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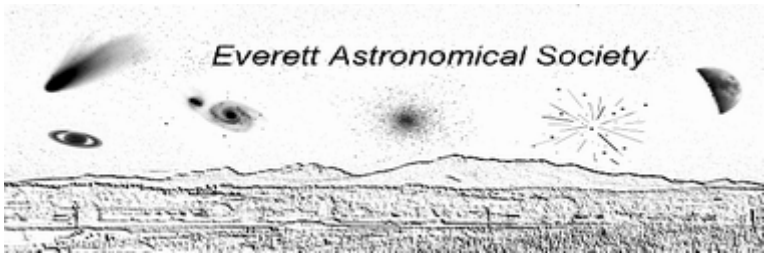

The Stargazer

March 2004

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EAS BUSINESS…

RECAP OF LAST MEETING

The February meeting had a biography presentation on the life of planetary scientist and science popularizer Carl Sagan, who was involved in the Viking missions to Mars, the Voyager missions to the outer planets, co-wrote and produced the highly influential Cosmos television series, and co-wrote the book Contact and other works, of non-fiction.

NEXT EAS MEETING - SATURDAY MARCH 27TH 7:00 PM - PROVIDENCE PACIFIC CLINIC (916 PACIFIC AVENUE) IN THE MONTE CRISTO ROOMS ON THE MAIN FLOOR.

Map/directions to the meeting are available at: http://members.tripod.com/everett_astronomy/directions_to_club_meetings.htm

Scheduled Meeting Dates:

Mar 27th – EAS Mtg – 7:00 PM
Apr 17th – EAS Mtg – (Vincent Woolf, UW, Helium Stars) 7 PM
Apr 24th – Astronomy Day at Library
May 22nd – EAS Mtg – (Bill Cook, Captain's on Optics) – 7 PM
Jun 26th – EAS Mtg – (Eric Algol, UW, T Tauri Star) 7 PM
Jul 14-17th – Table Mt. Star Party
Jul 31st – EAS Mtg – 7:00 PM
Aug 11-14th – Oregon Star Party
Aug 28th – EAS Mtg – (Dr. Julie Lutz, UW Astronomy) 7 PM
Sep 17-18th – Sun Lakes Star Party
Sep 25th – EAS Meeting – 7:00 PM
Oct 30th – EAS Meeting – 7:00 PM
Nov 20th – EAS Meeting – 7:00 PM
Dec 11th – EAS Holiday Dinner

MEMBER NEWS

The Resurrection of a 3" Refractor

I have always been fascinated with Astronomy. As a kid, during my early years growing up under the dark skies of rural Montana, the stars and planets were a fascinating part of my life. I recall seeing a science fiction movie called "*Destination Moon*" which only whetted my interest in things astronomical.

During my junior-high-school years, I subscribed to "*Sky & Telescope"* magazine. Advertisements for telescopes made me drool, but being of limited financial means, I could only dream at acquiring a telescope of adequate size to satisfy my desire for exploring the heavens. Finally, during my sophomore year in high-school, my father, apparently tired of my whining and pining for a telescope, and after my request to perform extra chores and demands for an increase in my allowance, succumbed to my wish for a telescope and allowed me to order a 2.4" Japanese refractor. I was astonished! After what seemed like an eternity, my 2.4" refractor arrived. I was thrilled, and immediately put it to use exploring the moons of Jupiter, Saturn's rings, the craters of the moon, and other celestial wonders; all the while wondering if maybe I should have held out for a little more aperture.

One day, a long-time friend of my grandparents came to visit. He had brought with him a handmade 3" refractor, which he had put together using sections of cardboard cores from a roll of linoleum and a war-surplus cemented achromat. He knew of my interest in astronomy, and since he was growing quite old and his eyesight was failing, he felt his telescope would be in good hands with a youngster interested in astronomy. *Hmm-* A three-inch refractor, like the ones I lusted for in "*Sky & Telescope*". I decided to splurge and bought a "cheap" equatorial mount for the 3" with odd jobs and my allowance. When I compared the images produced by the 3" with my own 2.4", I was a little disappointed; while the images were brighter, the detail visible in the 3" was not as sharp as in the 2.4". The 3" was relegated to a space under my bed, and basically stayed there for years.

After a hiatus, including a stint in the Army, marriage and the birth of two sons, my interest in astronomy again waxed. I recalled the 3" I had stowed away. Maybe with a new objective lens, some tube baffles, a finder scope, and a couple of quality eyepieces, I could resurrect the old scope. I did just that. I began pursuing Messier objects from my back yard with it, and was able to bag over half of them, in spite of growing light pollution. On double stars and planets the quality of the images was very good. I now own an 8" reflector, and a 4" refractor, in additions to the 2.4" of my high-school days, but when I want a quick look at the first-quarter moon, the configuration of Jupiter's satellites, or a presentation at a public star part, it's the 3" that I grab, for its simplicity, ease-of-setup and portability. The friend of my grandparents, now long gone, would be pleased.

- Robert D. Lyons.

Financial Health

The club maintains a $700+ balance. We try to keep approximately a $500 balance to allow for contingencies. Emailing a digital copy of the newsletter has been suggested to reduce printing and postage costs, and speed up delivery, please email Mark if electronic copy would be OK for you.

Club Star Party Info

Upcoming star party schedule:

March 20 – Ken & Judy Ward's
April 23, 24 – Astronomy Day
(Harborview Park, pending park permit approval)

We try to hold informal close-in star parties each month during the spring and summer months on a weekend near the New moon at a member's property or a local park. (call Bob Lyon at (425) 337-1510 for info or check the EAS website.) Members contact Bob Lyons for scope borrowing.

Club Scopes' Status

Scope	Loan Status	Waiting
10-inch Dobsonian	On loan	No wait list

EAS members: contact Bob Lyons (425) 337-1510 or 'bdlyons at verizon.net' to borrow a scope.

