BPAA Newsletter

Battle Point Astronomical Association, Bainbridge Island, WA

Issue 66

November-December 2004

NOVEMBER-DECEMBER-JANUARY CALENDAR

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

November

November 3: BPAA Board Meeting 7 p.m.
Taurids Meteor Shower Peak
November 5: Venus Passes 0.5 Degrees From Jupiter
Last-quarter Moon
November 6: Star Party Battle Point Park
Beginner Session 5 p.m.
November 12: New Moon
November 13: BPAA Member Meeting 3 p.m.
Mel Bartels, Servo Motor Telescope
Control Systems. Non-members Welcome.
November 17: Leonids Meteor Shower Peak
November 19: First-quarter Moon
November 20: Edwin Hubble's 115th Birthday (1889)
November 26: Full Moon

December

December 1: BPAA Board Meeting 7 p.m.
December 4: Star Party Battle Point Park
Beginner session 5 p.m.; Last-quarter Moon
December 8: BPAA Member Meeting 7 p.m.
December 11: New Moon
December 13: Geminids Meteor Shower Peak
December 21: Winter Solstice
December 18: First-quarter Moon
December 26: Full Moon

January

January 3: Last-quarter Moon
January 5: BPAA Board Meeting 7 p.m.
January 7: 395th Anniversary (1610) Galileo Galilei's Discovery of Jupiter Moons Io, Europa and Callisto
January 8: Star Party Battle Point Park
Beginner Session 5 p.m.
January 10: New Moon
January 12: **BPAA ANNUAL MEETING** 7 p.m.
All Members Invited.
January 17: First-quarter Moon
January 25: Full Moon

Also: Harry Colvin on CCD Imaging, and Bill O'Neill on Mars.

Lunar Eclipse October 27, 2004
photo by Doug Tanaka

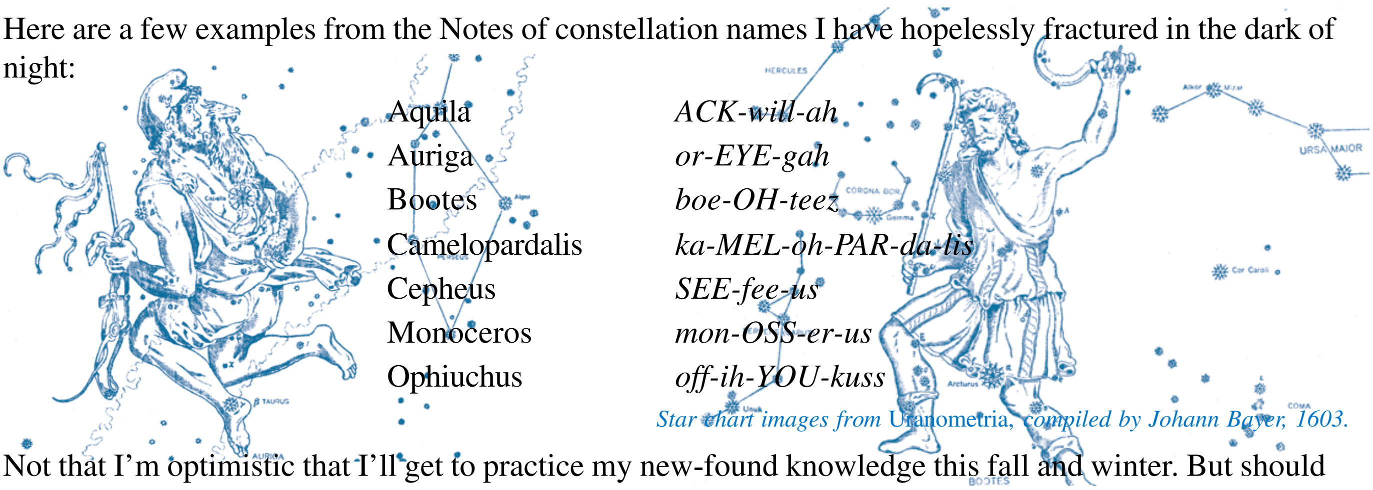
CALENDAR NOTES

Be sure and note the new date for November's Member Meeting. Rather than the usual second Wednesday of the month, the meeting will be held on Saturday, November 13, when BPAA is privileged to host Mel Bartels. In his presentation, Mel will describe servomotor control systems, and compare them to stepper systems for the control of telescopes. He will also present a brief history of telescope control systems. Mel is well known in the world of amateur telescope making; each year at the Oregon Star Party he conducts the Telescope Walk-about. For fifteen years he has worked on computer control of motorized telescopes, and developed a freely distributed control system that is used worldwide.The International Astronomical Union has honored Mel by naming asteroid 17823 "Bartels" for his contributions to amateur astronomy. Don't miss this opportunity to learn from one of the best.

