BPAA Newsletter

Battle Point Astronomical Association, Bainbridge Island, WA

ISSUE 54: JANUARY - FEBRUARY 2003

JANUARY – FEBRUARY - MARCH CALENDAR

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

January

January 3: New Moon 9:08 a.m.; Quadrantids Meteor Shower Peak
January 4: Earth at Perihelion (0.983 A.U. from Sun)
January 5-9: 201st Meeting of the American Astronomical Society in Seattle
January 7: Lecture, Robert L. Millis, Director of Lowell Observatory, 7 p.m. Bainbridge High School Auditorium
January 8: BPAA **Annual Meeting** 7 p.m. **ALL MEMBERS INVITED!**
January 10: First-quarter Moon 11:57 a.m.
January 12: Observatory tours 2 to 4 p.m. Gena Ritchie
January 15: Member Meeting 7 p.m. Harry Colvin; featured speaker John Rudolph
January 18: Full Moon 5:06 p.m.
January 25: Star Party Battle Point Park. Beginner session 6 p.m. Paul Below & Bruce Muggli; Last-quarter Moon 12:57 a.m.
January 30: Lecture Series 2003 7 p.m. Paul Middents: What is Archeoastronomy?

February (There will be no Member Meeting in February.)

February 1: New Moon 8:20 a.m.
February 5: BPAA Board Meeting 7 p.m.
February 6: Lecture Series 2003 7 p.m. Paul Middents: Basic Theory of Celestial Motions
February 8: First-quarter Moon 10:37 a.m.
February 9: Observatory tours 2 to 4 p.m. Gena Ritchie
February 13: Lecture Series 2003 7 p.m. Paul Middents: Basic Theory of Celestial Motions continued
February 15: Full Moon 3:59 p.m.
February 16: 55th Anniversary, Gerard Kuiper's Discovery of Uranus Moon Miranda
February 19: Nicolas Copernicus' 530th Birthday
February 20: Lecture Series 2003 7 p.m. Paul Middents: Archeoastronomy in the Americas
February 22: Star Party Battle Point Park. Beginner session 6 p.m. Paul Below & Bruce Muggli
February 23: Last-quarter Moon 1:26 a.m.
February 25: Lecture, Richard Berry, NASA Coordinator ISS-AT Project, 7 p.m.
February 27: Lecture Series 2003 7 p.m. Paul Middents: Archeoastronomy in the Americas continued

(Cont. on p. 2)

March (There will be no Middents lecture on Thursday, March 6.)
March 2: New Moon 7:13 a.m.
March 5: BPAA Board Meeting 7 p.m.
March 9: Observatory tours 2 to 4 p.m. Gena Ritchie
March 10: First-quarter Moon 9:54 a.m.
March 12: Member Meeting 7 p.m. Harry Colvin
March 13: Lecture Series 2003 7 p.m. Paul Middents: Archeoastronomy Around the World
March 17: Full Moon 5:34 p.m.
March 20: Lecture Series 2003 7 p.m. Paul Middents: Astronomy In the Classical World
March 21: Vernal Equinox
March 22: Star Party Battle Point Park. Beginner session 6 p.m. Paul Below & Bruce Muggli
March 24: Last-quarter Moon 1:48 a.m.

Calendar Notes:

This calendar is filled with a number of important and exciting events. On January 7, we are privileged to host Robert L. Millis, Director of Lowell Observatory. With the help of Louise Baxter, a science educator at Bainbridge High School, we have reserved the high school auditorium for Dr. Millis' lecture. The lecture will be open to the public and we are expecting a large turnout. For more information on his many outstanding astronomical accomplishments check out Dr. Millis' biography at http://www.lowell.edu/AboutLowell/millis.html. Dr. Millis is involved in the exploration of the Kuiper Belt, and his lecture will include a discussion of Kuiper Belt objects.

On January 15, John Rudolph, one of BPAA's founders and its resident archeoastronomer, will present his slide show on Long Lake, Oregon. The Long Lake site contains numerous ancient petroglyphs, some of which may predate 4750 B.C., making them the oldest petroglyphs in the Northwest and possibly in North America. (Cf. John's article on page 8.)

