ECLIPSE

The Newsletter of the Barnard-Seyfert Astronomical Society

Celebrating our 76th Year in 2004 **June 2004**

BSAS Membership Meeting, June 17, 2004

Come to the Adventure Science Center for the regular membership meeting of the Barnard-Seyfert Astronomical Society at 7:30 p.m.

We all know that large meteors struck the earth during its formation and early history, and that on rare occasions our planet has still felt these impacts in relatively recent times (Meteor Crater in Arizona was formed less than 50,000 years ago). Believe it or not, our home state shows the scars of several large meteorite impacts, although weathering by wind and rain means that these craters are not immediately obvious. Our June membership meeting will feature Mr. Marvin Berwind, a State of Tennessee geologist who has spent substantial time researching Tennessee's impact craters. Among the impact craters Mr. Berwind will discuss are the large Flynn Creek and Wells Creek craters, both located in Middle Tennessee and both measuring kilometers across. Please join us for a fascinating look at how meteor impacts have literally shaped our home state.

From the President

Joseph M. Boyd, Jr.

Recently, Mary and I traveled to Annapolis to visit our son, daughter in law, and our two grandchildren. En route we decided to visit the Green Bank Radio Telescope Observatory. While trying to decide on a route, we initially decided that "you can't get there from here". We finally got a route from our past president, Powell Hall, who formerly lived in West Virginia before coming to Nashville to retire. He told us to discard the route we had received from AAA, and to follow his instructions. We also had contacted the Visitor Center at Green Bank to make sure we could tour the facility, and they offered to give us advice on a route, which turned out to be almost the same as Powell's.

We were told that when the facility was being planned, there was a search for a remote site, which could be reasonably free from radio frequency interference. Well, they found it. It is remote, all right. The facility is located in what is called a radio free zone, which means that for many kilometers in every direction, there are no TV towers, cell phone towers, or other radio frequency generators. In the area in and around Green Bank, the homes do not even have microwave ovens, since these could interfere with the signals from outer space. Visitors can take their own cars only part way into the grounds, so must ride the tour buses which give regular free tours. The buses are diesel driven, so there are no spark ignitions to generate stray signals.

There is a new visitor's center, open less than a year, which overlooks the entire complex. It even has a balcony for those wishing to take pictures of the giant radio telescope, and also has a small lunch room which serves snacks a very reasonable prices. Tables and chairs near the huge picture windows afford a delightful place to eat lunch, so you are never out of sight of the giant dish. Visitors are treated to a video presentation as well as a question and answer session, after which the crowd boards the bus for the trip through the grounds of the complex. The tour guide encourages picture taking, and even stops the bus for all to get out at the big dish. We were not allowed to walk under it, but could get close enough that only a small part of it would fill the screen of our cameras. This dish, which is very new, replaces an older one which was designed, due to budget constraints, to last 20 years. It did better than that, but the guide told us that one night one of the workers came into the control center to say the dish is down. Thinking he meant the computer control had gone down, the response was that they should call someone to fix the computer. "No, you don't understand. The tower is DOWN. On the ground." The entire dish had collapsed without warning, due to metal fatigue. There was absolutely nothing left to salvage, so it was cut up for scrap, and the new one was built. It is an engineering marvel. It is taller than the Statue of

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Lawnchair Astronomy - Planets

By JanaRuth Ford

Lawnchair Astronomers are nocturnal creatures. As their obsession with things in the night time sky truly takes hold, Lawnchair Astronomers will find that not only is the Sun too bright, the Moon is also. In addition, the modern-day scourge of excessive outdoor lighting will cause even recent converts to want to flee the city for darker skies. Fortunately, there are a few celestial objects that do not require the darkest skies or the most powerful telescopes in order to be observed. Among the most interesting of these are the planets of our own solar system.

There are five planets that can be seen with the unaided eye. In ancient times, Lawnchair Astronomers watched them move against the background night sky. Believing that these moving lights were actually stars, they broke the stars down into two categories, the fixed stars and the wandering stars. The Greek name for these moving stars was “planetai”. Today we call these planets individually by their Roman names: Mercury, Venus, Mars, Jupiter, and Saturn.

The motion of each planet in our night sky is due to the fact that each planet travels about our Sun in a different orbit and at a different speed. These planets, the Sun, and the Moon follow a common path that arcs across the sky from east to west. This path, called the ecliptic, results from the fact that the planets and our Moon all orbit in roughly the same plane. This explains why the ecliptic is where the action is for solar system objects. Therefore, when planet hunting, always look along the ecliptic. It encircles the sky, but is low in the southern sky in winter and high, almost overhead from our viewpoint, during the summer due to the effect of the Earth’s seasonal tilt.

How do you know if the object you are viewing is a planet? One key is that planets seldom twinkle, but stars often glitter like diamonds. Although planets are smaller than stars, they appear larger through telescopes because they are so much closer. A planetary disc will be clearly visible through a telescope, but stars will still appear as pinpoints of light. A wider planetary disc is much less likely to be affected by atmospheric turbulence than a pinpoint of light. Therefore, turbulence causes stars to twinkle but not planets.