And here's a Web site that shouldn't be missed. Have you ever been at a Star Party and heard someone state the name of a star or constellation and then wonder to yourself in the darkness "Hmm, is that how you pronounce that?" It happens to me all the time, and I have a tendency to adopt the pronunciation I just heard, without having a clue as to whether what I heard was correct or not. But there is, I have learned, an easy way to check those pronunciations out. The Astronomical League's Web site includes a couple of pronunciation guides that can be downloaded and printed. The address of the site is at http://www.astroleague.org/index.html. On the left side of the home page select *Astro Notes*, then click on *Astro Note 7* and *Astro Note 14*. *Note 7* features stars and constellations. *Note 14* includes planets and their satellites and the surface features of Mars and the Moon.

Here are a few examples from the Notes of constellation names I have hopelessly fractured in the dark of night:

Aquila	*ACK-will-ah*
Auriga	*or-EYE-gah*
Bootes	*boe-OH-teez*
Camelopardalis	*ka-MEL-oh-PAR-da-lis*
Cepheus	*SEE-fee-us*
Monoceros	*mon-OSS-er-us*
Ophiuchus	*off-ih-YOU-kuss*



Star chart images from Uranometria, compiled by Johann Bayer, 1603.

Not that I'm optimistic that I'll get to practice my new-found knowledge this fall and winter. But should the skies clear, there are those wonderful bright winter constellations of Orion, Gemini, Canis Major and Taurus to behold, and meteor showers as well. The Leonids usually offer the best show, leaving persistent trails in the night sky.

Our star parties in November, December and January are scheduled with the beginner sessions to start at 5:00 p.m. to take advantage of those long winter nights. Other star parties may be scheduled at any time 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 will 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 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
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IN BRIEF

Mel Bartels and the Ritchie Telescope

Malcolm Saunders

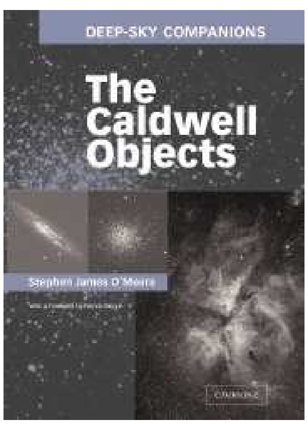
Anyone interested in hearing Mel Bartels' talk at 3:00 November 13 is invited to attend at the observatory. Amateur telescope makers will know Mel Bartels' reputation: for those who do not know of him I quote from his web page "As a hobby, I write real-time control code for computer controlled motorized telescopes." I encourage everyone who is interested in computerized telescope control to have a look at Mel's web pages, http://www.efn.org/~mbartels/, and in particular his page on computer-operated telescopes, http://www.bbastrodesigns.com/cot/cot.html.

After his talk he will help us work on the Ritchie scope's control system .The "Go To"command is not working: we can not direct the telescope to a celestial object. Instead we have to search the sky—faint objects can be difficult to find. Our telescope is best used, and is intended to be used, to show the sky to school kids and other nonexpert members of the public. It must be able to find celestial objects easily, reliably, and rapidly. We have worked on the "GoTo" problem for many months but have not been able to solve it—we sorely need the help of the "guru of telescope control systems."

Book Review

Deep Sky Companions: The Caldwell Objects by Stephen James O'Meara

Paul Below



O'Meara is one of the best visual observers of our age. For this book he used a relatively small refractor (4 inch) but he observes from the top of Kiluaea on the Big Island of Hawaii. This is a companion book to O' Meara's *Deep Sky Companions: the Messier Objects* and is similar in structure: For each object, there is technical data, including Hershel's description; a picture, a drawing by the author, a segment of a sky atlas type chart (you will want a complete chart or software to accompany the book), and the author's personal observations and historical comments. (O'Meara previously was the editor for a book compiling the writings of Walter Scott Houston, which also demonstrates his talent for presenting historical material in a well-organized and enlightening fashion.) At the end of the book is a chapter containing twenty spectacular non-Caldwell objects, just as in the Messier book a final chapter described some favorite non-Messier objects.