Astro Calendar

March 2004
Mar 04 - Jupiter At Opposition
Mar 20 - Vernal Equinox, 06:49 UT
Mar 25 - Moon Occults Mars
Mar 29 - Mercury Greatest Eastern Elongation (19 Degrees)
Mar 29 - Venus Greatest Eastern Elongation (46 Degrees)
Mar 31 - EAS Meeting - Providence Pac. Hospital – 7:00 PM

April 2004
Apr 03 - Venus Crosses the Pleiades (M45)
Apr 04 - Daylight Saving - Set Clock Ahead 1 Hour (North America)
Apr 05 - Spirit Mars Rover, End of Primary Mission
Apr 11 - Easter Sunday
Apr 19 - Partial Solar Eclipse (Visible From South Africa)
Apr 19-25 - Astronomy Week
Apr 22 - Lyrids Meteor Shower Peak
Apr 23 - Comet C/2002 T7 (LINEAR) Perihelion (0.61 AU)
Apr 24 - Astronomy Day
Apr 26 - Opportunity Mars Rover, End of Primary Mission
Apr 28 - Asteroid 5 Astraea At Opposition (9.8 Magnitude)

May 2004
May 05 - Eta Aquarids Meteor Shower Peak
May 07 - Comet C/2001 Q4 (NEAT) Closest Approach To Earth (.32 AU)
May 14 - Mercury at Greatest Western Elongation (25 Degrees)
May 15 - Comet C/2001 Q4 (NEAT) Perihelion (0.962 AU)
May 21 - Moon Occults Venus
May 25 - Mars Passes 1.6 Degrees From Saturn

June 2004
Jun 08 - Venus Transits The Sun
Jun 09 - Moon Occults Vesta
Jun 11 - Pluto At Opposition
Jun 12 - Mercury Passes 1.3 Degrees From Venus
Jun 21 - Summer Solstice (00:57 UT)
Jun 26 - Mercury Passes 2.1 Degrees From Saturn

July 2004
Jul 01 - Cassini, Saturn Orbit Insertion
Jul 05 - Earth At Aphelion (1.017 AU From Sun)
Jul 07 - Asteroid 3 Juno At Opposition (9.6 Magnitude)
Jul 11 - Mercury Passes 0.1 Degrees From Mars
Jul 26 - Mercury Greatest Eastern Elongation (27 Degrees)
Jul 29 - South Delta-Aquarids Meteor Shower Peak

August 2004
Aug 01 - Alpha Capricornids Meteor Shower Peak
Aug 06 - Southern Iota Aquarids Meteor Shower Peak
Aug 06 - Neptune At Opposition
Aug 12 - Perseids Meteor Shower Peak
Aug 25 - Northern Iota Aquarids Meteor Shower Peak
Aug 27 - Uranus At Opposition
Aug 31 - Venus Passes 1.9 Degrees From Saturn
Aug 31 - Start of Mars Solar Conjunction

September 2004
Sep 22 - Autumnal Equinox, 16:30 UT
Sep 27 - Mars Passes 0.2 Degrees From Jupiter
Sep 29 - Mercury Passes 0.6 Degrees From Jupiter
Sep 29 - Mercury Passes 0.8 Degrees From Mars

October 2004
Oct 09 - Draconids Meteor Shower Peak
Oct 13 - Moon Occults Mars
Oct 14 - Moon Occults Mercury
Oct 21 - Orionid Meteor Shower Peak
Oct 28 - Lunar Eclipse
Oct 31 - Daylight Saving - Set Clock Back 1 Hour

Over The Airwaves

"Our group of radio script writers now consists of EAS and SAS members Jim Ehrmin, Pat Lewis writer emeritus, Greg Donohue, and Ted Vosk, who are now regularly writing and helping to produce our astronomy radio show, "It's Over Your Head" on radio station KSER, FM 90.7. The six-minute segment is broadcast every Wednesday morning at approximately 7:20 A.M. and gives a weekly look at what's up in the sky over Snohomish County, with other information. If you have a good idea for an astronomy broadcast or would like to try your hand at writing a script, call Pat Lewis at (206) 524-2006 or email to joagreen@aol.com If you are a listener to the program, show your support by giving the program director of KSER a call!" Web page with lots of archives and other info is available at http://www.itsoveryourhead.org/

KPLU 88.5 FM National Public Radio has daily broadcasts of "Star Date" by the McDonald Observatory of the University of Texas at Austin, Monday through Friday at 8:58 A.M. and 5:58 P.M. Saturday and Sunday). The short 2 minute radio show deals with current topics of interest in astronomy. The University of Washington TV broadcasts programs from NASA at 12:00 AM Monday through Friday, 12:30 AM Saturday, and 1:30 AM Sunday on the Channel 27 cable station.

EAS Library – Book & Video List

The EAS has a library of books, videotapes, and software for members to borrow. We always value any items you would like to donate to this library. You can contact a club officer or **Librarian Mike Locke**, phone (425) 259-5995, email mlocke at lioninc.com, to borrow or donate any materials.

Membership Benefits & Information

Membership in the **Everett Astronomical Society** (EAS) will give you access to all the material in the lending library. The library, which is maintained by Scott Gibson, consists of several VCR tapes, many books, magazines, and software titles. Membership includes invitations to all of the club meetings and star parties, plus the monthly newsletter, ***The Stargazer.*** In addition you will be able subscribe to ***Sky and Telescope*** for $7 off the normal subscription rate, contact the treasurer for more information. **When renewing your subscription to *Sky & Telescope* you should send your S&T renewal form along with a check made out to Everett Astronomical Society to the EAS address.** The EAS treasurer will renew your *Sky and Telescope* subscription for you. **Astronomy** magazine offers a similar opportunity to club members.

EAS is a member of the **Astronomical League** and you will receive the Astronomical League's newsletter, ***The Reflector***. Being a member also allows you the use of the club's telescopes, an award winning 10 inch Dobsonian mount reflector, built as a club project or the 60mm refractor. Contact Bob Lyons (425)

337-1510 to borrow a telescope. EAS dues are $25. Send your annual dues to the **Everett Astronomical Society**, P.O. Box 12746, Everett, WA 98206. Funds obtained from membership dues allows the Society to publish the newsletter, pay Astronomical League dues and maintain our library.

OBSERVER'S INFORMATION…

LUNAR FACTS

Mar 06	Full Moon
Mar 13	Last Quarter Moon
Mar 20	New Moon
Mar 28	First Quarter Moon
Apr 05	Full Moon
Apr 12	Last Quarter Moon
Apr 19	New Moon
Apr 27	First Quarter Moon

Digital Lunar Orbiter Photographic Atlas of the Moon

The Lunar and Planetary Institute has created a digital version of the Lunar Orbiter Photographic Atlas of the Moon, and Consolidated Lunar Atlas available online at:
http://www.lpi.usra.edu/research/cla/menu.html
http://www.lpi.usra.edu/research/lunar_orbiter

UP IN THE SKY -- THE PLANETS

Object	Rises	Transits	Sets	Constellation
Sun	**6:07 am**	**12:25**	**18:25**	**Pisces**
Mercury	Daylight	Daylight	**19:59**	**Pisces**
Venus	Daylight	Daylight	**21:41**	**Aries**
Mars	Daylight	Daylight	**23:46**	**Taurus**
Jupiter	Daylight	**22:59**	**5:43 am**	**Leo**
Saturn	Daylight	**18:33**	**2:30 am**	**Gemini**
Uranus	**5:17 am**	Daylight	Daylight	Aquarius
Neptune	**4:28 am**	Daylight	Daylight	Capricornus
Pluto	**0:38 am**	**5:36 am**	Daylight	**Serpens**

