The Day the Martians Died: 50 Years of Planetary Exploration

By Tom Haeberle

On July 15, 1965, NASA’s Mariner 4 spacecraft made the very first encounter with Mars, taking up the vanguard for an armada of probes that would visit the planet over the next 50 years. Upon arrival, it took 21 photographs from less than 10,000 miles above the surface of the planet during a 25-minute flyby. And instantly, the images dashed the dream that we would ever meet a Martian. Gone were the canals, gone was the vegetation, and gone was the advanced civilization purported to exist on Mars by turn-of-the-20th-century American astronomer Percival Lowell.

Fascinated by what appeared to be a network of lines running along the surface of Mars, Lowell built an observatory in Flagstaff, Arizona in 1894 to study them further. The phenomena were first observed in 1877 by Italian astronomer Giovanni Schiaparelli, who dubbed them “canali.” Lowell attributed them to the work of intelligent life. In his three books about the Red Planet, he suggested the canals were built by a utopian society in order to channel water from Mars’ polar caps during dry times. He observed that darker areas in one hemisphere appeared to expand when the polar cap of the opposite hemisphere shrunk. These changes with the seasons he took to be an indication of growing plant life.

Lowell’s ideas about intelligent life on Mars were largely discredited as observational astronomy improved in the early 20th century, chalking the canals up to optical illusions. And, spectroscopy couldn’t seem to find any water in the Martian atmosphere. However, many still believed there may have been a permanent presence independent of Earth. Whether by random asteroid impact, perturbations to Earth’s orbit or spin, tectonic activity, or human-caused destruction, the natural habitat on this planet will someday disappear.

Picking up Stakes and Seeking Another Sun

By Richard Brounstein

There comes a time when your lease expires. A home will one day decay beyond repair, or at least become too expensive to fix, and then you will have to move. This is not just true for log cabins and skyscrapers. It also applies to our planet and even our Solar System. While the end of our term on Earth may seem far in the future, some scientists are working on finding a way for humans to leave this blue marble and establish a permanent settlement elsewhere. Many agree that for the human species to survive, it must be able to maintain a permanent presence independent of Earth. Whether by random asteroid impact, perturbations to Earth’s orbit or spin, tectonic activity, or human-caused destruction, the natural habitat on this planet will someday disappear.

At this point, we can only imagine how it might look to become a mobile, spacefaring civilization. Perhaps, millions of humans would live in large artificial habitats on planets, moons, asteroids, and space stations in our Solar System. To thrive, these space communities would have to harness the vital and lucrative resources of water and rare Earth metals, as well as the energy from our Sun. But their efforts still won’t ensure the survival of our species forever.

Our Sun’s time is running out. At 4.5 billion years old, it has already consumed nearly half of its hydrogen. The Sun will exhaust the rest in another 4.8 billion years. Then, it will swell up into an enormous red giant, about 200 times its current size, gobbling up Mercury, Venus, and possibly Earth. But long before then, our planet will by lifeless. As it burns through its remaining fuel, the Sun’s increasing luminosity will raise global surface temperatures and evaporate our oceans in a billion years’ time. Meanwhile, the violent, unstable death throes of our star will make the entire Solar System uninhabitable.
**WHAT’S UP IN THE SKY**

**AAA Observers’ Guide**  
By Tony Faddoul

**August’s Evening Planets:** Bright Venus can be seen below Leo the Lion shortly after sunset in the month’s first week. Jupiter will be in Cancer the Crab for an hour after sunset in the first half of August. Mercury will be up for an hour after sunset, moving between Leo and Virgo the Virgin. Neptune is in Aquarius the Water Bearer as of 10 PM, rising earlier every night until 8 PM at the end of August. Uranus can be found in Pisces the Fish, rising an hour after Neptune. See Saturn in Libra the Scales until 1 AM, setting earlier every night until 11 PM at the end of the month. Dwarf planet Pluto is in Sagittarius the Archer all night.

**August’s Evening Stars:** Spot the Summer Triangle of Vega in Lyra the Harp, Deneb in Cygnus the Swan, and Altair in Aquila the Eagle all night. See Antares in Scorpius the Scorpion and Arcturus in Boötes the Herdsman. Also, find the stars of constellations Cassiopeia, Cepheus, Draco, Sagittarius, Capricornus, Aquarius, Hercules, Andromeda, Pegasus, and the two Dippers throughout the month.

