity to observe the dark night skies from the mountain top site. After taking our families to a church supper, John and I spent Saturday night walking around the observing field checking out the various telescopes set up. We came across a Celestron-14 and its owner. I had purchased a Celestron-8 two years previously but had never looked through, or even seen, a C-14. I asked the owner what he had in the eyepiece and he said “M17 - the Omega Nebula”. (which is located in Sagittarius, about 6,000 LY from our Sun.) I now call it the “Loon Nebula”. I focused the image and, for the first time, saw one of the brightest, and most massive, star forming regions in our galaxy. I have included the image below that I took of M17 which reminds me of that night’s view through the C-14. A satellite had passed through the field of view during the two minute exposure.

I later learned that M17 is considered similar to M42, the Orion Nebula, but viewed edge on rather than face on, as with the Orion Nebula. The M17 nebulosity spans about 1/3 the diameter of the Full Moon and has embedded within it the open cluster, NGC 6618, one of the youngest open clusters known. The nebulosity itself was not uniform in brightness and was mottled throughout and displayed numerous patches of dark nebula. I was impressed by my view of M17 that night as well as the optics of the C-14 telescope. I turned to John and said, “WOW !, Someday I will buy a C-14!” A few months later, in November, 1978, I bought a second hand, but little used C-14, from Brian Kerman, a surgeon from Detroit.

I had a lot of fun using that telescope from our backyard in Lion’s Head. It has provided many “WOW” experiences. That telescope is now Paula’s and resides in her part of Quetican observatory and it still provides great images. I still remember John Dobson telling me that he has never seen a C-14 with poor optical quality.

I would like to end this month’s column with thoughts from rock guitarist, Brian May, on the WOW factor in astronomy. David Eicher and Brian May are good friends. May is one of the best guitarists in the world, and one of the founders of the British rock band, Queen. He abandoned his PhD studies in 1974 to pursue his rock music career, but returned 32 years later, in 2006, to complete his Doctorate in infrared astronomy and measuring interplanetary dust. Brian and David, along with others, have organized Starmus, a science and music festival, held in the Canary Islands. Brian has strong thoughts about the ”WOW” experience” in astronomy. (He calls it the “Ooooo” experience. He is disappointed by his fellow astronomers’ lack of awe at the beauty of the night sky.

In his words :

“I feel about astronomy the way I feel about music. At first, there’s the “Ooooo”moment --- the pure emotional enjoyment factor, in music and astronomy, just allowing the beauty of things to wash over you. But, if you don’t first allow yourself to be overwhelmed, I think you’ve missed the best part of it ! Once professional astronomers set up their equipment, they don’t bother to look up and go “Ooooo’ anymore”. Scientists tend to get wrapped up in what they think are explanations but actually are just relationships between facts. There’s a lot to the world outside of that, having to do with the beauty of nature and our small place in the Universe.”

Readers of this column are engaged on many occasions in sharing and interpreting the night sky for students and members of the public. No matter how many times you have shown a specific object, remember that for the newcomer, it is probably his/her first time ever, so, share the wonder, the story, and the “wow” factor and then, take pleasure in his/her own excitement.



M17 - B & W Image, Exp 2 minutes, STL 11K camera, -25C, TAK TOA

FINDING "THE LOST SCIENCE" OF 2001: A SPACE ODYSSEY

by [Mark Mortimer](#) [from Physics World www.physicsworld.com]

The film *2001: A Space Odyssey* brought space science to the general masses. Today we may consider it as common place, but in 1968 when the film was released, humankind yet to walk on the Moon. We certainly didn't have any experience with Jupiter. Yet somehow the producer, Stanley Kubrick, successfully peered into the future and created a believable story. One of his methods was to employ Frederick I. Ordway III as his science consultant. While Ordway has since passed, he left behind a veritable treasure trove of documents detailing his work for Kubrick. Science author and engineer Adam K. Johnson got access to this trove which resulted in the book "[2001: The Lost Science – The Scientist, Influences & Designs from the Frederick I. Ordway III Estate Volume 2](#)". It's a wonderful summary of Ordway's contributions and the film's successes.

