Bays Mountain Astronomy Club

☞*Next Meeting: Apr. 6*☜

SKYWARD *BY BRAD DUNN*

Last Saturday, I decided to bring the wife and kids along with me to Bays Mountain. I had planned to attend the StarWatch that night so we went early so the kids could enjoy the park for a while before observing began. I knew the girls would enjoy getting outside and seeing all the animals, but I was amazed at how much they enjoyed the indoor exhibits also. I attend monthly meetings and other events at the park on a regular basis and I have just gotten used to seeing the wolves, snakes, and other animals, and take them for granted. I had the chance Saturday to slow down and really appreciate some of the awesome exhibits and shows the park has to offer and I had a great day with my family. If it's been a while since you have brought the family out to the park, this is a great time to do it. The weather is perfect and the trees and wildlife are all starting to come out of their winter slumber, not to mention perfect skies for observing.

Last month's meeting was spent evicting our ladybug friends from their warm winter home at the dome observatory. We vacuumed all the bugs and wiped everything down real good in preparation for the spring StarWatches. [Ed.: Thanks for your wonderful and helpful efforts!] After that we went inside for a planetarium show. We saw the show that Robin Byrne had written about Pluto. This was a great little program that was fun to watch and full of information about why Pluto is no longer considered a planet. I also really enjoyed Robin's strong northern accent as the voice of the lead character. I would like to show this again soon for the members that have not gotten the opportunity to see it yet.

At the April meeting we will have some information on the upcoming transit of Venus, and start planning the public observing that will be taking place at the Appalachian Fairgrounds for this event. Our speaker for April will *possibly* be a meteorologist from WCYB News Center 5. He will be discussing the weather conditions that must be present for good "seeing" when observing the skies. There are several things that determine how good you can "see" on any given night depending on humidity, temperature, and other variables. I am waiting on confirmation now and will let you know as soon as I hear from him.

Calendar

Special Events

Apr. 28 Astronomy Day!

SunWatch

Every Sat. & Sun., 3 - 3:30 p.m.,

Mar. - Oct., weather permitting.

BMACers are always welcome to help.

StarWatch

8 p.m.: Mar. 17, 24 & 31

8:30 p.m.: Apr. 7, 14, 21, & 28

BMACers need to arrive 30 min. early to set up.

BMAC Meetings

7 p.m., Discovery Theater

Apr. 6 Possibly a talk on seeing.

May 4 Topic TBA.

Until then, take advantage of this beautiful weather and dust those telescopes off, get outside, and look up!

Note: Astronomy Day is upon us. Mark your calendars for April 28th! We'll have the usual presentations by members, displays, solar and night viewing and more. Please consider either helping with either bringing or manning a display, providing a short talk, or just helping out. Thanks!

Additional Note: Terry Alford was not feeling well. His article will resume next month.

EYE TO THE SKY *BY BOB SMITH*

Let's hope for fewer April showers this month and more warm and clear spring nights.

Jupiter should be your first target after the Sun dims these April evenings. If you witnessed the Venus-Jupiter conjunction last month and followed the downward slide of Jupiter you realize that Old Jove will soon be out of the picture. Early in the month Jupiter is still high enough to catch a good glimpse of the cloud tops and moons through your telescope. Later in the month, the planet is just too low for useful telescopic observation, but it's still fun to follow the bright dot as it gets ever nearer the horizon. How long can you follow Jupiter the latter half of April?

Venus is hard to miss simply because it is so bright and high in the west after sunset. The planet reaches its theoretical brightest magnitude at -4.7 around the end of the month. Venus is currently about 52 million miles from Earth and getting closer. The first of April finds the bright planet sliding through the Pleiades cluster. The evenings of the 2nd and 3rd will be a fantastic photo opportunity with Venus less than one degree south of the bright cluster. On the evening of the 24th, the Moon is located 6° south of Venus.

Mars is high in the south and prominent among the stars of southern Leo. At magnitude -0.4 it stands out well and is easily located with the eye. Even a small telescope shows a distinct globe and the larger the aperture the finer detail may be seen. Mars is currently about 77 million miles from Earth and a little past opposition. It normally moves mostly east against the starry background but will shift westward until April 15th when it will be seen only 4° from Regulus. Look for the big color contrast between ruddy Mars and blue-white Regulus with the naked eye. Through a telescope, the dark dagger of Syrtis Major is prominent on the face of Mars through most of the month. It may be found on the eastern or western horizon of the planet in the early evening or square on the meridian if you catch it right. On the evening of the 3rd, the Moon is 9° south of Mars.