**August’s Morning Planets:** Find bright Venus under Cancer shortly before sunrise in the last half of August. Mars is up around 5 AM between Gemini the Twins and Cancer. Uranus will be in Pisces and Neptune is in Aquarius until sunrise.

**July’s Morning Stars:** See the Summer Triangle of Vega, Deneb, and Altair. Look for Capella in Auriga the Charioteer, Aldebaran in Taurus the Bull, Beetlejuice in Orion the Hunter, as well as the stars of constellations Lyra, Hercules, Aquarius, Capricornus, Pisces, Aries, Draco, Pegasus, Cassiopeia, Cepheus, Andromeda, and the two Dippers.

### August “Skylights”

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<td>Saturn is stationary</td>
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<td>Mercury is 8° Venus (dawn)</td>
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<td>Aug 6</td>
<td>Last Quarter Moon at 10:00 PM</td>
<td>Mercury is 0.5° north of Jupiter (midnight)</td>
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<td>Aug 13</td>
<td>Perseid Meteor Shower peaks (pre-dawn)</td>
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<td>Aug 14</td>
<td>New Moon at 10:55 AM</td>
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<td>Aug 15</td>
<td>Venus in interior conjunction (pre-dawn)</td>
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<td>Aug 17</td>
<td>Moon at apogee (252,180 miles from Earth)</td>
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<td>Aug 22</td>
<td>First Quarter Moon at 3:30 PM</td>
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<td>Aug 29</td>
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**Perseids 2015: Shooting Stars Abound**

The Perseid Meteor Shower is one of the most stable shooting star events of the year. This year, it peaks on a moonless August night and promises to be a spectacular show with about a hundred meteors visible per hour.

**When is the Peak?**

The Perseid Meteor Shower will peak in the early hours of August 13. At the beginning of August, the meteors visible after midnight average 5 per hour. Each night of the month, the average will increase to reach about 60-100 per hour on the night of the peak in the predawn hours. The nights of August 11 and 12 will have similar, or close, number of visible meteors.

The best viewing window is in the early hours of the morning after 2:00 AM. The number of visible shooting stars intensifies every day as the peak approaches, and every night after 2:00 AM.

**Who can see the Perseids?**

This meteor shower favors the skies of the northern hemisphere. Those who live further south will see fewer meteors. The southern hemisphere has the chance to see 20 meteors per hour at peak under dark skies.

**How do I view the meteor shower?**

You will see the shooting stars striking everywhere across the sky. You don’t need to look for the Radiant which is the point they seem to radiate from.

Looking north to northeast, the meteors will seem to originate from the constellation Perseus. Find a dark spot, far away as possible from light pollution, and hope for clear skies. There is no need for any equipment to view the meteor shower, and you don’t need to know the constellations. Just look up, and enjoy!

Sources: timeanddate.com; Encyclopedia Britannica; earthsky.org.

Follow veteran sky watcher Tony Faddoul each month, as he points our minds and our scopes toward the night sky.
So Close Yet So Far Away

FOCUS ON THE UNIVERSE

By Stan Honda

Night sky close-ups, which sounds like an oxymoron, is an idea I’ve been thinking about for years, and I recently had the opportunity to try it out in a very special place. This June, I had the good fortune to serve as Artist-in-Residence at the North Rim of the Grand Canyon. I was one of five artists selected to live and work at the national park this year for a three-week residency.

Having an extended period of time at the Canyon allowed me to explore imaging close-ups of objects against a night sky in one of our nation’s most treasured landscapes. Other artists selected for the residency included painters, writers, and musicians. Over 40 parks have this program. It is a real testament to the National Park Service that artists are recognized as integral to the preservation of the wilderness.

The Grand Canyon is an astonishing place to see and photograph a very dark sky, and the North Rim is a particularly good site. Small and fairly remote, it gets only a fraction of the overall number of visitors to the Canyon. On my first night, I walked along a trail to a viewpoint. Peering through ponderosa pine trees, I could see the eastern horizon and what appeared to be clouds. These turned out to be the starlit band of the Milky Way, rising against an inky black sky.

The North Rim proved to be a great place to experiment with close-ups. In addition to offering such a dark backdrop, plants near the edge of the Canyon are poised over an abyss, without any trees or mountains interfering.

