



The Milky Way is seen amid high clouds at Indian Cove, Joshua Tree National Park, on August 11, 2004. (Wally Pacholka)

OCA CLUB MEETING

The free and open club meeting will be held Friday, October 8th at 7:30 PM in the Irvine Lecture Hall of the Hashinger Science Center at Chapman University in Orange. The featured speaker this month is Anwar Ahmed, who will present his talk 'Chasing First Light: The James Webb Space Telescope'.

STAR PARTIES

The Black Star Canyon site will be open this month on October 9th. The Anza site will be open October 9th. Members are encouraged to check the website calendar, for the latest updates on star parties and other events.

Please check the website calendar for the outreach events this month! Volunteers are always welcome!

You are also reminded to check the web site frequently for updates to the calendar of events and other club news.

COMING UP

The next session of the Beginners Class will be held on Friday October 1st (and next month on November 5th) at the Centennial Heritage Museum (formerly the Discovery Museum of Orange County) at 3101 West Harvard Street in Santa Ana.

GOTO SIG: Oct. 4th

Astro-Imagers SIG: Oct. 19th, Nov. 16th

EOA SIG: Oct. 25th, Nov. 22nd

Astrophysics SIG: Oct. 15th, Nov. 19th

President's Message

By Barbara Toy

Summer is really over now, in spite of the heat spell in September, though the fire season will be with us for a while longer unless the rainy season starts early. In the best of all worlds, we'd get early and frequent rains that would cluster around the full moon – but that never seems to happen in the real life of an astronomer... Rain or not, if you find yourself with some free time on your hands, check out the entries on our on-line calendar (<http://www.ocastronomers.org/calendar.asp>), and you'll see that there's a lot going on in the club, as usual, with something to amuse or interest anyone who has even a faint interest in astronomy. Celebrate the change in seasons by trying out activities you haven't tried before – it may give you a new area of enjoyment in our hobby and some new friends in the club!

AstroImage 2004

The AstroImage 2004 conference, which, as I write this, happened less than three weeks ago, was a really wonderful event – after hearing so many enthusiastic comments from people who attended the talks, I'm looking forward to seeing them on DVD, since I wasn't able to attend any of the sessions. If you missed the conference, you should definitely consider getting the talks on DVD as well as the Proceedings, which we'll have available in the not-too-distant future thanks to Liam Kennedy and Dave Kodama. Keep an eye open for the announcements when they're ready!

For me, one of the major benefits of the conference was the chance to visit with our sponsors and get to know them better. We had great sponsors for this event, and I'd like to introduce them to you:

Hutech Astronomical Products (<http://www.sciencecenter.net/hutech/>): If you see people around with Borg refractors,



chances are that they got them through Hutech. The company also carries a lot of products designed specifically for astroimaging, and it's not uncommon for people who ask for help on the AstroImages email group to be referred to Hutech as a likely source of information or a product to deal with the problem. One of the more recent additions to their product line is the Cannon Rebel digital SLR camera modified for astronomical work – there was a lot of talk about that at the conference (the Hutech "booth" – actually a table – displayed some excellent examples of what this camera can do in practiced hands), and it was even a topic of discussion in the club observatory at the September star party. For most of us, OCA members Ken and Mia Ishikawa are the face of Hutech, and we are very grateful for their long-term support of OCA's activities, and especially their regular support of the AstroImage Conferences. Besides that – they are wonderful people, and one of the major bonuses of the conference for me was the chance to have a real conversation with Mia during one of the lulls in conference activities.

Oceanside Photo and Telescope (OPT) (<http://www.optcorp.com/>): Many of us have spent a lot of happy hours browsing around at OPT, chatting with the staff, running into friends, exchanging information with other customers, and finding various astronomical or camera-related goodies that we can't live without. It's always fun to see them at other events (who could miss spending some time in their booth at RTMC?), and AI 2004 was no exception – and it gave me a chance to catch up on the latest on the plans to move the store, and check out some of their products that I hadn't seen yet at the store (such as the binoculars for solar observing). Besides being a general sponsor for the conference, OPT made arrangements for and sponsored one of the speakers, Mike Unsold, who was a great addition to the line-up of conference speakers. We really appreciate OPT's past and ongoing support of OCA's activities, and their many contributions that have helped us bring you special events such as the AstroImage conferences.