Paul Middents' lecture series starts January 30. This year Paul is focusing on archeoastronomy and modern cosmology. Those of you who have attended Paul's lectures before know how worthwhile they are. Paul is an excellent lecturer. The information he presents is supported by his Web page, with fascinating links to all things astronomical. Check it out to find out what you've missed in the past and to get an idea of how interesting this year's series will be: http://webpages.charter.net/middents/Home/ . As of press time, we are uncertain whether the lectures will be held at the Observatory as they have been in the past, or at another venue. Stay tuned to BPAA yahoogroups for further information on the location, or see BPAA's Web site, http://bicomnet.com/ritchieobs/ . (Cf. article on this series on p. 4.)

On February 25, Richard Berry will speak to BPAA members. For most of you, Richard Berry needs no introduction. He is the former editor of *Astronomy* magazine and has authored many books, including these classics: *The Dobsonian Telescope*, *The CCD Camera Cookbook* and *The Handbook of Astronomical Image Processing*. He has received many awards for his contributions to the advancement of amateur telescope making and for his efforts to further astronomy and amateur telescope making through his writing, editing, and teaching. He even has an asteroid named after him. Berry is currently serving as Chair of Grants and Proposals and NASA Coordinator for The International Space Station Amateur Telescope Project (ISS-AT). Many of you know that the idea of placing an amateur telescope on the International Space Station was conceived by BPAA's Founder and President Emeritus (Cont. on p. 3)

Mac Gardiner. Mac gave us an update on the project in the last issue of the Newsletter (*BPAA Newsletter*, Nov.-Dec. 2002, p. 4). Telescope Alpha, described in the May 2002 issue of the Astronomical League's *Reflector*, will soon be fully operational. In his presentation February 25, Berry will discuss Telescope Alpha and other aspects of the ISS-AT program. Again, at press time, we are not certain of the location for his lecture, but we will update you with this information by email and on the Web site.

Along with all these significant indoor events, let's hope we get some clear weather for viewing the winter sky. Our star parties in January, February and March coincide with the third quarter moons. Find the winter triangle; it provides an excellent way to detect the differences in star hues. Sirius is bright in the southern part of the sky. Above Orion's belt is Betelgeuse. Sirius with Betelgeuse can be joined to make a triangle with Procyon. Betelgeuse is strongly orange compared with whitish or bluish Sirius and Procyon. The orange color signals a star that has a lower surface temperature than hot whitish stars.

Finally, remember that star parties may be scheduled at any time via our email yahoogroup. Any member who plans 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 you can request to join our group on this page: 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
(dcolvin@bainbridgeisland.net)

NEWS BRIEFS

New Comet

A new comet has been discovered, and it may reach magnitude -2 in late January! The designation is 2002/X5. We might be able to see it in the early morning with binoculars in mid-January before the comet passes behind the sun.

Here are some links for more. I just heard about it and do not have many details yet.
http://skyandtelescope.com/news/current/article_816_1.asp
http://cfa-www.harvard.edu/iau/Ephemerides/Comets/2002X5.html
http://www.spaceweather.com/ P.B.

Telescopes for Christmas?

It's that time again, folks, when thousands of telescopes will have been given as Christmas presents. Unfortunately a great many of these will be no more than toys or ornaments (which is OK if you want a toy or an ornament).

If you don't know a great deal about telescopes and want some pointers on how to evaluate your purchase "in store," please look at:
http://www.astunit.com/tutorials/evaluating.htm

Our next beginner session will be held after the gift giving is over, but you can read our online article on amateur astronomy (and get gift ideas for that budding astronomer when you need it the next time) at:
http://bicomnet.com/ritchieobs/pages/sidewalk.htm

Also, a general Telescope Frequently Asked Questions document is at:
http://home.inreach.com/starlord P.B.

