BPAA Newsletter

Battle Point Astronomical Association, Bainbridge Island, WA

Issue 69 | May-June-July calendar | May-June 2005

(Unless otherwise noted, all events are at the Edwin Ritchie Observatory, Battle Point Park)

May

May 1: Last-quarter Moon
May 1: John Rudolf Memorial Planetarium Fund Kiwanis Brunch, Wing Point
May 1–8: Texas Star Party, Prude Ranch, Texas
May 4: BPAA Board Meeting 7 p.m.
May 5: Eta Aquarids Meteor Shower Peak
May 7: Star Party Battle Point Park, Beginner session 7 p.m.
May 8: New Moon
May 11: Member Meeting 7 p.m.
May 16: First-quarter Moon
May 23: Full Moon
May 23–24: Moon occults Antares
May 24: Photometry Workshop, Big Bear, California
May 27–29: Riverside Telescope Makers Conference, Big Bear, California
May 30: Last-quarter Moon

June

June 1: BPAA Board Meeting 7 p.m.
June 2: Spirit and Opportunity on Mars, 4 p.m., Jim Bell, Rover team leader, UW campus
June 4: Star Party Battle Point Park, Beginner session 8 p.m.
June 5: John Rudolf Memorial Planetarium Fund Kiwanis Brunch, Wing Point
June 6: New Moon
June 8: Member Meeting 7 p.m.
June 14: First-quarter Moon
June 20: Summer Solstice
June 21: Full Moon
June 26: Charles Messier's 275th Birthday (1730)
June 28: Last-quarter Moon

July

July 2: Star Party Battle Point Park, Beginner session 8 p.m.
July 3: John Rudolf Memorial Planetarium Fund Kiwanis Brunch, Wing Point
July 4: Grand Old Fourth in Winslow
July 5: Earth reaches aphelion, 1.016742 AU
July 6: BPAA Board Meeting 7 p.m.; New Moon
July 6–10: Mt. Bachelor Star Party www.mbsp.org
July 13: Member Meeting 7 p.m.
July 14: First-quarter Moon
July 21: Full Moon
July 28: Last-quarter Moon
July 29: South Delta-Aquarids Meteor Shower Peak

Calendar Notes

Jupiter put on a great show in April, which will continue through May. Close by is Spica, one of the bluest first magnitude stars, and one of the brightest in the spring sky, along with Regulus and Arcturus. Regulus is also bluish but appears white to the eye; it has a luminosity about 160 times the sun's. Arcturus has a pale orange color and is a giant star, about 23 times the diameter of the sun.

The spring sky will soon give way to the summer sky, and that means opportunities for optimal viewing at the many major star parties in the region. The Mt. Bachelor Star Party, scheduled for July 6–10, leads off this year. Go to www.mbsp.org to register. The Table Mountain Star Party is next, August 4–6. Register at www.tmspa.com. Finally, the Oregon Star Party, offering the darkest skies, is September 1–4. The Web site is www.oregonstarparty.org.

For Mars exploration enthusiasts, the University of Washington is offering a free public talk on June 2 at 4:00 p.m. The speaker is Professor Jim Bell, of Cornell University. Professor Bell is a Rover team leader. His talk is entitled "Rockin'and Rollin' with Spirit and Opportunity on Mars" and will be held in Room A102 in the Physics/Astronomy Building. More information is available at www.astro.washington.edu.

If you haven't yet attended one of the brunches at Wing Point benefiting the John Rudolf Memorial Planetarium

Fund, you should. The food is excellent and the cause is one that we all heartily support. $5 of each brunch goes to the Planetarium Fund. Call 842-2688 for reservations and ask for the Kiwanis Brunch at Wing Point.

Note that in June and July the beginner sessions for our local star parties will begin at 8:00 p.m. rather than at 7:00 p.m. And remember that any member at any time who is planning to observe can invite others to join in by sending an email to bpaa@yahoogroups.com. To join our email group, send an email with your name to bpaa-owner@yahoogroups.com and we can enroll you. If you want to also have web access to the messages and files, you can join the Yahoogroups by clicking the register link for new users on http://groups.yahoo.com/, and then requesting to join our group at: http://groups.yahoo.com/group/bpaa/. The system will send us a message, and we'll approve your request after we verify your membership.

