SEATTLE ASTRONOMICAL SOCIETY

The Webfooted Astronomer

July 2002

Apache Point Observatory

By George Best

July Meeting

Jeff Morgan
Research Engineer
University of Washington

Apache Point Observatory

Wednesday, July 17
7:30 p.m.

Physics-Astronomy Building
Room A102
University of Washington
Seattle

Come early at 7 p.m. for coffee and to visit with your fellow members.

Bring your slides to show after the program.

JEFF Morgan, a research engineer with the University of Washington, will discuss instrumentation at the Apache Point Observatory at the July 17 meeting. Morgan is responsible for the maintenance and development of instrumentation used at the Apache Point Observatory as well as the Manastash Ridge Observatory.

The Apache Point Observatory is owned by the Astrophysical Research Consortium (ARC), of which the University of Washington (UW) is a member. It is located in the Sacramento Mountains in southern New Mexico near Alamogordo. The Observatory houses two major and several smaller telescopes. The 3.5-meter telescope is a general purpose research facility on which the UW receives 31% of the observing time; the remainder is divided among five other universities. The UW's share is used primarily for faculty and graduate student research; much of the operation is remotely via the internet.

The Seattle Astronomical Society meeting will be held Wednesday, July 17, at 7:30 p.m. in room A102 of the Physics/Astronomy building.

Dark Skies Northwest will hold its monthly meeting prior to the SAS meeting from 6:30-7:30 p.m. in room A216 of the Physics-Astronomy Building.

Seattle Astronomical Society

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Media Shows Interest in Partial Eclipse

Compiled by Laurie Moloney

LAST month's partial solar eclipse generated a lot of media interest, and many SAS members were available to show them, and the public, the event. Here are some member accounts of that afternoon:

Sunset Hill Park

We had 8 volunteers from the club at Sunset Hill Park in Ballard and 3 at Greenlake. John Angel was at Greenlake with three TV station's and one radio station's crew looking for the eclipse. Randy Johnson provided a filter for one TV station so that they could video tape the event. We had an excellent turn out at Sunset. I was told by several that the news stations were informing the public that we would be at the two parks. So, it appears that Brian's (Allen) news releases got to the right guys, and the web site is being accessed by them as well. – *Mary Ingersoll*

Pretty nice eclipse! There was a great turnout at Sunset Park. Many regulars like President Mary, LorenBusch, Jerry West and some others I recognize but don't know their names plus some old faces that haven't been around for awhile like Sid Knight and Scotty Boivin. A photographer from the P.I. was supposed to show up but he never arrived. I heard that the TV and radio stations all ganged up on poor John Angel at Greenlake but he cut quite a dashing figure on the news. Reminded me of Barrymore. Ever think you missed your calling John? – *Tim McKechnie*

John holds down the fort at Greenlake

Carol and I left home at 2 p.m. and got to Green Lake early. We road our bikes for a while, and then set up. I ran into the Channel 7 news crew, and told them where we were setting up. There were a few people who set up at different spots around the lake. I spoke to one and told him where we were setting up. He told me he was there for a "private showing" and wanted to stay where he was. Okaaaayyy.

As I was setting up, the Channel 13 crew showed up and did a tape interview. After that, KIRO 710 AM was there an did an interview.

At that point, I called Mary on the phone. "HELP! I am here with three news crews!" Mary recommended I send the crews to Sunset Park. I didn't see Channel 13 and 710 KIRO, but I told Chan-

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Eclipse *(Continued from page 3)*
nel 7 about Sunset Park. But they were happy staying at Greenlake. They had a camera with a filter provided by Randy Johnson set up on the roof of their station house, and just wanted someone to tell them what they were looking at.

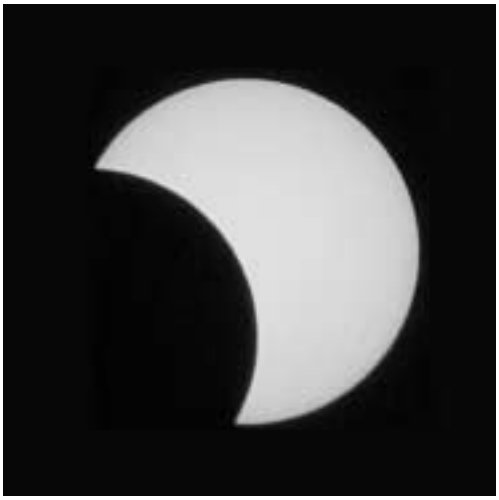
Dave now shows up with his scope. Good, now there are two of us and three scopes. Channel 13 comes back, and I tell them about Sunset, but they also want to stay at Greenlake.