The Cassini Probe

The Cassini probe, which is on its way to Saturn, just took its first image of the ringed planet. Cassini is scheduled to enter orbit in July of 2004, so it still has a ways to go, but it is nice to see that everything is operational.

News story:
http://www.space.com/scienceastronomy/cassini_saturn_021101.html

Cassini home page:
http://saturn.jpl.nasa.gov/index.cfm

Note: Bill O"Neill's next article on **Astrobiology** will appear in the March - April Issue #55.

President's Annual Letter

Paul Below's annual letter has been sent recently to all the members. Please take note of the item requesting that members keep their membership up-to-date. The enclosed yellow form is for this. Also add a note on that card if you wish to get the *BPAA Newsletter* in hard copy by mail instead of getting on the web site.

REPORTS AND ARTICLES

BPAA Sponsors a New Paul Middents Lecture Course:

Cosmologies: Ancient and Modern - An Introduction to Archeoastronomy and Modern Cosmological Theories

A ten-lecture series starting January 30, 2003 and ending May 15, 2003

Cost is $100 for the entire series or, $12 per 2-hour lecture.

20 Clock-Hour continuing education credits available through Central Kitsap School District / ESD 114.

Fees payable at the first lecture January 30, 2003 7:00 - 9:00 p.m.

Course tentatively to be held on Thursdays, 7-9:00 pm at the Ritchie Observatory, Battle Point Park, Bainbridge Island. (Check the web site for possible changes.)

Space is limited to 20 participants.

Pre-Register by e-mail to:
michaelw@cksd.wednet.edu

This will be the sixth year Paul Middents, retired Olympic College adjunct professor, has offered a lecture series for the BPAA. Course Outlines and Web links for the last two series can be found on his web page: http://webpages.charter.net/middents/Home/ . This year's series will also be supported on this web page and will rely heavily on web resources. The lectures are all supported by PowerPoint computer video presentations. Slides and notes will be available on CDROM.

The course will start with an overview of archeo-astronomy as revealed in several ancient cultures. Then the basic celestial motions detectable by naked eye will be covered. The causes of these motions as we now understand them will be emphasized. Then the evidence for ancient awareness of these motions will be studied in a variety of cultures. These cultures will include Mayan, early North American native sites, Inca, Polynesian navigators, stone circles of Great Britain, classical world of Egypt, Mesopotamia and Greece, Arab and Indian astronomy and the transmission of knowledge to western Europe.

The last three lectures will outline current ideas about cosmology. These lectures will draw on the recent *Scientific American Special Edition, The Once and Future Cosmos.*

Lecture 1: Introduction: What is archeoastronomy? Some examples from pre-literate societies and examples from the classical world of Mesopotamia, Egypt, Greece
Lecture 2: Basic theory of celestial motions
Celestial coordinate system and celestial mapping review
Annual solar motions
Annual star motions (helical risings)
Lecture 3: Basic Theory continued;
Planetary cycles
Lunar cycle and eclipses
General precession
Lecture 4: Archeoastronomy in the Americas
Peru
Maya
Lecture 5: The Americas continued
Anasazi
Susanville, CA, the Pacific NW and the Great Plains
Lecture 6: Archeoastronomy around the world
Polynesian Navigators
The circles of Great Britain
Chinese astronomy
Lecture 7: Astronomy in the classical world
Egypt and Mesopotamia (Origins of astrology)
Greek astronomy
Arab and Indian astronomy and the transmission of knowledge to Western Europe
Lectures 8 - 10: Modern cosmological ideas.

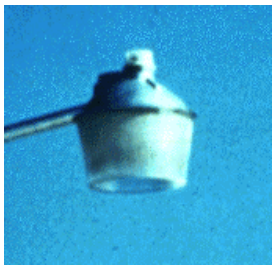
Mike Walker, Education Director

Have you returned the yellow form from Paul Below's Annual Letter? We'd like to know how you want to receive your *BPAA Newsletter*, from the web site or hard copy by mail.

