



ASTROIMAGE 2004

August 27-28, 2004 • Costa Mesa, Calif., CA



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OCA CLUB MEETING

The free and open club meeting will be held Friday, August 13th 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 OCA's own Liam Kennedy, speaking about his recent experiences observing the Venus Transit from Iran.

STAR PARTIES

The Black Star Canyon site will be open this month on August 7th. The Anza site will be open August 14th. 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 August 6th (and next month on September 3rd) at the Centennial Heritage Museum (formerly the Discovery Museum of Orange County) at 3101 West Harvard Street in Santa Ana.

GOTO SIG: Aug. 2nd, Sept. date TBA

Astro-Imagers SIG: Aug. 17th, Sept. 21st

EOA SIG: Aug. 23rd, Sept. 27th

Astrophysics SIG: Aug. 20th, Sept. 17th

President's Message

By Barbara Toy

In case you haven't picked up yet on the delicate hints that have been dropped here and there over the last few weeks, this month (August, the 27th and 28th, to be precise) is the month of our truly excellent AstroImage 2004 Conference. What a chance to learn from some of the true masters of the art – and it's happening in our own back yard! What a chance to meet and mix with other people interested in imaging – both from our club and from outside the club! What a chance to fill your mind with new ideas and your heart with enthusiasm – the creative energy that's generated when you get well over a hundred people who are interested in different aspects of the same subject together in one place is incredible, as we saw with AstroImage 2002.

In short, you really don't want to miss this one, especially if you missed the 2002 conference. There's something for everyone here, from the Beginners session (and social gathering) on Friday night to talks on advanced techniques and topics of more general interest during the day on Saturday, to the different (and entertaining) look at imaging from the perspective of "amateur" imaging in space on Saturday evening – so don't let your experience level, whatever it might be, get in the way of having a really good time!

You'll find more information about the conference elsewhere in this issue, and all the details are on the website – just follow the link on the homepage, or go directly to <http://www.ocastronomers.org/astroimage/2004/>. To top it off, if you sign up and get your money to Charlie Oostdyk at least a week before the conference, you'll save \$16, which is a deal you can't pass up – so sign up now, and we'll see you at the conference!

Now that I've got that out of my system...those of you who've read the July President's Message posted on the website will recognize a lot of what follows as coming from that Message. Unfortunately, there was a problem in transmitting the original version to Steve Condrey, our esteemed editor, so he wasn't able to include it in the July issue of this newsletter. Where appropriate, I've updated these sections, so the first two in particular are a lot different from the original July Message. Even if the rest may be a repeat for some of you, it's appropriate to have them in print, as that's the permanent record for the club and we also have some members who don't have access to our website.

Fire at Anza – Our Thanks to the Firefighters...

The more you look around the burned areas at Anza, the more you realize how much hard work the firefighters did to protect the buildings on our site and stop the fire. The most visible signs are cut branches and piles of cut shrubbery from where they cleared the bushes away from vulnerable areas and the sections of bare earth circling the burned zone that they cleared to bare earth to contain the fire and create firebreaks. Our local Anza fire department is through the California Department of Forestry (CDF), and we are very grateful to all of the individual firefighters who did so much to help us and to the entire CDF for providing support – particularly the other members of our local department.

Besides sending a letter on behalf of the club thanking the firefighters of CDF Fire Station #29 (our local fire station in Anza), we invited all of the local firefighters and their families to our annual Starbeque potluck party on July 17 as a token of our appreciation. I'm finalizing this on the morning after the Starbeque, which was a great party with a lot of good food and good company – but no firefighters. A fast-spreading wildfire started around 3:00 p.m.; according to the Sunday edition of the Press Enterprise that I picked up in Temecula on the way out, this was the Melton Fire in rural Sage, about 5 miles south of Hemet, and it was started by someone shooting at targets. It had burned over 2000 acres by press time, and was only 10% contained by nightfall. Our firefighters were undoubtedly very much occupied with that or the other big fires that have been burning in Riverside, San Diego and Los Angeles Counties. We are very sorry none of them made it to the party, and concerned for their safety and well-being through this already difficult fire season. [And, to add insult to injury, the smoke and ash from the fire interfered with the viewing and posed a danger to optics as well as sinuses.]

It's going to be a very long, hot summer for all of us, and particularly for those who have the job of fighting the fires and limiting their damage, and we wish them all the very best of luck and health in the difficult months ahead. Ironically, because our fire burned a lot of the dry vegetation on our site, we should now be in less danger of fire for the rest of the season, but that's a hard way to gain protection!