Four planets of our solar system are easy to find with the unaided eye, even from light-drenched city skies. Venus, Mars, Jupiter, and Saturn are also fascinating through a telescope. However, at high magnification these planets still seem small to first time observers. Even giant Jupiter looks nothing like a beach ball through an eyepiece.

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MAGAZINE SUBSCRIPTIONS FOR BSAS MEMBERS

We are always able to accept requests for new and renewal yearly subscriptions to SKY AND TELESCOPE and ASTRONOMY from our members in good standing.
The current yearly rates are as follows:
SKY AND TELESCOPE: $32.95
ASTRONOMY: $29.00
Checks or Money Orders should be made out to the Barnard Seyfert Astronomical Society (BSAS) and sent to the following address:

BSAS
P. O. Box 150713
Nashville, TN 37215-0713

DUES INFORMATION

On your Eclipse mailing label is the expiration date for your current membership in the BSAS. There will be a two month grace period before any member’s name is removed from the current mailing list. You will be receiving a number of warnings informing you that your membership is expiring.

Dues per year are $20.00 Regular (1 vote); $30 Family (2 votes); $15.00 Student (under 22 years of age)(1 vote); $15 Seniors (65 years or older)(1 vote); $25 Senior Family (65 years or older)(2 votes). Please call President, Joe Boyd, (615) 386-3134 if you have questions. Dues can be sent to:

BSAS
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THE ECLIPSE NEWSLETTER
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Mercury can be seen with the unaided eye just before sunrise or just after sunset, but it is challenging to see because it remains close to the Sun and is often lost in the solar glare. Binoculars make it easier to find. A telescope will show that Mercury has phases such as those seen on the Moon. Mercury will be visible during evening twilight in late June. Dazzling Venus is the brightest of the planets, outshining everything in the night sky except the Moon. It can be conveniently seen in the western sky after sunset for several months of each year. Like Mercury, the orbit of Venus is inside that of the Earth, so Venus will always rise before sunrise or set after sunset. It is never visible at midnight. Venus will transit the Sun on June 8, 2004 and move into the morning sky becoming the brilliant "morning star". Through a telescope, it is obvious that cloud-covered Venus goes through phases, just like the Moon and Mercury. The phases are due to the fact that these planet's orbits are inside the Earth's orbit so we see the portions that are lit by the Sun.

Mars is recognizable by its famous and distinctive rusty orange color. It is really interesting for about three months every two years when it's closest to Earth. At this time, called *opposition* because the planet is opposite the Sun in the sky, Mars is also brighter than the stars and its surface features, including polar ice caps, are often visible through amateur telescopes. Its brightness changes from month to month as its distance from Earth varies. At its greatest distance from Earth, Mars is fainter than several of the brightest stars and even Saturn. Jupiter, though not as bright as Venus, is brighter than the brightest of stars and all of the other planets. Through a telescope, Jupiter's four largest moons and colorful cloud bands are visible. Binoculars will also reveal the four largest satellites of Jupiter strung out in a line near the planet. Saturn, as bright as the brightest of stars, looks yellowish in color. This ringed planet appears simply as an oval through binoculars. A telescope is required to see the famous rings of Saturn as well as its largest moon. Mars and Saturn, both found in Gemini this June, will become increasingly difficult to observe in the evening. Jupiter will remain easily visible in Gemini all month.

The three outer planets were only discovered fairly recently, astronomically speaking. Uranus was found telescopically, by accident, in 1781 and Neptune was predicted mathematically before it was observed in 1846. Pluto wasn't discovered until 1930 and then only after a search lasting twenty-four years! Uranus and Neptune are both visible through binoculars. Uranus can be glimpsed with the unaided eye in a moonless night sky under exceptional viewing conditions. Through a telescope, Uranus appears as a greenish disk and under good seeing conditions will appear "fatter" than a star. It is currently found in Aquarius. Neptune requires patience. Look for it in Capricornus. Through a telescope, it appears as a small blue disk. Pluto is so faint that at least an 8-inch telescope is required for most to see it. Even through larger telescopes, this distant planet, now in Ophiuchus, simply looks like a dim star. Few have ever seen faint Pluto. It is usually a target only for well-equipped and seasoned Lawnchair Astronomers.

Ours is no longer the only known planetary system in our galaxy. All of the extrasolar planets found so far are quite close, astronomically speaking. Most are between 10 and 300 light years away. Some two-dozen stars that have known extrasolar planets are visible in the night sky, including Epsilon Eridani of *Star Trek* fame!

Mentoring/Outreach

Mary Boyd has offered to train BSAS members doing any type of outreach that involves children in the legal aspects and proper protocol required in such volunteer work. The times and places will be announced. This training is recommended for all members, but may be required for those involved in outreach to children and youth groups.

Thanks to **Larry Southerland** and **Evelyn Wright** for their generous contribution to the committee for the purchase of items to be included in the Novice Astronomer Kits.

Happy Birthday John Couch Adams

by Robin Byrne

This month, we celebrate the life of a man who deserves to be honored, but not necessarily for the reason he is most remembered.

John Couch Adams was born June 5, 1819 in Cornwall, England. Even as a young child growing up on a farm, he showed great abilities in mathematics, performing complicated calculations in his head. By his early teens, Adams also discovered an interest in astronomy. When he was 16, he calculated when an annular eclipse of the Sun would be visible in a nearby town where his brother lived.

