



A firefighting helicopter attacks the brush fire which approached the Anza observing site on June 5, 2004. The observatory and other OCA facilities may be seen above and to the left of the Quonset hut-type building in the foreground. (Photo courtesy Tom Caldwell)

OCA CLUB MEETING

The free and open club meeting will be held Friday, July 9th 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 Chris Butler, giving a tour of 'Our Own Little Corner Of The Galaxy'

STAR PARTIES

The Black Star Canyon site will be open this month on July 10th. The Anza site will be open July 17th. 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 July 2nd (and next month on August 6th) at the Centennial Heritage Museum (formerly the Discovery Museum of Orange County) at 3101 West Harvard Street in Santa Ana.

GOTO SIG: TBA (contact coordinator for details)

Astro-Imagers SIG: Jul. 20th, Aug. 17th

EOA SIG: Jul. 26th, Aug. 23rd

Astrophysics SIG: Jul. 16th, Aug. 20th

Fire at the OCA Anza Site

[Based on reports and pictures from Tom and Linda Caldwell, Dave Radosevich, Jim Hannum, John Kerns, Greg and Susan Pyros, Russ Sipe, Richard Cranston, Paul Brewer, and Barbara Toy; edited by Barbara Toy.]



On Saturday, June 5, 2004, a wildfire that started to the west of our Anza property swept over about a third of our property and also over the neighboring property owned by club members Jim Hannum, John Kerns and Dave Radosevich (referred to as the "HKR property"). As this is written, we do not know the official cause of the fire, but have been told that it was started by a driver who was reportedly drunk and who got stuck in a ditch not far from the OCA site. In his efforts to get out of the ditch, he managed to spark a fire in the dry grass along the road. That, the dry conditions, and a little wind were apparently all it took to send the "Elder Fire" (its official name) burning out of control for several hours.

OCA members Tom and Linda Caldwell own property about a quarter mile from our site, on the other side of the valley, and they can see both the club property and the HKR property from their home. Linda Caldwell saw an explosion

(which may have been the car that started the fire) and called 9-1-1. She and her husband were witnesses to the ensuing efforts to fight the fire. According to Tom's account:

My wife and I witnessed the fire today here about a quarter mile or less from [the OCA Anza site]. My wife probably made the first call to the fire department. An explosion, which she witnessed, on an adjoining property started the fire at about 4:50 p.m. The OCA [property] was directly in the path of the fire. We prayed and watched, which was all we could do. I took lots of pictures of the airdrops, helis and airtankers. Lots of fire equipment, and [the] response time was very good. . .

It was quite an operation. The CDF operated with military precision, a small army of personnel, many trucks, RFD [Riverside Fire Department] and CDF [California Department of Forestry] trucks, several different types of helicopters, including Sikorsky's heavy lift and two air tankers, along with an airtraffic coordination aircraft above them all. The wind was mild but it was blowing the fire directly toward the OCA site.... There were fire trucks up above [the OCA site] and various places throughout the night to watch for flare-ups. The property was in good hands. The fire people did a remarkable job.

Jim Hannum received a call about the fire from another neighbor, and he, Dave Radosevich and John Kerns went out to see the fire damage the next day. They went over the OCA property as well as their own, and Paul Brewer and the Caldwells checked the club property that day as well. They took pictures of the damaged areas, and provided the initial reports of the damage.

From our current information, the fire started on the other side of the ridge that's across the road from the entrance to the club property, and followed the valley on the other side of the ridge around to reach the HKR and OCA properties. It burned through the HKR property and the property to the east of it, where an old wooden building burned to the ground. It jumped the road to our property, and ultimately burned the entire undeveloped portion to the west and northwest, and also burned over most of Mars Hill down to the RV parking area next to Anza House, the northern end of the Lower Pad area (the level immediately below north side of the club observatory), where a lot of landscape timbers that were used as dividers and retaining walls were destroyed, all around the trailer that's near the club observatory, and all around the Upper Pad area and down to the storage shed across the road from the OCA Observatory and Star Cruiser Observatory.

Tom Caldwell took some dramatic pictures that show the scope of the fire, show smoke coming up from what appears to be the Upper Pad area or the HKR property, and also show different aspects of the firefighting efforts. The full set should be posted on the website by the time you read this. Greg and Susan Pyros used Greg's remote controlled helicopter to take pictures of the

fire damage from the air on the Wednesday after the fire, including the extensive area that burned before the fire reached our property. They are posted on Greg's website (and some are included here). The URL is <http://www.gregpyros.com/anza-fire/>, and there is also a link from the story on the fire that Russ Sipe posted on our website (the direct URL is http://www.ocastronomers.org/e-zine/feature_articles/).