Each evening, I set up my camera and tripod as usual for nighttime shots, using a wide-angle lens (24mm), which I placed very close to the plants. Often the lens would be only 6 inches from a branch, which led to some odd contortions of both the tripod and myself as I composed the shots. My typical exposure was 30 seconds, f2.8, at ISO 3200 for most of the photos. Shooting at f2.8 meant a very shallow depth of field, so the plant was sharp, but the background of stars was out of focus, giving the pictures a distinctive look.

My biggest problem was the wind. Even the slightest breeze would bobble the plant making it blurry in the picture, because the exposures were so long and the camera was so close. Some nights were very still, and the shooting was good. But usually, I had to take multiple shots just to get one that would be sharp. This required a lot of patience.

Under a berry bush, yellowish star Dubhe on the scoop of the Big Dipper (left) points to pale yellow Polaris at the handle’s end of the Little Dipper, with the Kochab glowing orange.

Someone asked me how it was that I could see well enough in the dark to focus. My headlamp, even on its red setting, provided enough light for autofocus, so I could make sure the plant was sharp. I was so close that I had to concentrate on a particular leaf or pine needle. I then enlarged the image on the camera’s screen and adjusted focus as necessary.

I discovered some notable aspects to my close-up night sky photos. First, the Milky Way was easily visible, with its arcing band of light bisecting the frame. Second, out-of-focus stars were rendered as large circles, and generally only the brightest ones appeared. Last, the main stars of constellations were easy to see and recognize, unlike in most night sky photos, where there are too many stars to make out any asterisms. The 24mm focal length turned out to be perfect – the stars were out of focus enough to be pleasing, but not so much that you couldn’t see the patterns of the constellations.

Photographer Dean Ketelsen, who has a remarkable blog (http://theketelsens.blogspot.com/) packed with fascinating observations about nature, made an interesting comment about the close-ups. He noted that the out-of-focus sky in the backdrop accentuates the stars’ visible colors, which are far less noticeable in sharper images. In an image of a pinyon pine leaf (thanks to the National Park Service Rangers for helping me identify the species!) with a blurry Scorpius in the background, you can clearly spot the cool red star Antares at the constellation’s heart and the three hot blue stars that form its head, with bright, white planet Saturn reflecting above.

This amazing and unique opportunity to experiment with night sky close-ups at the Grand Canyon turned out well and inspired me with many ideas for the future. So, stay tuned!

Explore more night sky photography at www.stanhonda.com.
Submit your photography questions to stanhonda@gmail.com.

Stan Honda is a professional photographer. Formerly with Agence France-Presse, Stan covered the Space Shuttle program. In his “Focus on the Universe” column, he shares his night sky images and explores his passions for astronomy and photography.
be life in some form on Mars. Scientists had to see for themselves. The Mariner 4 images ultimately revealed Mars as a harsh, dead world, cratered and inactive with a meager atmosphere. Despite its seasonal changes, Mars appeared more Moon-like than Earth-like. With an atmosphere 5,000 times thinner than the Earth’s, its skies were unlikely to be blue, and deadly radiation from the Sun would deny life as we know it.

Still, there was hope. The Martian craters imaged appeared to be younger than those on the Moon. This could mean that Mars had a denser atmosphere in the past and even liquid water on its ancient surface. And where there is water, there is life. Perhaps, evidence of life was still clinging there. We had to go back and find out.

In 1971, Mariner 9 arrived at Mars during a major global dust storm. When the dust settled the next year, the probe, the first to orbit another planet, imaged Mars from pole to pole, taking some 7,000 pictures. Dark surface areas were found to be volcanic plains, seasonally covered by the Martian dust. Other photos revealed Earth-like features: canyons, volcanoes, and dried-up riverbeds. Dreams of Martian life lived on!

So, Earth marched on Mars – the Vikings landed (NASA spacecraft, that is) in the late 1970s, and since the 1990s, we have had foot soldiers on the ground in the form of rovers, spreading out across the surface. This army of has found no foes, but the spacecraft have made significant discoveries including water ice, organics, and evidence of ancient oceans. We know Mars was once habitable, though there are still no signs of life today, but the search continues!

Now, as if in celebration of Mariner 4’s 50th anniversary, New Horizons has made the first ever flyby of Pluto in July, giving us the first images of that icy dwarf planet – and another connection to a Lowell mistake.