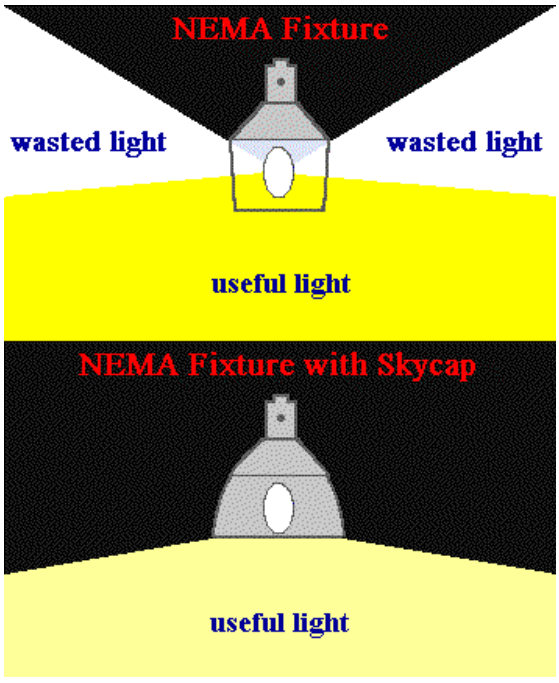
Retrofitting Light Fixtures

by Paul Below

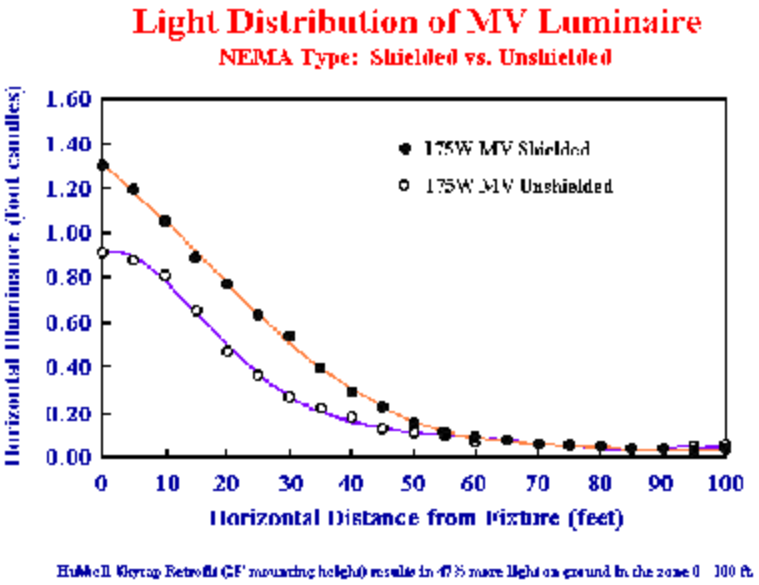
Improper night lighting is an increasing problem that is ruining our ability to enjoy the night sky. Overly bright, unshielded, or poorly aimed lights annoy neighbors, waste energy and money, create dangerous glare for drivers, and disrupt the nocturnal patterns of some wildlife. Ever hear bird song at night? Almost certainly, the reason was artificial lighting. As well, recent studies at the University of Washington have indicated that overly bright sleeping conditions can have adverse health effects on humans.



The first image is of the typical "all night" light. These lights waste tremendous amounts of electricity, expending a large percentage of their light as glare (light that goes directly into the eyes of pedestrians and motorists or into neighbor's bedroom windows!) and sky glow (light that goes into the sky illuminating only the bellies of birds and airplanes). However, with an inexpensive sky cap they can be converted to be very neighbor-friendly fixtures. The second diagram depicts the relative amount of wasted light from these fixtures.



The bottom half of the diagram shows what happens after the simple retrofit. But, what is the impact on the useful light? The following graph shows the difference between illumination on the ground of the unshielded and of the retrofitted light.



(NEMA – National Electrical Manufacturers Association)

The vertical scale on the graph is the amount of illumination on the ground. The horizontal scale is the distance from the light fixture. As can be seen in the graph, at distances of less than 60 feet from the light, the shielded light actually puts **MORE** light on the ground! At distances greater than 60 feet, it doesn't really matter as the light is ineffective at that distance anyway. So, with the shield, the fixture produces **MORE** useful light, with **NO** annoying glare!