In 1839, Adams began attending St. John's College in Cambridge, where he majored in mathematics. It was while he was a student that Adams became interested in the motion of the recently discovered planet, Uranus. It was known that the motion of Uranus did not follow the predicted path. In 1841, Adams wondered if there might be another planet beyond Uranus that could be the cause of its strange behavior. Adams graduated in 1843, and was given a Fellowship from Pembroke College, a position he held until his death. Still working on the problem of Uranus, by1845 Adams had completed his calculations for the position of this predicted planet. Here's where the story gets murky. There are several versions, but overall, it appears that Adams had tried to get Cambridge Observatory to look for the planet, but nothing happened. Adams than went to the Astronomer Royal, George Airy, for help, but through a series of miscommunications, still nothing occurred. Almost exactly one year later, using similar calculations performed by Urbain Le Verrier, Johann Galle found what is now known as Neptune. After the announcement was made about this discovery, the director of Cambridge Observatory tried to get some credit for England, saying that Adams had already predicted it. Because of that, Adams and Le Verrier get credit for their calculations, while Galle gets credit for observing Neptune first.

That's the story that is often told. However, some key correspondence relating to the story had disappeared from the Royal Greenwich Observatory, and had not been found until in 1999 they somehow showed up in Chile. Dr. Nicholas Kollerstron of the University College in London has been studying the documents and thinks that Adams may be getting too much credit. According to what he has seen in the papers submitted by Adams, Adams did not have just one prediction of the planet's position, but several - spanning over 20 degrees of the sky. It was only the predictions that were close to where Neptune was found that were made public at the time, all the others were hushed up.

Whether Adams should have credit for the discovery of Neptune or not, he did make other contributions to the field of astronomy. In 1859, Adams became Professor of Astronomy and Geometry at Cambridge. He held that post for 32 years. In 1861, he was named director of Cambridge Observatory. In 1866, Adams began to study the Leonid meteor shower. Based upon when Earth encounters the shower each year, Adams was able to compute the orbit of the Leonids. From that orbit, he determined that the Leonids are the result of Earth passing through debris left behind by comet Tempel-Tuttle. Adams also worked out a more detailed mathematical model of the motion of the Moon, as well as studying Earth's magnetic field.

In 1847, Queen Victoria offered Adams a knighthood. However, Adams refused it. The shy, unpretentious man did not want the attention, and feared he could not afford the lifestyle expected of a knight.

John Couch Adams died January 21, 1892 in Cambridge, England and is buried next to his wife. In 1895, a memorial tablet honoring Adams was erected in Westminster Abbey near the one honoring Isaac Newton. So, let the debate continue about Adams' claim to Neptune, but don't forget his other contributions to the world of science. One way or the other, John Couch Adams deserves to be remembered.

References:

Adams Web Page http://www-gap.dcs.st-and.ac.uk/~history/Mathematicians/Adams.html

John Couch Adams Web Page http://starchild.gsfc.nasa.gov/docs/StarChild/whos_who_level2/adams.html

Lost letters' Neptune revelations BBC News on-line by Christine McGourty http://news.bbc.co.uk/1/hi/sci/tech/2936663.stm

Barnard-Seyfert Astronomical Society
Minutes of a Regular Meeting of the Board of Directors
Held On Thursday, May 6, 2004

The Board of Directors of the Barnard-Seyfert Astronomical Society met in regular session at the Jefferson Square Club House in Nashville, Tennessee on May 6, 2004. A sign-in sheet was passed around in lieu of a roll call. President Joe Boyd declared a quorum to be present and called the meeting to order at 7:43 P.M. Board members Mike Benson, Joe Boyd, JanaRuth Ford, Bill Griswold, Powell Hall, John Harrington, Lonnie Puterbaugh, and Pam Thomas were present. Board members Tony Campbell, Kris McCall, and Jill Thompson were absent. In addition to members of the board, Assistant Secretary Bob Rice and Outreach Chair Heinrich Tischler were also present. The minutes of the previous regular board meeting held on April 1, 2004 were approved as published in the May 2004 issue of the *Eclipse* newsletter.

Joe Boyd reported that the BSAS and Vanderbilt University had agreed upon the amount of $1,003.10 to replace a lost check issued to the university on January 7, 2003 for printing the *Eclipse* newsletter and other expenses. Mr. Boyd also recommended that the BSAS investigate establishing an affiliate account with Amazon.com so that the Society could receive a percentage of member purchases made through its website. Pam Thomas put this recommendation into a motion that was seconded by Lonnie Puterbaugh and, following a brief discussion, adopted by a unanimous vote. Finance & Budget Committee Chair Bob Rice volunteered to research this arrangement and report back to the board. Mr. Boyd also reported that details of a proposed meeting with Dyer Observatory administration were still under discussion.