We were very fortunate that no structures were lost on either our property or the HKR property. Compared to what it might have been, our damage was minor: essentially, it seems to be limited to the complete loss of one table on Mars Hill, some damage to one or two others, loss of a couple of electrical boxes and minor damage to a few others and to associated conduit and wires, destruction of landscape timbers at the Lower Pads, and the loss of the vegetation on the northwest portion of our property. The HKR property lost all of its native vegetation, and their buildings were covered with fire retardant that they had to clean off afterward – part of Jupiter Ridge was also hit with fire retardant, but none of the buildings on the OCA site were. With the loss of the vegetation on that side, we also lost a lot of light screening, particularly from the effects of passing cars, and we also have a problem with ashes getting on everything whenever there is anywind, but these are truly minor irritants when you look at all that we could have lost.



A number of the pictures that Dave Radosevich and John Kerns took on the day after the fire are included in the story on the website, and Dave also did a Power Point slide show that includes both pictures and his comments, which you can download through Russ's story on the website. If you don't have Power Point, you can get a free reader through the MicroSoft site. Paul Brewer took a lot of pictures, as well, particularly of the Upper Pad area, and Barbara Toy took a number of pictures of the damaged pad areas the Thursday after the fire. We expect that at least some of their pictures will be available on the website by the time you see this.

We are very grateful for all of the hard work that the firefighters did to save our buildings and the bulk of our site. Needless to say, we don't want to press our luck – we want this to be our last direct experience with wildfire for a long, long time!





A small Bootid meteor (right side, 1/3 from top) is overpowered by the Milky Way over Indian Cove in Joshua Tree National Park on June 22, 2004. 30 second exposures @ ISO 1600 F/2.0 (F/1.4 28mm x 1.5 lens) with camera mounted on Huteck's Kenko mount for tracking. (Wally Pacholka)

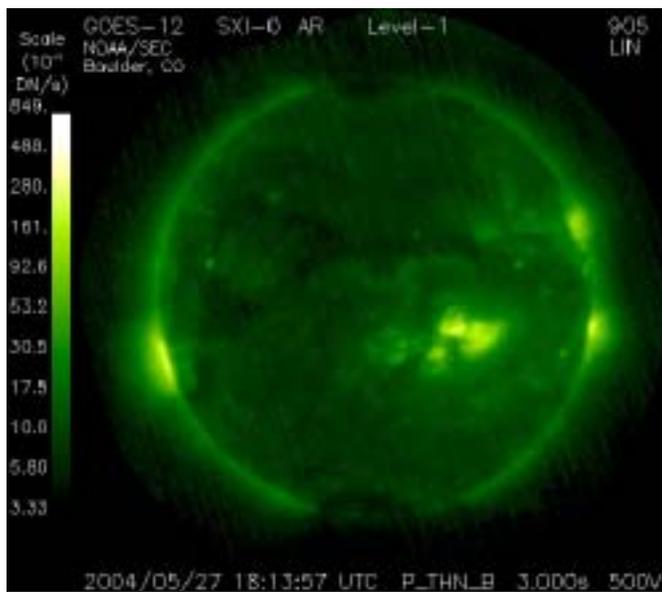


Venus (lower right) transits the Sun on June 8, 2004 in this picture taken from Bangalore, India. Vittal N. Badithe used a Sony digital camcorder with a Celestron ST-80 on CG-4 and Orion electronic color eyepiece and focal reducer.



Space Weather

By Patrick Barry and Tony Phillips



This image shows the outer solar atmosphere, or corona, as viewed by the GOES 12 Solar X-ray Imager (SXI). It shows the plasma at 4.0 MK (million degrees Kelvin). Bright areas are associated with sunspots seen in white light images and may produce explosive events known as flares. Dark regions are coronal holes where the fastest solar wind originates. Image courtesy of the Space Environment Center/NOAA.

Radiation storms, 250 mile-per-second winds, charged particles raining down from magnetic tempests overhead ... it sounds like the extreme weather of some alien world. But this bizarre weather happens right here at Earth.

Scientists call it "space weather." It occurs mostly within the gradual boundary between our atmosphere and interplanetary space, where the blast of particles and radiation streaming from the Sun plows into the protective bubble of Earth's magnetic field. But space weather can also descend to Earth's surface. Because the Earth's magnetic field envelops all of us, vibrations in this springy field caused by space weather reverberate in the room around you and within your body as much as at the edge of space far overhead.