The Caldwell Objects list was created by the astronomer Patrick Alfred *Caldwell* Moore in 1995, and the forward to this book was written by Moore. The list provides a global extension to the Messier list: a second set of 109 objects which picks up a lot of great objects that Messier missed.

For visual observers, there are two downsides to the Caldwells: First, several of the items are interesting scientifically but not particularly easy or interesting to observe. That doesn't bother me as observing requires the ability to get excited while looking at a dim fuzzy objects. Avid observers tend to have good imaginations: part of the excitement is knowing how far the photons of light have traveled, and something of their history. (Other people would rather watch dim fuzzy objects like TV or the Web.)

Second, the list is global in nature. The Messier list was created to identify objects that could be mistaken for comets (either in a telescope or naked eye as some comets were first discovered back in Messier's time without optical aid) and were all observed from France. The Caldwell list includes southern hemisphere objects, so observing the entire list requires travel to a southern location. Unlike the Messiers, the Caldwells are numbered in a particular sequence, starting at the north and moving south by declination. It should be a simple matter to figure out how many of the Caldwells could be observed from a given location.

All that being said, some of my favorite objects to observe are Caldwells, not Messiers. This includes the Double Cluster, the ET cluster, the North America and

Veil Nebulaes, and, in southern skies, Omega Centauri, and the Jewel Box.

The book concludes with two additional appendices, one that presents an interesting theory on why the Double Cluster was not listed by Messier (something I've often wondered about), and an article on William Herschel "The Greatest Visual Observer of All Time," by Larry Mitchell.

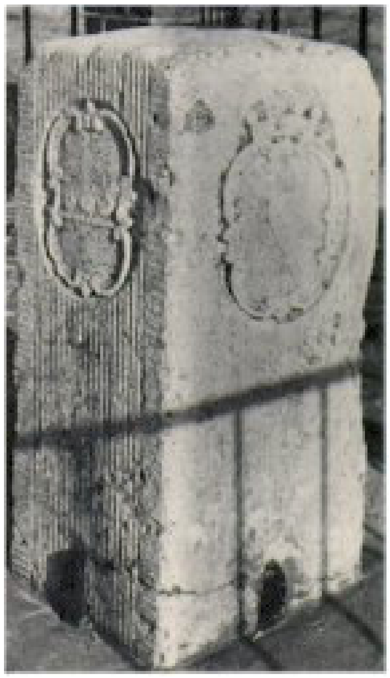
O'Meara's detailed descriptions in *Deep Sky Companions: The Caldwell Objects* earn it a place among my reference books. A good read as well, it's also earned a place on my nightstand.

Seeing Stars: Astronomy 0.001 Drawing the Line

Anna Edmonds

The Transit of Venus that Bill and I were privileged to see this past June has reminded me of a British team of two astronomers/surveyors. These men were sent to the island of Sumatra to observe the Transit of Venus in 1761. Our experience in the 2004 transit was blissfully uneventful (except for getting interviewed on Turkish television). Theirs was not.

On their second day en route to Sumatra, their ship was attacked by French pirates. When they suggested to their sponsor that their expedition might be more expensive than successful, they were warned that their reputations were at stake. They continued, only to learn that Sumatra had become French territory. Since Britain and France were at war, their arrival would put more than their reputations at risk. (They managed to observe the transit at the Cape of Good Hope on June 6.)



Granite boundary marker bearing the Penn and Baltimore Arms

However, now that they were experienced in the complications of field work and had the reputation as good working partners, they were sent off to survey and settle a border dispute in the American wilderness. They labored there from 1763 to 1767—only a decade before the Americans decided that they didn't want the British around any more.