(times local time for Everett PST)

NOAA SUN CALCULATOR

Need to know exactly what time the sun will set on Sept. 26, 2065? Or when it rose in 565 BC? How about the length of daylight a week from Tuesday in Albuquerque, N.M.? Just go to NOAA's solar calculator, now available on the Web. http://www.srrb.noaa.gov/highlights/sunrise/gen.html

Pacific Science Center Space Lecture Series

Paul Hodge, author of "Higher Than Everest"
Saturday, April 3, 2004 - 2 p.m. (Adobe Laser Dome)

Lynn Moroney, Chickasaw Storyteller - "Science Story"
Saturday, May 1, 2004 - 2 p.m. (Adobe Laser Dome)
Through "Science Story" Lynn Moroney explains how and why stories have been used to teach people about the world, and the place of story in astronomy and other space sciences. Long before we went into space, it was the stories, that helped us wonder about the universe and even today they invite us to wonder and spark our curiosity. Space isn't just for scientists, rather the arts help us "know" the world, and when we blend the two, we can have a richer understanding of the universes and ourselves.

SPACE: A Journey To Our Future, is open now through May 9, 2004. In an immersive exhibit experience, SPACE celebrates the past, present and the future of space exploration and discovery. For more information visit www.spacexhibit.com.

INTERNATIONAL SPACE STATION – VISIBLE SEATTLE PASSES

ISS Visibility –
http://spaceflight.nasa.gov/realdata/sightings/SSapplications/Post/SightingData/Seattle.html or also see link

http://www.heavens-above.com/PassSummary.asp?lat=47.979&lng=-122.201&alt=0&loc=Everett&TZ=PST&satid=25544

CONSTELLATIONS OF THE MONTH

MUSCA: The "Fly", as this relatively obscure southern constellation is also know by, borders on the constellations of Apus, Carina, Centaurus, Chamealeon, Circinus, and Crux. It ranks 8th in overall brightness (the number of visible stars in the constellation per size of the constellation in square degrees) among the constellations, containing 19 stars brighter than magnitude 5.5. Its central point is located at RA=12h,31m and Dec.= -69.5 degrees. It is completely visible from latitudes South of +15 degrees, and completely invisible from latitudes North of +26 degrees; this constellation ranks 77th in overall size among the 88 official constellations. Musca has no associated Messier objects or meteor showers, and has no well known or associated asterisms. Its midnight culmination date is March 30th, and its solar conjunction date is September 29th. Musca is one of 11 constellations invented by Peter Dirksz Keyser and Frederick de Houtman, during the years 1595-7. Musca contains a few interesting objects of note. Alpha Muscae is a 2.7 magnitude, spectrum B-3-IV star at a computed distance of about 430 light years, with an actual luminosity of about 1200 times that of the Sun. Its radial velocity in recession is about 11 miles per second, and it is a member of the broad Scorpio-Centaurus moving group. Small variations in both magnitude and radial velocity have been recorded, and it is not certain to which class of stars Alpha Muscae should be assigned. Beta Muscae (magnitude 3.06, spectrum B-2-V) is a beautiful double of nearly equal magnitudes, both stars of which form a slowly rotating binary star of uncertain period, and with a slowly increasing separation of the two components. Orbital motion during the last century suggests a period of four or five hundred years. The radial velocity of Beta Muscae is about 26 miles per second in recession, and it has a computed distance of about 470 light years from Earth and a total luminosity of about 580 times that of our Sun. Musca also contains several variable stars: these include R Muscae, S Muscae, RT Muscae, and UU Muscae (all Cepheids); BP Muscae (an eclipsing binary); and Y Muscae (an R Coronae Borealis-type variable), among still others. Musca also contains other star clusters, nebulae, and galaxies, including NGC 4372 (globular cluster); NGC 4463 (galactic cluster); I-4191 (planetary nebula); and NGC 5189 (diffuse nebula). If you ever head south of the equator, it is worth it (as it is for all the constellations, north and south) to try to discover some of the obscure wonders of this constellation for yourself.

YOUNG ASTRONOMER'S CORNER

The Young Astronomer's Corner has in the past been published in a question and answer format. The purpose of this periodic feature is to answer some common and familiar questions heard frequently in astronomy circles and classrooms. So, we hope to answer some of your astronomy-related questions in this manner. If not, let us know what your questions are (by calling or e-mailing an Officer or the Newsletter co-editor for example), and we will do our best to answer them for you!

QUESTION: Is there life on other planets?

ANSWER: Not that we know definitively. Certain requirements must be met for life as we know it to exist. These include a temperature that is neither too hot nor too cold; the presence of liquid water; and oxygen in the right amount to support life. Mercury has no atmosphere, and the temperatures range from 660 degrees F. during the day to –274 degrees F. at night (which is an extreme change for any life to survive, let alone day after day!!). On Venus, one would have to survive sulfuric acid clouds, and an average temperature of 900 degrees F., and atmospheric pressures greater than 90 times that of Earth. Martian temperatures are not as extreme as these, but are still harsh (lows can hover around –220 degrees F.) Also, the Martian atmosphere is made almost entirely of carbon dioxide and its atmospheric pressure is less than 1/100 that of Earth's. The gas giant planets (Jupiter, Saturn (see above), Uranus, and Neptune) are made up mostly of hydrogen and helium, and are extremely cold by Earth standards. This is all not to say that some form of life cannot exist under these extreme planetary conditions that we have mentioned, but we don't definitively and specifically know about it yet; for familiar forms of life as we know it, Earth is the place!!

QUESTION: Will humans be able to replace the energy and heat from the Sun when it dies in about another 5 billion years?

ANSWER: No. When the Sun dies, there won't be any humans around either (at least not on our home planet Earth) to worry about it!! When the Sun uses up its last fuel, it will swell greatly in size, to become what is known as a red giant. As it expands, the 93,000,000 mile distance between Earth and Sun now will greatly shrink, and the temperatures on Earth will greatly increase. All life will die off, and the oceans will boil away to nothing. But not to worry at this point……things won't begin to heat up for another 4 billion years or so!

PLANETARY FOCUS

"Planetary Focus" is a periodic column that is published bi-monthly in the EAS "Stargazer". If you have a favorite planet that you would like information about and/or statistics on, please contact newsletter co-editor Bill O'Neil. The planetary focus of this month's column is "Saturn", still beautiful and observable this winter and spring, both as a naked eye planet and certainly through telescopes:

Rotation around the Sun: every 29.46 years

Orbit: from 9.01 (closest or 'perihelion') to 10.04 (furthest or 'aphelion') Astronomical Units (AU)*; this is an orbit that varies between approximately 838 and 934 million miles from the sun. (*Note: One AU equals approximately 93 million miles).