Advanced Telescope Systems (ATS) (<http://www.advancedtelescope.com/>): Stephen Eubanks (OCA Board member, former Anza House Coordinator, and general lender of aid and assistance when needed) and Advanced Telescopes Systems are pretty much synonymous, as this is Stephen's company. If you want something portable but more stable than any tripod, you should check out his portable piers (he also makes permanently mounted piers). Besides looking after his own booth, Stephen frequently helped out with other things at the AI 2004 conference, such as setting up tables and chairs for the meals, moving the refreshment tables (we moved those and everything on and around them about four times), bringing an ice chest to help preserve the leftover lunches, and generally doing more than his share to keep things going smoothly. He and his company have been sponsors of past AstroImage conferences in addition to this one (for AstroImage 2002, he even donated one of his piers as a grand prize, which was extremely generous of him), and we are very grateful for that continuing support.

Western Amateur Astronomers (WAA) (<http://www.waa.av.org/>): WAA is an umbrella organization of local astronomy clubs, and OCA is a long-time member. Its most visible activity in recent years has been the G. Bruce Blair Award, which gives recognition to people who have made significant contributions to amateur astronomy. Among its activities, WAA also encourages and supports local and regional conferences hosted by local astronomy clubs, and we are very pleased that they became a sponsor of the AstroImage 2004 conference. In particular, they sponsored the refreshments, which meant that I got to work with Tim Hogle (our WAA representative, a Charter Member of OCA, and past OCA Trustee, among other claims to fame) and two of his WAA colleagues, Earl Wilson and Richard Rynne. Earl is the WAA representative for the China Lake Astronomical Society and WAA Treasurer, and Richard is the representative for the Sierra Wave Astronomical Society in Lone Pine, and they both came down to the wilds of Southern California for RTMC, as well – I highly recommend getting to know them if you have the chance, as they're both a lot of fun. If you have any questions about WAA, suggestions for who OCA should nominate for the next G. Bruce Blair Award, or ideas on what WAA might be able to do to help member organizations, Tim would be delighted to hear from you (he's listed in the Contact List on the back of the SA).

Without these sponsors, we wouldn't have been able to provide a conference with the caliber or range of speakers, in as nice a facility, or with the range of activities as we were able to include in AI 2004. We are very grateful to all of them – whenever you next have contact with any of them, please let them know how much their help is appreciated (especially those of you who went to the conference).

Website Update

I'm very happy to report that we now have a new Technical Webmaster, Hari Dudani, who has been taking over responsibility for the technical side of the OCA website from Liam Kennedy. I understand that he is already putting together a list of projects that need his attention – if you notice some changes in how certain portions of the website seem to function, you may be seeing the results of his efforts. We are delighted to have him as part of the team keeping our website working well.

We still need a new Website Editor, the position that Russ Sipe currently is filling. This person would be responsible for keeping content of the website current and adding new content. If you're interested, please contact Russ Sipe or me (see contact info on the back of the SA). Russ needs to leave that position by the end of the year, due to other commitments, so, if you're interested in it at all, please contact us as soon as you can.

Local Dark Sky Group

Many of you are familiar with the International Dark-Sky Association (IDA) and its efforts to preserve dark skies by a variety of activities that include laws to reduce light pollution, working with the lighting industry on better fixtures and standards, and community education. The IDA website (<http://www.darksky.org/>) has a wealth of information on dark sky topics, including helpful links to even more information. If you want to see examples of lighting ordinances that have been passed in different cities, this is the best place to start. If you want to know what kinds of full cutoff light fixtures are available, this site has links. IDA even has PowerPoint presentations available to help with talks you might want to give on dark sky topics. It's a great resource to non-members as well as members, but the more members they have, the more clout they have with politicians and bureaucrats, so I hope you'll join if you aren't already a member.

In addition to the general organization, there's a local section of IDA, the San Diego International Darksky Association, which focuses more on lighting issues in Southern California. Although it is centered in San Diego County, lighting in that county unquestionably affects us at Anza, so we have a direct interest in their activities. In a recent flyer I received from them, they mention that they gave "good lighting" awards to Pala Casino and Extended Stay America on Highway 78 for demonstrating good outdoor lighting, and that they are working to introduce the Model Lighting Ordinance that was recently posted on the IDA website in all of the communities in San Diego County that don't yet have a lighting ordinance – an effort that is likely to benefit us directly (as well as the Palomar observatories), and that I'd like to see pursued in Riverside and Orange Counties, as well.

Lisa Bruhn is the President of San Diego IDA, and is trying to expand the group's membership base. Again, the more members the group has, the more clout it will have with politicians, bureaucrats, developers, and even the members of the public they try to reach in their community education efforts (and, of course, the funds raised from membership donations help in all of the section's activities promoting and protecting dark skies). If you would like to join – and I hope you do – they list membership donations at four levels ("Star" at \$25.00, "Moon" at \$50.00, "Planet" at \$100.00, and "Galaxy" at \$250.00; all are tax deductible as IDA is a 401c3 organization). You should send your name, address, phone and email information, along with your payment, to: Penny Distasio, 719 Brookins Lane, Vista, CA 92803.