Saturn reaches opposition on April 15th which means it rises at sunset and sets at sunrise. The planet is magnitude 0.2 and bright in the fairly dim area around southern Virgo. The bright star southwest of buttery colored Saturn is 1st magnitude Spica. To help you locate the pair use the handle of the rising Big Dipper and "Arc to Arcturus and speed on to Spica." Saturn is always the "Oh, Wow" view through your telescope. There was a recent large storm on the surface so look for any remains such as whitish streaks or ovals when you observe. The rings are tilted 14° to our line of sight making it much easier to locate the dark Cassini division which separated the two major portions of the rings. Also, always check out the dim (10th magnitude) moons of Saturn. I like to make a small drawing of the locations of Tethys, Dione and Rhea before observing so I'll have some idea where they are located. The largest moon, Titan, is always very obvious through the telescope at 8th magnitude. Titan is south of the planet on April 2 and 18 and north on April 10 and 26.

If you're out observing the latter part of the month, keep your eyes open for bright streaks from the Lyrid meteor shower. These will be more prominent after midnight and will peak the night of the 21st/22nd. The Moon is new on April 21st, so if the sky is clear this should be a great Saturday night for observing. The radiant is from the constellation Lyra and south of bright Vega which is highest just before dawn.

HAPPY BIRTHDAY LEONHARD EULER

BY ROBIN BYRNE

This month we celebrate the life of a man whose contributions to mathematics and science live on. Leonhard Euler (pronounced "Oiler") was born April 15, 1707 in Basel, Switzerland. He was instantly surrounded by a strong religious family. His father, Paul, was a pastor of the Reformed Church, and his mother, Marguerite, was the daughter of a pastor. However, mathematics was also a constant presence. Paul had an interest in the subject due to attending college with Johann Bernoulli, who was considered the foremost mathematician in Europe. Their friendship would have a tremendous influence on Leonhard's life.

Although the family had moved out of Basel when Leonhard was quite young, when it was time to begin school, Euler was sent back to Basel to live with his maternal grandmother. Unfortunately, the school was not very good, and didn't even teach mathematics. But by this time, Paul had already begun teaching Leonhard some math, and Leonhard continued to read mathematics books on his own. At the age of 14, Leonhard entered the University of Basel, where he studied philosophy (his father wanted him to pursue a career in theology). However, while fulfilling his father's wishes, Euler was also receiving mathematical instruction from Bernoulli every weekend. Three years later, Euler had earned his Master of Philosophy degree with a dissertation that compared the philosophies of Descartes and Newton. But, rather than continuing the path to becoming a pastor, Bernoulli convinced his old classmate that Leonhard was too gifted in mathematics to pass up an opportunity to pursue that as his career. Two years later, at the age of 19, Leonhard Euler had earned his Doctorate in mathematics.

Euler had hoped for a position at the University of Basel, but it wasn't meant to be. Meanwhile, he won second place in a Paris Academy Prize Problem to determine the optimal location of masts on a ship. Over his career, Euler would ultimately win the competition a total of 12 times. Meanwhile, both of Bernoulli's sons were working at the Imperial Russian Academy in St. Petersburg. One of his sons, Nicolas, died of appendicitis in 1726. The vacant position at the academy was offered to Euler. Euler was still hoping for the University of Basel position, but when that didn't materialize, he gladly accepted the offer. Euler quickly adjusted to life in Russia, learning the language and living with Daniel Bernoulli, and teaching mathematics. He also took a side job as a medic for the Russian Navy to augment his earnings. When Euler was promoted to a full professor in 1730, he quit the Navy job. The Academy was established as a way to boost science in Russia. As such, the focus was more on research than teaching. In fact, there were very few students and a very light teaching load for the professors, so that they could devote the majority of their time to pursuing their areas of study. Unfortunately, when Peter II rose to power, the atmosphere changed, especially toward foreign scientists, and much of their funding was cut. However, after Peter II died, conditions improved, and Euler was able to advance to a position as professor of physics in 1731. Meanwhile, Daniel Bernoulli was not as happy, and returned to Basel, allowing Euler to be his successor as chair of the mathematics department.