Repairs, and Plans for the Future

We were very lucky that the firefighters were able to keep the fire from reaching any of the buildings on our site, and that the bulk of the area that burned was the undeveloped territory northwest portion of our property. The damage it caused around Mars Hill and the Lower Pads drives home the fact that we need to be a lot more aggressive in the future about clearing the weeds around the pads and buildings early in the season. Dave Radosevich, our Vice President, was one of the first club members to view the damage on our site, and has pointed out that, if the weeds had been cleared around all of the pads on Mars Hill as called for in the Pad Rules, there would have been no damage to any of the electrical boxes, in particular, as they were scorched by the heat of the weeds burning around them.

Thanks to the efforts of Bruce Waddington, who made a special trip out to Anza on June 13 to test the electrical connections on all of the pad areas (not just in the areas directly affected by the fire), we had a good summary of all of the problems before the star party on June 19. Gary Schones was able to make the electrical repairs to the Mars Hill area in time for the star party (including repairing some problems that weren't due to the fire). One positive side to all this is that Bruce found some problems we didn't

know we had, and he has generously spent additional time repairing a number of them when he was out there a few days before the July star party: we expect that the remainder will be fixed soon. Bruce and Gary – thanks again for your help!

As to the fire damage in particular, it turned out that the electrical damage overall was pretty minor, and most of the visible damage was cosmetic and didn't affect the wires themselves. And – another positive touch – the table that was destroyed turns out to have been dumped by some unknown person who no longer wanted it (which is *not* the way to dispose of something you no longer need, by the way), so it's not really a loss either.

We can't expect this kind of luck to continue, and in future years, pad and observatory licensees will be expected to clear the areas around their pads pursuant to the OCA Observing Pad Policy no later than May 31 of that year. If you are one of those members who regularly use particular pads when the license holders aren't there, you can show your appreciation by helping to clear the area around the pads you use. The rules provide that, if a particular pad isn't maintained, the club can do maintenance and charge the licensee for the cost. Since the danger caused by uncleared weed growth affects neighboring pads and the entire property, we will have to use that rule more aggressively than we have in the past to ensure that the weed clearance (which is part of the required pad maintenance) is done and done timely.

Of course, we'll also need volunteers every year to help with clearing the areas around the observatory, Anza House, the pads in the Football Field, and the other "general use" areas of the site – there's plenty of work for everyone! With many willing hands, we should be able to get it done without it being too much of a burden for any one person. You don't need to wait until next year to help out - if you see any weedy growth around the buildings or the pads out at Anza, please feel free to eliminate it!

Thanks to Member Neighbors at Anza – the Caldwells, and "HKR" (Jim Hannum, John Kerns and Dave Radosevich)

We are very fortunate to have several club members who have property near our Anza site and who help keep an eye on it. Tom and Linda Caldwell have a house on the other side of the valley from the club property, and Linda was one of the first people to see the fire and report it – undoubtedly a factor in the prompt response of the firefighters. The Caldwells watched the progress of the fire and the firefighting efforts, took pictures (they gave us a set for the club archives), and let me know what was happening. They also checked our site the next day, when people were allowed in after the fire was out. We really appreciate their vigilance and help.

We have another set of neighbors who I should have thanked publicly long ago for all they do continually to help keep our property safe and secure, and even to help improve it. Jim Hannum, John Kerns and Dave Radosevich own the property "next door" (the "HKR property," to borrow Russ Sipe's term, which is actually across the street from the club property), and one or another of them is frequently there when our site is empty. Over the years that they've had their property, they've had the practice of regularly patrolling the club site when they're out there, checking on who may be there and for any problems. Jim is often out at Anza during the week, as he's retired, and he has been very generous in making himself available to deal with problems when nobody else could be out there.

You will undoubtedly recall that Dave was instrumental in renovating the Kuhn. Because he was involved in that project, Jim and John were also part of it, helping out when needed. Dave decided that, while we were renovating the Kuhn itself, the observatory also should be made more usable, and Jim and John got involved in such projects as the removal of the device that was used to hold the Kuhn's primary mirror when it was removed or replaced and the box that went over it (this used to be beside the door inside the observing area and was used as a type of stand-up desk, because of its height). I wasn't there when this was done, but understand that it required hoisting the box and the device (which has a heavy metal frame) over the outer wall of the observatory, as it wouldn't fit through the door, and that this was no small feat.