The high clouds played with us for a while, but it cleared off later. At the peak, we had about 60 people waiting to look. Everyone got a chance to look, and all were happy—even the news crews.

Let's do this again next year! Thanks Dave for being there!
— *John Angell*

An Andy Warhol moment

I was on KIRO news radio yesterday. My Andy Warhol two seconds. On Sunday night a reporter from KIRO called me up and asked me about the eclipse. I was totally surprised when I got the call! I put in a pitch for light pollution. I never heard it on the radio. I should have put in a word for the SAS, but I was so dumb struck that I didn't think of it. The reporter sounded very surprised that you could see an eclipse during the daytime. I'm not sure if that was intentional, or just ignorance. —*Bruce Weertman*



SAS member Vasuki Seshadri took this picture from Lake Sammamish with a Sony DSC-S70 digital camera with a 5x add-on zoom lens, for a total magnification of 30x. A Type 2+ glass solar filter was held in front of the camera/lens combination. Exposure time averaged 1/350 sec. at f/2.8. For an animation, see http://sas.ilangainc.com/adri.html.

NASA's Space Place

E-Nose is E-Nose is E-Nose

Welcome to NASA's Space Place column, which will be featured in The Webfooted Astronomer *each month. The column, specially produced by NASA's Jet Propulsion Laboratory for astronomy clubs, will cover a wide range of topics related to space and earth science as well as the technologies that enable the science.—Editor.*

IT is very important to keep a "nose" on the air during space missions. Odors from dangerous chemicals in the air must be detected early and fast. One possible danger is hydrazine, the rocket fuel carried on board spaceships. If it leaked into the cabin area, it could do a lot of damage before anyone knew it was there. The job calls for a "super nose" that can detect faint smells far beyond the ability of human beings.

Scientists at Caltech, who studied the way human and animal noses worked, thought it might be possible to make a super-nose. NASA thought this was a good idea, so scientists and engineers at the Jet Propulsion Laboratory in Pasadena developed an electronic nose, or "E-Nose." This nose sniffs using a pump, smells using polymer sensors, and decides what's in the air using a mini-computer. E-Nose was developed to monitor the air that the crew in the International Space Station will breathe. It was tested on the Space Shuttle, and it worked just fine.

E-Nose will also have many uses here on Earth. It can monitor the air inside submarines and in factories to warn people very early if something is making the air unsafe. It can be used in processing food to determine if food is beginning to spoil. And someday it may be used on another planet or moon to sniff out what's "cooking" up there.

You can find out more about E-Nose and have fun testing your own nose at the Space Place Web site, http://spaceplace.nasa.gov/enose_do1.htm. The Space Place has fun and educational activities for parents, children, and teachers—and lots of facts related to many of NASA's space missions.

This article was provided by NASA's Jet Propulsion Laboratory, managed by Caltech in Pasadena.

From the President's Pen . . .

Sandpoint Bunker Project Update

By Mary Ingersoll

AT our last monthly meeting, on June 19, I presented the board's plan to the members regarding our desire to acquire land at Magnuson Park (a.k.a. Sandpoint) to develop into a facility for the club. The present "Plan" that is being proposed by the city parks department does not include the property we are interested in. Our desire is to become a "Program" for the parks department providing educational opportunities for the community, park visitors and the local school district. By becoming a Program, we then will become part of the Plan, which will direct city funding to improving the land and the bunker so that the SAS can function as a Program for the park. Our short-term goal is to acquire the land and the bunker from the city and to improve the land and the facility for our benefit as well as the public. Our long-term goal is to eventually build a permanent facility on top of the bunker – our own observatory to be funded by grants, contributions, and city assistance.

A vote was taken of those present at the meeting as to whether or not the members would support such an endeavor. Of those who voted, 27 said they would be willing and able to contribute their personal time to an education program or to general work in modifying the bunker to making it a usable facility for the club. Eight said they were not interested or unable to participate, and one said he was interested but unable. The reason for the vote was to see if we had adequate interest from the members to make this effort worthwhile. I would be very disappointed if the board made the efforts to procure the land but only four or five members were able to commit to being able to helping to do the work. It would be unfair to those folks, and it would be unwise for the club to focus so much into a program for which there were no interest. Also, my desire is not to spend any of the club's savings if it appears that we will not be able to become part of the parks department's Plan. At this time the only money we will be spending is on stamps.