(Continued on page 5)

NASA SPACE PLACE

The Planet in the Machine

By Diane K. Fisher and Tony Phillips

The story goes that a butterfly flapping its wings in Brazil can, over time, cause a tornado in Kansas. The "butterfly effect" is a common term to evoke the complexity of interdependent variables affecting weather around the globe. It alludes to the notion that small changes in initial conditions can cause wildly varying outcomes.

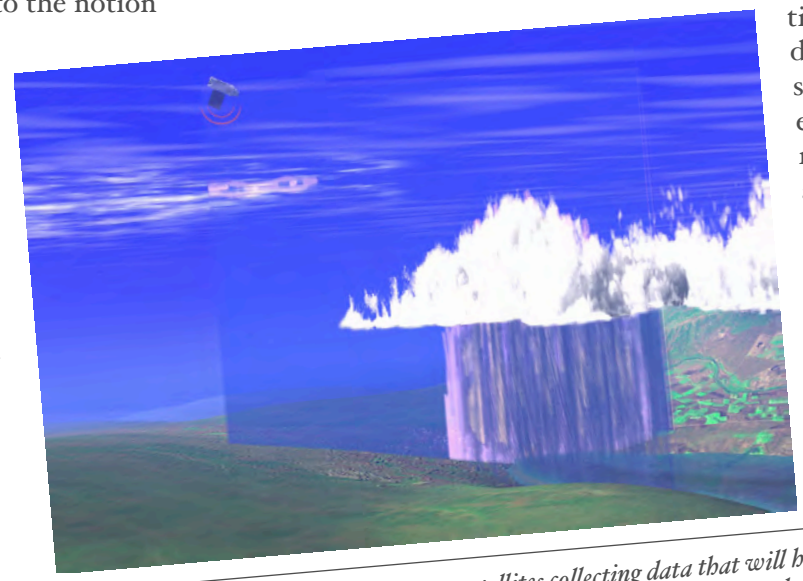
Now imagine millions of butterflies flapping their wings. And flies and crickets and birds. Now you understand why weather is so complex.

All kidding aside, insects are not in control. The real "butterfly effect" is driven by, for example, global winds and ocean currents, polar ice (melting and freezing), clouds and rain, and blowing desert dust. All these things interact with one another in bewilderingly complicated ways.

And then there's the human race. If a butterfly can cause a tornado, what can humans cause with their boundlessly reckless disturbances of initial conditions?

Understanding how it all fits together is a relatively new field called Earth system science. Earth system scientists work on building and fine-tuning mathematical models (computer programs) that describe the complex interrelationships of Earth's carbon, water, energy, and trace gases as they are exchanged between the terrestrial biosphere and the atmosphere. Ultimately, they hope to understand Earth as an integrated system, and model changes in climate over the next 50-100 years. The better the models, the more accurate and detailed will be the image in the crystal ball. NASA's Earth System Science program provides real-world data for these models via a swarm of Earth-observing satellites. The satellites, which go by names like Terra and Aqua, keep an eye on Earth's land, biosphere, atmosphere, clouds, ice, and oceans. The data they collect are crucial to the modeling efforts.

Some models aim to predict short-term effects—in other words, weather. They may become part of severe weather warning systems and actually save lives. Other models aim to predict long-term effects—or climate. But, long-term predictions are much more difficult and much less likely to be believed by the general population, since only time can actually prove or disprove their validity. After all, small errors become large errors as the model is left to run into the future. However, as the models are further validated with near- and longer-term data, and as different models converge on a common scenario, they become more and more trustworthy to show us the future while we can still do something about it—we hope.



CloudSat is one of the Earth-observing satellites collecting data that will help develop and refine atmospheric circulation models and other types of weather and climate models. CloudSat's unique radar system reads the vertical structure of clouds, including liquid water and ice content, and how clouds affect the distribution of the Sun's energy in the atmosphere. See animation of this data simulation at www.nasa.gov/mission_pages/calipso/multimedia/cloud_calip_mm.html.

For a listing and more information on each of NASA's (and their partners') Earth data-gathering missions, visit http://science.nasa.gov/earth-science/missions/.

Kids can get an easy introduction to Earth system science and play Earthy word games at http://spaceplace.nasa.gov/ecosphere.