Diane Colvin, BPAA Events Director (dtcolvin@comcast.net)

In Brief

President's Message

Paul Below

I am writing this on my PDA and submitting it via wireless internet from the Lava Java in Kona. The ocean is just across the street, the surf much calmer than last week.

We visited "the Pele" last weekend, driving down to the end of Chain of Craters road after dark. We saw the lava glowing on the Pali, and Orion laying on his side. On the walk out to the end of the road, we noticed that Cassiopeia was below the horizon, not circumpolar. And Orion was setting in the south. Too much cloud out over the southern sea for us to see the Southern Cross that night.

You may have heard about the plan to put lights on the sports fields at Battle Point Park. As you should expect, your Board is against such a move, although we are realistic in our expectation that our voices will be overwhelmed by the large numbers of sport participants, families and supporters. Sports outdraws science in the US.

I think it could be fairly asked why lighted fields are necessary. On June 20, sunset will be at 9:12 PM PDT (if my conversions are correct), and civil twilight will be at 9:53 PM. Is there a need to play soccer at 11 PM or midnight?

OK, to be fair, it must be noted I picked the summer solstice. But the same conclusion is valid throughout our northern spring and summer. In mid- May the sunset is at 8:42 PM and civil twilight is 9:19. On August First sunset is similarly at 8:45 PM and civil twilight at 9:21.

To complicate matters, it is somewhat difficult to use full cutoff lighting (lights that cause no wasted light to go upwards into the sky) to illuminate sports fields. Such designs either result in having extra light poles (more cost) or having extra tall poles (more glare, plus perhaps illegal light trespass into the neighboring residences which the full cutoff lights would have been intended to prevent). Regardless of the type of lighting, our facility would be useless whenever sports lights were turned on.

I recently attended the 5th annual Bainbridge environmental conference. I had my 60 seconds of fame as part of a video that was created on the state of the environment on Bainbridge. I did a stand up broadcast from near McDonald's. You might see the video on BIB. I did buy the DVD and perhaps we can watch it at a future meeting (if someone brings popcorn!) My topic was a quick explanation of light pollution. Remember that BI has a lighting ordinance, but enforcement relies on someone reporting a violation. Some people may not feel able to report a neighbor (wanting to maintain good relations) and may actually be relieved if a stranger reports a light that is causing illegal glare or sky glow. You can find a link to the ordinance on our light pollution page on our web site if you want to read the details.

We must all continue to support the sciences, and find new ways to engage young people in the excitement of discovery. Only when people know as much about the Mars rovers or Cassini mission as they know about, say, the Michael Jackson trial or what Paris Hilton is wearing this week can we say we've been successful.

In closing, remember that glare is never good.

And, always ask why we need more light to pump gas than we need to read books in the library!

Telescope News

Malcolm Saunders

Questar Gift: In late April, BPAA unexpectedly received the generous gift of a 7 inch Questar telescope, donated by Magie Biehl, a former Bainbridge Islander who has moved to San Diego. It comes with a sturdy tripod and one eyepiece. This telescope is available for loan to BPAA members.

Questar telescopes are sometimes referred to as the Rolex of amateur telescopes— finely made; meant to outlast a lifetime. Questar began producing telescopes in 1954, mostly of 3.5 inch diameter. This 7 inch model went into production in 1967. http://www.company7.com/questar/surveillance/que7bar.html

Questar telescopes in general are of the Maksutov optical design, invented by Dmitri Maksutov in the 1930s and 1940s (http://tec.idcomm.com/tec_us/company/DmitriMaksutov.html). This is a catadioptric design, like the Schmidt-Cassegrain design that has become common in the past decade. Catadioptric telescopes are combined reflector/refractor telescopes. They rely on a mirror as the primary optical element, but they add a lens at the opening, or front, of the telescope to correct for aberrations introduced by the mirror. The lens at the top end, or front, of the telescope also closes the telescope tube which helps to keep the optical elements clean and reduces problems caused by air currents within the telescope tube. In the case of the Maksutov design, both the mirror and the lens are spherical sections. This makes them relatively easy to grind and polish, compared to the paraboloid used in Newtonians or the paraboloid and hyperboloid used in Schmidt-Cassegrains. The importance of these simple optical shapes has diminished in recent years as computer aided design and manufacturing have become commonplace. Both Schmidt-Cassegrains and Maksutov telescopes have long focal lengths in a short tube, making them unusually portable. For example the Questar 7 telescope we just acquired has f/14 focal ratio, for a focal length of 2413 mm. This focal length is similar to the large telescope on the roof of the BPAA observatory. For more information about the Maksutov, Cassegrain and other telescope designs have a look at http://en.wikipedia.org/wiki/Reflecting_telescope#Schmidt-Cassegrain