ABOUT OUR SPEAKER

Anwaruddin 'Anwar' Ahmed will be speaking to us this month on the design, architecture, and scientific objectives of the James Webb Space Telescope (JWST). JWST is designed to operate primarily in the near and mid-infrared electromagnetic spectrum (0.9 to 29 microns) at cryogenic temperatures (7 to 30 Kelvins) that can be reached at Lagrange Point 2 of the Earth-Sun system.

The prime contractor for developing the JWST is Northrop Grumman Space Technology, and the major subcontractors are Ball Aerospace, Kodak and ATK. The scientific objectives of JWST are based on the recommendations of the astronomical community including the Decadal Survey, the Dressler HST & Beyond report, and the Ad-hoc Science Working Group (ASWG) with their Design Recommendation Mission.

ASTROSPACE UPDATE

October 2004

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 Web site (<http://www.ocastronomers.org>), select Space Update Online, and the topics are there to click on.

Cassini (Saturn mission) has discovered 2 new moons of Saturn. They are the smallest ones known, at about 2 and 2.5 miles across. Astronomers were surprised to find them between the orbits of Mimas and Enceladus, since theory says this area ought to have been swept clean of small moons by occasional comets passing Saturn. Astronomers do expect to find tiny moons near the rings or in the ring gaps, so further images will be taken of those areas looking for more moons. One of the new moons may be an object that was seen once by the Voyager spacecraft 23 years ago, but was never verified. Later it was announced that another moon or two were found near the F ring, the bizarre narrow braided ring.

A new **ring** has been discovered in Cassini images. It lies exactly in the moon Atlas's orbit, so is probably material thrown off that moon. The ring is quite faint and lies between the A ring (outermost ring visible in small telescopes) and the F ring.

Cassini took the most detailed **temperature** measurements ever of Saturn's rings. The side away from the Sun varied from minus 261 to minus 333 degrees F. The denser opaque regions were found to be cooler, as predicted. Certain individual ringlets were also found to vary in temperature from their surroundings. A picture of the rings has been released that shows the temperature using false color. It will probably become a classic image for those who wish to believe that the rings have turned red and blue.

Cassini completed its **maneuver** at the mid point of its first orbit about Saturn to change the size and shape of its orbit. For fuel efficiency, the previous maneuver that got Cassini into orbit had to take place much closer to the planet than all future orbits that are needed to explore the moon system; thus the requirement to change orbit size. This was the 3rd longest firing of its rocket engine. A close encounter with the moon Titan will occur Oct 26.

Genesis (solar wind sample mission) spent more than 2 years gathering solar wind material on a variety of collector materials, and was to be plucked out of midair by a helicopter Sep 8, in order to prevent the fragile collectors from breaking on impact with the ground, even though the parachute was capable of slowing to about 10 mph. But the parachutes failed to deploy, and it struck the Utah desert at 193 mph, breaking open the canister and shattering nearly all the collectors. Review boards have been set up to investigate. The best guess of the cause of failure at this early time is that there may have been a failure of the sensor that indicates it is time to begin the landing procedure, including deployment of a small and large parachute. Preliminary examination of the samples indicates that many may not be contaminated with Utah dust, and it is predicted that most, if not all, science experiments planned for the samples can be completed. Much of the analysis can be done even with shattered collectors. It will take a few months extra to determine what got contaminated, and how to clean it. The composition of the solar wind is believed to reflect the composition of the gas cloud that collapsed to form the Sun and planets about 5 billion years ago. Operators of the Stardust spacecraft (comet sample return) are quite interested in the outcome of the failure investigation, since Stardust is already on course to return its samples to the same place in Utah using similar parachutes in 2006.

Mars Rover Opportunity continues to explore Endurance Crater. It has completed measuring chemical content of all exposed rock layers from the rim down to just above the sand dune field in the bottom. Chlorine was 3 times as abundant in the middle rock layers, and magnesium and sulfur were found less abundant in the lower (older) layers. It is thought that water flooding the area just after the lower layers formed dissolved the magnesium and sulfur. An attempt was made to measure the nearest tendril of the sand dunes, but the rover started slipping badly just before it reached it, so was commanded back to harder ground. A new

variation of the so-called blueberry rocks (tiny spheres of hematite) has been found that has a coating of a lighter mineral around the blueberry. It is possible that the coating was deposited from briny water evaporating.

Astronomers from the University of Colorado say that the mineral and thermal measurements of Mars's surface from the orbiting Global Surveyor and Odyssey spacecraft indicate that the same conditions that are being examined close up by Mars rover Opportunity, which indicate a **sea** once covered the landing area, also apply to a surrounding area larger than the Great Lakes here on Earth.