Inclination of Orbit to Ecliptic: 2.5 degrees.

Mean Orbital Velocity: 9.65 km/sec.

Diameter at Equator: 120,537 kilometers (or 75,335 miles).

Mass: 95.16 (approximately 95 times more massive than earth); (5.9742 x (10 e24 (10 to the 24th power)) kilograms = 1 Earth Mass)**.**

Density: 0.7 times that of water (global density); Saturn is the only planet with an overall density less than 1 (water = 1).

Surface Gravity (Earth = 1): 1.08

Period of Rotation on its own axis: approximately 10 hours, 39 minutes.

Axis tilt: 26.73 degrees.

Satellites (moons): 18, as well as the most famous of all planetary rings.

Special Notes About Saturn: Saturn is the second largest planet in the solar system. It has a polar diameter of 107,500 kilometers, and, as such, has the highest oblateness of any planet: 0.108. (Oblateness is the "elliptical" nature or "flattening" of a celestial body; i.e., the degree to which that body differs from a true sphere). The appearance of Saturn in a telescope is dominated by its ring system that lies in the plane of Saturn's equator; the axis of Saturn is tilted by approximately 27 degrees with respect to the plane of its orbit. This phenomenon leads to opposite ring faces being tilted toward the sun and Earth by up to 27 degrees. Approximately every 15 years, the rings of Saturn (which are at most only about 2 kilometers thick!) become "edge-on" to Earth observers and virtually disappear. The ring system, which is about 270,000 kilometers across, adds to the average apparent magnitude (approximately 0.7) of Saturn at opposition. We will talk more about the ring system below.

Saturn's disk appears similar to that of Jupiter, as it too is crossed by yellowish dark (belts) and light (zones) cloud bands which run parallel to the equator. These bands are not as striking as those of Jupiter, although they too contain anticyclonic (counterclockwise-rotating) "spots" or "weather systems", (although they are less common and generally less dramatic (e.g., compared to Jupiter's Great Red Spot). Like Jupiter however, these spots are probably caused by different rotation speeds of the planet between the equator and the poles. Saturn in the past has been studied by the Pioneer 11 and Voyager probes; the Cassini probe is on its way. (Note: The Cassini probe was launched in late 1997, and is scheduled to arrive at Saturn in July of 2004, at which time it will begin a four-year exploration of Saturn and its moons. However, along the way, the probe has been engaged in some imaging studies. For example, on February 11, 2000, the Jet Propulsion Laboratory in California released images of the asteroid named Masursky, which Cassini snapped on January 23, 2000, on its way through the asteroid belt between Mars and Jupiter. It will fly by Jupiter this coming December. Asteroid Masursky has not been extensively studied from Earth, and Cassini's information could shed light on several parameters, including the asteroid's size and rotation period.). The early probes helped to determine that Saturn, like Jupiter, most likely has an internal heat source that helps drive its convection-weather systems; Saturn also, like Jupiter, emits more radiation than it absorbs from the Sun. These convective weather systems give rise to the cloud banks that are observed and most likely composed of ammonia crystals; the weather systems are also, like Jupiter, somewhat dependent on the zones they are located in (i.e., equator winds are comparatively stronger). Further studies show that the bulk of Saturn's mass and atmosphere is more than likely hydrogen, with methane and ethane present in the upper atmosphere. Internal composition models for Saturn indicate an iron-rich rock core, surrounded by ammonia, methane and water, which is further surrounded by liquid metallic hydrogen and then liquid molecular hydrogen, and finally the atmosphere as described above. Saturn has a magnetic field that is approximately 20 times weaker than that of Jupiter. Pioneer also found radiation belts (composed of electrons and protons). These energetic particles interact in the magnetic field and contribute to the emission of radio waves from Saturn; they also interact with the ring system, contributing to the brightness and "spoking" pattern seen especially in one of the rings (ring B); lightning discharges have also been noted in this region of the ring system.

The most famous part of Saturn to most folks is indeed its ring system. They were first seen (but not clearly) by Galileo in 1610,

and recognized as a true ring system later by Huygens in 1656. The rings are now known to be composed of literally thousands of smaller "ringlets" containing innumerable individual particles: all of these particles (maximum size is probably just a few meters in size; most are much smaller) are actually each an individual satellite of Saturn!! There are several distinct ring separations (divisions or gaps), creating distinctly appearing larger rings. These larger rings have been named (for example, the D-ring is closest to the planet itself, and may even interact with the upper atmosphere of Saturn). Other rings (heading outward from the planet) are the, C-ring (the "Crepe" ring, with a large number of distinct ringlets within its grooved confines), and the B-ring (see above), and then the A, F, G, and E-rings. There are significant gaps between several of these larger, more distinct rings. The most noticeable and well known of these gaps is also the largest (4,200 kilometers), and has been named the Cassini Division; with appropriate optical aid, it, and the larger rings, are easily visible from Earth by amateur astronomers. It is theorized that the Cassini Division, which separates the B and A rings, was probably formed from the disturbances from the orbit of one of Saturn's moons (Mimas), as well as the effect of the energetic particles in ring-B (see above).

Briefly, some of Saturn's moons are interesting in their own right. In addition to **Mimas** as mentioned above, at least two other moons bear mention: **Titan and Tethys**. **Titan** is the second largest moon in the entire solar system at 5,150 kilometers (Earth's moon = 3,476 kilometers), and it appears reddish-orange in color. Its atmosphere is mostly nitrogen, with traces of other molecules such as methane and hydrogen cyanide; it has enough of an atmosphere with the right gases to be warmed by a small greenhouse effect. Atomic and molecular hydrogen formed by photochemical reactions on this moon of Saturn probably lead to the formation of the doughnut-shaped ring around this moon as these types of hydrogen easily escape from its atmosphere. The interior is probably rock and water-ice, and the surface may have some very large methane "oceans". Titan will be visited by the Huygens "sub"-probe of the Cassini mission detailed above. **Tethys** is interesting not only as the largest of the inner moons of Saturn, but also because of an unusual and enormous canyon network that extends from its north to almost its south pole; this is known as the Ithaca Chasma, and it averages 100 kilometers wide and 4-5 kilometers deep. There is also a huge crater called Odysseus, which is 400 kilometers in diameter, a diameter that is fully 40% that of this moon's entire diameter! Substantial craters noted elsewhere on this moon of Saturn, indicates that Tethys has suffered considerable bombardment by large debris in its history.

