

SIRIUS ASTRONOMER

NEWSLETTER OF THE ORANGE COUNTY ASTRONOMERS
See our web site at <http://www.chapman.edu/oca/>

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Mr. Galaxy, aka OCA President Wayne Johnson, dedicates the Anza House during a ceremony at the August, 1998, Star Party and Potluck. This month's issue features the House, as well as the officially approved house regulations and a sample sign-up sheet. Also, see below for information regarding the upcoming Work Party!

CHAPMAN MEETINGS

The next meeting of the OCA is on Friday, February 12, at 7:30pm in the Science Hall of Chapman University in Orange. The free and open meeting will feature Dr. Tammy Smecker-Hane of UCI, who will give a talk on Dwarf Galaxies (see p. 10), as well as a "What's Up?" presentation by Chris Butler, plus a raffle and open slides/videos.

STAR PARTIES

The Silverado site will be open for observing on Saturday, February 6. The Site and Observatory will be open Saturday, February 13 (new moon is the 15th). Both events are open to members and their guests, *not the general public*. Come prepared for cold weather -- dress warmly (layers), and if in doubt, check the satellite weather pictures before leaving town or call the observatory.

COMING UP

A Work Party to help fix up the Anza House will be held from 10am to 3pm the same day as the Star Party. All interested persons please show up with tools! Especially needed is plumbing expertise. Curtain rods are also needed. Contact the Anza House Coordinator for details (contact info is on last page).

The President's Message

by **Wayne P. Johnson (aka Mr. Galaxy)**

Congratulations to the new OCA Board Members and thanks to everyone who ran for an office. Participation is a key element of belonging to any organization. I would like to encourage more of it, although we actually do pretty well for a club our size. It does seem to be true that the more effort you put into something the more enjoyment you get out of it.

As I mentioned at the January meeting during the election proceedings, there are 3 major goals that I would like to see accomplished during my term this coming year. The first is to finish the refurbishment of the 8-inch vintage Clark refractor for use at the Discovery Museum. We have the necessary \$4,000 needed to clean up the telescope and mount. Club members will accomplish that work. We need to raise an additional \$25,000 for the building to house the telescope. So far, we have \$8,000 accumulated toward that goal. If you know of someone or some organization that donates money to scientific, educational non-profit clubs such as the OCA, please let me know! We are close to reaching this worthwhile goal and it would be nice to see it completed. Eventually, the OCA will supply volunteers who will help out in the operation of this in-town observatory. It will be ideal for lunar, planetary and double star observing and will be used to show people of all ages how great the sky can be even from the city!

The second goal is to finish the MOCAT (Multi-functional OCA Telescope). We have installed the remote weather station (RAMS) at the Anza House and are continuing to debug it as the first stage of the MOCAT project. In the last part of 1998 we took possession of a 12-inch and an 8-inch homebuilt combination cassegrain telescope for use on the project along with a very sturdy dome from Mount Wilson. We poured a cement pad for the MOCAT observatory on the west side of the Anza House. Now we only need to: (a) knock off some rust and spruce up the telescopes, (b) locate the dome on the pad and install the telescopes in the new building, and (c) debug its software to make it a telescope capable of being used from inside the Anza House control room for those cold winter nights. This project should be of minimal financial impact, though we'll probably need to spend a little money here and there for upgrades.

The third goal is to encourage OCA members to join the Astronomical League as a club. The AL is an umbrella organization with a national membership of about 15,000 individuals in about 400 organizations. I think belonging to the AL would give us the nationwide exposure to other member organizations that we need to help us remain the dynamic organization we are. New ideas and inputs from various sources are always helpful. We rarely hear about activities in other organizations other than what we might read occasionally in the major magazines. In the past, the magazines would dedicate pages to amateur club activities, but that is hardly done at all today. There are some great awards programs for the younger members of our organization, which would help bolster their enthusiasm and promote participation in club events. There are also various observing programs with nationally recognized pins for reaching certain observing levels to encourage members to spend more time under the sky. Charlie Oostdyk is formulating an unbiased list of tangible items that people would receive or be eligible for as part of the \$3/person membership.

I hope that you, the membership, will support these goals that seem reasonable as the OCA marches into the next millennium. Have a great year!