Back home they were most acclaimed for determining the measure of a degree of meridian. But for the Americans, it was the determination of "the fortieth degree of north latitude from the equatorial" and the resulting settlement of the dispute. (Actually, the border in question is at 39° 43'.) The two properties in question belonged then to Cecelius Calvert, Lord Baltimore and William Penn, and the settlement established the boundary between Maryland and Pennsylvania. In the Missouri Compromise of 1820 that border separated the slave-owning South from the slave-free North and became known as the Mason-Dixon Line, named for the two surveyors, Charles Mason and Jeremiah Dixon.

You can't ever tell what you're going to get into with astronomy.

ARTICLES

Observing Deep, Far Away, and Long Past

Harry Colvin

It is no surprise to experienced deep sky observers that locating and observing details of objects with magnitudes beyond 14 requires dark skies, visual acuity, and telescopes over 20 inches in aperture. With my ten-inch Dob, Herschel objects that are Magnitude 13 usually appear as faint fuzzy spots and observing detail requires averted vision or imagination or both. After completing the Messier list with my six-inch telescope and the Herschel 400 with my ten-inch telescope, I was looking for another challenge. I wanted to go deeper to observe objects with detail in the range above Magnitude 14. From my experience at various star parties, even the owners of much larger telescopes were not observing objects in the ranges I wanted to explore. My solution was to dive into CCD imaging, not with the intent of producing pretty pictures of bright objects, but as a tool to allow me to make detailed observations of faint objects and perhaps even discover a minor planet or supernova. With CCD imaging those with visual impairments or night blindness can observe objects they would be unable to see with a telescope, and image-stacking methods mean light pollution and moonlight are less of a problem.

After purchasing the required equipment and software and spending over a year to climb a steep learning curve, my spouse and I are making observations that I never thought possible. Our latest challenge has been to image the galaxy groups and clusters from a list published by the Astronomical League, *The Galaxy Groups and Clusters Visual and CCD Observing Guide* by Bob McGown and Miles Paul.

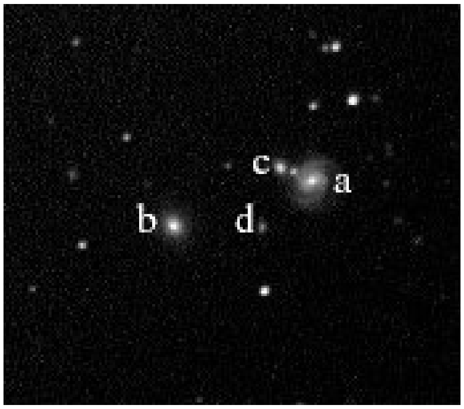


Figure 1. *Hickson cluster 96 taken at the Oregon Star Party 8/14/04. There are four galaxies: a. NGC 7674 mag. 13.5, b. NGC 7675 mag. 14.5, c. MCG +1-59-81 mag. 15.7, and d. PGC 1507 mag 16.6. NGC 7674 is a Sb spiral galaxy type showing two arms and NGC 7675 is a E0 elliptical galaxy type. MGC +1-59-81 is an E1 elliptical galaxy type. PGC 1507 is too faint to determine the type. The total integration time was 7.5 minutes. Apparent sizes of these galaxies are very small. Here the image field is less than 0.1 degrees.*

universe is not uniform but is "lumpy" with clusters of galaxies from small, local groups to immense walls of galaxies.

One of the observation requirements of the award is to make an attempt to characterize each galaxy's shape. Shape variation of individual galaxies within a cluster is complicated, but they can usually be placed into one of four structural types: elliptical galaxies, consisting of a nucleus, a central bulge, disc, and corona, ranging from spherical discs (E0) to elongated discs (E7); lenticular galaxies (SO) with a central disc but no spiral arms; spiral galaxies (Sa-Sd) with a nucleus and a thin or thick disc and a galactic halo that sometimes can take the form of arms; and barred spiral galaxies (SBa-SBd) with a bar-shaped nucleus across the spiral structure. Many clusters will have several types of galaxies (Figure 1). Not all galaxy shapes fit the classic types as can be seen in the Hickson 93 cluster (Figure 2). In this cluster the nucleus of NGC 7549 has a curved shape and one arm seems to be missing.