Commenting on the BSAS' participation in Astronomy Day on April 24, Mr. Boyd complimented board member and Sudekum Planetarium Director Kris McCall for her dedication in helping to organize this event. Mr. Boyd also complimented BSAS member Dr. Spencer Buckner and his students from Austin Peay State University along with the *Clarksville Astronomy Club* for their excellent telescope display. Mr. Boyd regrettably noted that, possibly because of the fee charged to enter the Adventure Science Center, very few people saw either this display or Loren Ball's outstanding asteroid hunting presentation. In addition, he cited Astronomy Day's close timing to the Music City Marathon and the Iroquois Steeplechase as another likely contributor to the generally low attendance. Mr. Boyd recommended that the BSAS continue to support the Adventure Science Center's observance of Astronomy Day in 2005. However, he also suggested that the Society should consider having an alternate event for which it determined the date, location, and activities. Furthermore, he pointed out that a reporter from *The Tennessean* suggested that the BSAS prepare its own news release for future public events and fax it to the newspaper.

Joe Boyd reported that the new President of Austin Peay State University was interested in establishing an observatory and that the university had acquired land for that purpose at a dark sky location away from Clarksville. Mr. Boyd stated that he was interested in working out a cooperative arrangement with APSU which he would present to the board. Mr. Boyd also suggested that the Outreach Committee should assume control over the BSAS' calendar of events.

Lonnie Puterbaugh commented that the rangers at Henry Horton State Park were very friendly toward astronomy and that the BSAS might be able to approach that facility for land to be used for a temporary observatory.

Joe Boyd complimented Webmaster Tony Campbell for creating an outstanding BSAS web site. Mr. Boyd suggested that information about future area science fairs should be included on our web site. Mike Benson commented that the BSAS would be able to work with APSU on the science fair that it sponsored. Mr. Benson also said that, as the BSAS' Astronomical League Correspondent, he would nominate Mr. Campbell for the League's 2005 Webmaster of the Year Award.

Joe Boyd handed out copies of a draft loaner scope policy. Equipment Chair Lonnie Puterbaugh stated that he would review the draft policy. Mr. Boyd noted that the final policy, in addition to being posted on our web site, would also be published in the *Eclipse* newsletter and the BSAS' informational brochure. Mr. Boyd also stated that the BSAS needed a statement of purpose and to finalize its logo.

Lonnie Puterbaugh informed the board that the BSAS had been approved to set up telescopes for a public viewing event following the Nashville Symphony's Summer Concert performance at Crockett Park in Brentwood on the evening of May 23. Mr. Puterbaugh noted that the Park Director had suggested turning on all the lights immediately after the concert and publicly declaring a dark area. Mr. Puterbaugh and Outreach Chair Heinrich Tischler will meet with the Director to work out final details. Mr. Puterbaugh suggested that, if this goes well, the BSAS would be invited back for future concerts. Joe Boyd commented that this could prove to be an excellent outreach project.

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Equipment Committee Chair Lonnie Puterbaugh reported that they had reviewed purchases made during the year and were within budget. Mr. Puterbaugh stated that the committee planned to rewire the declination motors on the two recently acquired Johnsonian Type V equatorial platforms to make these connections less subject to damage when they were used. He said that they also planned to reline the platforms' storage boxes with foam for better protection during transport.

Mentoring Committee Chair JanaRuth Ford reported that they were planning several learning-about-equipment type parties. She noted that after learning how to use their telescopes, members would be encouraged to take them to scheduled outreach events. Outreach Committee Chair Heinrich Tischler commented that the first such party was scheduled for May 15 at Warner Park to be followed by a trip to the comet party later that evening at the Adventure Science Center.

Bob Rice announced that the Finance & Budget Committee and the Grants Committee would meet jointly on May 12 to consider potential revisions to the 2004 budget and to review grant activities.

Program Committee Chair John Harrington reported that speakers at our membership meetings were scheduled for the entire summer. Powell Hall commented that it would be important to consider arrangements for International Dark Sky speaker Scott Davis at the June board meeting.

Joe Boyd recommended that, following research by Tony Campbell, the BSAS purchase a fixed central telephone service from VoiceNation for $9.95 per month plus a $15.00 setup fee. This arrangement would allow multiple BSAS officers to respond to messages at a single telephone location on a timely basis. Powell Hall put this recommendation into a motion that was seconded by Bill Griswold and, following a brief discussion, passed by a unanimous vote.

Joe Boyd commented that an Assistant Chair was needed immediately for the 2004 Tennessee Star Party (TNSP). He also noted that a statement of purpose should be developed for this annual BSAS event. Several potential Assistant Chair candidates were mentioned during the discussion that followed. The general consensus favored the TNSP being a get-together for fellow amateur astronomers rather than a public outreach effort. Most agreed that good fellowship should be the primary goal, but did not exclude fund raising as a reasonable secondary objective. Most also liked the arrangement of having speakers during the day followed by observing sessions at night. Joe Boyd suggested that a small committee be formed to draft recommendations for presentation at the next board meeting. Bill Griswold agreed to serve as a co-chair and recommended that current TNSP Chair Lloyd Watkins, who was not present, be asked to serve as the other co-chair. Powell Hall and Pam Thomas also volunteered to serve on the committee.

Mike Benson announced that Sky Publishing Corporation had sent him a promotional offer for cards that BSAS members and others could return to receive free copies of the new beginners' magazine *Night Sky*. The board suggested that he try to obtain several hundred of these cards.

Eclipse Editor Bill Griswold commented that he would omit the July star party from the newsletter's Activities and Events column because of confusion and conflicts with other scheduled functions. Mr. Griswold also announced that the 22nd of any month would be the cutoff date for including articles in the *Eclipse*.