Clear skies,

Wayne

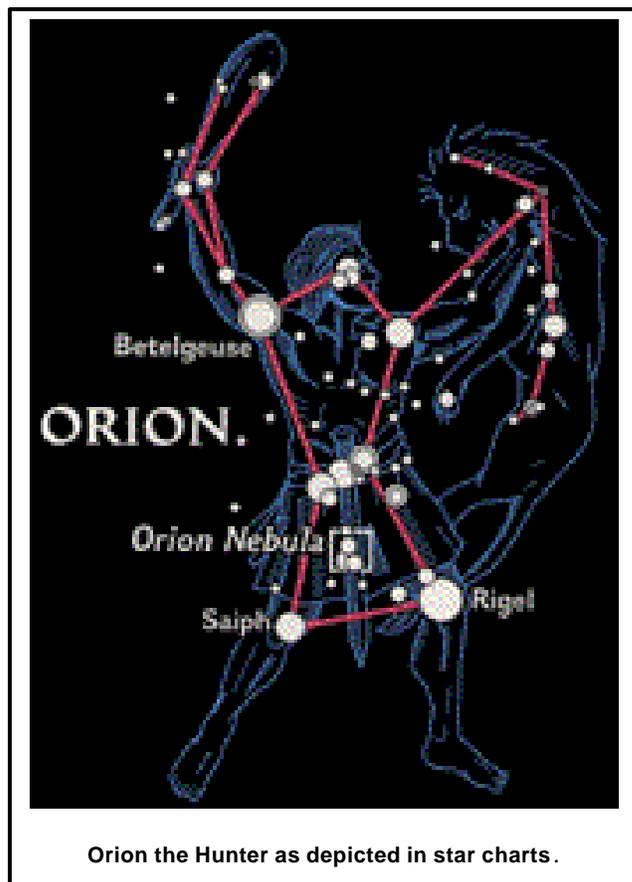
Starlore: Giant Hunter of the Night

Paul Curnow
Astronomical Society of South Australia

Most skygazers are familiar with the constellation Orion, now featured in the nighttime sky. Among many ancient races throughout the world the constellation was depicted as a mighty hunter carrying a club, shield and sword in his belt. Orion, “the Hunter”, is arguably the most recognizable constellation worldwide, with portions of it visible all across the globe. It is a most conspicuous constellation, ranking 9th in overall brightness and it is the 26th largest in size out of the 88 constellations. Within the constellation there are many asterisms, and to people in Australia one of the best known is probably the “Saucepan.” The “Saucepan” is positioned in the central part of the constellation, and is marked by the stars delta, epsilon, zeta, eta, theta and iota. However, folklore regarding this celestial giant dates back to much earlier times.

The ancient Egyptians called this constellation Sahu and identified it with their god Osiris (ruler of the underworld). The Egyptians believed that Sahu was the soul of the great god Osiris and evidence of this is found on the walls of the Temple of Denderah in Egypt. References to Sahu are also found in the Egyptian Book of the Dead. Osiris's consort was the goddess Isis, who was identified with the star that we now call Sirius in Canis Major. The Egyptians called this star Sothis and it followed Osiris across the night sky as he journeyed in his celestial boat. The constellation features many interesting stars, one of them being the red supergiant star Betelgeuse (alpha Orionis).

Betelgeuse is approximately 310 light-years away and it has a diameter of 300-400 times that of our sun. It fluctuates erratically and changes in brightness as it does so from apparent magnitude 0.4 to 1.3. Rigel (beta Orionis) is another interesting star that is one of the most luminous in the sky. It has an absolute magnitude estimated at -7.1 and is approximately 910 light-years away. In fact, if we relate Rigel to the sun, the star would be 47,863 times as bright as the sun (I'd suggest extremely strong sunblock)!



To the ancient Indians (Hindu) the stars Rigel and Betelgeuse mark out a constellation that they called Mriga (the deer). The star Betelgeuse marks the right foreleg of Mriga, and the star Rigel its left hind leg. The stars that astronomers now use to mark out the head of the hunter Orion (phi 1, phi 2 & lambda Orionis) also mark the head of Mriga the deer. The ancients believed that the gods of India were very angry with an ancient king who was known as Prajapati, because he had made advances on one of his many daughters (27 in total). Thus, they decided to punish the king with death for his misdeed. They created a new god called Bhutawat to hunt down and kill Prajapati.