The Sandpoint Park plans do not mean that we will abandon Greenlake or Cromwell park. Our sidewalk astronomy has been the hallmark of this club and we do not wish to see that diminish or be nullified by the Sandpoint Project. Monthly meetings will continue to be at the UW Physics/Astronomy building as well.

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The idea behind Sandpoint is to develop an organized, planned program that members would commit to be involved in. It will require volunteer hours from members to educate or to do manual labor (such as building a bookshelf, or installing electrical wiring, or providing access to the library and loaner scopes that will be housed there). Our intention is to have the park maintain the land and we maintain the facility. We will pursue the acquisition of public funding (through grants and contributions) and improve the area with such things as fencing around the bunker and light barriers between the parking lot and the telescope field. The long-term goal is to build an observatory on top of the bunker.

At present we are working to get the attention of city council members, the superintendent of Seattle Schools, and the head of the city parks department to make them aware of our talents that we are willing to give to the public in exchange for public land. Karl Schroeder is preparing letters of introduction, and we are hoping to take a group of interested city leaders on a tour of the observatory at Battle Point to show them what we have in mind.

After the vote last Wednesday night, we started working on contacting the people who will be able to assist us in becoming part of the "Plan." One member has already volunteered to donate enough money to the club to cover a six month lease for the bunker. I expect that within the next three or four months we will have sufficient feedback from the city to know whether or not we will be able to acquire the land at Sandpoint with city subsidies. And if we get the okay, will *you* be able to help out? I need to know from those of you who were not at the June meeting if you have something that you can donate to the Bunker Project. Are you an electrical engineer? A plumber? A carpenter? A designer? A teacher? An artist? Can you paint a wall? Are you willing to donate a little bit of your time to help build a home for the Seattle Astronomical Society?

Magnuson Park (Sandpoint) Star Party

We will have an informal star party at the Magnuson Park bunker on Sunday, July 7. This will give you an opportunity to check out the site and get a look at the night sky from this park. Sunset is at 9:07 p.m., and some of us plan to be there at 7:30 p.m. Feel free to come earlier and do some solar viewing, or take a stroll along the beach.

Enter park from Sandpoint Way at the NE 65th street entrance, stay on the main road down toward the beach (going east), the road will turn left and eventually end with a parking lot on your left and the bunker site on your right. Park either on the side of the road or in the lot.

Summer Star Parties

IT'S summer and the prime observing season is here. You may be planning to attend the big star parties, Table Mountain (July 11–13) and Oregon Star Party (Aug. 8–11). But here are some other observing opportunities to consider.

Fieldstar 2002 – July 26, 27

Fieldstar 2002 Star Party and Conference will be held July 26–27 at the Vernonia Peak Observatory, Vernonia, Oregon. A $6 individual or $10 family donation will help defray the cost of the event. See http://www.nwag.portland.or.us for more information or call 503-429-2430.

Cougar Mountain Star Party – Aug. 3

SAS volunteers are needed for this public star party: Trade that television and telephone for a telescope. From high atop Cougar Mountain be prepared for an evening of discovery. The Seattle Astronomical Society with their state of the art telescopes will help you explore the planets, stars and constellations. Bring a blanket and hot chocolate and hang out for the evening. This is an event you won't want to miss. Arrive before dark to get a look at the telescopes. Call (206) 296-4171 to register. Meet at Anti-Aircraft Peak, 18201 SE Cougar Mountain Drive, Cougar Mountain Regional Wildland Park, Bellevue/Newcastle, Saturday, August 3, 9 p.m.–midnight.—*Karl Schroeder*

Rattlesnake Lake Star Party – Aug. 9

Many of us have enjoyed using the Rattlesnake Lake area (outside North Bend) for astronomical viewing over the years. Last year, Cedar River Watershed (CRWS) officials granted authorized SAS members (who sign a consent form) exclusive use of an additional darker site behind locked gates at the back side of the lake. Despite tightened security due to the 9/11 tragedy, the kind folks at CRWS are still keeping these areas available for our use. It would be so much easier for them to just lock it down completely as most other sites and facilities have done.