I was there when John decided that we needed to sort through the stuff that had built up over the last 20 years or so in the bookcase, on the old desk, on the cabinet in the corner and inside it. It was a long job, even with several of us helping, but he kept at it (and kept us at it, too) for several hours until it was done – and there was a big pile of eliminated papers and other rubbish, the bookcase was cleaned and filled only with useful items, as was the cabinet, and the desk top and even the cabinet top were cleaned off. There's no doubt that his efforts have helped tremendously in making the observatory observing area so much more functional and attractive than it was before.

The HKR property was also burned over in the fire that burned part of our site, and they lost all of their natural vegetation. Fortunately, their buildings were also entirely undamaged, though they did get covered with fire retardant. Dave, Jim and John were out there the day after the fire, cleaning up, but still took time to check the club property for damage and to take pictures for those of us who couldn't get out there that day.

This account only scratches the surface of what these fine members have done and are doing for the club. I'm grateful to them personally for their friendship and all the help they've given me on club matters over the last couple years. One of the pleasures of my position is that I can also express thanks on behalf of the club – Jim, John and Dave, on behalf of Orange County Astronomers, thank you very much for all that you do for us!

I should also mention that, in addition to all the other things he's been doing, Dave has repaired the club's 12-inch LX200, and cleaned it up in the process. It's now got clean mirrors and corrector plate, the broken focuser is fixed, and the gears have been cleaned and re-lubricated. By the time you see this, it should be mounted in the Mocat observatory, and we may even have had "first light" on the remote control system. Thanks again, Dave, for your help with this!

RTMC Retrospective

What a difference one week makes! The weekend before our fire was Memorial Day Weekend, which was the annual RTMC Astronomy Expo, and we had a lot of members who attended. We even got a lot of them rounded up for the annual group picture(s) – the “official” ones this year are courtesy of Paul Brewer, whose pictures came out much better than mine.

I want to thank those members who helped us out with the booth, most notably Carl Fan, who spent almost his entire day there on Saturday, and also a good part of Sunday morning. Other volunteers included Stephen Bobchin, Craig Bobchin and Bob Gill (and I apologize to anyone I missed). Karen Schnabel spent so much time working the booth she hardly had time to do anything else – true dedication, with all the great events going on all weekend!



This year, in addition to the usual books and magazines on sale to benefit the club library, we were also selling a lot of things that I'd pulled from our storage area, cleaned up and sorted. These included lenses of various types, prisms, bits and pieces of binoculars (some with adaptations of different types), mirrors of various sizes, and a fascinating box of what had obviously been a very high precision piece of equipment at some point but had largely been reduced to gears and other interesting **bits** and pieces. We sold quite a bit, which should help the general fund...but we do have a lot left, and you may see some of it for sale at our general meetings, if I get energetic enough to bring it in.

All in all, it was a good weekend – I hope that all of you who went out there had as good a time as I did!

On the Social Front...

In the June issue, Steve Condrey noted that one reason the Sirius Astronomer got to the printer late in June was that he was moving during the time he needed to put it together. He didn't mention that he also got married and that he and his new wife went on a brief honeymoon – it's amazing he had any time (or desire) to think of the newsletter at all!

Congratulations, and best wishes to you and your wife, Steve!

Southern Cross Dreaming

Paul Curnow

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**[http://ching.apana.org.au/~paulc/
index.html](http://ching.apana.org.au/~paulc/index.html)**

Fixed into the psyche of many southern hemisphere observers is that great southern gem the Southern Cross (Crux). The Cross appears on the national flags of Australia, New Zealand, Western Samoa, Papua New Guinea and Brazil. In addition, rebellious miners led by Peter Lalor at the battle of the Eureka Stockade, which took place in the state of Victoria, Australia in December of 1854, flew the Southern Cross on a flag as a sign of their solidarity, and as a symbol of their disdain for officialdom. In Brazil the significance of the Southern Cross (Cruzeiro in their own language) is not just relating to their flag. For example, their western-most city is named 'Cruzeiro do Sul' and, one of their most popular soccer clubs is named the Cruzeiro.

The Southern Cross or Crux is only quite a recent constellation in its present day form that astronomers use today. In bygone times, the ancient Greeks had included the stars that comprise the Cross as part of the legs of the celestial centaur Chiron. In ancient times the Southern Cross was visible from the Mediterranean Sea, so it was known to the ancients who inhabited the region, however, since these earlier times the top like wobble of the Earth has carried the cross below their horizon. It wasn't until 16th century Portuguese and Spanish mariners identified the area as a cross shape and a symbol of their beliefs, that Europeans looked at the area differently. Consequently, the French astronomer Augustine Royer formally introduced the Southern Cross to us in 1679.