When the king caught sight of Bhutawat coming after him he changed himself into the deer and began to flee. But, Bhutawat was extremely swift himself and caught up with Mriga. When Bhutawat got close, he fired an arrow into the belly of the deer, killing him instantly. The three stars that we now identify as the belt of Orion (delta, epsilon & zeta Orionis) represent the arrow hanging from the belly of the deer. If we follow the three stars towards the constellation of Canis Major, we come to the brightest star in the sky (not counting the sun), Sirius, which the ancient Indians identified as the god Bhutawat.

The stars that make up the belt of Orion are also of great interest. Mintaka (delta Orionis) is a very complex multiple system, consisting of the primary, an eclipsing binary, and a wide companion visible with binoculars at magnitude 6.9. Alnilam (epsilon Orionis) is a blue supergiant with a magnitude of 1.7 and a distance of approximately 1200 light-years. The last of the

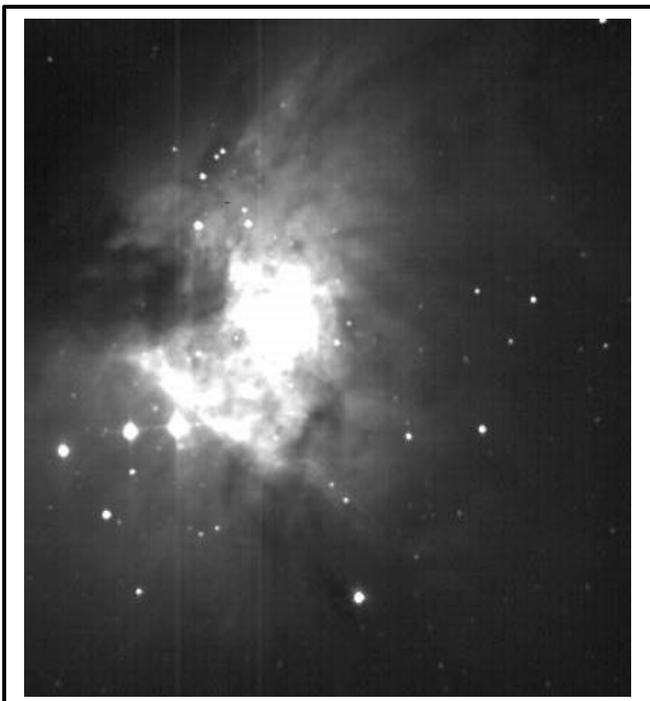


Image of M42, the Orion Nebula, taken with the OCA's CCD camera on the 22-inch Kuhn Telescope

three, Alnitak (zeta Orionis) is a blue-white double star with a magnitude of 2.0 and a distance of approximately 1100 light-years. In the sword of Orion we have one of the greatest sights to be seen even with just a moderate telescope. The Orion Nebula, M42 (NGC 1976), is a gigantic cloud of dust and gas that is approximately 15 light-years across and some 1300-1500 light-years distant. Behind the visible part of the nebula, radio astronomers have detected a large cloud of gas where many stars are still forming. The nebula is a beautiful sight through a telescope and arguably the finest diffuse nebula in the sky. Under clear conditions, the nebula is easily detectable with the naked eye.

In the region of Alnitak sits one of the most famous sights in the nighttime sky; however, this object is a lot more elusive than M42. The Horsehead Nebula, imbedded in a strip of nebulosity known as NGC 2024, is a marvel when seen in long exposure photographs. However, it is sometimes disappointing when viewed through small telescopes. The Horsehead is a dark lane of obscuring dust that appears much like the side profile of a seahorse. The star Saiph (kappa Orionis) which helps to complete Orion's rectangular appearance is a blue supergiant some 1300 light-years away, with a magnitude of 2.1. The last of the bright stars that completes the "rectangle" is the star Bellatrix (gamma Orionis) a blue giant star that sits approximately 360 light-years away.

Orion is truly one of the awe-inspiring constellations of the nighttime sky with many stories relating to its great majesty. We often overlook some of the brighter constellations as they become commonplace, but the next time you're out and deep in thought, spare some time to wonder at that giant hunter of the night.

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...and now presenting: *Anza House!*

by **Chris McGill**

What's it like to stay at Anza House? Why, it's really pleasant! The OCA's first attempt at multi-user sleeping accommodations is not quite the Four Seasons, but it holds up quite well, especially when compared with sleeping in the car!