What makes a movie? A plethora of ingredients must come together. But most of all, the audience must accept it for what it proclaims to be. For instance, a science fiction show must wander about in space and/or time. And the audience has to believe the wandering. In the 1960s, the general audience had little knowledge of space and could conceivably believe in anything.

Many films used expediency over truth, such as using a gun to shoot a capsule to the Moon. However, to validate his film, Kubrick enlisted Ordway from the Future Projects Office of the Marshall Space Flight Centre. Presumably this alone would have added large amounts of veracity, but Ordway took on the challenge as we see in Johnson's book and pushed further.

Ordway interviewed many scientists and engineers. Many of these came to the set to provide advice. Ordway acquired drawings as well as made his own schematics. He went to industry, academia and governments. Johnson skillfully brings this all to light. How did the results mesh with this effort? That is the value of Johnson's book. It gives credit to the breadth and depth of Ordway's research.

The book's first section identifies the knowledge sources; people like Willy Ley, books such as *Beyond Tomorrow The Next 50 Years in Space*, and organizations such as Boeing and its PARSEC project. It identifies the individuals who came to the filming sets to give advice and has many images of the sets as well.

The second section gives credit to preceding films, though it's not certain from Johnson's book as to how or if Ordway drew inspiration from them.

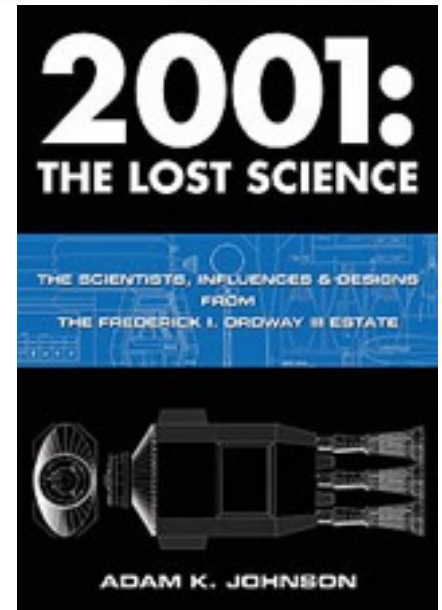
Its third and final section is probably the most fun as it provides many figures of the mock-ups, drawings and schematics. It includes a great full page image of Space Station V and a four page pullout section of Discovery X-Ray Delta One. There's also an interesting note therein that indicates that the sets and props had to be thoroughly believable from every perspective, as they didn't know where Kubrick may place the camera. Thus, the book gives the reader a taste of the fine detail for some graphics such as for the Moon Bus. With Johnson presenting all this from Ordway's collection then it's easy for the reader to understand why there's a high sense of believability to the film.

Yes, Johnson's book shows the amount of knowledge that was available in the early 1960s and that Ordway gained access to much of this information. The very large size of this book, about 11in by 14.5in helps show off many great images throughout. However, its size also suggests the style of the book; that is, it is a scrapbook. The book is a wonderful compendium of information relevant to the film *2001: A Space Odyssey*. But it doesn't add to the knowledge base. It's an excellent repackaging of existing material with only a little suggestive comments on cinematic technique that might be original. And, as with most scrapbooks, the value of this book is the

images. While the text is informative, it's also somewhat dry, so the reader will probably feel much greater reward from feasting on the many print reproductions, drawings and photographs within Johnson's book.

Perhaps the greatest value of this book is what goes unstated. That is, with enough effort and research people can construct a likely overview of humankind's

progress into the near future. A future than can be thrilling. The book "[2001: The Lost Science – The Scientist, Influences & Designs from the Frederick I. Ordway III Estate Volume 2](#)" by Adam K. Johnson captures some of the excitement and thrill as humankind lay poised upon the edges of travelling into space. Reading it will give you pause at just how far we've progressed in the last 50 years. And perhaps get you thinking about what the films of today might be telling us about the next 50 years.