The Southern Cross appears high during winter in southern skies and low during summer and is a difficult object to view from most northern locations as the star Gacrux (gamma Crucis) just skims the horizon when viewed from the latitude of San Diego. However, the stars that comprise the cross have featured prominently in 'The Dreaming' of Aboriginal Australians. For example, the Ngarrindjeri people who occupy the Coorong and Murray Valley region of South Australia saw the Southern Cross as a giant stingray in the sky that they called Nunganari. This stellar stingray was being pursued across the night sky by two sharks, the stars alpha and beta Centauri commonly known to southern observers as 'the pointers'. The Aranda people of who live in central Australia saw the Southern Cross as the claws of an eagle named Waluwara. The 'pointers' were seen as Waluwara's throwing stick and the dark cloud nebula the 'Coalsack' was seen as the eagle's celestial nest. Other western desert groups saw the 'Coalsack' as the dark head of an emu with its body trailing down into the dark lanes towards Scorpius. The Yankunytjatjara people who also come from central Australia saw the Southern Cross as a giant emu's footprint and the Boorong people of northwestern Victoria saw a possum sitting at the top of a tree within the Cross.

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ASTROSPACE UPDATE

August 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) - Preliminary analysis of images of the Saturnian moon Phoebe show that it differs in many ways from the appearance of the few asteroids that we have seen closely from passing spacecraft. This probably rules out the theory that Phoebe is an asteroid captured by Saturn. Because of Phoebe's differences from the other large moons of Saturn, it has long been believed that Phoebe did not form as part of the planet's formation process like those other moons did. This leaves the best remaining theory that this moon is a captured Kuiper Belt Object (KBO). KBOs are those icy objects found mostly in a belt outside of Neptune's orbit.

Although **Phoebe** is composed mostly of ice, the surface is covered with a darker material, but the brighter ice shows through in some areas, such as apparently newer impact craters. Phoebe's dark surface coating appears similar to that of Pluto and Neptune's moon Triton, both thought to be KBOs, also supporting the Phoebe KBO theory. Gravitational and image data from the flyby have been analyzed to get a more accurate measure of Phoebe's density (1.6 times that of water), which implies that much of the interior is water ice with some rock too. Phoebe differs from asteroids Ida, Mathilde, and Eros by lacking bright speckling from small craters, as well as being more generally spherical than these bodies. The ice content just calculated from density proved far higher in Phoebe than asteroids.

Also seen on **Phoebe** were craters everywhere, both large and small, landslides, grooves, ridges, chains of pits, bright streaks inside craters, and bright rays emanating from the smaller craters. Phoebe's daytime temperature was measured at -261 F., and the nighttime drop in temperature implies the surface is fluffy or porous. Spectral measurements found various hydrocarbons on the surface, generally resembling those on comets and primitive meteorites. Ice, dry ice (frozen carbon dioxide) and various water-bearing minerals were also found. Cassini also measured the surface with radar, the first time a spacecraft has done so for any moon other than our own. This will help in assembling a full map of Phoebe.

Cassini crossed the bow shock marking the edge of **Saturn's magnetosphere** 3 days before closest approach, considerably farther than the 3 previous Saturn spacecraft. The best explanation for this is the different angle of approach of Cassini, indicating the magnetosphere is larger in that particular direction. However the magnetosphere is known to change size somewhat with the strength of solar wind hitting it. More should be known after magnetic measurements are made over several orbits of the planet. Since Cassini is the first spacecraft to orbit Saturn, rather than just flyby, we expect to learn a great deal about the planet's environs, including magnetic data. Cassini also has an instrument that takes images of the magnetosphere from a distance, in contrast to earlier instruments that had to measure the magnetic field while passing through it.

Cassini successfully completed the 96-minute rocket burn that put it into orbit about Saturn. This occurred near the closest approach to the planet and inner **rings** that will ever happen during the mission. So the closest and therefore highest resolution images of the rings were taken near this time. Observation of the rings will continue for the next 4 years, but from a bit farther and with somewhat poorer resolution. The first images were spectacular, showing ring details better than the previous best ones returned by the Voyager missions. Density waves were seen, where ringlets get closer and closer then spread out again. Bending waves were seen, where a wave of particles is lifted out of the ring plane. Because the ring plane was crossed both before and after the orbit insertion rocket burn, Cassini was able to see both the sunlit side and the dark side of the rings during this time of high-resolution images. One ring was found to have a scalloped edge, thought to be an effect of a nearby moon. While most ring particles have been known since the Voyager mission to be water ice, measurements made by Cassini showed that the sparse particles found in the Cassini Division (the gap between the A and B rings, those most easily seen from Earth) are more dirt than ice. The F ring, the narrow braided ring just outside the A ring, also had more dirt. This dirt has a spectrum resembling the dirty coating on the surface of Phoebe. The edge of the main rings was found to have a considerable atomic oxygen content, not found in the rest of the rings.