My first opportunity to stay at the house occurred during last year's July Star Party and Potluck. As you can imagine, there were folks all over the site. Some came up to look at the house. Roy Weinberger (the Anza House Coordinator) opened the house and planned to stay in one of its bedrooms, and I went to the star party also planning to sleep in the house. At that time, some of the nicer things like the electric fans and the hand-sewn kitchen curtains had not yet appeared, but I was nonetheless able to secure for myself a bedroom (#1). Each of the bedrooms has a number affixed to the door. Roy had taken #2, which opens directly into a bathroom. I could also have stayed in Bedroom #3, which has a private bathroom. But I confess, *at that time*, I wanted to sleep as far away as possible from the bathrooms, due to the no-doubt exaggerated accounts I'd heard during Board meetings about certain four-legged critters that were occasionally also camping overnight in the house!



A view of bedroom #2, photo courtesy of Jim Small-

In addition to the inside door, bedroom #1 also has a window and a sliding glass door that directly faces the hill behind the house. The glass door is framed with vertical venetian blinds. I don't mind pointing out here that the mighty Hercules himself might have a little trouble closing those blinds (hint, hint)! Other than that, the room was and still is clean, carpeted nicely (wall-to-wall), and cozy. I had no trouble at all falling asleep! What *is* tricky is remembering NOT to turn on the bathroom light at night! *Mea culpa*, I've done it, Wayne's done it, and mostly everybody I know who's been there has done it at least once--and that's all it takes! In the morning, I left the room and almost stumbled into Steve Roley, who had crashed late that night in the living room.



Kitchen area in the front part of the house, photo courtesy of Jim

The house has two kitchens (one with a microwave oven), two full-sized refrigerators, and plenty of storage space. There's also a dishwasher and washer-dryer set, but I'm not certain whether these items are yet usable. Two front rooms look out onto the Lower Pads. In fact, you can hike directly from the Lower Pad area to the house, but you'd better watch out for anthills! These rooms still need blackout curtains, which is why the Coordinator and volunteers are energetically organizing a series of Work Parties for the house. The front rooms currently share three couches and a couple of easy chairs---all in fine condition. A dinette table with four chairs sits outside the front kitchen. At last month's star party, I chatted awhile with Jerry Floyd, a Mars Hill pad owner, and his friend Madame X as the two of them shared a quiet dinner of wine, cheese, and crackers. In addition, now that the heater is working, the house will be a great warming place for anyone who chose to take advantage of it.



Kitchen and dining areas, photo courtesy of Jim Smallwood.

Two other members who've volunteered at the house and also stayed there recently are Karen Caldwell and Lea Dawson. They told me that it was nice to have the convenience of access to kitchens and bathrooms. They also mentioned that rugs and pillows would also be welcome. I hope that many members will be able to participate in the next Work Party, to be held during the day of the next Star Party, February 13, from 10:00am to 3:00pm.

ANZA HOUSE REGULATIONS

Gaining entrance: The lock-box installed near the front door of the house will contain one house key on a large key ring so as not to lose it. The combination lock has the same combination as the warming room. The key is to always be replaced in the lock box, and Anza House is to be left unlocked for the duration of Star Party weekends. The last party leaving must lock up Anza House.

Liability waiver: A locked, slotted payment box will be attached to the living room wall, as seen from the front door upon entry, along with a clip board containing the log-in forms and payment envelopes for all residents to fill out. By signing the log-in form, overnight residents reserve a room or sleeping location, agree that their residency is at their own risk, and that the Orange County Astronomers club cannot be held responsible for any accidents/incidents that may happen to residents, guests, or anyone else spending time in Anza House.

Required information: The payment envelopes supplied must be filled out with names, dates, amount, room number (posted on each of the three bedrooms), and the appropriate \$5.00 per night, per person fee (cash or check made out to OCA) be placed in the envelopes, then sealed and deposited in the locked box.

Overnight residents: log their name(s), room # (bedroom 1,2,3 or front room), and dates spent in Anza House on the supplied log-in form which will be used to maintain the Anza House residency database for historical and statistical purposes by the club.

The Anza House Coordinator is responsible for gathering the log-in sheets and residency fees from the lock box at the end of star party weekends, or other times during a month as appropriate. The Coordinator will then forward all monies to the club treasurer and record data for the Anza House information database.