'ASTRONOMY & TELESCOPE LINGO', FUN FACTS AND MIRROR IMAGES

All these columns published last month. "Lingo" and "Fun Facts" will resume next month, and "Mirror Images" will resume in May. All these columns, effective this past January, became bi-monthly columns, with "lingo" and "Fun Facts" publishing one month, and "Planetary Focus" and "Mirror Images" the next. We will get back on track with "mirror Images" in May. See you then.

ASTRONOMICAL NOTES -- ON & OFF THE NET...

RECENTLY DISCOVERED NEAR-EARTH ASTEROID MAKES RECORD-BREAKING APPROACH TO EARTH

A small near-Earth asteroid (NEA), discovered the night of March 15 by the LINEAR asteroid survey, made the closest approach to Earth ever recorded. There was no danger of a collision with the Earth during this encounter. The object, designated 2004 FH, is roughly 30 meters (100 feet) in diameter and passed just 43,000 km (26,500 miles, or about 3.4 Earth diameters) above the Earth's surface on March 18th at 5:08 PM EST (2:08 PM PST, 22:08 UTC). On average, objects about the size of 2004 FH pass within this distance roughly once every two years, but most of these small objects pass undetected. This particular close approach is unusual only in the sense that scientists know about it. The fact that an object as small as asteroid 2004 FH has been discovered now is mostly a matter of perseverance by the LINEAR team, who search for larger kilometer-sized NEAs, but also routinely detect much smaller objects. Asteroid 2004 FH's point of closest approach with the Earth was over the South Atlantic Ocean. Using a good pair of binoculars, the object was bright enough to be seen during this close approach from areas of Europe, Asia and most of the Southern Hemisphere. Scientists hope to it would provide them an unprecedented opportunity to study a small NEA asteroid up close.

TWO NAKED-EYE COMETS AT ONCE!

A naked-eye comet - one visible to the unaided eye without telescope or binoculars - is an enjoyable sight, particularly for the brighter comets. On average, a naked-eye comet graces our skies about once every two years. However, most remain fairly faint or appear close to the Sun as seen from Earth, such that even experienced observers may require binoculars to spot them. Only rarely do two relatively bright naked-eye comets appear simultaneously. Such an event will take place in April and May of 2004, when skygazers will feast their eyes upon both Comets C/2001 Q4 (NEAT) and C/2002 T7 (LINEAR). Astronomer Dan Green, Director of the Central Bureau for Astronomical Telegrams (CBAT), said, "*As the clearinghouse for comet discoveries, CBAT has known of these comets for a long time. We have monitored them, collecting observations from around the world. If they brighten as predicted, then both may be visible to the naked eye in late April and part of May. If you haven't seen a comet, this is a great opportunity to go out and look at one*."

Historically, bright comets were interpreted as portents of doom, as in 1066 when the appearance of a comet, later known as Comet Halley, was blamed for the defeat of the Saxons at the Battle of Hastings. Comets were thought to be vaporous "exhalations" of the Earth, merely atmospheric phenomena. Only as science advanced in the 16th and 17th centuries were they recognized as true denizens of the solar system. The object most people visualize when they hear the word "comet" actually has three components - a small, irregular nucleus; a spherical, gaseous coma surrounding it; and a broad, sweeping tail. The cometary nucleus is the source of the gas and dust that create a comet's dramatic appearance. In 1950, Harvard astronomer Fred Whipple coined the term "dirty snowball" to describe a comet's nucleus. He began studying comets at a time when little was known about them, but he said, *"It turns out they were simple."* The nucleus is a chunk of ice and rock ranging in size from 100 yards or less up to several miles in diameter. Frozen gases (ices) of water, carbon dioxide, and methane are mixed with dust and rock into a conglomeration much like chocolate chip ice cream. As the comet nears the Sun, the Sun's heat vaporizes those ices, puffing off clouds of gas and dust that surround the nucleus to form a glowing coma. Radiation pressure from the Sun, combined with the solar wind, then sweep material from the coma outward to form a tail that can stretch across millions of miles of space. Scientists are interested in comets for a number of reasons. "*Comets are thought to have formed in the outer reaches of the solar system, and may thus contain rock and ices that date back billions of years. Also, comet tails are indicators of the solar wind*

and have helped us learn about the inner solar system. And not least, comets are known to hit planets from time to time, including Earth, so we need to keep an eye out for potential impactors," said Green. One intriguing possibility directly links humanity to these visitors from the outer solar system. While Carl Sagan once said that we are star stuff, Fred Whipple would add that we are comet stuff. "*Part of the water in our bodies comes from comets. That's because some proportion of the Earth's water comes from comets,"* said Whipple. To a layperson, the appeal of a comet may reside less in its scientific value than in its dramatic display of cosmic splendor. Comets C/2001 Q4 (NEAT) and C/2002 T7 (LINEAR) both have the potential to provide pleasant sights when they swing through the inner solar system this spring.

Comet NEAT is not especially keen, nor does Comet LINEAR travel a particularly straight line. Instead, both are named for the robotic telescope survey programs that discovered them. The programs locate comets so prolifically that many comets have shared the same names, including some reasonably bright comets, hence the importance of using the comets' full designations. Comet C/2001 Q4 was discovered by the Near Earth Asteroid Tracking (NEAT) program, for which the comet was named. Astronomers describe the brightness of celestial objects using a magnitude scale: the higher the magnitude number, the fainter the object. When found, Comet NEAT glowed at only 20th magnitude, about 400,000 times fainter than the faintest star visible to the unaided eye. Yet predictions indicate that Comet NEAT may brighten to 1st or 2nd magnitude in late April and remain that bright through mid-May, making it visible to skygazers, possibly even with light-polluted city skies. From non-light-polluted, clear skies, Comet NEAT may be visible to the unaided eye from early April through late June.

The second bright comet now approaching the Sun, Comet C/2002 T7 (LINEAR), was found by the **Li**ncoln Laboratory **N**ear **E**arth **A**steroid **R**esearch (LINEAR) program and announced on October 29, 2002. To an experienced observer, Comet LINEAR may become visible to the naked eye in mid-March, when it is expected to brighten to 6th magnitude. (Stars as bright as 7th magnitude are visible to the unaided eye in dark skies, if they are directly overhead. A comet is harder to spot since its light is spread out rather than concentrated in a star-like point, and it may be located close to the horizon where extinction dims it further.) However, the position of Comet LINEAR in the constellation Pisces places it very close to the Sun in our sky, so observers will have to wait several weeks for their first good viewing opportunity. Both comets are likely on their first trip through the inner solar system after having been nudged out of the Oort Cloud, the spherical reservoir of comets that surrounds our Sun far beyond the orbit of Pluto. As a result, peak brightness estimates are uncertain. "*Comets do a lot of things that are unpredictable,"* said Green. If a comet should break apart, as happened with Comet C/1999 S4 (also called LINEAR) in the year 2000, it would never become bright in our skies. On the other hand, if a comet should undergo a sudden outburst, it could brighten substantially above predicted levels. Both professional and amateur astronomers currently are monitoring and will continue to monitor the comets.