Having to leave because of other commitments, President Joe Boyd turned the meeting over to Vice President John Harrington at 9:45 P.M.

Membership Chair Bill Griswold commented that some members did not want their email addresses made available outside of the BSAS and cited providing this information to the Astronomical League as an example. Mike Benson stated that the League did not require members' email addresses to complete their records. Lonnie Puterbaugh suggested that using email for borrowing loaner telescopes might also be problematic. John Harrington asked Mr. Griswold if it would be possible to obtain a list showing what number of BSAS members lived in each Middle Tennessee zip code, and Mr. Griswold replied that he could.

Lonnie Puterbaugh announced that Middle Tennessee State University was having a public astronomy event tomorrow night and to check their web site for details.

There being no further business, Vice President Harrington declared the meeting adjourned at 10:00 P.M.

Respectfully submitted,
Bob Rice
Assistant Secretary

Meteors, Meteorites, and Impact Craters

By JanaRuth Ford

In 1714, Edmond Halley suggested that meteors might be extraterrestrial in origin. A few agreed with him, but not many. It was only in relatively recent times that there was a change of opinion concerning the extraterrestrial origin of meteors and meteorites. The words meteor and meteorite come from the same root word as the word meteorology, the study of weather. The Greek word is *meteoros,* which means "in midair". This is due to the fact that these objects were considered to be phenomena that originated in Earth's atmosphere, just like lightning. Meteors have been seen in the skies for centuries and meteorites have been found and prized for centuries, but it was a long time before their connection was understood. Both are meteoroids, basically interplanetary debris orbiting the Sun. Meteoroids are primarily produced by the decay of comets or the collisional fragmentation of asteroids, however, a few are fragments that were blasted off Mars or our Moon and drifted through space for millions of years before reaching Earth. These small, interplanetary bodies of rock and/or metal range in size from dust particles to a few meters across. A micrometeorite is so small that it must be viewed through a microscope.

A meteor, also known as a "shooting star" or "falling star", is the flash of light produced when a meteoroid enters the Earth's atmosphere. During entry into Earth's atmosphere, a meteor is heated to several thousand degrees, melting the surface and usually "burning up" at an altitude of 75 to 100 kilometers. A dazzlingly bright meteor is a fireball, and if it explodes, a bolide. Bright meteors occasionally leave a luminous trail called a meteor train that may last up to several minutes. A concentrated burst of meteors all seeming to originate from a single point the night sky, called the radiant, is called a meteor shower. A meteor shower occurs when the Earth collides with a concentrated group of particles that are believed to be cometary debris or the remnants of cometary disintegration. Meteor showers are easy to enjoy and require nothing more than a sturdy lawnchair and a clear, moonless sky. A meteor shower is usually named for the constellation or bright star seen nearest its radiant. The Roman historian Titus Livius, also known as Livy, noted one evening that "the sky was seen to blaze with numerous fires" (Strothers, 1979:87) Although several fanciful interpretations have been advanced, "Livy's report of 'scattered fires in the sky followed by a huge torch blazing out' (203 BC) is best read as an intense meteor shower with one particularly bright meteoric fireball" (Strothers, 1979:90).

A meteor shower that has an enormous number of meteors is called a meteor storm. During the early morning hours of 13 November 1833, a spectacular meteor storm was observed in the eastern parts of North America. The sky seemed to be ablaze with thousands of meteors. Eyewitnesses estimated that the rate exceeded 10,000 meteors per hour and at the peak, observers reported seeing 20 meteors each second. Church bells rang as people ran through the streets convinced that the world was coming to an end. At the time, a young and apparently unflappable Abraham Lincoln, who was later to become our sixteenth president, was living in New Salem, Illinois. In the early morning hours, Lincoln was roused from his sleep by a voice at his door informing him that the end of the world was at hand. Going outside, Lincoln said, "I saw the stars falling in great showers! But looking back of them in the heavens I saw all the grand old constellations with which I was so well acquainted, fixed and true in their places" (Vertuno, 1999). When he saw the familiar stars staying in place, he knew that not every star was falling and therefore concluded that this celestial event was not a signal of the end of the world.

Have you wondered about the current Alabama license plates? This same spectacular meteor storm was also seen across the southeastern US, including the state of Alabama. It became known there as "The Night the Stars Fell on Alabama" and even inspired a song of the same name. A book entitled *Stars Fell on Alabama* was written by a University of Alabama professor in 1934 and in 2002, the state government put the phrase "Stars Fell On Alabama" on its license plates. According to the Alabama Department of Archives and History, "The shower caused such great excitement across Alabama that it became a part of the state's folklore and was used for years to date events".

Larger rocky or metallic objects that do not completely vaporize before reaching Earth's surface are called meteorites. In space, meteoroids are cold. As they hit Earth's atmosphere, traveling 10 to 40 kilometers per second, kinetic energy is transformed into heat and light in the conservation of energy. Moving through the atmosphere, their surface temperatures rise rapidly, which leads to mass loss through ablation, that is, material is lost from the surface of the meteoroid as a result of atmospheric friction and vaporization. The heated and melted parts rapidly "burn off" so not much heat is transmitted to the interior. Therefore, after a meteorite lands, it may be warm, but not hot.