Reservations: Anza House is opened to OCA members and their visitors on a reservation basis. Only members can make reservations, and reservations are made on the same day of the evening desired and cannot be telephoned in or made in advance of the weekend in question. Consecutive nights may be reserved on the first day (e.g., someone desiring a reservation for a Friday and Saturday night may reserve both nights on that Friday). Members may make reservations at any time during the day. If rooms are unreserved by 8p.m., guests may reserve them. Reservations for special groups and special events on non-Star Party weekends must be arranged with the Anza House Coordinator.

The Anza House Coordinator will continually coordinate the Anza House volunteer group efforts to ensure that maintenance (ongoing and as-needed), adherence to clean-up standards, supplies and any other services for Anza House are achieved.

By using the Anza House, residents agree to the following:

- There is *NO SMOKING* in Anza House at all!
- Do not use the computer room unless authorized to do so.
- Do not disturb sleeping residents - be courteous – no radio or loud noise after 10 PM.
- Use of showers and bathrooms are for all club members and visitors.
- Use of red flashlights only outside; any white light inside must not be visible to the outside.
- Please submit any suggestions for improvements or enhancements to Anza House in the slotted lock box on the living room wall, and label it "suggestions."

Telephone Numbers:

- In case of emergency call 911.
- If it's urgent call Roy Weinberger (949) 768-5205.
- Non-urgent/suggestions – write it down and put in lock box.

Please bring with you the following (Anza House cannot supply any of the following items):

- Bed and bath linens (i.e., blankets, pillows, towels, wash cloths)
- Personal hygiene supplies (i.e. bath soap, shampoo, etc.)

Departure Requirements: All residents must adhere to the following:

- Leave the residence as clean or cleaner than you found it. This means vacuum the sleeping area you used.
- Remove all trash, as there is no trash pick up facility – “Take it with you off the site.”
- Clean up and remove all foods/drinks from refrigerators.
- Leave both refrigerators on and closed.
- Be sure that toilets, sinks and showers are clean.
- Ensure Anza House is secure when leaving (i.e., windows and doors locked, stove burners are off, all lights off).

(This document was approved by the OCA Board of Trustees.)

A SAMPLE ANZA HOUSE SIGN-UP SHEET:

Anza House Sign-Up Sheet for the Week of _____

Instructions: 1. Bedrooms are reserved on first come first served basis. 2. PRINT your name in the "Reserved by" slot to reserve a room and the slots therein. 3. A minimum of two occupants are required to reserve a bedroom, although only one need be present to make the reservation. 4. All persons sleeping in Anza House must pay \$5 per night and SIGN their full name in an appropriate box. 5. Use of Anza House for sleeping is granted only to those who sign in.

NOTICE

All persons entering these premises do so at their own risk. Orange County Astronomers assumes no responsibility for injury, damage, or loss to any person or property. Those persons using these facilities hereby release and hold harmless Orange County Astronomers, its agents, and/or representatives from any liability or obligations associated with use of said facilities. Safeguard your personal belongings and use the premises in a safe and responsible manner.

<p style="text-align: center;">Friday Bedroom #1</p> <p>Reserved by: _____</p> <p>Signature #1 _____</p> <p>Signature #2 _____</p> <p>Signature #3 _____</p>	<p style="text-align: center;">Saturday Bedroom #1</p> <p>Reserved by: _____</p> <p>Signature #1 _____</p> <p>Signature #2 _____</p> <p>Signature #3 _____</p>
<p style="text-align: center;">Friday Bedroom #2</p> <p>Reserved by: _____</p> <p>Signature #1 _____</p> <p>Signature #2 _____</p> <p>Signature #3 _____</p>	<p style="text-align: center;">Saturday Bedroom #2</p> <p>Reserved by: _____</p> <p>Signature #1 _____</p> <p>Signature #2 _____</p> <p>Signature #3 _____</p>
<p style="text-align: center;">Friday Bedroom #3</p> <p>Reserved by: _____</p> <p>Signature #1 _____</p> <p>Signature #2 _____</p> <p>Signature #3 _____</p>	<p style="text-align: center;">Saturday Bedroom #3</p> <p>Reserved by: _____</p> <p>Signature #1 _____</p> <p>Signature #2 _____</p> <p>Signature #3 _____</p>
<p style="text-align: center;">Friday Front Room</p> <p>Signature #1 _____</p> <p>Signature #2 _____</p> <p>Signature #3 _____</p> <p>Signature #4 _____</p> <p>Signature #5 _____</p> <p>Signature #6 _____</p> <p>Signature #7 _____</p> <p>Signature #8 _____</p>	<p style="text-align: center;">Saturday Front Room</p> <p>Signature #1 _____</p> <p>Signature #2 _____</p> <p>Signature #3 _____</p> <p>Signature #4 _____</p> <p>Signature #5 _____</p> <p>Signature #6 _____</p> <p>Signature #7 _____</p> <p>Signature #8 _____</p>