- Jul 1 to 3** Bruce Peninsula National Park **Dark Sky Weekend** (Fri-Sun) (camping starts Thu night Jun 30 campers must sign up with Brett)
- 1 Fri **Aldebaran** 0.4° S of Moon (below local horizon),
Moon at perigee: 366 000 km
 - 4 Mon **NM** rises locally at 6:09 am DST
 - 6 Wed Regular Meeting **at ES Fox Observatory** Movie Night
Public Welcome
 - 7 Thu **Regulus** 1.9° N of Moon
 - 8 Fri **Grey Roots** Public viewing (starts at dark)
 - 9 Sat **Jupiter** 0.9° N of Moon
Fox Dark of Moon Viewing night (BAS members & guests)
 - 11 Mon **FQ Moon** rises 1:24 pm DST
 - 13 Wed Moon at Apogee: 404 300 km
 - 16 Sat **Saturn** 3.8° S of Moon
Venus-Mercury appulse evening twilight (sep'n 0.5°)
 - 19 Tue **Full Moon** rises at 8:41 pm DST
- 23/24 Sat/Sun Whispering Pines Stargazing Weekend**
- 26 Tue **LQ Moon** rises locally at 12:15 am DST
 - 27 Wed **Delta Aquariid Meteor Shower:** ZHR = 20
 - 29 Fri **Aldebaran** 0.3° S of Moon (Close miss about 6:30 am)
 - 30 Sat **Mercury** 0.3° N of Regulus

Planets

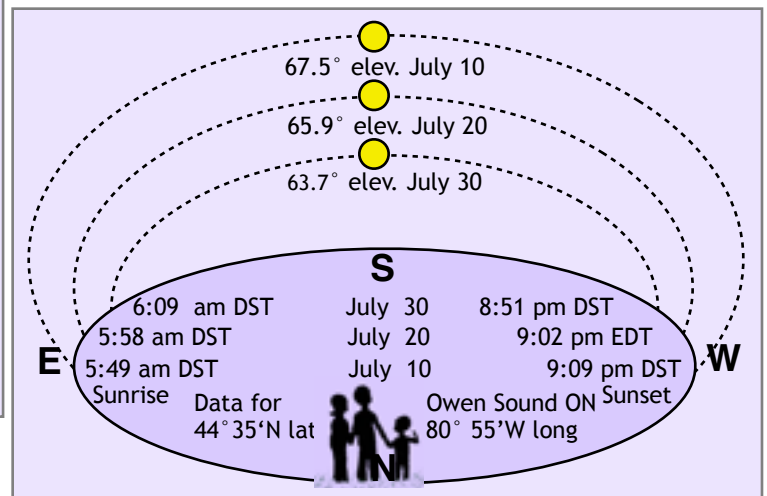
MERCURY is an evening planet now and passes Venus on the 16th (0.5°) and Regulus on July 30. Separation is 0.5° just before they set.

VENUS, (-3.9) by mid-July starts to become visible in the evening sky. It is 15° from the Sun by month end. **MARS**, is mag. -0.7 (at month-end), and now in the SW sky after dark. It is heading back (eastwards) toward Scorpius after retrograding last month in Libra. The disk has shrunk to a gibbous 13" now. **JUPITER**, (-1.7) is low in the SW at sunset and sets by 10:30 at month end. Jupiter season is ending. **SATURN**, (mag. 0.3) follows Mars closely, -both are past the meridian at the end of twilight. Rings are still fully tilted. **URANUS**, (5.8) and **NEPTUNE**, (7.9) are morning planets with Neptune rising at midnight (by month end) followed by Uranus 1.5 h later. **Dwarf planet, Ceres** (8.2) rises an hour after Uranus. **Asteroid, Vesta** (6.7) is still near the Sun and difficult to see. **PLUTO** (mag. 14) rises before midnight in Sagittarius and is visible in dark sky at its meridian transit time about 2 am DST. Charts for these planets/asteroids for 2016 are now on the BAS website.