Where can you buy the Sky Caps?

Lighting Group Northwest is the Manufacturers' Representatives for Hubbell Lighting Products in Western Washington. The NPU-B1 is available from authorized Distributors: Platt Electric Supply in Bremerton or North Coast Electric, Stoneway Electric Supply or All Phase Electric Supply in Seattle. The Products may or may not in stock at the distributors; they are available from the factory with approximately 1 week lead-time.

So, what does the end result look like? Check out these **before** and **after** pictures on the next page:

Amazing difference, huh? Before After

What else can you do?

A productive way to improve lighting used in residential areas, since Bainbridge Island now has suitable standards written into the local lighting code, is to find which local retailers carry shielded products (and encourage more to do so). Locally owned businesses are particularly well able to respond to this kind of approach. This information is now being made available through the BI community planning department and distributed with building permits.

Here are some additional tips, gleaned from the Bainbridge Island ordinance:

- Turn off outdoor lights after 9 p.m.
- Reduce wattage of landscape lighting (as we have seen, properly shielded lights can produce more or equally effective lighting with lower wattage).
- Aim lights so waterways are not illuminated.
- Mount lights under porch overhangs.
- Block lights to keep illumination on your property.
- Aim accent lights downward (always aim floodlights no more than 45 degrees from horizontal).

See:
http://www.theglarebuster.com/
http://www.elights.com/darksky.html
for more good lights.

BPAA Financial Report for November 2002

BALANCE SHEET:	**$**	
Current Assets	16,694	
Fixed Assets	243,811	
Total Assets	**260,505**	
Liabilities	-0-	
Equity	260,779	
Total Liability/Equity	**260,505**	
PROFIT & LOSS:	**$ Nov.**	**$ YTD**
Income:		
Contributions	50	7,441
Membership Dues	- 0 -	2,280
Other	166	1,947
Total Income	**216**	**11,668**
Expense:		
Administration	327	1,872
Program	117	2,437
Utilities	46	739
Total Expenses	**490**	**5,048**
Net Income (Loss)	**(274)**	**6,620**

Eric Cederwall, Treasurer

MEGALITHIC ASTRONOMY

By John Rudolph

One does not have to journey to Newgrange, Ireland or Carnac, Brittany to do Megalithic Astronomy in the ancient chambers dating to 3000 BC. Our Megalithic instrument is right here on Bainbridge Island in the reinforced concrete building housing the Ritchie Observatory

There being a full moon close to the Winter Solstice, and the night of December 19 being clouded by only a thin layer of cirrus, it seemed like a good opportunity to measure and mark the angle of the Moon when it crossed the meridian close to midnight. One (Cont. on p. 7)

of our members, Cara Cruikshank, accompanied me to Battle Point Park where we found the gates closed and locked and the key that I had did not fit the new lock. So, undaunted, we parked the car and walked to the observatory. The Moon was at least an hour from being due south so we cranked up the Ritchie 27.5" telescope and looked at the Moon. This was a new experience for our neighbor, and with the Moon one day past full, we could observe the craters on the upper edge with startling clarity. Midnight passed and the Moon was still not yet to the meridian, but we shut down the telescope and began to watch for a shaft of moonlight coming through the aperture on the circle of plywood high on the south wall of the building. Alas, some 2 x 4s interrupted the path of the light. A crowbar found in the shop made short work of removing this obstacle. Now we were ready for the moonlight.

The thin clouds and the very high declination of the Moon prevented a real visible beam of moonlight to impinge on the step of the back stairs where in a previous year, a felt pen circle marked the spot made by the summer solstice Sun. No matter, we stretched a spool of nylon fishing line from the supply shelves of the shop from the aperture to the step and aligned the barely discernable glimmer of the Moon by squinting along the string. By marking the spot with a felt pen and measuring the altitude (over and up) we were able to lay this out on the drafting board and measure the sun and Moon angles with reasonable accuracy.