In fact, one way to see these "geomagnetic storms" is to suspend a magnetized needle from a thin thread inside of a bottle. When solar storms buffet Earth's magnetic field, you'll see the needle move and swing. If you live at higher latitudes, you can see a more spectacular effect: the *aurora borealis* and the *aurora australis*. These colorful light shows happen when charged particles trapped in the outer bands of Earth's magnetic field get "shaken loose" and rain down on Earth's atmosphere.

And because a vibrating magnetic field will induce an electric current in a conductor, geomagnetic storms can have a less enjoyable effect: widespread power blackouts. Such a blackout happened in 1989 in Quebec, Canada, during a particularly strong geomagnetic storm. These storms can also induce currents in the metallic bodies of orbiting satellites, knocking the satellite out temporarily, and sometimes permanently.

Partly because of these adverse effects, scientists keep close tabs on the space weather forecast. The best way to do this is to watch the Sun. The NASA/ESA SOHO satellite and NOAA's fleet of GOES satellites keep a constant watch on the Sun's activity. If a "coronal hole"—where high-speed solar wind streams out from the Sun's surface—comes into view, it could mean that a strong gust of solar wind is on its way, along with the geomagnetic storms it will trigger. And an explosive ejection of hot plasma toward the Earth—called a "coronal mass ejection"—could mean danger for astronauts in orbit. The advancing front of ejected matter, moving much faster than the solar wind, will accelerate particles in its path to near the speed of light, spawning a radiation storm that can threaten astronauts' health.

Look for coming articles for more about space weather and about NOAA's efforts to forecast these celestial storms. Meanwhile, read today's space weather forecast at <http://www.sec.noaa.gov/>. Kids can learn about the geostationary and orbits of the GOES satellites at http://spaceplace.nasa.gov/en/kids/goes/goes_poes_orbits.shtml.

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Jane Houston Jones receives Blair Medal

Dr. Gilbert Bruce Blair was born September 13, 1879 in Blairsburg, Iowa and studied at both Tabor and Washburn Colleges in Kansas. He continued his graduate work at University of California, Chicago and Kansas majoring in Physics. He held a fellowship at Lick Observatory too. Dr. Blair taught astronomy at Washburn from 1907 to 1919, and then moved westward, where he taught at the University of Nevada in Reno until his death in 1949. In 1936, Dr. Blair organized the Astronomical Society of the University of Nevada. He is the founder of the Western Amateur Astronomers (<http://www.waa.av.org/>)

Dr. Blair envisioned a grand meeting, to be held once a year, which would bring western amateur astronomers together to exchange ideas and to meet each other. The first Western Amateur Astronomers conference was held at USC in August 1949. 200 delegates from 23 organization attended. It rained! A month later Dr. Blair died of a heart ailment. Dr. Blair's obituary ran in the October 1949 Sky and Telescope magazine.

The sixth WAA Convention was held in August 1954 at the JosephineRandall Junior Museum in San Francisco and was hosted by the San Francisco Amateur Astronomers, who hold their meetings at the Randall Museum today. The WAA presented the first G. Bruce Blair Medal to Albert G. Ingalls, editor of the Amateur Telescope Making books. The G. Bruce Blair medal was designed by Eastbay Astronomical Society member Frank Kettewell, who was a cartoonist for the Oakland Tribune. The seventh convention was held in 1955 at Yosemite National Park. A.L.P.O founder Walter E. Haas received the second WAA G. Bruce Blair Medal.

Fast forward to the 2004 Riverside Telescope Makers Conference and Astronomy Expo. Imagine my thrill as I walked to the stage and received the 2004 WAA G. Bruce Blair medal! I was surrounded by many past winners as I received this years award.

When I went through the award winners list from the past 50 years (http://www.waa.av.org/Blair_recip_99.html) I discovered that I knew over half of the awardees personally and admired or was inspired by all of them. Dr Haas inspired me to not just look at the planets but to study and sketch their features when observing through my telescope. Clifford Holmes inspired me by his infectious joy of amateur astronomy. Paul Zurakowski inspires me



Jane Houston Jones receives the Blair medal from WAA president Jack Borde, with three former medalists in the background.

every day to help others build telescopes the best they can. Betty Neall and Denni Medlock, the only other two women Blair medal winners set a high bar for me and remind me that it is important for women amateur astronomers to encourage the stars of tomorrow. I could go on and on...