The diagram below gives the sunrise/sunset times and the Sun's altitude for July. The Sun reached its highest point last month and is lowering in the sky. The moon phase graphic at the bottom of this page shows the lunar phase for each night of the month. Times of moonrise for NM, FQ, FM and LQ for Owen Sound are in the Sky Calendar listing at left. See Special Events for details of the Mercury-Venus close approach July 16.

BAS Events

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- 6 Wed **Regular Meeting at ES Fox Observatory**
Movie Night Public Welcome
 - 8 Fri **Grey Roots** Public viewing (starts at dark)
 - 9 Sat **Fox Dark of Moon Viewing** (BAS members/guests)
- 23/24** **Whispering Pines Stargazing Weekend**, register Sat/Sun with Greg R. at wpc@campontario.net

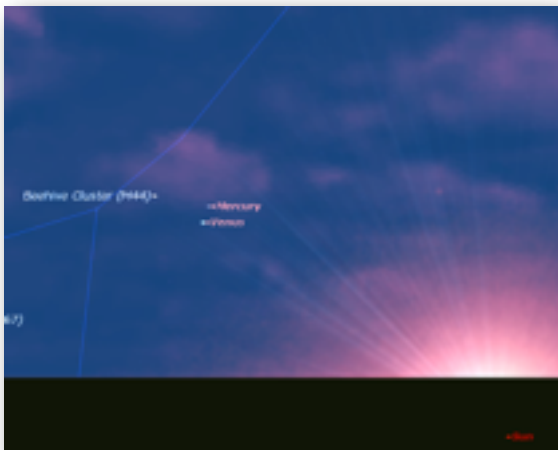


Special Events

July 16: Venus - Mercury Challenge

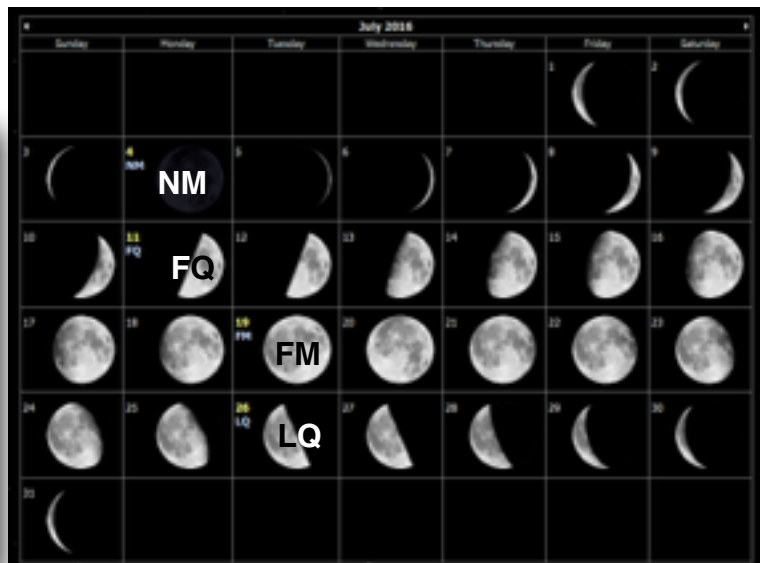
The two interior planets, Mercury and Venus offer a daytime viewing challenge for those with GOTO telescopes. They set about 9:45 pm at the western horizon and are less than half a degree apart all day but only 11° east of the Sun, so be careful. The Sun sets at 9:05 pm and you have 45 minutes to spot Venus and then just above it will be Mercury.

Both are almost fully lit (Mercury is -1 magn. Venus -4 magn.) and bright enough to be seen in binoculars through the twilight. This would be a good time to try for the green flash as well.