During the **ring plane crossings** about 200,000 particles were detected to have hit the spacecraft, most about the size of a smoke particle, and none causing any damage. Cassini was protected by turning its massive antenna dish toward the particles during the ring plane crossings. Many **other instruments** took advantage of the proximity to the planet and rings, such as the magnetometer, radio and plasma wave instrument, and imaging spectrometer. Measurements of wind speed and temperature in the clouds of Saturn were made at various altitudes.

Cassini measured the **rotation period** of Saturn's magnetic field, and it is 6 minutes longer than when it was measured by Voyager in 1980. It is not possible for such a large planet to slow down its rotation that quickly, so that means that the magnetic field must be slipping in relation to the planet. One theory to explain the new Saturn observations is that where the magnetic field emerges from the planet may have changed latitude. The cloud surface at different latitudes is known to rotate at different speeds. But this still requires the magnetic field to slip in relation to the rotation deep inside the planet, which was not expected. The magnetic field of Jupiter was monitored for many years, and no similar change in magnetic rotation period was ever detected.

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The indigenous Australians who live in northeastern New South Wales and southeastern Queensland called the Southern Cross 'Yaraan-doo' and it was associated with 'death'. Their creator god Baiame, the sky king, had created the first people from the red clay of the earth and had given them a code to live by. However, some of the people had broken a taboo by killing and eating a kangaroo. One of the men in the group had left the main party after refusing to take place in the eating of the kangaroo. Eventually, this man collapsed from exhaustion and hunger under a large white gum tree (a *yaraan*). Suddenly, a menacing dark figure with fiery glowing eyes emerged near the man and elevated him off the ground and placed him into a large hole in the side of the tree. With a great clap of thunder the people watching saw the tree uproot itself and begin to slowly ascend into the sky. Shortly after the people watching heard a loud screeching and two Sulphur Crested cockatoos (the *Mooyi*) were seen chasing after the tree in order to reach their roosting place as it headed ever higher into the heavens. Eventually, the tree ascended so high into the sky that the tree vanished from sight and all that can be seen today are the four brightest stars of the cross which represent the two eyes of the first man to die on the earth and the two eyes of the spirit of death (the *Yowli*). The two screeching cockatoos can still be seen chasing the tree in the form of the two pointer stars alpha and beta Centauri. When the world had realised that the first man to die on the earth meant death had come to our world there was wailing everywhere. Therefore, to some Aboriginal groups in Australia the Southern Cross is a reminder to them about when death first came to our world.

The stars within the constellation offer the night sky enthusiast a rich bounty of wonders. Acrux (alpha Crucis) is a bluish binary star system located approximately 321 light years away and is easily seen through small telescopes. Mimosa (beta Crucis) is magnitude 1.3; blue giant star located approximately 353 light years away. Gacrux (gamma Crucis) is a close red giant star that is located at a distance of 88 light years. Delta Crucis, a blue white star sits at a distance of 364 light years away and the orange giant star epsilon Crucis is located some 288 light years away.

However, perhaps one of Crux's richest objects is the 'Jewel Box' or NGC 4755. This popular southern sky open cluster, was first described by the brilliant astronomer Sir John Herschel (son of William) as a piece of 'multicoloured jewellery', hence the name the 'Jewel Box'. The stars in the 'Jewel Box' sit at a distance of just under 5,000 light years and are possibly only a few million years old. The 'Jewel Box' appears as a hazy 4th magnitude object, so it is easily visible under clear skies. In addition, as mentioned earlier, the dark 'Coalsack' nebula is an awe-inspiring site under truly dark skies. It covers approximately a 7 by 5 degree area of sky and spills into the neighbouring constellations of Centaurus (the *Centaur*) and Musca (the *Fly*). The 'Coalsack' lies at an estimated distance of 600 light years.

Like my early Homo sapien ancestors before me, I still look up at the Southern Cross in awe. Whether it is seen as a cross, a stingray or the foot of an emu the constellation continues to shine as a stellar beacon and I am sure that

for millennia to come it will impress future generations of humankind.

Paul Curnow
Adelaide, South Australia

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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

For Sale: Meade 8" SCT; includes GPS and \$1000 in extras. Make a reasonable offer.