As part of our continued use of the area, we committed to performing a small amount of community service by helping the CRWS with astronomy outreach education. To fulfill this commitment, we need several volunteers to participate in a large public star party at Rattlesnake Lake on Friday, August 9, at 9 p.m. Please consider participating in this event. Not only does it help us fulfill our com-

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July 2002

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	1	2	3	4 Independ-ence Day	5	6 Poo Poo Point Star Party
7 Sand-point Star Party	8	9	10	11	12	13 Green-lake, Cromwell SP
14	15	16	17 SAS Meeting	18	19	20 Tele-scope Makers at Peter Hirtle's
21 Astro-photo at Keith Alred's	22	23	24	25	26	27
28 Southern Delta Aquarids Peak	29 SAS Board	30	31	1	2	3 Cougar Mountain Star Party

Table Mountain Star Party

Fieldstar 2002 Vernonia, Oregon

Minutes
Life – Thriving on Chaos?

By Greg Donohue

OUR guest for June 19 was Monika Kress, post-doctoral scholar in the UW Astronomy Department's Center for Astrobiology and Early Evolution. She spoke on "The Origin and Early Habitat of the Earth."

The study of astrobiology requires a holistic approach to science that breaks down the more traditional barriers between disciplines. Last year the UW was awarded a 5-year, multi-million dollar grant by NASA to study the origin, evolution, distribution, and fate of life in the universe

Hydrothermal vents on the seafloor are one of the candidates for where life may have originated. Sunlight is totally absent in these regions, so life there must survive solely upon the chemical energy released by the vents. These extreme environments are shedding light on the conditions in which life can survive on the Earth, and perhaps elsewhere. Mars and Jupiter's moon Europa represent places where life might now or have once existed.

Probing the origins of life on Earth naturally leads to questions about the source of our own oceans and the organic materials from which life arose. Hydrothermal vents and extraterrestrial matter from comets are possible vectors by which pre-biotic organic chemistry might have originated.

After molecular hydrogen (H_2) and carbon monoxide (CO), water (H_2O) is the third most abundant molecule in the cosmos. It permeates cold interstellar dust clouds in the form of gas or of icy mantles on dust grains. In addition to these three most abundant molecules, infrared spectra of interstellar clouds also reveal other interesting material: methanol (CH3OH), carbon dioxide (CO_2), ammonia (NH3), methane (CH4), carbonyl sulfide (COS), and silicates (glassy, sand-like particles). Of particular interest are lines of some unidentified molecules, XCN. Molecules such as these (containing carbon-nitrogen bonds) are the precursors to amino acids, upon which all life on Earth are based.

From the condensation of these interstellar clouds, stars form. The material left over from this stellar formation process often ends up as disks around these nascent stars. About 4.6 billion years ago, our own Sun was formed by just such a process, and the left over

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Minutes *(Continued from page 10)*
material not incorporated into the Sun itself became the solar nebula, a proto-planetary disk from which the rest of the solar system eventually formed.

Calculations indicate these nebulae cool and become diffuse over cosmologically short time scales. After 100,000 years the nebula is still so hot in the region where the terrestrial planets will ultimately form that even rocks (silicates) are still in the vapor state. Only far out in the nebula has it become cool enough for water ice to form. After about 1 million years, the nebula becomes cool enough for the first meteoroids to form.

The effective end of the solar nebula occurs around 10 million years after its inception. Jupiter had barely assembled by this time, and the bodies that would eventually become Earth and Mars were just getting started. Unlike the gas giants, whose mass allows them to accrete gaseous material, the Earth and Mars could only form from solid materials. Since the temperature of the solar nebula in the terrestrial region at this time was still too hot to allow water ice, Earth and Mars must have accreted very dry. Any water and other volatile materials, including organics, must have been introduced subsequently.

Over the course of 100 million years, planetesimals in the terrestrial zone collided and accreted to form the major physical bodies of solar system as we essentially find them today. The interior region was still very dry. But numerical experiments indicate that some mixing of materials occurs between the inner and outer regions. Particularly, water-rich material from the outer zone tends to drift inward. This strongly suggests a few final massive impacts are responsible for bringing water to Earth.

The D/H (deuterium-to-hydrogen) ratio in comets is about 3 times the D/H ratio of seawater. This leads to the conclusion that at most 10% of the Earth's water came from comets. However, the D/H ratio of many meteorites is virtually identical to that of seawater. Some of these meteorites contain about 10% water, in the form of hydrates. So our oceans likely came from material that originally formed in the asteroid belt. If that is true, might an asteroid belt be one of the requirements for life?