Virtual Astronomy

by Dave Kodama

For the computerized astronomer, 1998 brought many nice surprises – huge memory increases for computers, huge hard disk drives, and more powerful processors, all for less cost than ever before! So now that you've gotten that 450 MHz Pentium II with 9 GB hard drive and 128MB of memory for Christmas, what do you do with it?

For starters, you might consider one of the many electronic star charts (also called planetarium programs). As a little exercise, I tried to make a comprehensive list of these programs, and these are the ones I found:

- The Sky 5.0 (<http://www.bisque.com/>)
- Megastar 4.0* (<http://www.willbell.com/software/megastar/index.htm>)
(Tech Support: <http://www.flash.net/~megastar/>)
- Hypersky* (<http://www.willbell.com/software/hypersky/hypersky.htm>)
- Deep Space 5.56* (<http://www.davidchandler.com//dspace.htm>)
- NGC View 5.0 (<http://store.skypub.com/skypub/ngcv5.html>)
- Redshift 3 (<http://www.redshift3.com/>)
- Starry Night Deluxe 2.0* (<http://www.siennasoft.com/>)
- Deep Sky Planner 3.0 (<http://www.skypub.com/store/dsp/dsp.html>)
- Sky Map Pro 5* (<http://www.wsoftware.com/featureinformation.htm>)
- Sky Chart III* (<http://www.southernstars.com/skychart/>)
- Epoch 2000 (<http://www.meade.com/catalog/epoch/epochsk.html>)
- Guide 7.0 (<http://www.projectluto.com/>)

*Demo or shareware version is available for downloading

Note that all of these programs can be purchased online from the web sites included in the list above. Many of these web sites also provide downloadable patches (corrections), upgrades, and enhancements (e.g. current comet orbit data) for registered owners. If you are interested in checking out any of the programs above, many of them (marked with an asterisk) have a demo version or shareware version of the program available for downloading. If you become familiar with any of these programs or find one not listed here, be sure to email me, as I'm always interested to learn about what these programs can do.

I have *The Sky* (version 4) and *Deep Space*, which may be considered to be on opposite sides of the spectrum. *The Sky* is just one product in the extensive Software Bisque product line: well written, very full-featured, and meant to run on the latest operating systems (Win 95 and NT) and the fastest possible computer. On the other hand, *Deep Space*, which has not been updated for a couple of years, only requires DOS and does fine on a 386, which is great for using that old computer out there with your scope. Both programs, however, are available with the complete Hubble Guide Star Catalog on CD-ROM. Both programs are also capable of interfacing to with my Celestron digital setting circles, which makes it easy to find (some say cheat) my way across the sky.

If you really want to make full use of your computer, you can arrange to participate in the SETI project, which is calling upon anyone connected to the net to help by analyzing some of the data collected from the Arecibo radio telescope. To do this, you must download a program from their web site at:

<http://setiathome.ssl.berkeley.edu/>

This program acts like a screen-saver, automatically starting up whenever your computer is idle. The project is scheduled to start up in April 1999, but the details of the project are already available on the web site. In the past, similar distributed computing projects on the web have successfully taken on projects such as cracking previously unbreakable cryptographic codes, so you can expect your computer's efforts to be a real part of the effort!

(If you would like to be emailed weekly notices of upcoming OCA meetings, send a note to me at:
kodama@alumni.caltech.edu.)

Space Update

Gathered by Don Lynn from NASA and other sources

To find out more on these topics, or those of past months' columns, through the World Wide Web, send your Web browser to our OCA website (<http://www.chapman.edu/oca/>), select Space Update Online, and the topics are there to click on.