The search for a trans-Neptunian body was a big priority for Lowell’s observatory. Anomalies in the orbit of Uranus led him to conclude a “Planet X” was responsible. In 1930, 15 years after his death, protégé Clyde Tombaugh found Pluto – but it wasn’t what they were looking for. Neptune’s mass was later verified, proving there were no anomalies, and it turned out Pluto was too small to have caused them anyway. Nevertheless, the first two letters of Pluto and the symbol adopted for the celestial body (♃) still honor Percival Lowell.

New Horizons’ flyby of Pluto caps a half-century of what has been a golden era of Solar System exploration that began with Mariner 4. Lowell’s Martians were put to rest fifty years later after his death, and his not-so-Planet-X was seen another fifty years later. These missions remind us of how far we’ve come, both in understanding and in the distance traveled, and how long it took us to get there. And what a treasure it is to see a new world for the first time, again!

Sources: Environments Out There (I. Asimov); New Worlds for Old (D. Lunan)

**AAA Around Town**

**A Private Moment at Public Observing on the Highline**

From time to time, AAA gets requests to organize stargazing at private events. These can range from weddings to birthdays to kids parties. As the Private Events Coordinator for the club, I organize these plans. This May, I received an unusual e-mail with a stargazing request from a young man named Mark, who lives in San Francisco. He had something very unique in mind.

Mark and his girlfriend, Natalia, visited the High Line in New York on a Tuesday last summer and enjoyed observing with AAA. This sparked a new interest in astronomy for the couple, and they later bought their own telescope. Now, Mark wanted to return to the High Line so that he could propose to Natalia – and he wanted to enlist the help of AAA.

Mark and I exchanged many emails in the weeks leading up to his target date of June 26. He explained that the proposal had to happen on the High Line; no place else would do. With the help of one of his friends, we arranged for a sign to be placed in a window very high up in the Standard Hotel (the room was graciously comped for this purpose), which could only be read from below with the aid of a telescope. Then, pretending to offer to let Natalia peer through the eyepiece at some celestial object, I would trick her into observing the sign and read his proposal. But could we actually pull it off?

The long-anticipated day finally arrived. I showed up early to the High Line to set up and rehearse my role. I had never met them before, so Mark sent me photos in advance so that I would be able to recognize the couple as they approached. At 8 PM, I saw them coming towards me: right on time!

I started with my usual AAA routine – handing out postcards, chatting about the club – and as the pair came closer, I stopped the young woman to ask if she would like to see the Moon. She was very enthusiastic, recounting the wonderful experience that she and her boyfriend had stargazing last year, which of course, I knew all about. She took a look, saw the sign, and gasped as she read the words, “Natalia, will you marry me?” She turned to see Mark down on bended knee, presenting her with a ring. She replied with a big “YES” – and lots of crying.

It was a truly wonderful moment, and I was thrilled to be a part of it. I’ve said this before and I’ll say it again – you never know what amazing things can happen when you observe with AAA!

Mark surprised his girlfriend, Natalia, with a special astronomy-themed marriage proposal on the High Line in June, with the help of AAA.
System a turbulent place. Space colonies will struggle to survive. Even if some could withstand the Sun’s violence, they’ll be left with a cold, dead star. Eventually, it will shrink into a white dwarf, no longer producing the energy on which civilizations depend.

So, maybe we should be planning for a really long-distance move – to a new solar system. Fortunately, there are billions of stable stars in our galaxy that could support advanced civilizations. The best option is a red dwarf star. M-class red dwarfs are the most common star in the Milky Way, making up about 75% of all stars, and perhaps the universe. They also last a long, long time. Red dwarfs can shine for over a trillion years. That’s about 100,000 times the lifespan of the Sun. But these small, dim stars don’t put out as much energy, only about 20% of what our bigger, hotter G type home star generates.

Today, Earth receives less than one-millionth of the Sun’s energy, of which humans harness an even smaller amount. Most of the Sun’s energy is wasted into interstellar space. This is also true for red dwarf stars. To get the energy we need for a future home in a red dwarf system, we would have to gather more than an orbiting planet would receive.

A Dyson sphere might do the trick. Dyson spheres are theoretical structures that completely surround a star to trap as much of its energy as possible. Although they are still a matter of science fiction, humans might advance to the point of being able to build such a giant spherical shell around a red dwarf with a habitable interior and enough power to support us for billions of years.