During the Hadean ("hellish") period of Earth's pre-history (4.5 to 3.8 billion years ago, the Earth was undergoing routine ocean boiling impacts. Near the beginning of this period, about 4.5 billion years ago, Earth was struck a glancing blow by a massive planetestimal about the size of Mars (10% of the Earth's mass).

Much of Earth's mantle was stripped off and sent into orbit, eventually condensing to form the Moon. This scenario is consistent with the relatively low density of the Moon, and the relatively high density of the Earth itself.

The atmosphere after such an impact would have been rock vapor, lasting for perhaps a million years. Eventually things cooled down so that boiling water existed at the Earth's surface – conditions similar to those around hydrothermal vents today. Might this be where the first Earth life arose? Are the archeans found at hydrothermal vents today really the oldest form of life, or are they just survivors of the Hadean chaos?

Arriving at the rate of about $1/m^2/yr$, micrometeorites are ubiquitous and, since the end of the Hadean, are responsible for bringing the bulk of the remaining material to Earth. At this rate, about 30,000 tons of extraterrestrial organic material falls to Earth annually aboard these infinitesimal interlopers.

Micrometeorites are of course not large enough to cause damage. But what about the impact hazard from bigger objects? Larger bodies have the potential to wreak greater havoc, but there are relatively few of them, whereas smaller bodies are more numerous, but incapable of causing much damage. To help convey this concept, MIT professor Dr. Richard P. Binzel proposed an impact threat scale of 1-10 that takes into account both an object's kinetic energy and the probability that it will impact Earth. The IAU, meeting in Torino, Italy, initially endorsed the scale in June 1999, naming the scale after the city in which they met. Large and small objects alike that are certain *not* to hit Earth are assigned a zero or one value. But very small objects (about 20 meters or less in size), even if they are *certain* to impact us, are also assigned impact hazards of zero. Larger bodies that are certain to impact us are rated either 8, 9, or 10, depending on whether the object is massive enough to cause local, regional, or global destruction, respectively.

Two fairly independent and self-regulating CO_2 cycles occur on Earth. One is biological. But there is also a geologic carbon dioxide cycle. CO_2 is expelled into the atmosphere by erupting volcanoes. Since it is soluble in water, CO_2 is washed from the atmosphere by rain, making the rain rich in carbonic acid. Carbonic acid can dissolve certain minerals in the crust, resulting in chemical weathering and erosion. This material is transferred to the ocean to become carbonaceous sediments. At various places along tectonic plate boundaries, these carbonaceous sediments

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Minutes *(Continued from page 13)*
are subducted into the mantle. There the internal heat of the mantle forces the CO_2 back out of the rock, and this gas is then expelled once again by volcanoes.

Several times in the Earth's ancient past, this cycle has become unbalanced. During times of global glaciations (the "snowball Earth"), rain virtually ceases, so carbon dioxide is not scrubbed from the air, and therefore builds up in the atmosphere. Eventually this leads to an overheating rebound due to the greenhouse effect. After a long period, the cycle catches up to itself, and things equilibrate again. But our burning of fossil fuels is a new wildcard in this equation. And that behooves us to carefully examine our effects on this once-closed system, lest we have a very negative effect on at least one aspect of astrobiology: the *fate* of life in the universe (well, at least on *some* life in the universe, anyway)!

Dr. Kress concluded by predicting: "I really do believe that it's going to be very soon that we really understand what makes the Earth a living planet, and that will aid us in our search for potentially habitable planets around other stars."

Star Parties *(Continued from page 8)*
mitment, it is also a great way to say a big "thank you" to the CRWS for letting us continue to use the sites (not to mention being a fun way to share our enthusiasm for astronomy)! Please contact Greg Donohue or Karl Schroeder if you are willing to help. *– Greg Donohue*

Squak party – Aug. 9, 10

Last September about 15 members of the Squak Mountain Telescope Gang participated in an impromptu star party at Bowman Bay, Deception Pass State Park, Whidbey Island, WA. About 150 members of the public turned up on an absolutely still night with the sea so calm you could see the milky way in the reflection. Can you imagine stars above and below?

The Park Service would like to make this a regular event, and so, on August 9–10, 2002, Squakers and SAS members are invited to participate in our very own Star Party. Please e-mail Paul MacAree if you would like to participate. We have room for about 65 astronomers (free camping!) in one of the Northwest's most beautiful parks. Paul MacAree, 425-868 3286, Mobile: 425-894 3722. *—Paul MacAree*

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