Mars Polar Lander - was launched January 3, along with 2 small probes (designated Deep Space 2 mission) that are under the wings of the Polar Lander for the 11-month trip to Mars. At last report, the spacecraft were all functioning normally, after solving a problem with the star camera, the camera that sights stars to orient the craft correctly. The problem was caused by sunlight reflecting off the spacecraft's backshell. Turning the spacecraft manually to put the shell in shadow cured it.

The 2 probes will separate shortly before the larger craft lands softly (by parachute & rockets) near Mars's South Pole. *The 2 probes will not land softly!* They will hit the surface about 60 miles from the Lander at the speed of a jet plane. After burying themselves 3 to 6 feet under ground, the probes will measure water content of the soil and temperatures and weather for about 50 hours. Designers dispensed with the usual complications necessary to shed the protective shells around the 2 spacecraft used during launch: the shells will disintegrate at landing.

The Lander carries a twin of the stereo camera used on Mars Pathfinder. If you liked last year's Mars pictures, you'll be pleased again. In addition, the Polar Lander has a soil scoop on a robotic arm, with a camera mounted on the arm for close-ups. The arm camera is black & white, but has three colored lights to illuminate the subject, allowing color pictures to be made from 3 exposures. Soil from the scoop will be analyzed in 8 tiny ovens in an instrument called TEGA, or Thermal and Evolved Gas Analyzer. The Lander will report the weather (temperature, pressure, winds, and humidity) during its planned 3-month surface mission.

Mars Polar Lander also has a microphone, supplied by The Planetary Society, to listen to sounds on Mars. This is the first time we will hear sounds from another celestial body, though Carl Sagan first suggested a spacecraft microphone many years ago. Scientists expect to hear wind, thunder, the spacecraft parts moving, and the scraping of the soil scoop. As with any first instrument, we may hear surprises. The Martian sounds will be posted on the Planetary Society's web site for the world to hear. Other spacecraft instruments include a wide-angle camera to record the descent and landing, and a lidar (laser radar) to measure clouds and haze. The latter is the first Russian-built instrument on a United States spacecraft.

NEAR (Near Earth Asteroid Rendezvous) - Don't hold your breath for the images of NEAR going into orbit around asteroid Eros, which was supposed to have happened January 10! The rocket burn in late December to accomplish that was shut down by the spacecraft computer when it exceeded safety limits, so NEAR shot right on past Eros. A quick investigation allowed understanding of the problem and a re-planning of a new orbit. A rocket burn on January 3 retargeted the spacecraft for another interception of the asteroid in February 2000, when it will be able to attain orbit about Eros for the 12 months originally planned, and achieve all mission objectives. Yet, the flyby that was supposed to be an orbit capture was not a complete loss. Gravity data about Eros's mass and shape was obtained, as were images, infrared spectra, and magnetic field data. These observations were all planned, radioed to NEAR and executed in the 3 days after the unexpected rocket burn shutdown. Once again, spacecraft controllers have rescued a mission from almost certain defeat.

Chandra (X-ray Observatory) - was renamed from AXAF (Advanced X-ray Astrophysics Facility), in honor of the late Indian-American astrophysicist Subrahmanyan Chandrasekhar, as a result of a contest to select a name. Fifty-nine people submitted Chandra, but only the two best essays earned the prize of a trip to observe its launch upon the Space Shuttle Columbia, scheduled for April 8. This is a new launch date, delayed to allow further software testing. Chandrasekhar, widely regarded as one of the foremost astrophysicists of this century, won the Nobel Prize in 1983 for his theoretical studies of physical processes in the structure and evolution of stars. The Chandra X-ray Observatory is the third of the Four Great Orbiting Observatories, after the Compton Gamma-ray Observatory and Hubble Space Telescope. It will study powerful sources of X-rays, such as exploding stars and matter falling into black holes. It is 45 feet long and its images will be 50 times more detailed than previous X-ray telescopes.

Stardust (Comet Sample Mission) - is set for launch February 6, to visit comet Wild 2 in January 2004, returning a sample to Earth 2 years after that. It was recently discovered that material is streaming into the Solar System, like a reverse solar wind, and the sample collector on the spacecraft should collect some of that in addition to its intended comet material.

Galileo (Jupiter mission) - took images in December of Saturn, Titan (Saturn's largest moon), Uranus, and Neptune. Why is a spacecraft in orbit around Jupiter shooting other planets, of known color and brightness, but which also will appear tiny in the images? The images are being used to calibrate the cameras. Galileo also took field and particle measurements as it flew through the center of a region known as the plasma sheet. This region is largely unexplored and is a region of Jupiter's magnetosphere where the solar wind exerts a varying influence on Jupiter's magnetic field and the plasma in it.