The **RAT** (Rock Abrasion Tool) on Opportunity jammed when a pebble caught in the spinning blade, but it fell out a few days later, so the rover is ready to drill more holes in rocks. This allows the spectrographs to measure the composition of the rocks rather than that of their dusty or weathered coatings. Opportunity has ground 18 rocks and brushed 5. Spirit's RAT has ground 9 rocks and brushed 28.

Mars Rover Spirit examined the best bedrock it has seen part way up the Columbia Hills. In those rocks it found the first evidence that standing water had modified those rocks. Previous evidence of water by this rover could have been caused by mere seepage. The other rover had found evidence of running water at its landing spot. The bedrock in Columbia Hills is softer and contains more bromine, sulfur and chlorine than rocks found on the plain below the hills.

During the middle of September, Mars, along with the rovers there, passed behind the Sun (called **conjunction**). Radio communication was expected to be lost for a few days at this time, so exploration plans for this time were preloaded into the rovers. For safety, the plans included no driving or movement of the robot arm, but instead concentrated on pictures and infrared measurements.

Meteorite source found – Scientists who have made a careful analysis of radioactive and other properties of a meteorite found 2 years ago in Oman believe that it reveals exactly where on the Moon it came from, and when it formed, was launched from the Moon by an impact, and fell to Earth. In addition dates have been measured for when it was churned twice by lunar impacts before being knocked into space. The rock formed 3.9 billion years ago when a huge impact formed Mare Imbrium, one of the large "seas" of lava visible on the Moon. It contains KREEP, an acronym for rocks high in potassium, rare earth elements, and phosphates. KREEP has been found only in Mare Imbrium, at least so far. The rock was churned up from deep below the surface by the impact 2.8 billion years ago that formed the crater named Lalande. An impact 200 million years ago churned it again, leaving it about a half yard below the surface. About 340,000 years ago another impact created a crater 43 miles north-northeast of Lalande and knocked the rock into space, from which it fell to Earth 9700 years ago. 7 of the 30 known meteorites that came from the Moon were found in Oman, where the desert climate preserves meteorites well, and the lack of vegetation makes them easier to find.

Neutron star – Scientists have measured the mass and radius of a neutron star using a new technique involving the X-ray spectra of the surface. The spectra showed the rotational velocity of the star, through line widening, and the surface gravity through redshift caused by General Relativity effects. The rotational period was known to be 1/45 second from the period of flickering caused by material falling onto the neutron star. These numbers allow calculation of the total mass (1.75 times the Sun) and radius (7 miles) of the star. This indicates a density of matter that agrees with theoretical densities of a neutron superfluid, but is not as dense as the theoretical quark matter that has recently been proposed as the material of some neutron stars.

Small exoplanets – A team of astronomers using a 3.6-meter telescope in Chile has detected a planet orbiting the star mu Arae whose mass is about that of Neptune, by far the smallest mass of any planet known outside our Solar system (exoplanet). They were actually trying to do astro-seismology (the study of a star's interior from observing the surface waves), but the disturbance from the planet interfered with observations. About a week later, another team announced 2 more planets in this mass range found orbiting the stars 55 Cancri and Gliese 436. All 3 lie in the range of the smallest gas giant or the largest rocky planet that should form according to planetary formation theory, so it is not yet known which type they are. All are quite close to their stars, at least according to Solar system standards, and therefore complete an orbit (their year) in a matter of Earth days. The radial velocity method was used to find all 3; that is, a spectrograph was used to measure the forward and back motions of the star as it is tugged by the gravity of the planet circling it. The planet at mu, a Sun-like star, orbits in 9.5 days and is 50 light-years from Earth. The star was already known to have a Jupiter-sized planet orbiting much farther away. This is the reverse of our Solar system, where Neptune is in an orbit beyond Jupiter. This difference may mean that the Neptune-sized planet at mu is not a gas giant. The planet at 55 Cancri is the 4th planet found in this system, the largest group of planets known outside the Solar system. It orbits at only 3.5 million miles from its star, taking just 2.8 days, and is 41 light-years away. Its closeness to its star keeps it about 2700 degrees F. The other planets there orbit in 15, 44 and 4520 days. The planet at Gliese 436 orbits its star every 2.6 days at a distance of only 2.6 million miles, is about 700 degrees F., and is about 30 light-years from us in Leo. This is only the second planet known to orbit an M dwarf star, a type with only about 2/5 the mass of our Sun. This class of planets is still about 10 to 20 times more massive than Earth. The sensitivity to discover planets as small as Earth will probably have to wait for future space telescopes such as Kepler, Terrestrial Planet Finder, and the Space Interferometry Mission.