Our newly acquired Questar comes with a built-in finder scope as well as a built in barlow lens. That means that, simply by flipping small levers, the telescope can show the same object at three different magnification powers. The tripod is sturdy, and lightweight, but not well suited for astronomy as it is currently configured. This is because it will not point high in the sky. We can change that by adding a "wedge" to the top of the tripod. The telescope also has provision for placing a camera at the prime focus, although we are missing one part to accommodate the camera.

How's The Big Telescope? The new telescope control system is now in place on the Ritchie telescope. We have a new computer to run the system. The software is working, we've made new motor mounts and motors are installed. Our first attempts at running the telescope with the new system were discouraging. The telescope took on a jerky motion at slew speed. At least two factors contributed to that motion. Tuning of the control parameters within the software eliminated it, although more work on the gears and motors might also help. Results of daylight tests since then are encouraging. As far as we can tell in the daylight, the telescope does an accurate Go-To and it looks like it should be tracking well. The next step is to try it on a star at night. Regardless of the outcome of that test, there is more work to be done on the gears and motors, re-arranging of wiring and other equipment and much more to learn about the new control software. However, if night time tests look good, we can start using the telescope again before that work is completed.

Seeing Stars—Hercules and his Lesson—Astronomy 0.001

Anna Edmonds

The constellation Hercules rises in the East in May and June about the time that our sky is getting dark enough to see the stars. It will be visible in the night sky from now through the summer and fall. However, while the hero for whom it is named was a brilliant hunter, his constellation is not distinguished by any brilliant stars.

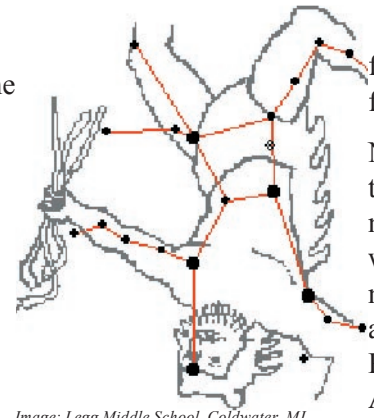


Image: Legg Middle School, Coldwater, MI

Hercules is located about halfway between Vega and Arcturus and is usually thought of crouching upside down. He could be looking down toward the North Star. The center is often described as a butterfly, using six of the brighter stars to outline the insect. Four of the most northern stars of the butterfly mark the "Keystone" where the most interesting object of the constellation, the Great Globular Star Cluster, is found. This cluster, also identified as M13, lies on a line between the western two stars of the Keystone. It was noted first by Edmund Halley in 1715; Charles Messier who catalogued it about 50 years later thought it was only a fuzzy cloud. With even as small as a 4" telescope, today we can get an idea of the swarm of its million sparkling points. M13 is measured at about 25,000 light years (ly) away from Earth; the diameter of its core is about 300 ly. It is made up of about a million stars rotating around a gravitational center. You can maybe begin to imagine the size by this comparison: In the densest part of the core, if the individual stars were the size of grains of salt, they would be separated from each other by several miles.

Globular clusters are typically balls that rotate around themselves and are held together by gravitational pull. They evolved about 10 billion years ago, evidenced in the fact that they are metal poor. That is, they were formed before gasses in the universe had fused creating the heavy metallic elements.

None of the stars in Hercules is more than third magnitude. But in spite of its somewhat nondescript character, Hercules apparently was one of the first constellations to be named. And it was also named for a hero or a god in the languages other than Greek. The Phoenicians called it the sea god Melkarth. Among the Babylonians it was either the hunter Nimrod, the hero of the Flood story Gilgamesh, or the sea god Izhdubar. Greek writers sometimes called it "the Kneeler," and when it was used as an image on coins, Hercules was shown on Greek coins kneeling to string his bow, or wearing the skin of the Nemean lion that he had overcome as one of his twelve labors.