Moon Phase Chart for July 2016

created with QuickPhase Pro 4.0



Sagittarius (Sag) α Sagittarii - Rukbat
β Sagittarii - Arkab
γ Sagittarii - Al Nasl δ Sagittarii - Kaus Meridionalis
ε Sagittarii - Kaus Australis ζ Sagittarii - Ascella
σ Sagittarii - Nunki λ Sagittarii - Kaus Borealis π Sagittarii-Al Baldah

Sagittarius (the Archer) is the southernmost of the zodiacal constellations, lying between Capricornus to the east and Scorpius to the west. The central part of Sagittarius has a group of stars [an asterism] resembling in shape a giant teapot complete with spout and handle, an aid in identifying this constellation. The stars forming the handle and dome of the teapot comprise a group of stars known as the "Milk Dipper," another distinguishing feature. Sagittarius lies directly in the plane of the brightest part of the Milky Way; the Galactic Center is located in this constellation. The region is very rich in star clusters and nebulae. An enormous number of stars also lie in this region of the sky; it is a grand area for scanning with fieldglasses. Observe in binoculars the dark areas in the Milky Way around γ and δ Sagittarii; these are clouds of cosmic dust with no nearby stars to illuminate them. M 24 is an open cluster, impressive in binoculars, while M 8, the "Lagoon Nebula", is visible to the naked eye. M 22 is a magnificent globular cluster; its stars are of the 10th magnitude and fainter, but so compact they form an object barely visible to the naked eye.

DOUBLE STARS

	Mag.	Sep'n (s)	Location	Remarks
ζ	3.3-3.5	1	190030	
η	3.2-10	4	181537	
μ	4.0-11.0-9.5-9.5	17-48-50	181021	Quadruple.
π	3.7-3.8-6.0	1	190721	Triple.
54	5.4-8.9	46	190381	Yellow-Blue.

MESSIER OBJECTS

Mag	Location	Remarks
M 8	- 180124	Diffuse Neb. "Lagoon Nebula", visible to naked eye.
M 17	- 181816	Diffuse Neb. "Horseshoe Neb", "Swan" or "Omega"
M 18	7.5 181717	Open Cl.
M 20	- 175923	Diffuse Neb. "Trifid Nebula"; very large, bright, has several doubles, multiple stars
M 21	6.5 180223	Open Cl.
M 22	5.9 183324	Globular Cl. Called the finest after M13, see above.
M 23	6.9 175419	Open Cl.
M 24	4.6 181618	Open Cl. Beautiful field.
M 25	- 182919	Open Cl.
M 28	7.3 182223	Globular Cl. Very condensed.
M 54	- 185231	Globular Cl.
M 55	- 193731	Globular Cl.
M 69	8.9 182832	Globular Cl.
M 70	9.6 184032	Globular Cl.
M 75	8.0 200322	Globular Cl. Most "open" of the large globulars.

Other Objects of Interest (Sag)

- NGC 6723 - Globular Cl. Loc'n. 185637
- NGC 6822 - Irr. Gal. mag. 11. 194315.
- R Sagittarii - Long per. (269 d) var. max mag 7.3. Location 191319
- T Sagittarii - Long per. (392 d) var. max mag 8.0. Location 191317
- W Sagittarii - Cepheid var., mag range 4.3-5.1. per. 7 d15h55 min. 180230

Scutum (Scu)

Scutum (Scu) is a small, faint constellation lying between the three great constellations of Aquila, Ophiuchus and Sagittarius. Its four brightest stars are in the shape of a great elongated diamond. The two brightest stars, α and β Scuti, have magnitudes of 4.1 and 4.5 respectively. It lies in the Milky Way and therefore does not stand out very well. M 11, a "semi-globular" open cluster, is visible to the naked eye. [a favourite open cluster for many observers -ed]