Current WAA president Jack Borde received the G. Bruce Blair medal in 1987, the year I discovered amateur astronomy. 1987 was the year I became an amateur astronomer, first by learning about different types of telescopes then by joining an astronomy club. The following year, I took a deep breath and signed up for John Dobson's telescope making class in San Francisco. A few months later, I was spending all my free time looking through f/7.3 10-inch Stardust, which I still use today. Like countless thousands who preceeded me, I got my start as an amateur astronomer at the hands of John Dobson, so I dedicate this award to John for the years of wonder that he has brought into my life. Every day he inspires me to ask a question, answer a question, or take my telescope out on a local sidewalk and share the wonder of the universe with others. Thanks, John!

ASTROSPACE UPDATE

July 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.

Hubble Space Telescope (HST) has made follow-up spectrographic observations of 22 of the extremely faint reddish galaxies seen to pepper the background of the recently released Hubble Ultra Deep Field image. As predicted, most (16) were extremely distant galaxies, colored red by redshift from the expanding Universe. The light from them has been traveling to us for most of the life of the Universe, so these are among the first galaxies formed after the Big Bang. The objects are 10 times fainter than any object for which a ground-based spectrum has ever been accomplished. What about the other 6? Three are much closer galaxies colored red by heavy dust, and the other 3 are tiny red dwarf stars within our own galaxy. The spectra of the 16 early galaxies showed the star population was nearly identical to that of galaxies up to 3 billion years younger. This was a surprise, as it was thought that the star population would substantially change for galaxies after the first generation of stars to form had thrown off heavier elements and had ionized gas clouds, changing the character of the Universe. Theory predicted these changes would reduce the percentage of blue stars in galaxies as time wore on. What was not a surprise was that many of the early galaxies were found to be interacting, which was predicted to occur frequently before the expansion of the Universe reduced the density of galaxies.

Galaxy stripped - Theory says that the hot gas observed to be present in centers of large clusters of galaxies ought to blast the star-forming material out of the galaxies that orbit through the region. Observational evidence for this happening has been meager. New observations with the 3.5-meter WIYN Telescope at Kitt Peak in Arizona show strong evidence of this stripping going on in galaxy NGC 4402 in the midst of the Virgo Galaxy Cluster. The evidence includes: one end of the dust disk is gone, the dust disk is bent, starlight is redder on the side where dust should be pushed toward, and there are linear filaments of dust that appear to be thick spots resisting the stripping action. The adaptive optics of the telescope allowed fine detail to be seen for the first time in this galaxy.

Chandra (X-ray observatory) and the Palomar 200-inch telescope have uncovered evidence that the supernova remnant known as W49B is probably the result of a collapsar, which is a very violent supernova believed to create gamma-ray bursts. If so, it will be by far the closest gamma-ray burst remnant seen. It is inside our own Milky Way galaxy, and was created a few thousand years ago. Almost all the gamma-ray bursts that have been measured are billions of light-years away, and their remnants fade within days or weeks until they are too dim to be seen at those distances. The evidence for W49B include jets rich in iron and nickel, a barrel-shaped nebula with rings bright in infrared, and hot caps of gas at the ends of the barrel, emitting X-rays. The observations seem to clear up a controversy regarding collapsar theory, in that formation of high mass stars necessary for collapsars should occur in high density regions of space, but observations of gamma-ray burst remnants seem to show low density. W49B appears to have blown away the material in its vicinity during its few million years as an ordinary but bright star before the collapse-explosion event, leaving it in a bubble of low density in the midst of high-density material.

Mars Rover Opportunity completed its survey around the rim of Endurance Crater, an impact feature the size of a football stadium. Findings there include a rock with a braided ripple pattern (evidence of flowing water) and that the sand in the bottom of the crater is basaltic. The cliffs within the crater contain some basaltic layers, but they appear too thin to be lava flows. The best theory is that the thin layers were formed by water depositing layers of sand eroded from volcanic rock elsewhere. Possibly wind could have deposited the layers; further investigation is needed.

After much testing with a rover in a mock-up of the crater materials and slope hastily built in Pasadena, engineers decided to cautiously drive **Opportunity into Endurance** on June 9 in order to sample rock layers deeper, and therefore older, than those found in Eagle Crater, where the rover landed. The rock layer below that corresponding to Eagle Crater can be reached only about 20 feet down the slope of Endurance Crater from the point entered. Opportunity will not go to the bottom of Endurance, since that is all soft sand, likely to trap the rover. Navigation within the crater will be kept as much as possible to flat slabs of rock, which have been found to present the least danger for the rover to lose traction on slopes. It is planned to spend about 3 weeks examining rocks and soil within the crater, then exit near where it entered.