Evidence suggests that most meteorites are fragments of Earth-crossing asteroids originally ejected from the main asteroid belt. Meteorites frequently appear brecciated, that is, they are composed of fragments of dissimilar material jumbled and welded together during asteroid collisions. Afterwards, these fragments were ejected in

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different directions with some thrown into orbits that eventually intersect Earth's orbit. Meteorites are usually divided into three types: iron, stony-iron, and stony. The latter is subdivided into two groups: chondrites or achondrites. Chondritic meteorites contain small spherical bodies, called chondrules, which are mainly composed of silicates. The lack of chondrules in achondrites is thought to result from large-scale collisional melting of the parent bodies.

The first documented meteorite fall in the United States took place during the early morning hours of 14 December 1807. An exceptionally bright object flew over New England and crashed near Weston, in southern Connecticut. A Mrs. Gardner, who lived in Wentham, Massachusetts, saw what she described as a brilliant object as large as the full Moon moving swiftly across the sky. Nathan Wheeler, a Justice of the Court of Common Pleas, also saw the meteorite and noted a long train that lasted some 30 seconds. He heard three loud explosions and a rumble like that of a "cannon ball rolling across the floor" (Sanderson, 2001:2). The object, later determined to be a stony meteorite, landed in a field belonging to Elijah Seeley. The farmer led two professors from Yale through his field, still full of terrified cows, to a hole filled with meteoritic rock. James L. Kingsley, a college librarian as well as professor, and Benjamin Silliman, a professor of chemistry at Yale, collected samples of the meteorite and interviewed witnesses. Silliman analyzed the brownish, granular fragments he collected in his laboratory at Yale and reported his conclusions. Not everyone was convinced, however. Even the President of the United States, Thomas Jefferson, was skeptical stating "It is easier to believe that Yankee professors would lie than that stones would fall from heaven" (Hartman and Impey, 2002:260). Nathaniel Bowditch of Salem, Massachusetts, a noted astronomer and author, was able to independently confirm the findings of the Yale professors.

No human in recorded history has been killed by a meteorite. Though human encounters with meteorites are extremely rare, there have been a few close calls. On 30 November 1954, a 3.9-kilogram meteorite crashed through the roof of a house in Sylacauga, Alabama, then ricocheted off a chest of drawers before striking Ann Hodges as she slept on her couch. She suffered no injuries other than a massive bruise on her thigh. This was the first well-documented case of a human being struck by a meteorite. Though she became an instant celebrity, she was not allowed to keep the meteorite because the house was rented and her landlord took possession of the stone. It was, however, named for her. The Hodges Meteorite is now on display at the Alabama Museum of Natural History on the campus of the University of Alabama in Tuscaloosa.

Much larger meteorites have impacted the Earth in the past. Meteor Crater in Arizona, also known as Barringer Crater, was known long before it was ever suspected of being an impact structure. Even though this crater is one of the youngest on Earth, 30 meters of sediment cover the floor and erosion has removed 15 to 25% of the ejecta. Still, the 1.2-kilometer in diameter crater is one of the best-preserved impact sites on Earth. Iron meteorite fragments have been recovered up to 7 kilometers from the crater indicating that the impacting body most likely broke apart just before impact. David J. Roddy, a member of the U.S. Geological Survey Astrogeology Team, along with Eugene Shoemaker, suggested in 1995 that the impactor had a diameter of 45 to 50 meters and was likely formed by a collision in the main asteroid belt that fragmented the nickel-iron core of an asteroid.

In 1991, a meteoroid was tracked as it passed by Earth at less than half the distance to the Moon. This was the first recognized Moon-crossing asteroid. In December 1994, James Scotti, using the Spacewatch telescope, detected another small, Moon-crossing asteroid just fourteen hours before its closest approach to Earth. Scotti later said, "While I did find this little guy, I missed the other 40 or 50 objects of similar size that probably passed within the Moon's distance that day" (Peebles, 2000:80). Orbits of these small solar system objects are difficult to predict with any certainty. The closest ever-recorded meteoroid that did not enter Earth's atmosphere was seen on March 18 of this year. The 30-meter in diameter object (compare to the Barringer meteorite) passed by Earth at one-ninth of the distance to the Moon and was only discovered two days before its closest approach to Earth.

One of the most recently recognized and studied impact craters in the US is the Wetumpka Crater in Alabama. Its unusual geological features were first noticed in 1891. However, it was not recognized as a possible impact site until the completion of a 1969-1972 geological mapping survey. The 6.5 kilometer, semi-circular, rimmed structure was formed 80 to 83 million years ago. The crater shape is especially interesting since it suggests an oblique impact on a northeast to southwest trajectory. A rebound peak that is typical of complex craters is discernable at the center of the crater. According to geologists from nearby Auburn University who oversaw the core drilling at Wetumpka, the 1998 drilling recovered "shocked quartz, iridium, and impactites, which provided key evidence confirming meteoritic impact at Wetumpka" (King et al., 1999: 64). Drilled samples indicate that the impactor was most likely a chondritic asteroid.