Both comets will present viewing challenges, since at their brightest they will also be relatively close to the Sun as seen from the Earth. As a result, they will appear either in the western sky shortly after sunset, or in the eastern sky shortly before sunrise. The glow of twilight may interfere with viewing. Spotting either comet will be easier if observers first locate their target through binoculars, searching the relevant area of the sky for the fuzzy round glow of the coma, with a tail pointing up from the horizon. Once you know where to look, try lowering your binoculars and looking with the eyes alone. Green recommended, "*You'll need a good observing site with a low horizon, few city lights, and clear skies. Neither comet will be particularly easy to pick out, especially in the light-polluted skies that most people face. Your best bet is to attend a public open night at your local observatory or astronomy club, where experienced observers can help you*."

The Southern Hemisphere will enjoy the best views of Comet C/2001 Q4 (NEAT), which moves from the constellation Tucana through Hydrus and into Dorado during April, passing by both the Small and Large Magellanic Clouds. It will be visible in the evening sky between sunset and about 11:00 PM local time. During May, Comet NEAT moves northward, becoming visible to observers at mid-northern latitudes early in the month. Comet NEAT appears in the evening sky after sunset as it slides from Canis Major through Cancer and into Ursa Major by month's end. Comet NEAT passes closest to Earth on May 7th at a distance of around 30 million miles (48 million kilometers). (For comparison, the Earth is at a distance of 93 million miles, or 150 million km, from the Sun.)

The most eye-catching views of Comet NEAT in the Northern Hemisphere are likely to occur during May 12-16, when the western horizon after sunset shows the comet and four bright planets (Venus, Mars, Saturn, and Jupiter) all in a line. The dramatic lineup not only offers wonderful photographic opportunities, but also graphically demonstrates the contrast between the clockwork regularity of orbiting planets and the irregular serendipity of visiting comets. Comet C/2002 T7 (LINEAR) may be visible in the morning twilight just before sunrise in late April and early May to Northern-Hemisphere observers with a flat eastern horizon. The comet then disappears into the solar glare again as it moves from Pisces through Cetus, Eridanus, and Lepus to Canis Major. Comet LINEAR finally reappears in the twilit evening sky in late May, but will be fading, so observers should use binoculars to locate it before attempting to view it with the naked eye.

Southern Hemisphere observers will enjoy better views of Comet LINEAR, which will be visible in the early morning sky to the east from mid-April through early May. In mid-May, Comet LINEAR begins to swing into the evening sky, and for a few days may be visible both immediately after sunset in the west and immediately before sunrise in the east. Around May 20th, the comet becomes an evening object visible only in the western sky after sunset. Comet LINEAR passes closest to Earth on May 19th, at a distance of about 25 million miles (40 million km). As June opens, both comets will fade as they speed ever farther from both the Sun and the Earth. Yet if current predictions hold, the brief but enjoyable appearances of Comet NEAT and Comet LINEAR will be remembered for years to come! A photograph of C/2002 T7 taken with a MicroObservatory robotic telescope is at http://cfa-www.harvard.edu/press/pr0409image.html

SEDNA (2003 VB12) – DISCOVERED AT SOLAR SYSTEM EDGE

The coldest most distant place known in the solar system; possibly the first object in the long-hypothesized Oort cloud . On 15 March 2004, astronomers announced the discovery of the coldest, most distant object known to orbit the sun. The object was found at a distance 90 times greater than that from the sun to the earth -- about 3 times further than Pluto, the most distant known planet. The discovery was made on the Samuel Oschin Telescope at the Palomar Observatory east of San Diego on 14 November 2003 by the team of Mike Brown, Chad Trujillo and David Rabinowitz. Because of its frigid temperatures, the team has proposed that the object be named in honor of Sedna, the Inuit goddess of the sea from whom all sea creatures were

created. Officially, the object is currently known to astronomers as 2003 VB12, based on the day of its discovery.

How far away is Sedna?

Sedna is the most distant solar system object ever discovered. It is twice as far from the sun as any other solar system object and three times farther than Pluto or Neptune. Standing on the surface of Sedna, you could block the entire sun with the head of a pin held at arm's length. Even more interestingly, the orbit of Sedna is extreme elliptical, in contrast to all of the much closer planets, and it takes 10,500 years to circle the sun. The sun is in the middle of the swarm of solar system objects. Sedna is at 90 AU (1 AU is an Astronomical Unit, the distance between the earth and the Sun, about 150 million kilometers, or 93 million miles).

What is the Oort cloud and what is its relationship to Sedna?

The Oort cloud is a hypothetical shell of icy proto-comets in very loose orbits around the sun that extends to a distance of almost halfway to the nearest star. Occasionally, passing stars cause a slight change in the orbit of one of these proto-comets which causes them to come streaking in to the inner solar system where we see them as comets. Though the Oort cloud has never been seen directly, the comets that we do see are very strong evidence of its existence. The Oort cloud is expected to be much much further out than the orbit of Sedna. So why do we think Sedna is a member of the Oort cloud? We believe that the existence of Sedna is evidence that the Oort cloud actually extends much further in towards the sun than previously thought. This "inner Oort cloud" was formed in the same manner as the previously known "outer Oort cloud." Early in the history of the solar system many small icy bodies were orbiting the sun and getting sling-shot out by close encounters with planets. As they were traveling further and further from the sun, the orbits of these bodies were affected by distant stars, causing them to slow down and stay attached to the sun. Sedna probably suffered a similar fate, except the stars which affected it must have been much much closer than previously expected. We believe that this is evidence that the sun formed in a tight-knit group along with many other stars.

How big is Sedna?

In the discovery images, we see only a point of light. We can't directly measure the size of Sedna from this point. The light that we see has traveled from the sun, been reflected off the surface of Sedna, and come back to us where we can see it in the images like the discovery images below. So a small icy object and a large coal-covered object, for example, would both look about the same brightness in the discovery images, because both objects could reflect about the same amount of sunlight. We can measure Sedna's size using a thermal telescope, which measures the heat coming from the surface. We know how far away Sedna is, so we know that the surface temperature is about 400 degrees below zero Fahrenheit. A large object of that temperature will give off much more heat than a small object of that temperature (just light a match and a bonfire are the same temperature, but a bonfire keeps you much warmer at night because it is so much bigger). We used the 30 meter diameter IRAM telescope, and the Spitzer Space Telescope. Sedna was too small to be detected in either. This tells us that Sedna is at most about 1800 km in diameter: about halfway in size between Pluto and the largest known Kuiper belt object Quaoar. Even though all we know for certain is that Sedna is smaller than 1800 km, we have evidence which suggests that the size might be pretty close to this number. We are virtually certain that the size is larger than the 1250 km size of Quaoar, though this object has shown many unexpected characteristics, so we can't completely rule out a smaller size.