In the story of Hercules' encounter with Atlas, it was the hero's cleverness pitted against the physical strength of the giant who was holding up the sky. Hercules agreed to carry the sky briefly while Atlas fetched the Golden Apples for him (another of his labors). Of course Atlas wasn't eager to resume the load of the sky, but Hercules tricked him by agreeing to continue to hold that burden if Atlas would take it just a moment while he shook himself and shifted the lion skin to protect his shoulders. The shaking dislodged several stars, and Atlas was so startled that he didn't notice Hercules escaping. Hercules got even with him when he joined the immortals in the sky because his weight added that much more for Atlas to bear.

Could it be that meteor showers, which we think are residue from a comet's trail, really mean that Atlas has managed get someone else to hold up the sky momentarily and is knocking a few stars loose by shaking his shoulders?

News from the Maiden Lane Observatory

Harry Colvin

The Maiden Lane Observatory has been operational since September. The observatory is an 8' by 10' roll-off roof design built around a 12" diameter concrete pier. The observatory is linked via Cat 5 cable to our home computer network and has complete access to the Internet. The telescope and CCD camera can be remotely operated from the office in our residence. Observatory computers are used to control the telescope, CCD cameras, planetarium search and control functions, and the security system. With motion sensing imaging software and email alert messages we know when visitors come calling. Raccoons, neighborhood cats, birds, and deer have all

been detected and duly recorded.

The observatory has made a significant difference in the way we observe. Because of light pollution, I now do all my observing with a CCD camera. Before the observatory, set-up time was at least 1-2 hours. Now we roll the roof off and can be imaging in less than 15 minutes. I now go out for observing even if clouds are in the area. Before I would never even set up if there was any threat of clouds. The remote operation from a warm office this winter was particularly nice. Trying to stay warm while waiting for an image to complete is not my idea of fun. Now with the observatory instruments under remote control, I don't have to freeze.

Most subjects for observation this winter were galaxies or galaxy clusters. Many of these were in the Magnitude 15-18 range and were quite challenging. We also began imaging asteroids. And after presenting test observations to the Minor Planet Center (the official naming and clearing organization for comet and asteroid discovery) the Maiden Lane Observatory was designated G59. Only about 1,500 observatories worldwide have been so designated.

I have been appointed as an advisor to the Astronomical League's ISSAT (International Space Station Amateur Telescope) program. In addition, I soon will begin training to operate the ISSAT remote telescope in Arizona Sky Village. I am looking forward to getting hands on experience with cutting edge remote control technology.

Maiden Lane Observatory

The Maiden Lane Observatory gear will be in the field at dark sky sites for at least three weeks this summer, at Bachelor Mountain, Table Mountain, and OSP. Then this September we are off to Bryce Canyon National Park where we have been accepted as volunteer astronomer rangers. Our duties will include presenting astronomy lectures and conducting viewing sessions, and leading moonlit canyon hikes. It's a great opportunity both for dark sky viewing by night and hiking and backpacking by day. When we'll get to sleep I'm not quite sure of yet.

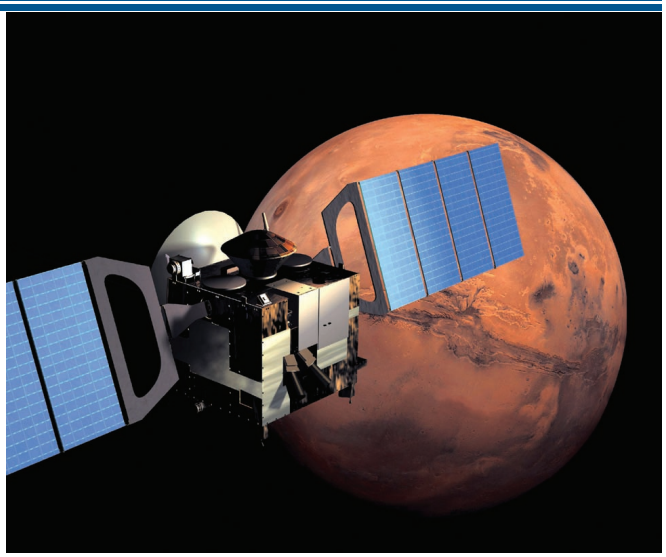
$CH_4 + H_2O + ♂ = LIFE?$

Ted S. Frost

Astronomers and planetary scientists are awaiting conclusive evidence of microbial life—past or present— on Mars. Confirmation that life exists on the Red Planet could be the most significant discovery ever made by man, philosophically and scientifically.