Opportunity has been using a **deep-sleep mode** at night. This turns off the malfunctioning arm heater, which sapped battery power over night, and required recharging the batteries every morning from the solar panels before beginning science operations. The down side is that they must turn off all heaters for deep-sleep, including one that protects the infrared spectrometer from freezing damage. Eventually it is expected that a bad night will permanently damage the spectrometer, but it was judged worth the risk in order to extend the amount of science every day.

Mars Rover Spirit has found the best evidence of water evaporating in the distant past and leaving salt deposits (probably magnesium sulfate) in the Gusev region, still not as strong as the evidence from the other rover of standing and gently flowing water. Spirit's evidence was spectrographic analysis of the soil in a trench dug by spinning one wheel in the bottom of a crater driven through on the way to the Columbia Hills. As I write this, Spirit is less than 200 yards from those hills, which it has been approaching since April. It has already taken infrared spectra of the hills, which are believed to be much older than the terrain in the flats of Gusev Crater already examined by Spirit. The rover's odometer reads about 2 miles now. By the time you read this, it should be exploring the hills. (continued next page)

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The **Final Beagle** (missing Mars lander) **Report** has been filed with the European Space Agency. The report is not being made public, but the fact that the exact cause of failure at landing of the spacecraft is not known and the list things that will be done better next time were made public. It is encouraging that they plan a next time. The list is quite telling if you read between the lines. My interpretation of the list: 1) the airbag and parachute designers were too proud to seek any input from NASA or the Russian space agency, the only people who have ever attempted (successfully) parachutes and airbags on other planets; 2) deploying on the surface was never realistically tested (Beagle may have landed, but failed to open upright); 3) not all parts were shock tested (pyrotechnic parts to separate things during entry and landing may have broken spacecraft parts that were not tested for that); 4) wires may have been connected wrongly between parts — some connectors were omitted in favor of directly connected wires to meet stringent weight constraints, and this was done after testing; 5) detection of entry into the atmosphere may have failed, and there was no backup detector; 6) the heat shield, back cover and parachute discarded after entry were never tested for aerodynamic stability and ballistic characteristics and may have struck the spacecraft; 7) telemetry during descent and landing was not available (which is why no one knows the cause of failure); 8) there was no system to directly command the spacecraft to recover from problems in automated systems; 9) the teams were asked to do too much in too short a time with too little funding and no flexibility; actually there is quite a long list implying that various mismanagement techniques occurred.

Youngest black hole or neutron star - Astronomers using linked radiotelescopes around the world have found the youngest black hole or neutron star known when it recently became uncovered from the debris of a supernova explosion 21 years ago in nearby galaxy NGC 891. The previous record holder was the neutron star from the supernova of 1182. Further observations should distinguish whether it is a black hole, and then we can watch for the first time the early development of either a black hole or neutron star. Spin and magnetic properties of such young objects are hotly debated and should be settled by observation at many wavelengths.

Youngest planet - A large planet has been discovered circling a star known to be only a million years old. Spitzer (orbiting infrared observatory) has found missing a section of spectrum of a dust disk about a star known as CoKu Tau 4. This implies that all matter is missing from the disk at a certain temperature, and therefore a certain distance from the star, further implying a planet has formed there large enough to gravitationally sweep away the matter. Standard planet formation theory says it takes longer than a million years to form a large planet, so the theorists are scrambling to revise. A leading new theory is that gas giant planets clump together as gas, not as a rocky planet (taking perhaps 4 million years) that later collects gas. Or maybe there is another explanation for the missing piece of the dust disk.

Cassini (Saturn mission) has arrived after almost 7 years in space. On June 11, it made the first moon encounter at Phoebe, passing about 1000 times closer than Voyager did to this moon. Because Phoebe is farther from Saturn than Cassini's orbit will be, this pass during arrival is the only one possible. This is the first time a spacecraft has ever closely examined this class of moon: quite dark and somewhat irregular in shape. Many astronomers believe that Phoebe is a captured Kuiper Belt Object (KBO), one of those icy asteroids that are mostly found beyond Neptune's orbit. Phoebe's unusual dark surface, orbital tilt, distance from Saturn, retrograde orbit, rotation period and other characteristics all point to a different source than Saturn's other large moons. So this pass by Phoebe may tell us a lot about KBOs. Preliminary findings are that it is heavily covered with craters of various sizes, varies considerably in brightness over the surface, and is closer to spherical than predicted. Such small moons (about 140 miles across) don't have sufficient gravity to pull themselves entirely spherical.