But, before we become proficient at building Dyson spheres, humans will need to master interstellar travel. The biggest challenge in moving a civilization to another star system is just getting there. Even if we develop a way to send spacecraft to other stars, transporting large numbers of human beings that far is another story. Today, probes travelling within our Solar System hibernate, shutting down for months or years until they approach their destination. En route to another star, a spacecraft would have to be dormant for perhaps tens of thousands of years, but a civilization of humans is unlikely to sustain itself in a suspended state for that long.

Maybe the answer is to wait until the star comes to us. 70,000 years ago, a red dwarf called Scholtz’s Star, along with its brown dwarf companion, passed by just 0.8 light-years from our Sun. It would take a spacecraft like Voyager about 14,500 years to reach it from Earth. Perhaps, that is a little more manageable than making it to our nearest neighbor star, Proxima Centauri, 4.2 light-years away (an 80,000-year journey), but we are still going to want to cut down on that commute. Even if we build a faster spacecraft, assuming its safe for human transport, it would have to be very, very big – and how do you pack up an entire civilization? We might be able to trim the voyage to just a few human generations, make multiple trips, and develop micro-storage techniques, but the energy needs for such a vessel are going to be enormous. And the cost would be, well, astronomical.

One day, before the Earth and Sun run out, humans might perfect interstellar travel and develop ways to power a civilization around a red dwarf. And the Large Synoptic Survey Telescope (LSST) may find us a new home. Data from the LSST over the next decade should reveal other red dwarfs in nearby space that either came close in the past or are headed for a future encounter with our Solar System. Be ready to hitch a ride.

We’ll be sad leave our Sun behind, but when you gotta go, you gotta go. So, put on your pioneering spirit and prepare to make a new star your home!

Sources: space.com; nasa.gov; wiki.
**The Summer Triangle: Gateway to the Milky Way**

**AMAZING GAZING**

By Jason Kendall

For those who are new to stargazing or who feel they rely too much on their mobile apps when observing, there is one easy target in the night sky that always delivers this time of year – the Summer Triangle.

The asterism is composed of three bright stars: Vega, Deneb and Altair. They each shine with about the same brightness and form a large triangle that rises in the East around dusk. It is up until dawn all summer long, so there are plenty of chances to see it.

To know which star is which, Vega rises first, then counterclockwise comes Deneb, then Altair. Each of these points of the Summer Triangle is the brightest star in its constellation. Vega lives in Lyra the Harp, which looks like a small box next to it. Deneb is the tail of Cygnus the Swan, otherwise known as the Northern Cross, and Altair represents the eye of Aquila the Eagle.

The Summer Triangle can also lead you to find the Milky Way. From our Earth home within the galaxy, we can see the disk of the Milky Way, called the Backbone of the Night or the Great Celestial River by some cultures, but you have to be somewhere dark. On a Moonless night, head to a big park, away from streetlights, houselights, and car-lights, because their glow will wash it out. Wait for the Summer Triangle to rise high in the sky off the horizon. Deneb is right in the center of the Milky Way, with Vega and Altair on either side. If you look carefully, you’ll see the faint glow of the galaxy running along the cross of Cygnus.

The Summer Triangle lies in an area of the sky rich with wonders. Next to Vega is Epsilon in Lyra, which reveals itself to be a double-star in binoculars. But with a telescope you can further see that each component star is itself a double-star, so it is really a quadruple. Also in Lyra is M57, the Ring Nebula, which is a favorite target for telescopes. A planetary nebula, it is the remnant of a star similar to our Sun, formed during the last stage of its evolution before becoming a white dwarf. Perhaps one day, five billion years in the future, some distant observer will see our Sun puff itself apart.

Vega is 25 light-years from Earth, and it’s neat to think that our television broadcasts from 25 years ago are just reaching that star system. Potential planetary inhabitants there would just be getting the news about the launch of the Hubble Space Telescope, the reunification of Germany, and the Milli Vanilli lip-sync scandal.