DOUBLE STARS

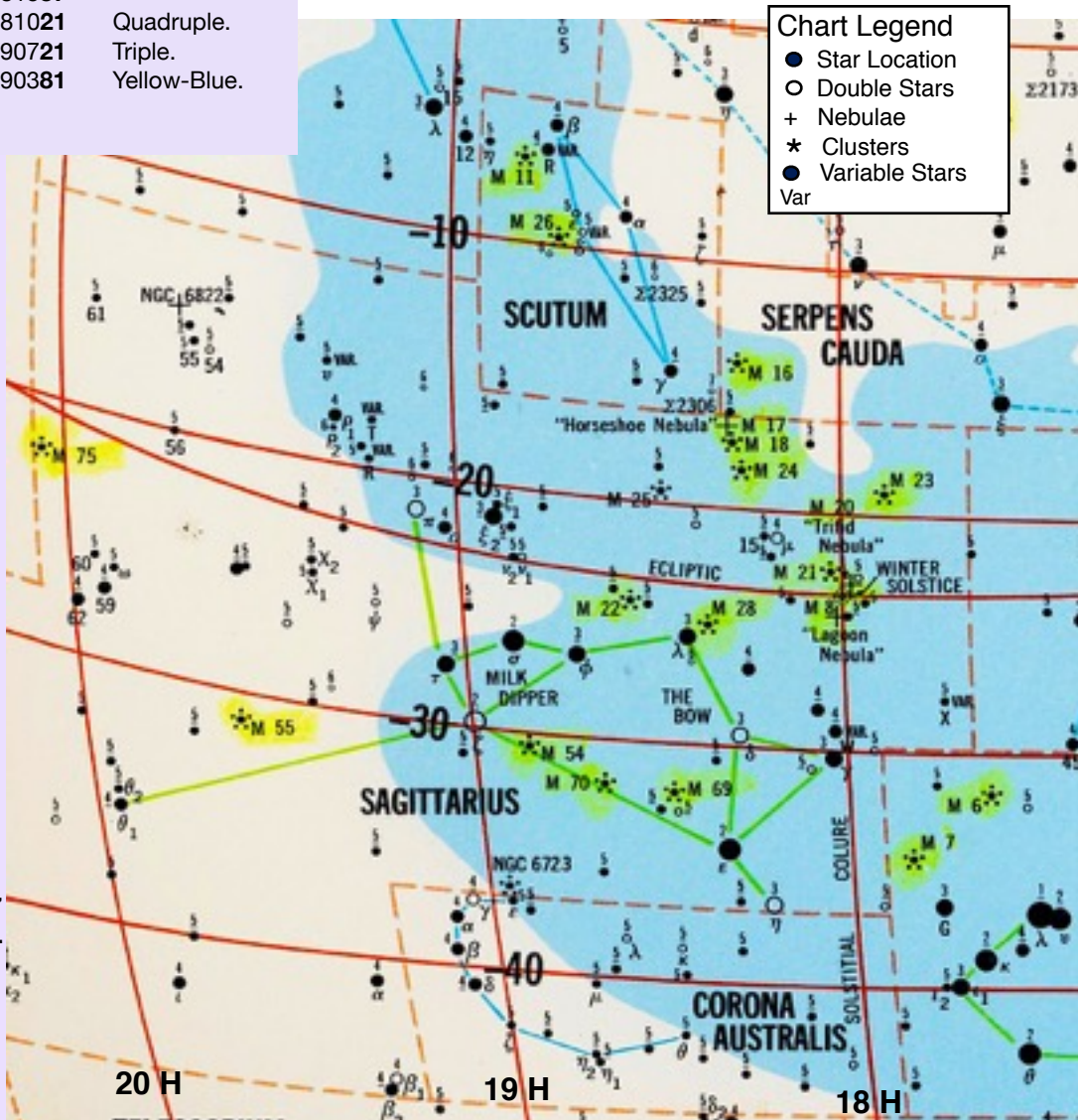
	Mag.	Sep'n (s)	Location	Remarks
Σ2306	7.2-7.9	12	181915	Yellow-Deep Blue; very beautiful.
Σ2325	6.0-9.3	12	182810	

MESSIER OBJECTS

	Mag	Location	Remarks
M 11	6.3	184806	Open Cluster. Called semi-globular. Known as the "Wild Duck" cluster. [or the "Borg Cube" -ed]
M 26	9.3	184309	Open Cluster. Coarse.

Other Objects of Interest in Scutum

- R Scuti - Long period (145 days) variable, magnitude range 4.9-9.0. Location 184506.



BAS Member Loaner Scopes

Solar H-alpha scope now available.

Our Lunt solar scope can be borrowed by BAS members and it is waiting at the Fox! Contact John to get your hands on it. We now have a suitable mount for it as well. A short training session will be provided on pickup.