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Meteors, continued from Page 8

There are several impact craters that have been identified in Tennessee. Dave Roddy's field mapping of one Tennessee impact site was the first mapping detailed enough to demonstrate the impact origin of these ancient structures. Marvin Berwind, a geologist with the Tennessee Division of Geology, will share the latest findings concerning these impact sites at the June 17 BSAS meeting. Join us to learn how these structures were discovered and determined to be the result of interplanetary debris bombarding the Earth.

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5 June 2004 Equipment and Star Party

by Heinrich Tischler

THE SKY IS NOT OUR FRIEND! Space is our sanctuary… space provides tranquility… space has no thunderstorms nor does it have rain clouds. The sky plots against those who wish to gaze at the stars. We will regroup and gather at our secret meeting site (the Warner Park Airplane Field) at 6:00 pm on June 5th. It is imperative we do not tell the Sky. I normally would not be so paranoid but I have recently discovered the Sky can read and write. I have seen the skywriting across the horizon. Imagine, trying to wish one of us happy birthday!

Bring your equipment; bring your questions. The High Ministers of Information will be there to answer all (should they forget their medications, then they will be just the Ministers of Information). Please bring food and beverages for you and yours. Remember, a little extra food might be needed to keep the non-ministers away from your telescopes.

At 8:30 we will stay and host the Warner Park Star Party. This will be a great time to share your new expertise with the general public. We will again have the two fields as before. **Please encourage the public to visit both sites.** All they have to do is follow the yellow lights. Should they start walking towards the white lights, inform them that they are heading to the parking lot. This will be a great evening!!

From the President, contnued from Page 1

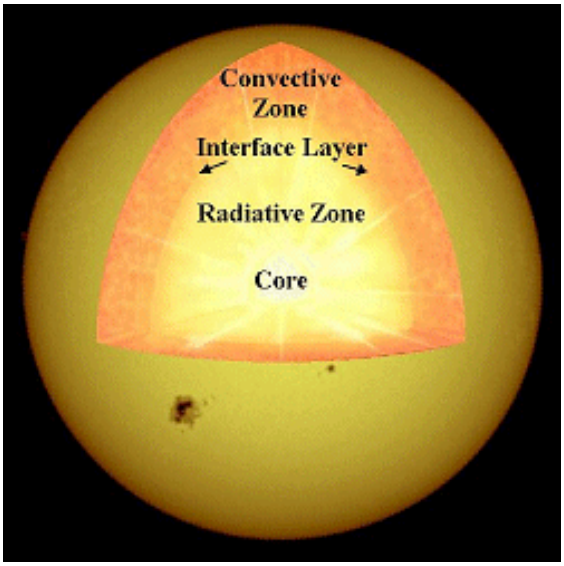
Liberty, and about two thirds the height of the Washington Monument. The dish itself is 100m by 110m, and is the largest movable object on land anywhere in the world. Except when it is being maintained, it can operate around the clock. This one is built to last.

For those of you new to astronomy, the Green Bank facility is part of the National Radio Astronomy Observatory, which was created to provide state of the art radio telescope facilities for use of the scientific community. The NRAO telescopes are used by scientists all over the world to study all types of astronomical objects know, from planets to comets to quasars and galaxies billions of light years away. By the way, if you would like to propose a project and have the use of some "viewing time", the NRAO will accept proposals from either groups or individuals.

We learned a lot about West Virginia roads on this trip. Thanks to Powell, we did as well as possible in navigating the hairpin turns and narrow highways en route to Washington. If you should decide to visit Green Bank, and I strongly encourage you to do so, let me know and I will be glad to put you in touch with the authorities. For road advice, don't forget Powell Hall.

The advent of two comets has caused a flurry of activity in the BSAS outreach department, as we have public star parties scheduled well into June. I hope each of you will try to attend and participate in at least one and preferably two of these events. We are enjoying a lot of camaraderie, getting to know each other better, and having a genuine good time. Astronomy is fun in and of itself, but this makes it even more enjoyable.

Fun Facts - Did You Know?



- The Sun contains almost 98% of the total mass of the solar system.
- The Sun's period of rotation at the surface varies from 25 days at the equator to 36 days at the poles.
- Deep down, below the Convection Zone, the period of rotation appears to be 27 days.
- 109 Earths would fit across the Sun's disk, and it's interior could hold 1.3 million Earths.
- The Sun's core temperature reaches 15,000,000 degrees C (27,000,000 degrees F)
- Pressure at the Sun's core reaches 340 billion times that of Earth's at sea level.
- Every second, the Sun fuses 700 million tons of hydrogen into helium, releasing 5 million tons of pure energy.
- Energy produced by nuclear fusion at the Sun's core takes a million years to reach the surface.
- The Sun has been active for 4.6 billion years and has enough fuel to remain active for another 5 billion years (or so).

Want to learn more? Visit the Big Bear Solar Observatory's web site http://www.bbso.njit.edu/

Barnard-Seyfert Astronomical Society
Minutes of the Monthly Membership Meeting
Held on Thursday, May 20, 2004

President Joe Boyd called the meeting to order at 7:45 P.M. at the Adventure Science Center and welcomed new members and visitors. Program Committee Chair John Harrington introduced BSAS member and former Adventure Science Center employee JanaRuth Ford who presented a planetarium program on extra-solar planets entitled "In Search of Alien Worlds." Following the planetarium show, Ms. Ford described several newer techniques for locating extra-solar planets including gravitational microlensing and transit detection. She additionally pointed out that 122 of these objects had been found as of May 15. Ms. Ford also demonstrated several DVDs from NASA's Night Sky Network and showed how BSAS members could use these for public outreach.