Gerald Strong 714-538-2517

For Sale: Takahashi Epsilon Series E-160 Hyperbolic Astrograph Tube Assembly only. Included are eyepiece and camera adapters, finder scope and mounting rings. Please see <http://www.lsstnr.com/E160.htm> for specifications and pictures if not familiar with this great wide field instrument. \$1500.00. Email for pictures. Carl Blue, carlblue@earthlink.net, evenings or message 562 597-4035

For Sale (all in like new condition)

Meade LX 200 8" SC Telescope with Telrad and spotter scope.
Televue 16mm Nagler type II eyepiece
Televue 22mm Panoptic eyepiece
Meade Series 4000 26mm eyepiece
Meade Series 4000 9mm Illuminated Reticle eyepiece
Parks GS-5 15mm eyepiece
Meade 4000 #140 Achromatic Barlow 1.25"
Meade Off axis guider
Meade 4000 f 6.3 Focal Reducer / Flattener
Meade Variable Proj. Tele-Extender
Parks ALP SC rear cell Broadband filter
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Lumicon Oxigen III 1.25" filter
All for \$3000.00, Please serious inquiries only. (909) 924-6652

About Our Speaker

Liam Kennedy is a past president of the OCA (2001,2002). He is the producer of Look Up Tonight, the club's monthly cable TV show (with the help of the OCATV SIG team of course). When Liam is not sitting at his computer editing videos you may find him running the computerized mini-planetarium system at the Griffith Observatory Satellite where he is a part-time planetarium lecturer.

There were many places in the world where you could have witnessed the Venus Transit... so why on earth did a group of Americans choose to do so in Iran? The 18 day tour included trips to many different parts of the country and allowed the group to make contact with many Iranians who are part of the dedicated amateur astronomy communities. The photo of Liam at right was taken by former OCA member Hassan Mahvelati, now living in Iran.



Liam will be showing the story of the trip, particularly highlighting the special activities around the Venus Transit which included a 3-day conference in Shiraf University in Tehran, a visit to the largest telescope in Iran (actually smaller than the Kuhn telescope), and the special small town of Saadat Shahr, home to the country's largest stromony club.

The transit itself was viewed from the site of the 2500 year old tomb of Cyrus the Great and the telescopes were set up directly on a crumbling concrete pad where, over 30 years previously, the late Shah of Iran stood to pay tribute to that great ruler, and the empire he founded, as part of the country's lavish 2500 year celebration of the Persian empire. Liam will be featuring video and still photos.



Transit observers at tomb of Cyrus the Great (Mike Simmons)

SPECIAL THANKS to Barbara Toy and Matthew Ota for their help in resolving some equipment issues that threatened to delay the newsletter!

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Cassini's first (of 45 planned) flyby of **Titan** has occurred, resulting in some infrared images of surface features, since infrared penetrates the thick Titan clouds better than visible light. The best images will probably be radar images taken on future closer passes. No specular reflections (glint like that off a shiny surface) were seen on this pass, though such have been seen in Earth-based radar of Titan, and are thought to indicate liquid methane lakes on the surface.

Stardust (comet mission) - More findings from the Stardust encounter with Comet Wild 2 have been announced. The comet has pinnacles 100 yards high, both craters with rounded floors and ones with flat floors and straight sides, far more jets of particles shooting up than expected, and jets shooting far higher than expected. The material being thrown out in the jets was determined to range from smaller than sand grains to larger than trucks. Fortunately the spacecraft hit no large particles, since even some small ones managed to penetrate the first dust shield due to their high velocity. Two large bursts of dust were hit, one with over 1000 particles hit during the most intense second. Samples of comet material collected during the flyby will be returned to Earth in early 2006. Two of the craters on the comet have been named Left Foot and Right Foot, because their shapes resemble footprints rather than the circular shape typical of craters. Each is about 1/5 the size of the entire comet.

Large old galaxies - Using the Gemini North Telescope in Hawaii, a team of astronomers has discovered and analyzed 300 galaxies so distant that the light we see left them between 8 and 11 billion years ago. It had been predicted that few very large galaxies would have formed by that early time in the history of the Universe, but instead many very large galaxies were found. In a separate study, the Very Large Telescope in Chile found 4 galaxies that are several times as massive as our Milky Way (quite large for galaxies) which are viewed as they were about 10 billion years ago due to their distance and consisting of stars up to 2 billion years old at that time. This is yet more evidence that theorists need to revise their theories on how galaxies form to allow very large galaxies to form much earlier than previously thought.