Right next to Deneb is the North America Nebula, a vast star-forming region. It can be viewed in dark skies with a telescope – although I have been able to see it with the naked-eye from very far outside the city. Infrared telescopes can pick up the dust clouds that hold its many baby stars, which will emerge in millions of years to shine on their own like our Sun. Stars always form in groups, and near Deneb are two star clusters, M39 and M29. They are easy to find in binoculars and small telescopes. The dust clouds that surrounded them during formation are long gone now, leaving behind just the bright stars, which appear grouped together in the sky.

Opposite Deneb at the head of Cygnus the Swan is one of the greats – the double-star Albireo. With one star bright yellow and the other bright blue, this binary is easily observed in binoculars. On the eastern side of the constellation is the Veil Supernova remnant, formed by a star explosion about six thousand years ago. Anyone around then would have seen the bright supernova in the daytime. What’s left of this dead star today is only visible by telescope in dark skies with no Moon. Nearby is another stellar corpse, M27, The Dumbbell Nebula, a real treat in a telescope.

Near Altair in Aquila the Eagle is a famous variable star, Eta Aquilae. Its luminosity pulses, getting brighter and dimmer over a 7-day period, which you can actually observe. To see it, you don’t need binoculars, just clear skies and patience. Following its changes over a week can make a good summer project for students to show off in science class in the fall. Eta Aquilae is a Cepheid variable, a special kind of star that can be used to determine distances to other galaxies when studied in batches. In 1924, Edwin Hubble measured the distance to Cepheid variables in Andromeda, showing it was a galaxy separate from our own and proving that the universe was bigger than us – the Milky Way was just one of numerous galaxies out there.

At the opposite end of the Eagle, is an unremarkable star called Lambda Aquila, 125 light-years away. However, it has the distinction of being a destination for NASA’s Pioneer 11. Launched in April 1973, the probe is still heading toward the star, after having made an historic first flyby of Saturn in 1979. Unfortunately, it stopped transmitting in 1995. No one has heard from it since, but it will pass by Lambda Aquila in about 4 million years, bearing a plaque with a message about Earth to other civilizations it may meet.

The Summer Triangle region is also known for its exoplanets. Between Vega and Deneb is a patch of sky that the Kepler Space Telescope has been staring at since 2009, looking for other worlds. It is concentrating on just 150,000 of the millions of stars in this small area. So far, over a thousand planets have been confirmed to be orbiting some of these stars. One such exoplanet announced in July is about the same size as Earth, and it orbits its home star at a distance that makes it cool enough to support liquid water on its surface. Unfortunately, Kepler-452b is 1,400 light-years away, so we will never be able to visit our distant planet cousin.

From doubles to clusters, baby stars to dead stars, variables, spacecraft, and exoplanets, the Summer Triangle is an amazing area of the sky that has a lot to offer the stargazer.
**Celestial Selection of the Month**

*The Cigar Galaxy*

![A composite image of M82 with visible light from the Hubble Telescope (orange and yellow-green), X-rays from the Chandra Observatory (blue), and dust in infrared from Spitzer (red).](Image1.png)

At only 12 million light-years away in the constellation Ursa Major, the Cigar Galaxy (M82) is an edge-on spiral that bright enough to see in binoculars, making it a popular target for amateur astronomers. But, the cigar is just a phase. M82 is what’s known as a starburst, a brief stage of galactic evolution with an extraordinarily high rate of star formation. Stars are born in the center of M82 ten times faster than in our whole galaxy. M82 is also five times more luminous than the entire Milky Way. Typically, galaxies enter a starburst stage because of interactions with a neighbor galaxy, which can result in an eventual merger. M82’s starburst was likely caused by a close encounter with nearby M81. At its core are at least 197 massive young star clusters. Each cluster averages 200,000 solar masses.

Within this dense, energetic core are four regions of brightness that detectable at visible wavelengths. Concentrated at two of these regions is a galactic superwind, which gives M82 its unique bipolar outflow. Superwind is created when remnants of supernova overlap within star-forming areas, blowing superbubbles that burst out into intergalactic space. The young, hot, massive stars of M82 have very short lifespans, exploding in supernovae about once every ten years, feeding the superwind continuously. In 2014, astronomers detected a very bright, Type 1a supernova in M82 that could be observed with a small telescope. **SN 2014J** was the closest of this type seen since 1972.