The clusters and groups on the list contain as few as three galaxies or as many as 30. They are divided into 50 galaxy trios from *The Atlas of Compact Galaxy Trios* compiled by Miles Paul, 99 Hickson Compact Galaxy Groups, 50 additional galaxy groups (most located in the Virgo cluster), and 50 Abell clusters. Einstein's Cross is included as a challenge object. To receive the Astromonical League's Galaxy Clusters and Group Award one must observe 120 clusters, with 30 clusters (including each galaxy in the cluster) from each group. Either visual or CCD methods may be used to observe the clusters and member galaxies.

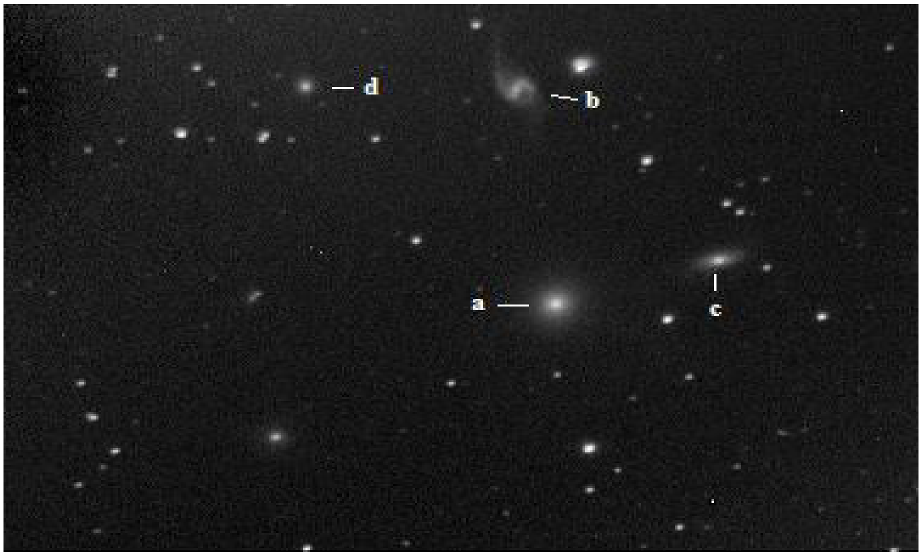


Figure 2. *Hickson cluster 93 taken at the Oregon Star Party 8/13/04. There are four galaxies in this cluster: a. NGC 7550 mag.12.6, b. NGC 7549 mag. 3.2, c. NGC 7547 mag 13.9, d. CGCG 454-15 mag. 15.3. NGC 7549 has a very distorted nucleus. The field of view is less 0.2 degrees. The image was the result of five stacked three-minute images.*

When I first began observing galaxies a few years back, I saw them as individual objects. But as one goes deeper, further away and further back in time, single galaxies lose their individual identities and because of gravitational attraction are usually members of groups or clusters. Clusters can also group into super-clusters. Examples include those in Perseus, Coma Berenices, Virgo, and Corona Borealis. The

Some clusters show clear interaction between galaxies similar to that observed in M51. For example, in the Hickson 92 cluster the nuclei of NGC 7318A and NGC 7318B are clearly interacting (Figure 3).

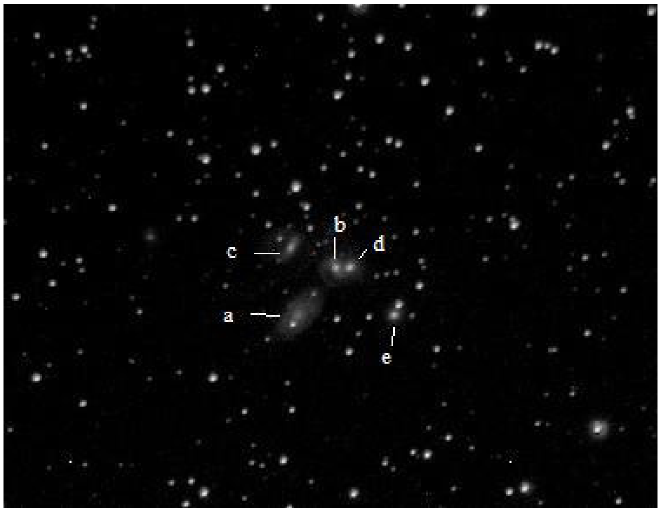


Figure 3.*Hickson cluster 92 taken at the Oregon Star Party 8/13/04.Of the five galaxies in this cluster, NGC 7318 A and NGC 7318 B seem to have interaction: a. NGC 7320 mag.12.5, b. NGC 7318 B mag. 13.2, c. NGC 7319 mag. 13.3, d. NGC 7318 A mag. 13.6, and e. NGC 7317 mag. 14.0. The field of view of this cluster is less than 0.1 degrees. The image is made of five raw three-minute images that have been stacked and processed. The total integration time was 7.5 minutes.*