It is one thing to read about how the Moon is offset 5.15 degrees from the path of the ecliptic, and quite another to see the Moon's image moving farther and farther away from the image of the Sun in the dim recesses of our concrete cave. It was my intention to work up the mathematics of just what was happening and why, but the rush of last minute Christmas doings cut off the work of your otherwise diligent researcher. Paul Middents' class will address these mysteries, and I hope to get a front row seat. Until then, the readers will have to do their own math. When you can show me what happens graphically, please call me.

We wish all an interesting and blissfull NEW YEAR!!

Black Holes: Feeling the Ripples

Astronomers have finally confirmed something they had long suspected: there is a super-massive black hole in the center of our Milky Way galaxy. The evidence? A star near the galactic center orbits something unseen at a top speed of 5000 km/s. Only a black hole 2 million times more massive than our Sun could cause the star to move so fast. (See the Oct. 17, 2002, issue of *Nature* for more information.)

Still, a key mystery remains. Where did the black hole come from? For that matter, where do any super-massive black holes come from? There is mounting evidence that such "monsters" lurk in the middles of most galaxies, yet their origin is unknown. Do they start out as tiny black holes that grow slowly, attracting material piecemeal from passing stars and clouds? Or are they born big, their mass increasing in large gulps when their host galaxy collides with another galaxy?

A new space telescope called LISA (short for "Laser Interferometer Space Antenna") aims to find out.

Designed by scientists at NASA and the European Space Agency, LISA doesn't detect ordinary forms of electromagnetic radiation such as light or radio waves. It senses ripples in the fabric of space-time itself--gravitational waves.

Albert Einstein first realized in 1916 that gravitational waves might exist. His equations of general relativity, which describe gravity, had solutions that reminded him of ripples on a pond. These "gravity ripples" travel at the speed of light and, ironically, do not interact much with matter. As a result, they can cross the cosmos quickly and intact.

Gravitational waves are created any time big masses spin, collide or explode. Matter crashing into a black hole, for example, would do it. So would two black holes colliding. If astronomers could monitor gravitational waves coming from a super-massive black hole, they could learn how it grows and evolves.

Unfortunately, these waves are hard to measure. If a gravitational wave traveled from the black hole at the center of our galaxy and passed through your body, it would stretch and compress you by an amount far less than the width of an atom. LISA, however, will be able to detect such tiny compressions.

LISA consists of three spacecraft flying in formation-a giant triangle 5 million km on each side. One of the spacecraft will shoot laser beams at the other two. Those two will echo the laser signal right back. By comparing the echoes to the original signal, onboard instruments can sense changes in the size of the triangle as small as 0.0000000002 meters (20 picometers).

With such sensitivity, astronomers might detect gravitational waves from all kinds of cosmic sources. The first, however, will probably be the weightiest: super-massive black holes. Will "feeling" the ripples from such objects finally solve their mystery, or lead to more questions? Only time will tell. Scientists hope to launch the LISA mission in 2011.

Nancy Leon, Education and Public Outreach Leader

NASA New Millennium Program

URARA SYMPOSIUM

By John H. Rudolph

The BPAA Board of Directors, with its usual largess, voted unanimously to sponsor my attending the Utah Rock Art Research Association's annual symposium, on November 9-12 in St. George, Utah. Sponsor, yes, travel money, no, but I attended anyway. It was a wonderful meeting of people from many parts of the country all being enthusiastic about the ancient writings on the rocks. Petroglyphs (engraved or pecked) and pictographs (painted on the rocks) are found worldwide. The American Southwest has them in great abundance. The papers presented were about a great variety of rock art sites and subjects. My paper was the only one about archaeoastronomy, illustrated with forty slides. The following is a synopsis of this presentation . The best parts of the symposium were the field trips into the dramatic canyon country near St. George and Kanab, Utah. Both petroglyphs and pictographs in rock shelters were seen. Bounding herds of deer, soaring hawks and good friends made the trip most memorable.