At the center of M82 is a supermassive black hole, typical in most galaxies, but the galaxy is also home to what may be an intermediate-mass black hole – so far, a hypothetical concept. No one has proven conclusively that such “medium-sized” black holes exist, but in 2006 scientists found an ultra-luminous X-ray source (M82 X-1) about 600 light-years off the center of M82 that appears to be oscillating quasi-periodically. M82 X-1 could be powered by an intermediate-mass black hole several hundred times more massive than the Sun. The scientists believe the black hole is orbited by a red giant star that accretes material to feed it.

But, even stranger things lurk inside M82. In 2010, astronomers detected bright radio wave emissions, unlike anything seen before, from an unknown object in the galaxy. Some believe the radio waves may come from a microquasar. Microquasars produce some radio emissions from relativistic jets at the site of a compact object, like a black hole or neutron star. However, this one would be very unusual, because known microquasars also emit large quantities of X-rays; the object in M82 does not. The jury is still out on what the unknown object may be, but it seems like a one-off. Of course, that’s a rather Milky Way-centric attitude to take. Starburst galaxies are rare in our part of the universe, but a large number of distant galaxies in the Hubble Deep Field are known to be starbursts. Because starbursts like M82 are so active, with massive new stars forming and exploding all the time, it’s possible that anything can happen there! **AMW**

Sources: newscientist.com; universetoday.com; wiki.

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**Telescope of the Month**

*The Lick Observatory in California*

At the summit of Mount Hamilton, CA sits the world’s first permanently occupied mountain-top observatory with its own police and post office. Since 1888, the Lick Observatory has been owned and operated by the University of California. Constructed with a bequest from James Lick, the site was picked because it was above low cloud cover that blocks light from nearby San Jose. But a hundred years later, the Silicon Valley had grown and gotten a lot brighter. In the 1980s, San Jose introduced a light-reduction program to help the observatory.

The Lick’s first telescopes were a 12-inch and a 36-inch refractor, Earth’s largest at the time. In 1892, it was used by E.E. Barnard to find a fifth moon of Jupiter, the first to be discovered since Galileo found his four in 1610. Today, the Lick houses seven telescopes, including the Shane 3-meter reflector. The Shane has three configurations: wide-field prime focus, intermediate Cassegrain focus, and long-length Coudé focus for high precision spectroscopy. It is able to produce remarkably clear images, on par with space telescopes, by using Adaptive Optics (AO). From the observed motion of a natural guide star or a laser shot out of the dome, AO compensates for atmospheric distortion with a mirror that can change shape hundreds of times each second.

The Lick’s Shane telescope with its AO technology has had a major impact on our understanding of the universe. In 1998, Nobel Laureate Saul Perlmutter observed Type 1a supernovae with the Shane, co-discovering dark energy and finding that our universe is expanding at an accelerated rate due to that mysterious force. It is also a formidable planet finder. Starting in 1995, Geoff Marcy found most of the first 100 exoplanets with the Shane. A new, fully-automated 2.4 m telescope is currently under construction at the Lick, designed specifically to search for Earth-like exoplanets using the Doppler method – measuring changes in the wavelength of a star’s light due to an orbiting planet. But, the observatory is in peril; budget cuts continuously reduce staff.

UC has threatened to shut down the Lick in 2018, when funding from a key source is scheduled to end. In March, Google donated $1 million. This will help keep the observatory going, but only for the next two years. **AMW**

Sources: rsaa.anu.edu.au; wiki.
A Message from the AAA President

Dear Club,

AAA members are making the most of summer weather and summer skies! About a dozen of us journeyed to an overnight dark-sky observing session at North-South Lake in July – our first of the year. Although rain earlier in the day left the site wet, we had a great time. Dew formed on our cameras and scopes by the time we set up our equipment, making photography difficult, but, the sky was clear and beautiful, so we had fun!

The next AAA trip to this prime location is on August 15. Check out http://www.aaa.org/north-south-lake/ for more details. If you would like to receive planning information about AAA trips to North-South Lake and Ward Pound Ridge, email me to be added to the Dark Skies Google Group.

To learn more about observing events this summer, AAA’s calendar updates frequently with location and other information – be sure to check back often at http://www.aaa.org/calendar.

Finally, SAVE THE DATE for the 20th Anniversary of AAA’s Urban Starfest on October 17 in Central Park!