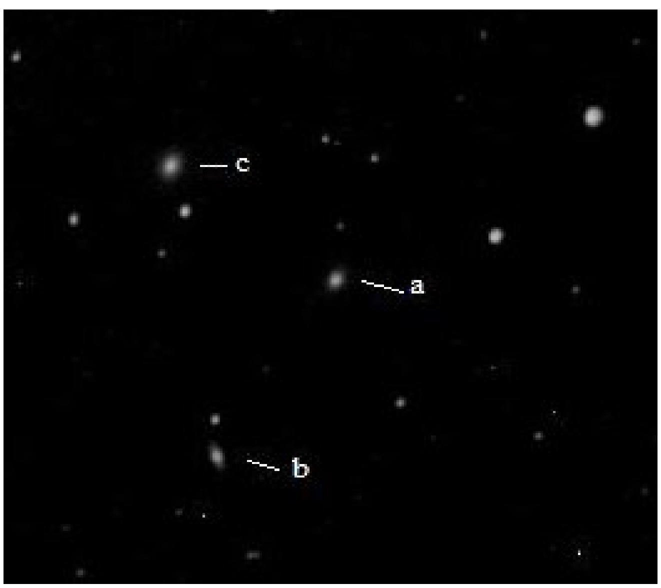


Figure 4. *A stacked image of a group of galaxies in Cetus from the Atlas of Compact Galaxy Trios, taken 10/14/04 at Sky View Acres near Goldendale, Washington: a. NGC 426 mag. 12.8, b. NGC 429 mag. 13.4, c. NGC 430 mag 12.5. Comparison of this image with the DSS image in Figure 5 confirms the identity of these objects.*

It is often necessary to confirm a galaxy's identification in a cluster. One way to do this is with direct comparison with Digital Sky Survey (DSS) images obtained from various sources on the Internet. This also allows comparison of our image results with those taken with telescope systems costing hundreds of thousands of dollars more. (Figures 4, 5). Yes there is a difference.

Equipment: I purchased a Meade ten-inch LX200 GPS for the simple reason that the instrument provides both the OTA and GOTO mount in one package for a reasonable price. I have added upgrades to the basic telescope including a Milburn wedge, a 6.3 focal reducer, steel gears in the drives, and upgraded thrust bearings in the focus mechanism. Except for some minor problems initially, the telescope has performed as hoped. Our CCD camera is a Starlight Xpress MX 916, a very sensitive low noise camera designed for imaging deep sky objects.

Telescope Control: We use Autostar II firmware for automatic alignment, focus control, and periodic error and backlash corrections in the drive system. *Starry Night Pro* software is used for synchronization and GOTO procedures. *Star2000* interlaced guiding technology provides automatic guide corrections during imaging.

Figure 5. *A DSS image downloaded from the Internet of the same group of galaxies as those in Figure 4: a. NGC 426, b. NGC 429, c. NGC 430.*

Software: We use *AstroArt 3.0* for camera control and image processing. *Starry Night Pro* is used for charting, telescope GOTO control and sync. *Deep Sky 2000* is used for planning observation sessions. Cartes du Ciel produces detailed star charts for confirming an object's identification and Live Sky links via *Starry Night Pro* provide DSS Internet images.