Is Sedna a planet?

NO, at least not by our definition. Astronomers have been unable to agree on a precise definition of planet, but we have a suggestion for a definition below. By our definition, Sedna is not a planet. Nor is Pluto.

What is the definition of a planet?

It is difficult for scientists to have to define a word that everybody thought they already knew the meaning of. But discoveries such as Sedna, Quaoar, 2004 DW are blurring the line between planets, asteroids, and comets. These objects are all big, so what are they? We prefer to call them planetoids. To us, a planetoid is any round object in the solar system that is not big enough to be considered a planet (actually we don't know that any of these objects are round, but it is a reasonable assumption).

So what is a planet?

We define a planet to be any body in the solar system that is more massive than the total mass of all of the other bodies in a similar orbit. For example, many asteroids cross the orbit of the earth. Yet the earth is more massive than all of those put together. Thus, the earth is a planet. Ceres, the largest asteroid, is not greater in mass than the sum of the masses of the remaining asteroids. Hence, not a planet. What about Pluto? Pluto sits squarely in the Kuiper belt, yet is not more massive than the total of the other Kuiper belt objects. Thus -- like Ceres -- Pluto is no planet, just the largest object in its class. Planetary demotion has happened before. When the first asteroids were discovered they were called planets, since no one knew what else to call them. As more and more discoveries piled up it was realized that the asteroids are a separate class of bodies, the planetary designations were revoked, and the asteroids were officially reclassified as "minor planets." As we learn more about the solar system our ideas have to change. The time has come for Pluto to take its rightful place as the largest Kuiper belt object. Incidentally, if we were self-interested we would argue the other side. Our discovery of Quaoar is currently considered to be that of the largest known Kuiper belt object. If Pluto were reclassified, though, Quaoar would then be demoted to second place! Sedna is the only object known in the inner Oort cloud, but we suspect that there will be many more found and that Sedna will not dominate the mass (or even be the most massive!). Thus, to us, Sedna is not a planet. Our definition takes our solar system from 9 planets to 8 planets. A alternative definition promoted by astronomers is that anything in the solar system that is made round by its own gravity should be considered a planet. The definition takes the solar system from 9 planets to hundreds of planets, when you include all of the asteroids, satellites (the moon!), and Kuiper belt objects that are round.

While the final decision is really just a matter of semantics (is Australia an island or a continent? Does it really matter?), we feel that it is important for scientists to come up with a definition that fits the centuries-old perception of what a planet is. Suddenly expanding the solar system to include 100s of planets strongly conflicts with our sense that a planet is somehow special and rare. Yet scaling back to 8 requires removing Pluto from its seemingly special place. Which is better? An final alternative is to simply define planets as the 9 now known. That is the current definition, and it requires neither adding nor subtracting to the known number. The problem is that a purely historical instead of scientific definition will inevitably cause inconsistencies. If we find something larger than Pluto, is it a planet? Historically, no. Until astronomers agree on something more sensible than historical accident, the debate will continue.

How well is the orbit known?

We know the orbit fairly well. After finding Sedna in November 2003, we were able to trace it back in archival data to 2001. With this nearly 3 year arc, we know that the perihelion (closest approach distance) is most likely to be within about 7 AU of our 76 AU perihelion estimate. With a perihelion of 76 AU, Sedna has a 60% farther closest approach than any other solar system object. We expect that the orbit will be improved in coming weeks as people search though archival data.

Is Sedna a Kuiper belt object?

NO. Sedna never enters the region of the Kuiper belt. The Kuiper belt is an icy asteroid belt just beyond Neptune. Extremely strong evidence shows that it has a rather sharp edge at 50 AU. Sedna never comes close than 76 AU. Calling Sedna an inner Oort cloud object makes much more sense. There are some KBOs that go very far from the sun like Sedna does, but they all have closest approach at about 35 AU. Sedna is special because it doesn't come any closer than 75 AU to the sun. We believe that this is because of the effects of passing stars, as described above. A second speculative explanation for Sedna's orbit is that a larger body, perhaps Mars-sized or larger could exist at around 70 AU in a circular orbit and could have caused Sedna to get thrown into its strange orbit. If such a planet existed, we would likely have already found it in our survey, though there are still a few places left to hide.

How was Sedna found?

We have been conducting an ongoing survey of the outer solar system using the Palomar QUEST camera and the Samuel Oschin Telescope at Palomar Observatory in Southern California. This survey has been operating since the fall of 2001, with the switch to the QUEST camera happening in the summer of 2003. To date we have found around 40 bright Kuiper belt objects. To find objects, we take three pictures of a small region of the night sky over three hours and look for something that moves. The many billions of stars and galaxies visible in the sky appear stationary, while satellites, planets, asteroids, and comets appear to move. Objects in the inner Oort cloud are extremely distant and so move extremely slowly. The discovery images cover a total area of sky equivalent in size to the head of a pin held at arm's length. Incidentally, that is how big the Sun would appear from Sedna. It is moving quite slowly and is faint, much slower and fainter than the recently discovered 2004 DW, which we also found. Vast areas of the sky have to be searched before something this unusual is found. Our search for new objects will continue for the next few years.

How bright is Sedna; can I see it?

Sedna is about 20.5 magnitudes in R, considerably fainter than 2004 DW and Quaoar. It is beyond the reach of almost all amateurs astronomers (though, interestingly, the first confirmation of the existence of Sedna was made at Tenagra Observatory, an extremely high-end amateur telescope run by Michael Schwartz in southern Arizona). In March 2004, the location of Sedna is easily found in the evening sky to the southwest just after sunset. It is almost directly below Mars, and forms a triangle with the very bright Venus.

What is Sedna made of?

We don't know. Because it's surface is relatively bright, from the thermal observations (see above), we might expect it to have water ice or methane ice like Charon and Pluto have. But observations from the Gemini Telescope and the Keck telescope suggest that this is not true. From observations at the 1.3-m SMARTS telescope in Chile, we do know that Sedna is one of the most red objects in the solar system -- almost as red as Mars. Why? We're currently baffled.

What else do we know about Sedna?

From observations at the 1.3-m SMARTS telescope in Chile we have determined that Sedna likely rotates once every approximately 40 days. Of all of the objects in the solar system, only Mercury and Venus are known to rotate more slowly. Why the slow rotation? Our hypothesis is that Sedna's slow rotation is caused by the effect of a moon! We should soon be able to confirm the existence of this moon with observations from the Hubble Space Telescope, which should be able to direct see the tiny satellite. Stay tuned.