THE LONG LAKE SITE NEAR LAKEVIEW, OREGON

This site is situated on the high sage-covered plateau on the west edge of the Great Basin adjacent to a shallow lake bed, usually dry by the end of summer. A basalt escarpment, 4 kilometers long and 10 meters high runs along its western margin. A wind-blown talus up to 3 meters deep lies along the base of the cliff. The country is rich with the kinds of food plants and animals utilized by the early inhabitants. Probably they were more abundant then than now. Petroglyphs embellish the cliff face along the entire length ranging in age from very old to more recent.

Many persons are not aware that early Native Americans used a variety of ingenious counting and calculating systems, some based on 10, some on 20 , some on 8-16, and some on base 2. *Native American Mathematics* edited by Michael P. Closs, Texas U. Press 1986 is my source for being able to state in my paper that many of the glyphs at Long Lake represent counts of tallys. Fig. 1 illustrates a count familiar to all of us who have been paying attention. Connected figures of an increasingly

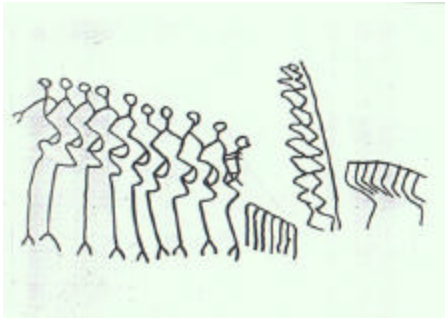


Fig. 1

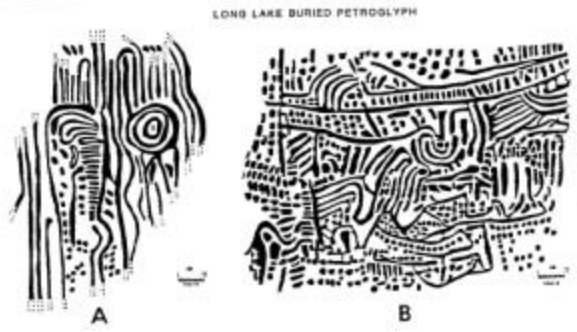
pregnant woman through nine months with a babe in arms the tenth rival "A Nude Descending a Staircase" by Duchamps and precedes it by perhaps 2000 years. To the right of the figures are serpentine lines that have the same count. The lower seven line glyph may refer to the Moon, being one quarter of the visible lunar cycle. (Thanks to Jane Bush and Ron Lee for providing me with this glyph.) While not at the Long Lake site, this glyph illustrates my point.

At Long Lake the more recent petroglyphs are goats, lizards with 12 toes, human figures, blue camas sprouts (an important food source) with older figures of chevrons, concentrics, serpentines, and hands. Older glyphs run more to many arrays of dots or dashes with numbers congruent with lunar counts for a year (6 + 6 + 1) and lunar cycles (19) and one panel of four lunar cycles (19 x 4 = 76) the cycle of Halley's comet. One panel has the same counting array as is found on the Agate Point Petroglph Stone on Bainbridge Island (1 + 1 + 1+ * + 1 + 1 + 1) where the full Moon marking each month is shown from summer solstice at one end to the equinox in the center to the winter solstice at the other end and back to the equinox and the summer solstice.

At the southeast end of the escarpment is a circle of stones with a standing stone at each end imbedded into the mother rock. From this circle of 3 meters diameter , the summer solstice Sun can be observed rising from behind a singular peak on the otherwise flat horizon, providing a very accurate determination of the time of year. Not only agricultural peoples needed to know when certain activities should commence, but foraging peoples also needed to know when to start out for their yearly round of food gathering and hunting.

At certain places, fine arrays of dashes can be seen peeking up above the talus. In a paper by Bill Cannon and Mary Ricks, they describe an "unauthorized dig" that exposed panels of petroglyphs below the talus. These glyphs were mostly long arrays of carefully inscribed dots and dashes separated by lines, with an (Cont. on p.9)

occasional concentric or spiral, and several whorls. This is shown in Fig. 2 taken from Cannon and Ricks' paper.