Chandra (X-ray observatory) has captured the hot gas clouds of a cluster of galaxies (called Abell 2125) merging together. One of the clouds has a very low content of iron atoms, so is in the very early stages of cluster evolution. Each cloud of hot gas contains hundreds of galaxies, which are merging to form a huge cluster of galaxies. Early in the evolution of galaxies, they go through a period of supernovas that eventually release large amounts of iron into the gas about them. Study of this cluster should tell us much about the details of galaxy evolution and galaxy cluster evolution.

(cont'd on page 8)

“Explore the Universe” at the National Air & Space Museum

by Matthew Ota

At the ever-popular Smithsonian National Air & Space Museum in Washington, D.C. is a current display of rare astronomical instruments and artifacts called “Explore the Universe”. Located on the Mall, the NASM is the most popular museum in our nation’s capital.

As you enter you walk through the history of astronomy, starting with “Naked Eye”, featuring medieval astrolabes and Tycho Brahe’s Armillary Sphere. Dim lighting throughout this display reminded me of the lack of light pollution in this era of astronomy.



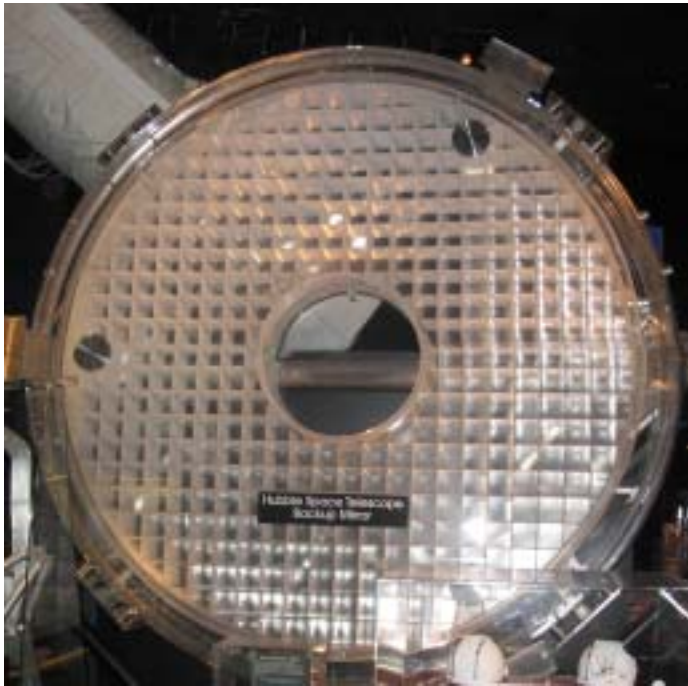
The next section, “Looking Further”, is when your jaw begins to drop. The main artifact here is William Herschel’s 20-foot telescope, on loan from the National Maritime Museum of London. Herschel, who is sometimes referred to as the world’s first amateur astronomer, used this telescope to observe and catalog thousands of nebulae. This British national treasure includes a display of a speculum mirror, which was placed at the bottom of the large wooden telescope tube.



“Looking Further, Photography” is the next display. It is housed within a simulated observatory dome and contains an artifact that is familiar to many of us Southern California astronomers - the Newtonian focus cage from the Mount Wilson Observatory’s 100 inch Hooker Telescope. It includes a mannequin sitting in Hubble’s chair, intently staring into the eyepiece. The display also includes a video of a 1930’s era newsreel on the Hooker Telescope that shows Edwin Hubble working with Milton Humason at the observatory. A light box display shows the operations at Mt. Wilson today, which includes the CHARA array.

"Looking Further, Spectroscopy" has two major artifacts, the 1950s era prime focus spectrograph from the 200 inch Hale telescope at Palomar Observatory, and the Brashear spectrograph from the Lick Observatory. This spectrograph was built in 1894 and is very prominent in the history of the Lick Observatories, as it was installed on the great 36-inch refracting telescope there.

In the "Exploring the Universe in the Digital Age" section, the most prominent artifact is the perfectly ground mirror for the Hubble Space Telescope made by Kodak as a backup to the imperfectly ground Perkins-Elmer mirror that is now in orbit. It seemed a waste to me to have this fabulous mirror on display instead of in use on a modern telescope.



The original Hubble Space Telescope's Wide Field / Planetary Camera WF/PC or "Wiff-Pick" is on display. Originally on the HST, it was removed on orbit by astronauts in 1993 and replaced with the WF/PC 2 camera. In a separate display is the CCD chip from the WF/PC, an 800 x 800 pixel array containing 640,000 pixels. That is 640k, 6/10ths below the megapixel unit now used to rate digital cameras. In addition to this display is a Chandra X-Ray Telescope imager, the ROSAT X-ray imager and a prototype for a high-resolution x-ray imager from the Smithsonian Astrophysical Observatory.