By the time you read this, Cassini will have reached its closest approach to the planet, crossed the plane of the rings outside the rings we normally see (but inside the very faint G ring), fired its main engine for 96 minutes (late June 30), and **achieved orbit**. The main engine had not been powered up for 5 years, except for a mid-course correction in late May that went flawlessly, raising hopes that the orbital firing will succeed. This is the first mission to orbit Saturn, and is scheduled to spend 4 years studying the planet, rings, magnetic field, moons and other features. The tour will include 76 orbits and 52 close encounters with 7 different moons. Most of the encounters will be with the giant moon Titan in order to use gravity slingshots to direct toward other moons. In December the Huygens probe will be released, to land on Titan the following month. Cassini will map Titan by radar during close passes, since radar penetrates the thick hazy clouds of that moon. Titan is about as large as the planet Mercury and is the only moon with a substantial atmosphere, in fact denser than Earth's. From the temperatures and atmospheric content measured in the past, it has been predicted that Titan has methane rain and snow. The Huygens data ought to be amazing.

Top Quark - A better measurement has been made of the mass of the top quark, and it is heavier. Because of relationships thought to exist between the masses of various particles, this means that the Higgs Boson should be more massive also, and some of the lightest supersymmetry particles may be lighter. The more massive a particle is, the more energy is required to create it in particle colliders, so the supersymmetry particles may be discoverable at the energies attainable in current colliders, but the Higgs Boson will have to wait for the completion of the new collider at CERN in Switzerland, due in 2007. Discovery of the Higgs Boson would support Peter Higgs's theory of why all particles have mass, and discovery of any supersymmetry particle would support Symmetry theories and String theory.

Spitzer has imaged in infrared Centaurus A, a large elliptical galaxy whose center is largely obscured in visible light by dust, and found the remnants of another galaxy that appears to have been consumed in a collision with the larger galaxy. It appears to be a spiral galaxy that has been twisted into a parallelogram shape, as predicted by some galaxy collision computer simulations. This collision explains the disturbed appearance of Centaurus A's dust and its active star birth.

Instant AstroSpace Updates:

FUSE (far ultraviolet observatory) has detected molecules of nitrogen in interstellar space for the first time, even though it is predicted to be the 5th most common element in the Universe and has been searched for for decades. It was detected by its spectrum impressed on that of a more distant star.

FUSE has also measured the distance precisely (1860 light-years) of an ultraviolet star behind the **Veil Nebula**, proving that one of the two authoritative measurements of the distance to the Veil is much too large. Since the Veil is the best-studied supernova remnant of its type, it is important to know how far it is, and therefore how large, how bright, how energetic, how fast expanding, and how old it is.

Astrophysicists have resolved the problem that the **Cold Dark Matter theory** predicts that we should have far more and larger dwarf galaxies than actually exist. New computer simulations showed that formation of dwarf galaxies is starved by bright young stars blowing away the material for formation, and then later dwarf galaxies are stripped of material by gravity during encounters with other galaxies.

Researchers have **resolved the conflict** between the evidence from the Cosmic Microwave Background measurements that implied the first stars to form in the Universe were huge, 200 to 500 times the mass of our Sun, and the evidence from second generation stars in our Milky Way that have the wrong composition to have formed right after really massive stars. A new theory shows that a distribution of those first stars having masses from 20 to 100 times our Sun will produce both pieces of observational evidence.

Images taken by HST of nearby dim stars show what appears to be a planet, probably 5 to 10 times the mass of Jupiter and at a distance from its star comparable to Neptune. If confirmed, this will be the first **directly-seen exoplanet** (planet outside our Solar system), since the more than 100 known exoplanets have all been detected by indirect means. In this survey, 2 other possible planets were seen, but are probably far larger than Jupiter and so may be brown dwarfs.

An array of radiotelescopes around the world has found that at least some of the **radio-emitting filaments** near the center of our Milky Way galaxy are pointing to very active star forming regions. These filaments, which range from 10 to 100 light-years long, were discovered 20 years ago, but still remain pretty much unexplained.

Using millimeter telescopes (very short wavelength radiotelescopes) to study the Whirlpool Galaxy (M51) showed that carbon monoxide molecules just behind the spiral arms are warmer and more turbulent than that just ahead of the arms. This strongly supports the theory that the arms of a spiral galaxy consist of **density waves** that form the stars we see, and the waves travel around the galaxy at a much different speed than that of the stars and matter orbiting in the galaxy.