Youngest white dwarf - The hottest (about 200,000 degrees) known white dwarf star has been discovered with Chandra (X-ray observatory) and FUSE (far ultraviolet observatory). White dwarf stars have finished consuming their fuel, so fusion has shut down, and the star then cools forever. So hottest means most recently shut down, perhaps only 100 years ago. The surface is made of carbon and oxygen with a touch of neon. Theorists had expected this core to be covered by a layer of hydrogen and helium that never got hot enough to fuse, but no such layer was observed. Now they must explain how the formation of a white dwarf can lose that layer.

Chandra has discovered a gravitationally lensed quasar that shows 4 images in X-rays. A nearer galaxy that by chance lies exactly in front of the quasar is causing the multiple-image lensing by its gravity, as required by General Relativity. In addition, one of the 4 images is much brighter, indicating that a nearby star lies on the path taken by that light, and so that one image is being doubly gravitationally lensed. It is estimated that the double lensing is magnifying the image by more than 10,000 times, so this may be a unique opportunity to study a really distant quasar in great detail. The quasar has been determined to be so distant that its light left there 11 billion years ago.

Binary brown dwarfs - A pair of brown dwarfs orbiting each other has been discovered with the largest known separation of any such pairs (6 times the separation of Pluto from our Sun). Brown dwarfs are stars that formed without enough mass to ignite fusion of hydrogen, which powers ordinary stars. This pair tends to disprove the theory that brown dwarfs form by being ejected gravitationally from their formation clouds before they have accumulated enough matter to become ordinary stars.

Star Masses - For the first time the mass has been measured of a very cool star known as an L-type dwarf. This one is orbited every 10 years by a brown dwarf, and careful measurement of the orbit by the Very Large Telescope in Chile and other telescopes allowed calculation of both masses: the very cool star is 8.5% the mass of the Sun, and the brown dwarf is 6%. Adaptive optics were used for the measurements, since the separation of the two stars is about 0.2 arc seconds, too close to be distinguished normally in ground-based telescopes. Both stars are relatively young, about 1/2 to 1 billion years old. Both stars had about the same surface temperature of about 1500 degrees C. The relationship of a star's mass, age, and brightness has not been well established for very small and cool stars, such as this one, so this first accurate mass is a breakthrough. The first L-type dwarf star was discovered only 7 years ago.

3-D Solar eruptions - By determining the distance of material ejected by the Sun, using the way sunlight is polarized when reflecting off the material, scientists have prepared 3-D images of this material for the first time. A process known as Coronal Mass Ejection (CME) throws this material off of the Sun when certain magnetic conditions exist. CME material was found to be an expanding arcade of loops, as opposed to bubble-like or rope-like, which had been predicted by various theories.

Mars Rover Opportunity is still inside Endurance Crater as I write this, examining rocks and sand of various layers within the crater. This allows piecing together the geological history of the area. A layer has been found that corresponds to rocks found in Eagle crater, where the rover landed, and then Opportunity proceeded to deeper, and therefore older, rock layers. The rover is finding firm slabs of rock, which have been found safest for the rover to travel on, to deeper in the crater than was apparent from the rim, so exploration is proceeding deeper than originally planned. More salt (including sulfate salts) has been found within Endurance than expected. Evidence is mounting that shallow salty seas have covered the Meridiani area several times.

Mars Rover Spirit reached the Columbia Hills in June and proceeded to examine rocks on the lower levels of the hills, including some with curious shapes apparently caused by erosion, and others that have a rotting appearance with soft interiors. Perhaps the

most curious are what are being called Cobra Heads: rocks that jut out like a cobra head from the top of a rock neck. Much time has been spent examining a rock called "Pot of Gold", which is composed of more resistant nodules and planes in a softer rock that is eroding away. Its shape has been described as that of a potato with toothpicks stuck in it and jelly beans stuck on the toothpicks.

Spirit's spectrometers have identified the iron-rich mineral **hematite**, which is often formed in water. The area where Opportunity landed is littered with hematite, but this was the first found where Spirit landed. Spirit remains working excellently, though it has reached double its planned life of 90 Martian days on the planet, except that the right front wheel is getting sticky. Engineers are testing methods of heating and redistributing lubrication within the wheel, and are testing running on the remaining 5 wheels if the sticky one fails completely.

MOST (Canadian orbiting telescope) monitored the brightness of the star Procyon 8 times per minute for over a month and found no pulsations. MOST makes by far the most accurate brightness measurements of any telescope, so previous measurements of slight pulsations and the theories which support that have to be discarded. It had been hoped to analyze Procyon's pulsations using asteroseismology to determine what is in the star by the surface pulsations, but there weren't any. MOST has collected good pulsation data on Eta Bootis and evidence of star spot activity on Kappa 1 Ceti.