The final artifact in this section is a bit unusual, the Pigeon Trap used by Penzias and Wilson during the process of the discovery of the echoes of the Big Bang. They thought that this radio interference was caused by nesting pigeons, so they placed this trap inside the satellite horn antenna. This radio hiss was actually caused by the faint echo of the Big Bang and Penzias and Wilson had inadvertently discovered it, leading to a Nobel Prize in Physics.

The final section is called "Exploring Today". It is the largest portion of the exhibit and contains models of the Chandra X-Ray Observatory, the Smithsonian Astrophysical Observatory, the Hubble Space Telescope, the Hopkins Ultraviolet Telescope flown on the Space Shuttle, the ROSAT satellite and the crown jewel of observatories in the continental United States, the Kitt Peak Observatory in Arizona. Also included in this section is a display of modern-era amateur astronomer's astroimages. This display has information card on how to submit digital images for display in the museum or on their online web page. This may be of interest to our many astroimagers in the OCA. Our very own Bill Patterson has already displayed some of his work on this web page:

<http://www.nasm.si.edu/exploretheuniverse/firstlight/index.htm>

This temporary display of rare astronomical treasures is only a small part of the museum. There are many other fine exhibits of interest to space buffs in the mall museum and also at the new Udvar-Hazy annex at the Dulles Airport. These fine museums are open to the public and are free from admission fees.

The NASM main web page is at <http://www.nasm.si.edu/>

(cont'd from page 5)

Also shown in the same Chandra image is a **galaxy falling** into the cluster of galaxies, and being stripped of its gas by a hot gas cloud of the galaxy cluster. The image shows a tail of gas behind the infalling galaxy, cooler (only 10 million degrees) than the gas cloud it is falling into. Follow up observations with the Hubble Space Telescope show the galaxy has a large-scale disturbance, its star-forming regions are concentrated on one side, and its dust is twisted into chaotic patterns, obscuring the spiral pattern it must have once had. Radio observations show particles escaping by spiraling through the galaxy's magnetic field.

Chandra has taken a very long exposure (11 days) of the supernova remnant **Cassiopeia A**, probably the most detailed image ever made of such a remnant, revealing more complexity than expected. A large jet-like structure protrudes beyond the nearly circular shock wave. It extends about 10 light-years in both directions. The jets are rich in silicon, but poor in iron, although other areas of the remnant are rich in iron, as expected. The supernova exploded about 340 years ago. The neutron star formed by the explosion is seen faintly at the center of the remnant, with no pulsar pulsation detected.

Chandra has completed its planned 5-year mission, and has been **extended** for another five years since it is producing such amazing observations.

Ages of galaxy and globular cluster – The Very Large Telescope in Chile has for the first time measured the beryllium content in very old main sequence stars in a globular cluster (NGC 6397). The significance of this is that beryllium builds up in the entire vicinity of a galaxy early in its history, so the amount of beryllium in the globular cluster tells us how much later the globular formed than did the first stars of the galaxy. Main sequence stars had to be measured because when stars evolve off the main sequence, they destroy their beryllium. This had not been measured before because the spectral lines of beryllium are weak and a ways into the ultraviolet, but a new spectrograph on the VLT was able to handle the challenge. The answer is that NGC 6397 formed about 200 to 300 million years after the Milky Way. The age of the stars in NGC 6397 was measured at 13.4 billion years, plus or minus 0.8 billion. The Milky Way galaxy must then be about 13.6 or 13.7 billion years old, plus or minus 0.8 billion. The best estimate for the age of the universe since the Big Bang is 13.7 billion years, implying that the Milky Way formed quite soon after the Big Bang. It is believed that any galaxy takes at least 200 million years to form, so the age of the Milky Way is probably not over 13.5 billion years.

Small telescope discovers exoplanet (planet outside the Solar system) – A team of astronomers has built a network of 4-inch relatively cheap telescopes in the Canary Islands, at Lowell Observatory in Arizona, and Palomar Mountain, to monitor thousands of bright stars for drops in brightness caused by planets passing in front of them. The first batch of observations yielded 16 candidates, which were all checked out with larger telescopes to eliminate the other causes of brightness drops, and one of the candidates was proven to be a new exoplanet. This is the first planet discovered by a dedicated survey of star brightness, and the first by such a small telescope. However the largest optical telescope in the world (Keck in Hawaii) was used to take spectra of the star to confirm that a planet was the cause of the brightness drop. The new planet orbits its star every 3.03 days, is nearly 10 times closer to its star than our planet Mercury is, has about the mass and diameter of Jupiter, and is about 500 light-years from us. The closeness to its star keeps its temperature at about 1500 degrees F. Further observations will be made to try to detect its atmosphere or any possible moons or rings, though the likelihood of moons or rings surviving this close to a star is small.