REFLEX, a study of galaxy clusters that are bright in X-rays (most clusters are thought to emit large amounts of X-rays due to hot gas within), has released its first catalog, containing detailed data on 447 clusters. Study of this data has provided verification on the matter density of the Universe and on the existence of a cosmological constant, or dark energy. This galaxy cluster method is entirely independent of the other methods of measuring these. The catalog should greatly help those studying gravitational lenses, the large-scale structure of the Universe and galaxy cluster formation.

A study using Chandra X-ray observations of 26 galaxy clusters up to 8 billion light-years away has found that the expansion of the Universe has speeded up in recent billions of years, supporting other evidence of a repulsive force, or dark energy. The new data fits a **cosmological constant**, not a variable force. The new method is based on the apparently constant ratio of total mass to hot gas mass in galaxy clusters, which allows distances to be calculated from the X-ray energy.

The **Astrophysical Virtual Observatory**, a huge collection of past observations from ground- and space-based observatories, has yielded its first major discovery. A team has found in it evidence of 30 supermassive black holes in the centers of galaxies that had previously escaped detection because they are hidden behind huge dust clouds, but were found in observations at other wavelengths. This search implies that there are 2 to 5 times as many supermassive black holes as thought, but the majority are behind dust.

A study of several of the **most distant known quasars** was made with the Gemini North Telescope in Hawaii using adaptive optics in infrared. It was expected to find evidence of collisions, thought to explain why quasars were more plentiful in the past than now, since it is known that galaxy collisions were more common long ago. However no evidence for collisions was found, and in fact most of the galaxies surrounding the quasars were too dim to be seen in infrared, which would not happen with collisions.

A double star known as WR20a has been found to be eclipsing, and so its orbit has been firmly established, which allows calculation of the masses of both stars. They turned out to be the **most massive stars** known at 80 times that of the Sun. Mass estimates have been made larger than this for other stars, but are not firmly established. The pair orbits every 3.7 days, nearly touching, blasting each other with hot stellar wind.

On the basis of finding in meteorites the decay products of iron-60, an isotope created only in very massive stars, astronomers have proposed that the **Solar System formed** in the neighborhood of a very massive star. This has been considered unlikely in the past because a very massive star blows the star-forming and planet-forming material out of its neighborhood. (continued next page)

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The source of **million mile-per-hour winds** leaving galaxy M82 has been found with HST and WIYN observations. Many millions of years ago M82 nearly collided with its neighbor galaxy M81, churning the gas in M82 into a burst of star formation, and those new hot stars heated clouds of gas, which emit the wind.

LONEOS (Lowell Observatory's automated asteroid search) has found an asteroid whose orbit is entirely inside the Earth's (second one known), and orbits in only 6 months (the shortest known). On average it is second closest to the Sun of all objects, but crosses closer to the Sun than Mercury to briefly be the closest.

Using a variety of methods to estimate asteroid ages and accurate color measurements for over 100,000 asteroids made by the Sloan Digital Sky Survey, astronomers showed that **asteroids turn redder** as they age. This solves a problem that meteorites thought to be chips off certain asteroids do not match the color of those asteroids. If the meteorites were in space long enough, they would age to colors that do match.

Astronomers using the Very Large Telescope in Chile observing in infrared have found in the M17 nebula a dust disc with jets about a forming very massive star (30-40 times the Sun's mass), ending a controversy over whether large stars form differently than small stars (which are known to form in dust discs with jets). It is the **largest known dust disc** about a forming star, both in mass (110 times the Sun) and dimensions (12 times the size of the Solar system).

XMM-Newton (X-ray observatory) has found a cyclic behavior in X-rays emitted by a star that resembles what our Sun does over its 11-year sunspot cycle. This is the first such x-ray cycle found in another star.

Spitzer has found icy dust particles coated with water, methanol and carbon dioxide in the dust disks surrounding 5 newly formed stars in Taurus. This is the first time such have been found in such dust disks, which are believed to be the birthplace of planets and comets.

Spitzer discovered 2 of the **farthest planet-forming discs** ever observed, about 13,700 light-years away in Centaurus.

Spitzer has found many more star-forming spots (about 300) in a nebula known as RCW49 than previously known. This probably means that previous estimates of **star forming rates** in the Milky Way are too low. Further observations are expected to find stars in all stages of forming in this one area, allowing astronomers to piece together a complete picture of star formation.

Spitzer has begun making a giant **mosaic** of the entire Milky Way in infrared, which will be composed of 300,000 images when complete.