Procedure: Because the telescope and mount is equatorially mounted, all observation begins with polar alignment. With the LX200 the alignment location and timing is automated, but we still need to center Polaris using wedge adjustments. We also center selected alignment stars manually, and perform drift alignment to remove drift caused by errors in polar alignment. We center the telescope on a star in the range of Magnitude 7 – 9 using a 9 mm illuminated crosshair eyepiece, replace the eyepiece with the CCD camera, and focus with a Kendrick focus mask and fine adjustments controls on the Autostar II keypad. We use *Starry Night Pro* to locate and slew to objects. In some situations it is necessary to sync on a nearby star before slewing to an object. Test images confirm that the object is centered on the chip. We use *AstroArt*'s telescope command buttons to center an object. Then we select a guide star and start *Star2000* guiding to track the object within one pixel, representing about 3 seconds of arc. We make a series of raw 180 second images, with the number of image frames depending on the sky conditions and the object brightness. The resulting images are stacked and calibrated with dark, flat, and bias frames using *AstroArt*. Image processing means removing the background gradient and performing DDP (Digital Development Process). We can image 5-10 objects per night.

Future Plans: We have just started to explore the capabilities of our equipment. Future plans include increasing image resolution by using high resolution binning methods, using imaging software for the detection of minor planets, and experimenting with filters to reduce light pollution and improve image detail. Automation of image acquiring procedures and remote control of telescope and CCD camera will also play a significant role. Amateur observers wishing to go deeper and far away with their observation programs might wish to consider CCD as an alternative to a larger telescope. The cost of CCD equipment continues to decline as the sensitivity and capability continues to increase. Cameras capable of deep sky imaging are now being marketed for less than $300. Could the era of the Big Dob be ending?

Reference: Galaxy Groups and Clusters : a Visual and CCD Observing Guide for the Advanced Amateur Astronomer, *Bob McGown and Miles Paul (Astronomical League, 2003.)*

Astrobiology: Mars News

Bill O'Neill

I've almost lost track of what's happening on Mars. We live in an unprecedented time for extraterrestrial exploration, with public access to most of the data and interpretation. Nevertheless, while the local weather was good, I was so absorbed by the world at my feet or just up the road, that I took little notice of the news from our neighboring planet.

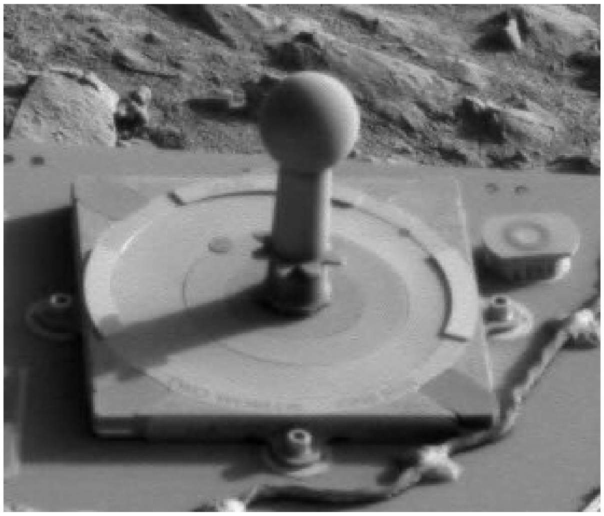
Courtesy NASA/JPL-Caltech

This fall at UW I'm on an oceanography tangent and miss most astronomy and astrobiology seminars. However I'd be there if anyone offered to review what's emerged from the Mars missions, and I'll eagerly enroll when a course on the subject is offered. (Paul Middents?) In an attempt to catch up, I decided to compose a one-page summary and open the subject for comment. I'm sure no expert, but here goes. Hit me with your best shot (constructive/instructive criticism, that is).

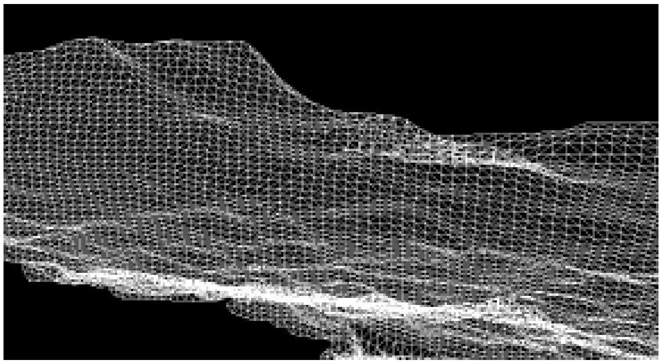
● Maps are the tools and first fruits of exploration. Mars Global Surveyor (MGS), launched in November 1996, carried into stable orbit 250 miles above Mars a package of instruments that yielded data from which an extraordinary photo-montage has been constructed. A detailed topographic map of the entire planet was assembled by combining photos from its Mars Orbiter Camera (MOC) with data from its Mars Observer Laser Altimeter (MOLA). MOLA resolves features to 10 meters in height. The story of these instruments, and the people behind them, has been told very well in a book, published in 2002, by Oliver Morton, entitled *Mapping Mars* (available at Kitsap's libraries). A wall map drawn from the MOC-MOLA data, distributed with the February 2001 *National Geographic*, barely suggests the map's fine detail.