Black Hole – Scientists have developed a new way to measure the mass of a black hole and applied it to the one in the center of the galaxy NGC 3516 in Ursa Major. Using the XMM-Newton X-ray observatory, they tracked a mass falling into the black hole through its last 4 orbits about it, which took about 1 day. The spectrum of the matter showed gravitational redshift and Doppler shift, and from that and the orbital time, the mass can be calculated. The result has some uncertainty, but lies between 10 and 50 million times the Sun's mass.

Spitzer (infrared space telescope) has imaged the colliding pair of galaxies commonly known as the Antennae. The center of the collision in visible light shows only dust, but the infrared images penetrate the dust to show a population of newborn stars. The Antennae are about 68 million light-years away, and have been colliding in a large swirling motion for about 800 million years, churning the galaxies and throwing off streamers of stars and dust.

Exoplanet – Astronomers using adaptive optics on the Very Large Telescope in Chile believe they have imaged an orbiting a star (other than the Sun) for the first time. Since past images of alleged exoplanets have all turned out to be some other object, this observation will have to be verified by further observation. The exoplanet candidate is a very faint and red point very close to (4/5 arc second) a brown dwarf in the constellation Hydra. The infrared spectrum of the candidate indicates that it is probably a planet about 5 times as massive as Jupiter, with a surface temperature of about 1000 degrees C., and has already ruled out some of the imposters that looked like planets in the past. The temperature is explained by the exoplanet being quite young so that it is still losing the heat of formation, not by heating from its brown dwarf. The brown dwarf has been measured at only 8 million years old, so its planet would have to be somewhat younger than that. The next step is to track the candidate and its brown dwarf for a year or two to see if their motion matches the supposed orbit.

Dr. Fred Whipple, author of the dirty snowball (although he preferred "icy conglomerate") theory of comets, has died at age 97. He was the oldest working astronomer, still holding a position at the Smithsonian Astrophysical Observatory, where he was director until 1973. He was an active researcher for the Contour comet mission. He long ago retired as professor of astronomy at Harvard. He discovered 6 comets over his career, but changed the way everyone viewed comets with his 1950 paper on icy conglomerates. 11 years before the first Earth satellite (Sputnik) was launched, he invented a way to protect spacecraft from meteors in space, a method still used. Also before Sputnik he organized a network of amateurs trained and equipped to observe satellites, which was

the only such system ready when satellites appeared. The Mt. Hopkins Observatory in Arizona was renamed the Whipple Observatory in 1981.

Beagle 2 report – Another report, by a different group, has been released following investigation of the failure of Beagle 2, the European Mars lander that disappeared last December. Like the previous report, it also concludes that there is not enough data to conclusively tell what failed, since there was no data transmission planned or attempted during the landing phase. However, this team judged most of the possible failures as unlikely, and suggests that the only likely explanations are failure of the parachute to slow the craft down enough or failure of the air bags during the first bounce. Both of these could be contributed to by unexpectedly low atmospheric pressure, and in fact such was measured near the landing area by Mars Express from orbit and by the NASA landers in other areas of the planet. Failure explanations considered unlikely, but possible, included: electronics failure, damage to the heat shield, broken antenna, collision with some object or debris, and falling into a crater during landing. Like the previous report, this one noted the severe constraints on budget and schedule to deliver the spacecraft, and shortage of system testing. The report concluded that the smudge found on images of the landing area taken by Mars Global Surveyor were probably not the spacecraft, but a tiny crater. The Mars Reconnaissance Orbiter to arrive in 2006 will probably have the resolution to find Beagle 2. The European space agency is asking NASA if they can place a replacement Beagle piggyback on the Mars Science Laboratory, a lander scheduled for 2009.

Solar Sails – Only a month after the first ever test of a solar sail in a space simulator (by NASA), the first deployment of a solar sail in space was accomplished by the Japanese space agency. It was a suborbital flight, intended to test deployment only, so it did not get a chance to sail under sunlight pressure. The Planetary Society's solar sail was completed and sent to Russia for launch into orbit in a few months.

Phosphorus is the 5th most abundant element in life, and is fairly common on the Earth, but fairly rare in the universe. However iron meteorites contain substantial phosphorus. A new study shows that most of the Earth's and life's phosphorus compounds probably came from the corrosion by water of the minerals in meteorites that rained down on Earth in its early history. Since Jupiter perturbed planetesimals during this time such that many of them collided with Earth, it may be necessary to have a Jupiter-like planet in any planetary system to supply ingredients for life, such as phosphorus, to any Earth-like planet.