New Millennium Program missions:

Deep Space 1 (Asteroid, Comet and Technology Test mission) - is one of a series of space missions called the New Millennium Program designed to test new technologies in space. The ion engine used to power Deep Space 1 was described in this column last month. Additional technologies tested on the mission are a large solar array (larger than usual to power the ion engine), a new type of radio transmitter-receiver, autonomous optical navigation (guide itself from images it takes, without intervention by controllers on Earth), several microelectronics experiments, and software to plan and execute many activities that are generally controlled from Earth. One instrument combines a camera, ultraviolet imaging spectrometer, and infrared imaging spectrometer for the first time.

Deep Space 2 - Referred to in the lead paragraph above. There are 10 new technologies tested there, including obviously the ability to smash into a planet, an auger to pull soil in, a moisture analyzer, and extremely low-temperature batteries.

Deep Space 3 - twin spacecraft to separate and fly formation up to a kilometer apart to perform interferometry, planned for launch in December 2001.

Deep Space 4, or Champollion - to land on the nucleus of comet Temple 1 in 2005.

Earth Orbiter 1 - to test technologies for land-imaging missions. It will take images in hundreds of different colors of the spectrum, rather than the 10 now used in advanced land imaging. It will also test a plasma thruster, carbon-carbon radiator, X-band phased-array antenna, a lightweight solar array, and formation flying software.

Earth Orbiter 2 - to test an infrared laser to accurately measure global winds from the Earth's surface up to a height of 10 miles. This mission will be flown in the Space Shuttle cargo bay in 2001.

FEBRUARY'S FEATURED SPEAKER



Dr. Tammy Smecker-Hane
Assistant Professor, Department of Physics and Astronomy
University of California, Irvine

Professor Smecker-Hane earned her B.A. (1988) and Ph.D. (1993) from Johns Hopkins University. She joined the faculty of UCI in the fall of 1995. Her research interests are in the formation and evolution of galaxies, and she does both theoretical and observational work in these areas. In addition, she is the director of the UCI Observatory, which operates a 24-inch telescope equipped with a CCD.

Her talk is entitled: "*New Thoughts on the Dwarf Galaxies that Orbit the Milky Way.*" Here is a summary: "our Milky Way is surrounded by a set of small, faint, galaxies, called dwarf galaxies. These dwarfs are attracted to the Milky Way because of gravity and they orbit about the Milky Way similar to the way the planets in our solar system orbit the Sun. Because the dwarf galaxies are so close to us, in recent years we have been able to determine their star formation histories in unprecedented detail. The results have surprised us. Some of the galaxies that we had thought contained only old stars have turned out to harbor stars having a huge variety of ages, and some of these galaxies have stars as chemically complex as the Sun. In 1995, a brand new dwarf galaxy was discovered; the Sagittarius dwarf galaxy is actually our closest neighbor. So close, in fact, that the Sagittarius dwarf is being ripped apart and cannibalized by our Milky Way. These dwarf galaxy tales will be discussed in the talk."

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For Sale: Beautiful Anza Log Home! Has a concrete observing pad and pier, *just a mile from OCA's observatory* on 20 mountaintop acres with an excellent well. The 10-year-old home has 360° views, 2 bedrooms, den, 2 full baths, great room with cook's gas kitchen, huge master suite, leaded glass doors, tile floors, decks, spa, satellite dish, and separate 24' x 36' garage. Horses are welcome. To own this piece of paradise for \$189,000.00 call (949) 240-4303. Ask for Bob or Jude Kosslyn. Property is listed with ERA Realty (Jane Boehringer), 888-427-5372; website: www.eraonline.com

Book for Sale: "*Beyond the Planets,*" by Sarah Solomon. Photographs of 16 original oil paintings of nebulae with descriptive text. Ms. Solomon's paintings have been exhibited at Caltech, U.C. Berkeley, and the Smithsonian Institution. Cost: \$15.00, plus \$3.00 shipping and handling. Make check payable to: Eva Schmidler, 21192 San Miguel, Mission Viejo, CA 92692. For more information, write to the above address or send an email to: rayaridesign@earthlink.net.

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