President Boyd recalled the meeting to order at 8:53 P.M. The minutes of the previous membership meeting held on April 15, 2004 were approved as published in the May 2004 issue of the *Eclipse* newsletter. Dark Sky Committee Chair Powell Hall reported that this committee would meet on June 01. Mr. Hall also noted the importance of the upcoming July 15 committee meeting that would take up final planning for June speaker Scott Davis' arrival from the Dark Sky's national committee in Phoenix.

Mentoring Committee Chair JanaRuth Ford reported that a comet party was planned for Saturday, May 22, at Long Hunter State Park from 8:30 PM until 10:30 PM. She also announced that the equipment party that was rained out on May 15 has been rescheduled for June 5 at Warner Park. In addition, Ms Ford commented that the Society's recently acquired Night Sky Network materials were used to reach approximately 160 people during the recent Astronomy Day celebration at the Adventure Science Center.

Lonnie Puterbaugh reported that the BSAS had received permission to set up telescopes at Crockett Park in Brentwood for the first summer concert on Sunday, May 23. Mr. Puterbaugh noted that directions would be posted on our web site and that participants would have to leave by 10:30 PM.

Joe Boyd commented that physics apparently would not be taught at some Metro High Schools next year due to budget constraints. Bill Griswold reported that the ad hoc committee he chaired had determined that the 2004 Tennessee Star Party's two goals should be to raise funds for the BSAS and to provide fun and good fellowship for our members. Mr. Boyd called for volunteers to sign up following the meeting.

JanaRuth Ford reported that BSAS members wishing to go on the impact crater tour at Wells Creek should meet in the Adventure Science Center's lower parking lot at 10:30 AM on Friday, May 28. Tennessee State Geologist Marvin Berwin will lead the tour.

Joe Boyd announced that the Astronomical League would sponsor a certificate program for the June 8, 2004 solar transit of Venus. Mr. Boyd said that details could be found in the BSAS' Eclipse newsletter and on the Astronomical League's web site. Mr. Boyd also announced that Finance Committee Chair Bob Rice had filed the necessary papers with the Tennessee Secretary of State's office to renew the BSAS' corporate charter. In addition, Mr. Boyd reported that Loren Ball's recently discovered asteroid #83596 would be named for the BSAS.

Joe Boyd reported that the BSAS had paid Vanderbilt University $1,003.10 to replace a lost check issued to the university on January 7, 2003 for printing the *Eclipse* newsletter and other expenses. Mr. Boyd commented that a future meeting with Dyer Observatory administration to discuss matters of mutual concern was also being worked out.

There being no further business, the President declared the meeting adjourned at 10:00 P.M.

Respectfully submitted,
Bob Rice
Assistant Secretary

Activities and Events

June 1 — 30, 2004

6/1 Dark Sky committee of BSAS, 7:30 pm at 4343 Lebanon Pike, Room 201
6/3 BSAS Board of Directors, 7:30 pm at Jefferson Square
FULL MOON
6/7 Conj. Neptune and Moon
6/8 Conj. Uranus and Moon, Venus in inferior conjunction transits the face of the Sun; only the final part of its transit visible from Nashville, within an hour after sunrise.
6/9 LAST QUARTER
6/11 Pluto at opposition
6/17 BSAS membership meeting, 7:30 pm at Adventure Science center, speaker Mr. Marvin Berwind
NEW MOON
6/18 Mercury in superior conjunction with the sun
6/18-20 Star Party, Henry Horton State Park
6/19 Conj., Saturn with Moon
6/20 Summer Soltice 7:57 CDT; conj., Mars & Moon
6/23 Conj., Jupiter and Moon
6/25 FIRST QUARTER

July 1 — 31, 2004

7/1 BSAS Bd. of Directors, 7:30 p. m. at Jefferson Sq.; Spacecraft Cassini orbits Saturn
7/2 FULL MOON
7/3 Dog Days begin
7/4 INDEPENDENCE DAY; conj., Neptune & Moon
7/5 Conj., Uranus & Moon; Earth at aphelion
7/6 Dark-sky committee, 7:30 p. m. at McKendree Towers
7/8 Conj., Saturn & Sun
7/9 LAST QUARTER
7/10 Conj., Mercury & Mars
7/13 Conj., Moon & Venus
7/14 Greatest brilliancy of Morning Star Venus
7/15 BSAS meeting, 7:30 p. m. at Adventure Science Center, Speaker:Mr. Scott Davis
7/17 NEW MOON
7/18 Conj., Moon & Mars
7/19 Conj., Moon & Mercury
7/21 Conj., Moon & Jupiter
7/24 FIRST QUARTER
7/26 Mercury, gr. elong. E (i. e. as evening star)
7/3l Conj., Neptune & Moon; FULL “BLUE” MOON (i. e. second full moon of the calendar month). N. B. When two celestial objects pass closely, they are said to be in conjunction; in the listing above, the more northerly of the two is named first.

Note: all dates & hours according to Central Daylignt Time

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