Instant AstroSpace Updates:

Astronomers studying the star **Tau Ceti**, the nearest Sun-like star, have discovered that it contains 10 times as much asteroid and comet material as our Solar system has. If Tau Ceti has planets, they have to be experiencing far more bombardment by asteroids and comets than Earth does, making them probably unsuitable for life to form.

Spitzer (space infrared observatory) is revealing the shapes of the cooler parts of galaxies, those that emit infrared, but not much visible light, and also the galaxy parts hidden in visible light by dust. As a result some galaxies seen by Spitzer appear to have been misclassified (because of obscured parts), and that the classification scheme may have to be modified somewhat for infrared observations.

Chandra (X-ray observatory) has detected a diffuse glow of X-rays from a large region around the center of our Milky Way galaxy, which indicates a large cloud of very hot gas probably occupies it. The observation was made by subtracting out every point-like X-ray source from observations of the galaxy center, leaving the image of this large diffuse glow.

Radio astronomers using the Byrd Telescope at Green Bank have discovered 2 more **molecules in interstellar clouds**: propanal and propenal. About 130 molecules are now known to exist in space.

The launch of **Messenger**, the second ever mission to Mercury, has been delayed until August 2. Hopefully Messenger will be on its way when you read this.

Transit On the Midnight Sun

By Helen Mahoney

My husband Doug Millar and I like to travel to see astronomical events. We've gone places to see eclipses, comets, meteor showers, and the aurora borealis. So, we really didn't want to miss out on the transit of Venus.

Keeping a budget in mind, we looked at the Fred Espenak map of the transit for a relatively near-by location. When we noticed that the northern part of Alaska was in the "entire transit visible" area, it occurred to us that the reason that was true was that the sun didn't set there this time of the year! I had always wanted to see the midnight sun, and the chance to see that and the transit at the same time was too good to pass up.

We flew to Anchorage, and then drove north with our friends Mike and Lana Melum. It was so strange to see it not get dark for six days. In Anchorage, the sun does actually set for about four hours, but it is hugging the northern horizon, and the sky never got dark enough even to see Jupiter. Meanwhile, in the south, the earth's shadow could be seen as a low dark dome that changed position from southeast to southwest, and then retreated as the sun rose again.

We drove along the Dalton Highway to a town called Coldfoot (population 13), 60 miles north of the Arctic Circle. Coldfoot had originally been a camp for gold miners, and later a camp for builders of the Alaska pipeline as well as the Dalton Highway, which snakes along next to the pipeline and provides its access, as well as access to Prudhoe Bay where the pipeline starts. Now, Coldfoot Camp is a modular-home hotel for truck drivers and tourists (including a busload of people from a Princess Cruise that came up to see the midnight sun and went to bed at 8 pm.—go figure).

We set up our little observing site, which included our Helios hydrogen alpha telescope and a neat white light projection scope called the "Solarscope," which we picked up at RTMC. The latter is what I used when taking the photo I've included. It worked very well to allow the 15 or so folks that had gathered with us to see everything at once.

(continued next page)

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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.

(continued from page 9)

I was looking through the Helios when Doug said, "Transit should begin any second." Suddenly, I saw a tiny crescent shaped nick in the limb of the sun, like someone had just caught it with a hole puncher. A flood of thoughts and emotions raced through me: It looked like a solar eclipse, but the arc was so much smaller than the moon...It was actually going to happen—they had predicted it correctly, and we were in the right place at the right time to see it!...No one alive had ever seen what I was now seeing!...Helen, you're hogging the Helios, let me look! (Oh, that was Doug.)

Interestingly, because the hydrogen alpha filter showed the chromosphere, the defect caused by the silhouette of Venus was seen in the Helios for quite a while before it could be appreciated with the white light, photosphere view. Soon, however, the nick could be seen with that scope as well, much to the delight of all the folks watching with us. I suddenly thought of my friends Joel Harris, Liam Kennedy, and Hassan Mahvelati, who were at that moment viewing the same event in Africa and Iran. How strange to be on the "other" side of the world from them, and yet, due to the earth's tilt, to also be on the "same" sunlit side of it.

We lost the sun for the last part of the transit, as it dipped below a mountain range, but it never did set that night (I stayed up to be sure). The hills behind us were in sunlight the whole time. It seemed like a prolonged sunset, which suddenly started to feel more like a dawn about 2 am. The birds felt it, too, as they all woke up and cheerfully began chirping to start another nightless day.



Venus transit from Coldfoot, AK at midnight (Doug Millar/Helen Mahoney)



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