Instant AstroSpace Updates:

Chandra (X-ray observatory) has imaged the relatively nearby Fornax cluster of galaxies, and found that it is being pulled gravitationally by a massive structure of dark matter.

Mars Express (European Mars orbiter) has relayed pictures and data from the rover Opportunity to Earth in a test of international spacecraft compatibility. Mars Odyssey continues to relay most rover data.

Mars Odyssey has completed its prime mission of observing the planet from orbit for 1 Mars year (687 Earth days), and has been funded for another Mars year. The extended mission will characterize year-to-year variations in surface and atmospheric conditions, monitor the atmosphere during the next orbiter's dipping into the atmosphere for aerobraking, and relay data from the next lander.

A type II **supernova** has been discovered by an amateur astronomer in Japan in nearby (11 million light-years away) galaxy NGC 2403, the closest supernova in more than a decade. The star was about 15 times the mass of the Sun and only 14 million years old when it exploded.

The gravity spacecraft **GRACE** has been found to so precisely measure Earth's gravity that it can detect a few inches change in groundwater or river levels, and thus can be used to track the effects of rainfall for climate scientists.

SOFIA (2.5-meter [98-inch] telescope mounted in a 747 jet) saw its first airborne light in August. It is designed to make observations above most of the Earth's atmosphere.

The European Space Agency has completed construction of an observation cupola, covered with windows, to be installed on the **International Space Station** in 2009. The justification was for guiding space-walk and robotic operations about the station, but should vastly improve capabilities for astronomy or to observe Earth.

It has long been known that astronauts usually lose mass in space, and so do rats. A new study shows rats lose weight in increased gravity. Apparently **eating regulation** systems in people and animals depend on the "right" value of gravity.



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(cont'd from page 3)

And, if you're interested in getting involved in a "Dark Sky" section within OCA, please let me know – it's an area where we really need to take action before we lose our dark sky at Anza entirely to local development and before Orange County is entirely built out.

Upcoming "How to Use Your Telescope" Class

The next "How to Use Your Telescope" section of the Beginners Class is the first Friday in November (that is, the 5th) which is the regular meeting time for the Beginners Class. We need volunteers to come help out with this session – so please plan to come if you want some help with a telescope, or if you want to help out others who need some assistance in getting their 'scope to work and in finding things with it. We always have a lot of fun with this class, which (weather permitting) often is like a small-scale star party.

As usual, it formally starts at 7:30 p.m., and will be on the grounds of the Centennial Heritage Museum, both in the classroom at the back of the property and in the parking area around the classroom. The museum is at 3101 W. Harvard St., Santa Ana, just west of Fairview Ave., between Edinger and Warner. If you have any questions about this event, please contact Antonio Miro, Jim Benet or me.

In Closing...

Don't forget that Daylight Savings Time is officially over in the early morning hours of October 31 this year – just in time for the Trick-or-Treaters. If you have a "GoTo" telescope and it starts acting strange around then, or the next time you fire it up after that night, it may not have made that transition successfully. It always seems to be a challenge if I'm running the Kuhn during that transition...

Magazine Subscriptions

Subscriptions to the Astronomy magazines are now due for renewal, if you subscribed for one year or would like to subscribe at the club rate. You may also extend an existing subscription that does not end in December for one year at the club rate. Bring your check made out to the OCA to the meeting or mail it to:

Charlie Oostdyk, Orange County Astronomers, PO Box 1762, Costa Mesa, CA 92628.

Checks made out to the magazine publishers cannot be processed and will be returned to you.

If you already subscribe, please provide the mailing label or the billing invoice with your check.

One-year rates are as follows:

	Club Rate	Regular Rate
Sky & Telescope	\$33.00	\$42.95
ASTRONOMY	\$29.00	\$39.95

The **DEADLINE** for subscribing at the club rates will be the **October monthly meeting, October 8th.**

The publishers will send expiration notices to all current club subscribers about November 1st even if you renew through the club. It takes the publishers a few weeks to process renewals.

For Sale: Canon EOS Rebel G, Excellent condition only a few years old. Camera body only. - \$100 o.b.o., Please call Bill Johnson at 714-553-5793 or e-mail at home@byjohnson.com

For Sale: 2 Discovery mirrors, 6" F/5 (new coating) and 6" F/8 (coated last year). Unblemished, in excellent condition, aluminized and quartz overcoated. \$40 each. Contact Bill Hepner at 714-447-8566 or billhepner@yahoo.com

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