Many scientific papers have come forth the past year announcing new discoveries involving life on the Red Planet. Academic seminars such as the March 14th Lunar and Planetary Science Conference have been dominated by presentations considering Martian life. Life-on-Mars articles recently appeared in *The New York Times*, *The China Daily Press*, *The Economist*, and *The San Francisco Chronicle*.

Two discoveries in the past year have generated excitement. Observations and data produced by the European Space Agency's Mars Express Orbiter, NASA's rovers Spirit and Opportunity, and infrared spectrometer studies at observatories in Chile and Hawaii make it clear that Mars was wet and warm some 3.7 billion years ago (3.7 Ga)[1], and that something is currently putting methane gas (CH_4) into Mars' atmosphere[2].



Mars Express Orbiter above Mars (Image: ESA)

Evidence of methane in Mars' atmosphere really gets scientists charged up, because methane in Earth's atmosphere is nearly all derived from one-celled

organisms—a class of Archaea called methanogens. By way of an involved process, methanogens convert H_2 and CO_2 into CH_4 (methane) and H_2O. They are extremophiles that live in harsh anoxic environments such as swamps, rice paddies, and the stomachs of cows. They are also found in termite guts, undersea hydrothermal vents, hot springs, and sewage sludge.

And here's the kicker: atmospheric methane has to be continually replenished because it is destroyed by UV radiation, which causes it to react with hydroxyl radicals. On Earth a molecule of atmospheric CH_4 lasts, on average, 10 years. In the atmosphere of Mars, its life is estimated to be 400 years—still fleeting on a geological time scale. This means that the methane showing up in Mars' atmosphere cannot be a holdover from planetary formation. Clearly, it is being produced.

Fourier transform spectrometer (FTS) installation, Cerro Pachón, Chile (Photo: SAO/SRL)

Methanogens have been on Earth a long time. Ribosomal 16S RNA sequencing puts methanogens far down on the tree of life, meaning (from a time-line standpoint, anyway) they are a "primitive" life form. Because methanogens are thought of as "simple" and "primitive" extremophiles, astronomers and planetary scientists make them likely candidates for methane production on Mars[3]. Microbial life on Mars? Not on the surface, of course. The surface of Mars is too cold (-55° C), too dry and too subject to UV radiation to support life as we know it.

The hypothesis is that methanogenic microbes evolved in the more hospitable wet-warm period of Mars and survive today in isolated subterranean oases, possibly pockets of subterranean water liquefied by residual planetary internal heat, similar to continental basaltic terrains on Earth where subsurface methanogens obtain energy from H_2 and CO_2 generated by hydrothermal activity[4]. On Mars, the methane so produced would, so the story goes, migrate to the surface into the atmosphere through cracks and fissures associated with crater formation from bolide impacts.

Recently, NASA had to rein in two of its scientists, in response to reports that the scientists were planning to issue a paper claiming there is strong evidence for current life on Mars.

Before getting too carried away by possible parallels to microbe methane production on Earth, a couple of "not-so-fasts" should be considered. First, methane can be and is produced by non-biological mechanisms as well as by "bugs"—in particular, hydrothermal reactions. At mid-oceanic ridges here on Earth, seawater and CO_2 react with basaltic magma to produce methane as a by-product in the conversion of the mineral olivine to serpentine, a process called "serpentination." The temperature at which this takes place is relatively modest—100° to 400° Celsius. Methane also is a by-product of asteroid impacts and volcanic activity.

So, although most of Earth's atmospheric methane comes from biological sources (the methanogens), biology isn't the only source, particularly when accounting for small amounts. And, on Mars, we are dealing with small amounts. The amount detected on Mars by infrared spectrometer analysis is only 10 parts per billion. Since Mars' atmosphere is less than 1% of Earths,' that is a tiny amount. A factor of 100 less than the current production of methane on Earth from non-biological sources.