Several Dobs available.

One 12-inch dobsonian loaner telescope is available for free loan to members. Smaller 8-inchers are also available. Contact John H. or Brett T. for availability. Scopes come in and out so keep checking with John or Brett if you are interested in a loaner.



SGN Classified Ads Section
(Now also on our website)

The Cartoon Corner www.xkcd.com

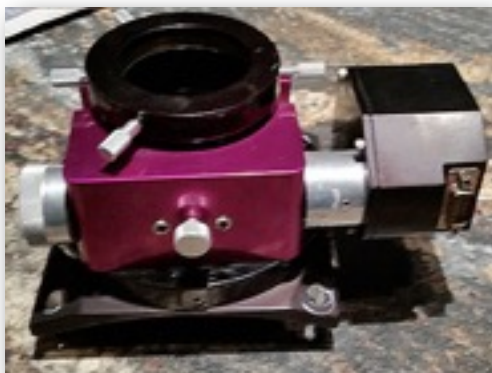


ISS Passes resume July 10

Visible passes of the ISS resume in early July but are morning observations until July 25. Table right is from heavens-above and shows passes over the Fox Obs.

FOR SALE: Moonlite CRL 2.5 inch Large Format **Crayford Newtonian Focuser** (\$592.10 new -see <https://focuser.com/products.php>) with Hi-Res Stepper Motor (\$252.81 new). Flange for 14" tube, accepts 2" accessories (EP/camera). This is a **true Crayford focuser**, not the cheap "Crayford-style" knock-off. Not set up for manual focusing, requires hand paddle (\$330 not included) for manual operation and computer control for remote focusing. This is meant for a remote imaging setup and comes from an abandoned project (12" scope). Over \$850 plus taxes and shipping new.