● MGS was succeeded by Mars Odyssey, launched in April 2001. It began producing useful data in Febuary 2002 and within a few months provided evidence of vast quantities of water (hydrogen atoms, at least) near the surface of Martian soil (40-70% ice by volume, compared to 30% for terrestrial permafrost) at mid-to-high latitudes in both hemispheres. (Page 9, *BPAA Newsletter* July 2002, and NASA/JPL August 25th, Odyssey press release). Odyssey surveyed Mars for a full (23 Earth-month) year, and the mission was just extended through 2006 enabling it to look for climate change. Odyssey's data, combined with MGS maps facilitated choice of significant landing sites for two amazing robots, which have gone on like Energizer Bunnies–nine months!

● Opportunity, although the second to arrive (January 24th), was the first to strike pay-dirt. It confirmed that the extensive flat region where it landed, Meridiani Planum, is covered with hematite, an iron mineral which commonly develops in aqueous environments. It spent two months examining layered sedimentary outcrops around the shallow Eagle Crater which appear to have been under water for quite awhile. Gray 1-2 mm diameter spherules, dubbed "Blueberries," appear to be concretions like those that form terrestrially when hematite precipitates from mineral-laden water and coats sand grains. Significant amounts of the elements S, Cl and Br were found, as they are where salty brine has been evaporated; also a hydrated iron sulfate, jarosite, which forms only in acidic lake springs on Earth. Many of the Meridiani rocks contain small (<1 cm) linear cavities that could have formed when soft evaporite salt (e.g. $CaSO_4$) crystals were leached or eroded from earlier deposits. Cross-bedding and ripple marks on several rocks support the interpretation that they accumulated in a salty body of water which flowed for substantial periods. Opportunity moved on (0.8 km in April) to explore Endurance, a large meteor crater. It is now traversing the inside rim.



The 50,000th image from NASA's pair of Mars Exploration Rovers: it shows the camera's calibration target,,with a glimpse past it to rocks and soil in the "Columbia Hills" (NASA/JPL/Cornell)



3-D Mesh Map represents the topography of Spirit's location on sol 192.(NASA/ARC)

● Spirit landed on Jan. 4th in a less geologically-exciting environment at Gusev Crater. It worked its way, examining numerous rock formations en-route, some 3.6 km to the "Columbia Hills," where it recently encountered highly-altered soft rock (also containing elevated levels of S, Br & Cl), which appears to have been eroded by water. All this evidence of Mars' aqueous history fosters hope that fossil signs of microscopic life (if there ever was any) may be found by future missions to the planet, while the water still under the surface bodes well for *human* exploration.

NASA

The Moon in the Shadow of the Earth, October 27, 2004 : An Eclipse Gallery

Doug Tanaka/15xbinoculars and digital camera

During a total eclipse the moon is in the darkest part of the earth's shadow, the umbra. But it still reflects light. The earth's atmosphere acts like a lens, and bends rays of sunlight into the umbra. The light the moon reflects during an eclipse is usually orange or red, even blood-red, because the lens of the atmosphere scatters blue wave-lengths , leaving the redder, longer wave lengths to travel to the moon. Conditions on earth, such as volcanic eruptions, can change the refractive properties of the atmospheric lens, and alter the color and brightness of a lunar eclipse.

Reference: *http://sunearth.gsfc.nasa.gov/eclipse/LEmono/TLE2004Oct28/image/TLE2004keen.html*

Don Willott/3X optical zoom

George McCullough/Early Totality

Doug Tanaka/Moon Over Puget Sound and Yellow Moon

Rik Shafer/digital camera and tripod

IN THIS ISSUE

Send submissions to *Newsletter Editor*
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Include 'BPAA Newsletter' in subject line.

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