Sedna, 2004 DW, Quaoar, 2002 AW197; Why are all these new, big objects being discovered NOW?

Technology is the reason. Clyde Tombaugh discovered Pluto in 1930 using photographic plates, which let you look at a very wide piece of the sky, but they are not nearly as sensitive as the CCD's that we use now. (A CCD is what you will find inside most digital cameras.) The new, large objects listed above tend to be just faint enough that they would be out of range of all the older surveys for moving objects done after Tombaugh's. Today, CCD's are getting large enough and computers are getting fast enough that it is significantly easier to find these types of planetoids than it was even 5 years ago. We use a 172 Megapixel camera mounted on a robotic telescope to find these things. Even about 5 years ago, such cameras were not available, and the computing power to analyze these cameras was not quite there either.

Are there more inner Oort cloud objects like Sedna that we haven't seen?

It is very likely that there are more inner Oort cloud objects like Sedna. We have looked at only 15% of the sky before finding Sedna. As we continue to look at the sky, we may find a few more objects like Sedna. But this is only the beginning. Kepler's law states that an object on a very elliptical orbit like Sedna spends most of its time farthest from the Sun. Thus, for every Sedna we find near closest approach, there should be many more very far from the Sun that we can't see because they are so far away and faint. Also, Sedna is rather large, about 1/2 to 3/4 the size of Pluto. Most solar system populations like the Kuiper belt objects and the asteroids actually have many more smaller objects than large objects. So, for every Sedna we find that is large, there should be many more that are small that we missed because they were faint. Although it is very difficult to make predictions from one object, it seems very likely that the inner Oort cloud will have thousands of times more objects than just Sedna. It is likely that there is more mass in the inner Oort cloud than in the Kuiper belt and *the asteroid belt combined.*

***Why* is it called Sedna?**

2003 VB12 is the official temporary designation of the International Astronomical Union (IAU) Minor Planet Center, based on the year (2003) and date (14 Nov = the 22nd 2-week period of the year thus V=the 22nd letter of the alphabet. after that it is sequential based on the discovery announcement) of discovery. Once the orbit of 2003 VB12 is known well enough (probably 1 year), we will recommend to the IAU Committee on Small Body Nomenclature -- which is responsible for solar system names -- that it be permanently called Sedna. Our newly discovered object is the coldest most distant place known in the solar system, so we feel it is appropriate to name it in honor of Sedna, the Inuit goddess of the sea, who is thought to live at the

bottom of the frigid arctic ocean. We will furthermore suggest to the IAU that newly discovered objects in this inner Oort cloud all be named after entities in arctic mythologies.

Sedna's story - http://www.hvgb.net/~sedna/story.html
Sedna's tale - http://www.spiralgoddess.com/Sedna.html
The legend of Sedna - http://www.inuitgallery.com/sedna.shtml
The legend of Sedna the sea goddess - http://www.polarlife.ca/Traditional/myth/sedna.htm

'FAB FIVE' MAKE RARE APPEARANCE IN NIGHT SKY

Like a busy urban family, planets rarely get together all at once. Later this month, however, the five so-called naked-eye planets - Mercury, Venus, Mars, Jupiter and Saturn - will reunite in the night sky, giving spectators a unique chance to see Earth's closest companions in one easy sitting. The gathering will be visible every night for an hour after sunset, beginning around March 22 and lasting about two weeks. While other opportunities to catch a five-planet rendezvous will take place in the next few years, both at dawn and dusk, this one is not to be missed. "*This particular planetary grouping will quite possibly offer the best nighttime views until 2036*," says Dr. Myles Standish, an astronomer at JPL. For early risers, there will be another chance to see all five naked-eye planets together just before sunrise in December of this year and early January 2005. Since ancient times, the naked-eye planets have intrigued and inspired onlookers all over the world. But only sporadically, usually every few years or so, do their orbits take them to the same side of the Sun. When this happens, the planets stretch across the morning or evening skies depending on which side of the Sun they reside. More rare are planetary alignments in which the five planets assemble in a very small corner of the sky. "*Every so often the five visible planets will collect on one side of the Sun*," says Standish. "*Only when conditions are right, will they all be clearly visible at either dusk or dawn*." To catch the planetary get-together, you'll need a good view of the sky, free of buildings and bright city lights (you should still be able to see the planets through urban light pollution). The show begins around March 22 and lasts through early April, when Mercury fades from sight. The finest views will take place during the last 8 to 10 days of March. Begin by looking to the western horizon each evening just after sunset. Seated in a row up and across the sky will be Mercury, Venus, Mars and Saturn. Saturn will lie almost directly overhead. Following the line of the planets, Jupiter will be close to the eastern horizon. Together, the planets will span about 135 degrees. About an hour after dusk, Mercury will dip below the western horizon. The Moon will also be attending the festivities, mingling through the planets in an orderly fashion. On March 22, it will take a seat next to Mercury, and then climbing up the night sky, it will end its tour on April 1 right above mighty Jupiter, the largest planet in our solar system. As the Moon slides from planet to planet, it will grow in size from a slender crescent to a nearly full circle of white. Note that Venus is currently brighter than usual because of where it lies in relation to Earth and the Sun. The Moon and planets will appear to follow nearly the same path through the stars. This is because their orbits around the Sun occupy planes that are close to that of Earth's orbit. The plane Earth moves in is called the ecliptic. If for some reason you miss the "Fab Five," another set of orbiting bodies will soon make a grand debut. In April and May of this year, two naked-eye comets, C/2001 Q4 and C/2002 T7, will grace the twilight skies. To spot the cosmic balls of dust and ice look to the west at dusk or dawn. A pair of binoculars will help to initially locate the comets because they may be slightly washed out by the Sun. On May 12 to 16 look out for a mini-reunion with the naked-eye planets, when comet C/2001 Q4 lines up with Venus, Mars, Saturn and Jupiter

FROM THE EDITOR'S TERMINAL

The Stargazer is your newsletter and therefore it should be a cooperative project. Ads, announcements, suggestions, and literary works should be received by the editor before the 1st of the month of publication, for example, material for May's newsletter should be received May 1st. If you wish to contribute an article or suggestions to ***The Stargazer*** please contact Mark Folkerts by email or by telephone (425) 486-9733 or co-editor Bill O'Neil, at (774) 253-0747.

The Star Gazer
P.O. Box 12746
Everett, WA 98206

In March's Stargazer:

The next EAS Meeting is 7:00 P.M. Saturday, March 27th at the Providence Pacific Clinic – 916 Pacific Avenue in Everett.