Asking \$600.00. Contact **Paul** at ski@bmts.com



Date	Brightness (mag)	Start			Highest point			End			Pass type
		Time	Alt.	Az.	Time	Alt.	Az.	Time	Alt.	Az.	
25 Jul	-0.9	00:55:23	19°	NE	00:55:23	19°	NE	00:56:35	10°	NE	visible
25 Jul	-0.9	02:27:57	11°	NW	02:30:33	23°	N	02:33:16	10°	ENE	visible
25 Jul	-2.0	04:04:23	10°	NW	04:07:32	42°	NNE	04:10:40	10°	E	visible
25 Jul	-2.3	22:21:22	10°	SSW	22:24:07	25°	SE	22:24:18	25°	SE	visible
25 Jul	-0.5	23:57:11	10°	WSW	00:03:27	11°	NE	00:03:35	10°	NE	visible
26 Jul	-0.9	01:35:55	18°	NW	01:37:18	24°	N	01:40:02	10°	NE	visible
26 Jul	-1.4	03:11:24	10°	NW	03:14:22	31°	NNE	03:17:20	10°	E	visible
26 Jul	-3.4	04:47:44	10°	WNW	04:50:58	63°	SW	04:54:11	10°	SE	visible
26 Jul	-1.5	21:29:28	10°	SSE	21:31:17	14°	SE	21:33:06	10°	E	visible
26 Jul	-3.4	23:04:02	10°	WSW	23:07:18	85°	NNW	23:10:34	10°	ENE	visible
27 Jul	-1.1	00:41:12	10°	WNW	00:44:03	27°	N	00:46:55	10°	NE	visible
27 Jul	-1.1	02:18:19	10°	NW	02:21:08	26°	N	02:23:58	10°	ENE	visible
27 Jul	-3.2	03:54:40	10°	WNW	03:57:57	75°	NNE	04:01:12	10°	ESE	visible
27 Jul	-1.7	05:31:53	10°	W	05:34:01	16°	SW	05:36:09	10°	S	visible
27 Jul	-3.3	22:11:05	10°	SW	22:14:16	54°	SE	22:17:28	10°	ENE	visible
27 Jul	-1.6	23:47:49	10°	W	23:50:50	33°	NNW	23:53:51	10°	NE	visible
28 Jul	-0.9	01:25:10	10°	NW	01:27:52	23°	N	01:28:13	23°	NNE	visible
28 Jul	-1.7	03:06:03	30°	ENE	03:06:03	30°	ENE	03:08:00	10°	E	visible
28 Jul	-2.5	04:39:12	16°	W	04:41:09	29°	SW	04:44:01	10°	SSE	visible
28 Jul	-2.3	22:54:29	10°	W	22:57:38	46°	NNW	23:00:50	10°	NE	visible
29 Jul	-0.9	00:31:52	10°	WNW	00:34:36	23°	N	00:36:05	17°	NE	visible
29 Jul	-0.2	02:08:37	10°	NW	02:08:37	10°	NW	02:08:37	10°	NW	visible
29 Jul	-3.1	22:01:16	10°	WSW	22:04:31	74°	NNW	22:07:47	10°	ENE	visible
29 Jul	-1.1	23:38:30	10°	WNW	23:41:19	26°	N	23:44:08	10°	NE	visible
30 Jul	-0.7	01:15:33	10°	NW	01:17:02	20°	NNW	01:17:02	20°	NNW	visible
30 Jul	-1.4	22:45:06	10°	W	22:48:03	31°	NNW	22:51:02	10°	NE	visible
31 Jul	-1.1	00:22:23	10°	NW	00:25:07	24°	N	00:25:32	23°	NNE	visible
31 Jul	-2.0	21:51:42	10°	W	21:54:49	42°	NNW	21:57:58	10°	NE	visible
31 Jul	-0.9	23:29:06	10°	WNW	23:31:49	23°	N	23:34:05	12°	NE	visible
01 Aug	-0.5	01:05:46	10°	NW	01:06:39	16°	NW	01:06:39	16°	NW	visible
01 Aug	-1.1	22:35:43	10°	WNW	22:38:29	25°	N	22:41:16	10°	NE	visible
02 Aug	-1.2	00:12:41	10°	NW	00:15:12	27°	N	00:15:12	27°	N	visible
02 Aug	-1.3	21:42:16	10°	WNW	21:45:12	29°	NNW	21:48:07	10°	NE	visible
02 Aug	-1.1	23:19:30	10°	NW	23:22:16	24°	N	23:23:46	18°	NE	visible
03 Aug	-0.3	00:55:54	10°	NW	00:56:20	13°	NW	00:56:20	13°	NW	visible
03 Aug	-1.1	22:26:14	10°	NW	22:28:56	23°	N	22:31:38	10°	NE	visible



In the digital age, Moon maps on paper seem an anachronism but let me tell you why I like the one above. First of all, it is not too detailed but detailed enough. Thirteen of the near-side Mare are identified (in a different label colour) and the labels are placed off the chart not covering any features on the Moon itself. Craters are also coloured in yellow labels to stand out and there are not too many of them to wade through. The nine prominent ones that stand out because of ray patterns or contrast are all here. I would have added Proclus to make it a nice even ten.

Clearly this is a chart that would not be too useful when examining the moon at high power. Then the other maps with more features labelled would be preferred. This one would be a good reference for binocular viewing and also views of the Moon at low power through a small telescope. I will be using this with Mallincam views of the Moon with students, because there is a limit to how many names you can throw at them. They want to know the key Mare like Imbrium and Tranquillitatus, a few bright craters like Tycho and Copernicus and the Apollo 11 landing site in Mare Tranquillitatus.

One of my favourite craters is Proclus and it is visible most of the time being on the edge of the Moon that gets lit first. The split ray pattern is a good way to talk about how impact angle controls the appearance of the ejecta.

Mare Imbrium alone is worth a detailed look. Even at low power, the peaks of the Straight Range and isolated peaks of Mt. Pico and

Piton cast visible shadows (except at FM). The mare floors also have noticeable colour differences that show the Moon is not a drab grey and white but has some subtle colours that reveal eras of different aged lava flows.

Once the Moon is past FQ, the Apollo 11 landing site comes into view. It is easy if you are familiar with the profile of the Lady in the Moon. The landing site is located just above her ear. See below.