These are quite different from the glyphs above the talus except for one panel that we found in our survey of 2001 that is very old (weathering and patina) and is like the buried arrays. Some of the buried glyphs show features that are to be found at the Little Blue Table site in Idaho as well as on the walls of the chambers at Carnac in Brittany, France. Some of these long tallys can be counted and seem to represent counts of astronomical events, but more extensive research and analysis need to be done to match glyphs with events. There have been some techniques developed to determine the dates of petroglyphs, with mixed results. The exposed panels are dateable because they descend below a layer of Mt. Mazama ash that created Crater Lake when it erupted in 4750 BC. It seems clear that these panels of glyphs were created by a long-lived culture well before the eruption. It is entirely possible that these people were forced to move away from the area because of the devastation to plant and wildlife in the area. A hiatus of hundreds of years may have occurred before a different culture arrived to make their marks on the basalt above the windblown talus of ash, soil and debris, entirely different from the earlier tallys.

SEEING STARS Astronomy 0.001

By Anna Edmonds

Have you been looking at Venus this past month? The beautiful, large, clear light in the morning sky? In fact, it's been so bright that if you knew right where it was, you could still see it even after the sun rose. No wonder it was named for a goddess—and with Earth the only goddesses so honored!

But Venus isn't a star. It shines like a star; it's mostly visible when the stars are out. However, it has a limited area in which it can be found; and it has a limited time: It stays close to the Sun, so, for instance, you'll never see it in the east in the evening. And, it wanders around: Sometimes you can see it just at dawn—the Morning Star, and then sometimes it's around after sunset—the Evening Star. "Wanderer" is what its name means, and that of eight more of our neighbors—the "planets."

How can you tell whether the light you're seeing in the sky is a star or a planet? The first answer I was given to this question was that stars twinkle but planets shine steadily. Now with my older eyes they all seem to blink on and off, so that answer doesn't work for me. So the next answer is more complicated, and is one I've already hinted at: If you watch the points of light over a period of time you will notice that stars stay in the same place relative to each other: the Big Dipper always looks like the Big Dipper. But the planets move. For Venus, early in December you couldn't help seeing it when the clouds parted and you looked southeast before the Sun was up. By spring it will be gone, lost in the sunlight. The other planets act the same: they move around relative to the fixed stars, and sometimes they disappear behind the Sun.

Therefore, another way to determine whether the light is a star or a planet is to know the stars. That's not quite as hard as it sounds. To start you don't have to know all the millions of them, or even to begin, all of the 6,000 that people with good eyes can see over the year without help on a clear night in a dark sky. Instead of this, you can start by learning the names of the fifteen brightest—the first magnitude—stars that are visible in our northern sky. At the same time, you can make it easier for yourself if you also learn the groups of stars—the constellations—that these stars are part of.

These fifteen first magnitude stars that are up in our northern sky (and their constellations in the parentheses) are *Aldebaran (Taurus), Altair (Aquila), Antares (Scorpius), Arcturus (Bootes), *Betelgeuse (Orion), *Capella (Auriga), *Deneb (Cygnus), Fomalhaut (Piscis Australis), *Pollux (Gemini), *Procyon (Canis Minor), *Regulus (Leo), *Rigel (Orion), *Sirius (Canis Major), Spica (Virgo) and Vega (Lyra). The ones with a "*" before the name are visible here in the early evening during the winter months. You'll notice that there are a majority of them visible now.

Getting back to the planets, for the next two months Venus has been in the constellation Libra (that constellation has no first magnitude star); it's moving into the region north of Antares. Of the other planets, Mars is there in Scorpius, but it's quite dim. Jupiter is not far from Regulus; and for Saturn, Aldebaran might help you locate it. Mercury scoots around close to the Sun. It's low in the twilight early in January and then low in the eastern morning dawn the end of January (when it will be at its brightest), and all of February.

Next time I'll talk more about what to look for with the planets.

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