Because of this, James Kasting and David Catling go so far as to say: "(While) one might conclude . . . that methane is an excellent biomarker (for existence of life) . . . this is not necessarily so."[5]

Cautious skepticism seems to be in order, especially since the assumption that methanogens are "simple" and "primitive" organisms may be unwarranted. From a biological standpoint, this is not the case. Don't be fooled by the bad neighborhoods they live in. Yes, it is true methanogens evolved very early on Earth, but they most certainly are not simple and they are not primitive in the sense of being characteristic of an early stage of development. Many other "bugs" using earlier stages of development preceded them. In spite of their name, Archaea are not older than bacteria.

The fact is, methanogens are complex and unique. They are only one phylum of the Domain Archaea. No other living things are methanogenic and they possess metabolic enzymes that are extremely unusual[6].

In order to live, organisms must find ways to convert

external energy into internal energy storage units. The internal energy storage used by all life on Earth is adenosine triphosphate (ATP). Life has two ways of converting external energy into ATP. The simplest, most primitive, and least involved is "substrate level phosphorylation" (SLP) that makes ATP by converting an organic molecule from one form to another. It is used by many bacteria and includes the fermentation process that gives us beer, sour dough bread, cheese, and lactic acid muscle pains. The second way to produce ATP is a more complicated process that came along later called "electron transport phosphorylation" (ETP). It is used by most so-called advanced forms of life who favor it because it is a more efficient and effective means of producing ATP.

Methanogens are in the advanced camp. They are ETP'ers, not SLP'ers. The methane they produce is a by-product of a very intricate and complicated metabolic process involving the creation of a proton motive force outside their cell membrane (meaning a positively charged electrical field), an electron transport complex within their cell membrane (meaning circuitry for an electrical current), and ATP synthase complexes imbedded as gateways through their cell membrane (meaning electrically powered little ATP factories). Not only are all these parts complicated in and of themselves, they require the manufacture and use of a large supply of complicated chemical cofactors and enzymes—complicated macromolecules that in some instances are unique and whose interactions are not completely understood.

Being the chemically complicated little creatures they are, could it be that early evolution of methanogens on Earth was a fluke? A stochastic happening rather than an inevitability? Could it be an unwarranted assumption that methane on Mars is consistent with evolution on Earth? An experience of a sample of one?

Keep in mind that the window for origin of life on Mars was probably short, and during the time it existed conditions were inhospitable. Mars is thought to have formed 4.5 Ga. Stable inventories of liquid water are not thought to have lasted past 3.7 Ga[7]. Subsequent to 3.7 Ga, Mars' internal heat died down, reducing volcanism. And, most significantly, Mars lost its protective magnetic shield and most of its greenhouse warming gases. Mars is only 1/9th the mass of Earth, so its escape velocities are much less (5,000 m/sec. vs. 11,400 m/sec.).

The 4.5 to 3.7 Ga time interval for warm liquid water happens to coincide with the heavy bombardment period for terrestrial planets, called the Noachian period on Mars and the Hadean period on Earth. This was the time when Earth, Mars, and Venus were clobbered by asteroids, some containing enough kinetic energy to completely vaporize and sterilize planetary oceans. On Earth, the last ocean-vaporizing event is thought to have been as late as 4.1 Ga and possibly even 3.8 Ga.[8]. Similar catastrophes may have occurred on Mars.

Based on geographic features seen today on Mars[9], episodic liquid water forming events undoubtedly occurred after the Noachian heavy bombardment period. These would have come from occasional asteroid impacts and volcanic activity. However, it is questionable whether the bodies of water so formed would have lasted long enough or been extensive enough to be a viable site for origin of life.

In view of these constraints, would the window of evolutionary opportunity on Mars have remained open long enough for organisms to evolve as sophisticated and complicated as methanogens? I wonder.

Fortunately, future robotic expeditions planned for Mars include capabilities for isotopic analysis. If the carbon in the CH_4 of Mars turns out to be skewed in favor of C_{12} vs. C_{13}, that should answer the question, since life forms always favor the lighter isotope of a chemical element. Meanwhile, we wait and wonder.

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In This Issue

Send submissions to *Newsletter Editor*
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Attach graphics as separate files.
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