Marcelo Cabrera
president@aaa.org

Other Astronomy Events in NYC

SAT, Aug 1
@ 8 pm Astronomy at Van Cortlandt Nature Center, Bronx, F
NYC Urban Park Rangers guide naked eye observing and discuss the science, history, and folklore of the universe. (nycgovparks.org)

TUES, Aug 4
@ 6:30 pm AMNH Astronomy Live at the Hayden Planetarium, X
“Superstitions in the Stars” with Emily Rice and Jackie Faherty. Learn about the science behind Super Moons and Blood Moons, the origin of the zodiac, and other celestial events that make the news. (amnh.org)

SAT, Aug 8
@ 9 pm Perseid Meteor Shower at Salt Marsh Nature Center, Brooklyn, F
NYC Urban Park Rangers guide naked eye observing and discuss the science, history, and folklore of the universe. (nycgovparks.org)

TUES, Aug 11
@ 6:30 pm AMNH Astronomy Live at the Hayden Planetarium, X
“Visiting Pluto and Friends in the 21st Century” with Emily Rice and Jackie Faherty. Explore New Horizons’ historic journey to the icy dwarf planet and what it learned along the way. (amnh.org)

FRI, Aug 14
@ 7 pm Columbia Summer Film & Stargazing at Pupin Hall, Manhattan, F
Hubble (IMAX). Observing follows. (outreach.astro.columbia.edu)

SAT, Aug 15
@ 9 pm The Night Sky at Fort Greene Park, Brooklyn, F
NYC Urban Park Rangers guide naked eye observing and discuss the science, history, and folklore of the universe. (nycgovparks.org)

F: Free; X: Tickets required, contact vendor for more information

Astronomy Nights at the Intrepid with AAA
Every Friday & Saturday Night @ 7:30 pm – 11 pm
SAT, Aug 1 Next: Oct 3
AAA Observing at Brooklyn Museum Plaza – Brooklyn, PTC
@ 9 pm – 11 pm
Aug 4, 11, 18, 25
AAA Observing at the High Line – Manhattan, PTC
Every Tuesday Night @ 7:30 pm – 11 pm
Aug 6, 13, 20, 27
AAA Observing at Brooklyn Bridge Park – Brooklyn, PTC
Every Thursday Night @ 7:30 pm – 11 pm
SAT, Aug 15 Next: Sep 12
AAA Observing at Great Kills – Staten Island, PTC
@ 8:30 pm – 11 pm
SAT & SUN Aug 15-16
AAA Observing at North-South Lake, Haines Falls, NY MPTC
@ 8 pm – 2:30 am
Take a field trip with AAA to the Catskill Mountains in an exceptionally dark location for deep sky observing. For AAA members only. Reserve a spot by emailing treasurer@aaa.org.

TUES, Aug 25
AAA Solar Observing at the Highline – Manhattan, PTC
@ 6 pm – 8:30 pm
FRI, Aug 28
Astronomy Nights at the Intrepid with AAA – Manhattan, PTC
@ 6:45 pm – 11 pm
“Stellar Forensics” with Maryam Modjaz. Stargaze with AAA on the flight deck of the Intrepid and learn about the deaths of massive stars in gamma-ray bursts and supernovae. Enjoy live demos and trivia games with prizes! The event is free and open to the public, but registration is required at: http://www.intrepidmuseum.org/astronomynights.aspx.

AAA Observing at Carl Schurz Park – Manhattan, PTC
@ 8 pm – 11 pm
SAT, Aug 29
AAA Solar Observing at Poe Park – Bronx, PTC
@ 11 am – 1 pm
AAA Observing at Parkchester – Bronx, PTC
@ 8 pm – 10 pm

M: Members only; P: Public event; T: Bring telescopes, binoculars; C: Cancelled if cloudy.
For location & cancellation information visit www.aaa.org.

Eyepiece Staff
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Editor-in-Chief: Amy M. Wagner
Copy Editor: Richard Brounstein

Contributing Writers: Rori Baldari, Richard Brounstein, Tony Paddoud, Jason Kendall, Stan Honda, and Amy Wagner
Eyepiece Logo and Graphic Design: Rori Baldari
Administrative Support: Joe Delfausse

Printing by McVicker & Higginbotham

The Amateur Astronomers’ Association of New York
Info, Events, and Observing: president@aaa.org or 212-595-2922
Membership: members@aaa.org Eyepiece: editor@aaa.org
Visit us online at www.aaa.org.