A survey of microlensing announced a few years ago that astronomers had found 17 events that appeared like a small massive object had passed in front of a distant star (in the Magellanic Cloud) and caused it to brighten by gravitationally lensing the light, as General Relativity requires. Opinion was divided over whether these were caused by small objects within our galaxy disk or larger objects out in our galaxy's halo. The first of these 17 objects to be independently observed was seen by both HST and Spitzer (orbiting infrared observatory) and found to be a **low-mass star** in the disk of the Milky Way.

Space Ship One is scheduled to launch from the Mojave Desert space test center into space (sub-orbitally) June 21, making its pilot the first astronaut not propelled by a government. It was designed by Burt Rutan, who flew around the world unrefueled in 1986.

Chandra and XMM-Newton (X-ray observatories) have found that a nebula in the dwarf galaxy Holmberg II glows from being excited by X-rays from a black hole within, only the second such nebula known. The mass of the black hole has been calculated to be 25-40 times that of our Sun, putting it barely up into the range known as **intermediate mass black holes**, which are rarities. Lower mass and supermassive black holes are relatively common, but not intermediate.

HST has measured the **distance to the Pleiades** star cluster using its guidance sensor to measure its parallax. The result is about 10% closer than the Hipparcos measurement, but agreeing closely with the measurements made recently by Mt. Wilson and Palomar using interferometers. This is a serious problem, since the scale of the Universe is based on the distance to the Pleiades, and the Hipparcos distance was believed to be extremely accurate. NASA has asked for proposals to **service HST** with a robotic (unmanned) mission. It remains to be seen if proposals can show how the difficult task of replacing failed parts (mostly gyros and batteries, but possibly even cameras and spectrographs) can be accomplished, to extend the life of HST.

(continued next page)

REMINDER: Articles and other submissions are due on the 15th of each month. Send all material to SiriusAstronomer@OCAstronomers.org in PDF, MS Word, or plain text format. Non-members may submit material, but priority for publication will be given to OCA members. No more than one page of commercial ad space will be included in any given issue on a first-come, first-served basis (private party want-ads are free for members). Inquiries regarding rates for ad space should be addressed to Charlie Oostdyk, OCA Treasurer, at the contact listed on the back page. Reviews of equipment, books, vendors, etc. represent the views and experiences of the reviewer and should not be construed as an endorsement by OCA or the Sirius Astronomer.

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The Orange County Astronomers present an information-packed conference covering the latest in astroimaging techniques:

- Special Presentation: Amateur Astroimaging from the International Space Station by Don Pettit (NASA astronaut) & Robert Reeves
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For registration and updates: <http://www.ocastronomers.org/astroimage/>

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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For Sale: Meade 8" SCT; includes GPS and \$1000 in extras. \$2500 or best offer

Gerald Strong 704-538-2517

If it cannot be shown, HST will be deorbited to crash into the Pacific Ocean sometime after its few remaining gyros fail, possibly about 2008.

A 125-mile wide **impact crater** has been found off the coast of Australia that matches in age the great extinction of species 250 million years ago. It has long been thought that an asteroid impact may have caused this extinction, similarly to the impact at Chicxulub suspected of killing the dinosaurs 65 million years ago.

For Sale (all in like new condition)

Meade LX 200 8" SC Telescope with Telrad and spotter scope.
Televue 16mm Nagler type II eyepiece
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Meade Series 4000 26mm eyepiece
Meade Series 4000 9mm Illuminated Reticle eyepiece
Parks GS-5 15mm eyepiece
Meade 4000 #140 Achromatic Barlow 1.25"
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Parks ALP SC rear cell Broadband filter
Lumicon UHC 1.25" filter
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All for \$3000.00, Please serious inquiries only. (909) 924-6652

There are 2 theories for the source of the **outer satellites** of Jupiter and Saturn: 1) they are captured asteroids, 2) they are broken pieces of a very few captured asteroids. New observations with the Gemini North telescope show that carefully measuring the colors of these satellites groups them into a few families of like composition, favoring the second theory.

Rosetta, the mission to arrive at Comet Churyumov-Gerasimenko in 10 years, was recently scheduled to test its instruments after a successful launch. Fortunately the Solar system provided a substitute comet for the tests in the form of Comet LINEAR T7, which many of you have been observing lately.

FOR SALE

Dark sky site: 5 acres, 3,550' elev (never snowed in), darker than Anza; w. 1,100 sq ft home: 3b+2ba, only 3 yrs old, tile & wood-laminate flooring, freshly painted interior, extra pad for observatory, etc. All utilities, very safe community. Zoned for adding 2nd home, horses, etc. ½ hr. south of Lake Isabella, 2½ hrs N. of LA. \$129,000. Pictures available. Jay.Glowacki@aero.org, eve 310-831-4199.

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