This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.

MISCELLANEOUS

Happy Birthday

by Robin Byrne

(continued from page 4)

With this new position, and more financial security, Euler felt he could now marry Katharina Gsell, which he did on January 7, 1734. Over the years, they would have 13 children, but only 5 would survive past childhood.

It was during his time at St. Petersburg that Euler would make many of his contributions to the field of mathematics. In 1736, he solved the "Seven Bridges of Konigsberg" problem. The city included two islands, which were connected to the main part of the city, and to each other, with a total of 7 bridges. The question asked was: could you travel across all 7 bridges only once each, and return to the starting point. Euler proved that it was not possible. Such a path is now called an Eulerian circuit and is considered the start of graph theory.

With Daniel Bernoulli, Euler developed what is now known as the Euler-Bernoulli beam equation, which is widely used in engineering. Although much of Euler's applied mathematics was geared toward classical mechanics, he also explored astronomical applications. In particular, Euler developed techniques to more accurately calculate the orbit of the Moon, which was very useful for the calculation of longitude. He also developed a method for calculating the orbit of a newly discovered comet based upon only a few observations. He even determined the parallax of the Sun.

In the field of optics, Euler did not agree with Newton's description of light as corpuscles, but instead favored the wave nature of light. Euler wrote a paper in 1740 extolling the wave explanation developed by Christian Huygens. This helped to solidify the wave nature of light as the accepted theory until the early 20th century, when the idea of photons grew out of quantum theory.

By 1741, turmoil in Russia was to the point that Euler felt the need to leave. Frederick the Great of Prussia had offered Euler a position at the Berlin Academy. Euler leapt at the chance. For the next 25 years, he flourished at the Academy, writing over 380 articles. It was here that Euler first published his ideas regarding functions, which is now a standard part of mathematics. In particular, he pioneered the use of the notation f(x) to represent a function that depends on the variable x, and was the first to think of the trigonometric entities of sine, cosine and tangent as functions. He also published a work on differential calculus that combined the works of Newton and Liebniz into the form of calculus we use today. Many of the symbols used in mathematics also owe their origin to Euler. The base of a natural logarithm is represented by the letter "e," which is also known as Euler's number, the Greek letter sigma for summation, and "i" for the imaginary number equal to the square root of -1 are all examples of Euler's innovations. In spite of all of these accomplishments, Frederick the Great always regarded Euler as unsophisticated and inept, especially in comparison to his favorite philosopher, Voltaire, who frequently

Regular Contributors

BRAD DUNN

Brad is the current chair of the club and a member since 2007. During the day, he runs Dunn Professional Billing and Dunn Construction.

BOB SMITH

Bob is a founding member of BMAC, since 1980. He has also served as chair many times over the years. He currently works at Pioneer Industrial Sales.

TERRY ALFORD

Terry is also a founding member since 1980 and has been chair many times, as well. He has worked as an astronomy lab instructor at ETSU since 2001 and is also the sole proprietor of Celestial Woodworks.

ROBIN BYRNE

Robin has been writing the science history column since 1992 and was chair in 1997. She is an Associate Professor of Astronomy & Physics at Northeast State Community College (NSCC).

ADAM THANZ

Adam has been the Editor for almost all of the years since 1992. He is the Planetarium Director at Bays Mountain Park as well as an astronomy adjunct for NSCC.

belittled Euler in public. As a result of this unfavorable environment, in 1766, Euler returned to Russia.

For many years, Euler had difficulties with his eyes, which may have begun with a fever that almost killed him in 1735. That made him almost blind in his right eye, and it worsened over the years. Shortly after returning to Russia, a cataract in his left eye was discovered, which rendered him almost completely blind. Fortunately, Euler had a nearly photographic memory - it is rumored that he could recite all of Virgil's Aeneid by heart, even knowing which page each passage was on. So, blindness was not nearly as debilitating as it could have been. With the help of his sons and others, Euler was able to dictate his work and continue to publish. Because those helping him were also scientists (his son Johann was a physicist), they played more the role of colleagues than as pure scribes. For example, Euler's work on the motion of the moon he gladly shares credit with those who helped in its development.

Euler was a prolific publisher of his work. In 1775, he averaged one paper per week. Over his lifetime, his work would fill roughly 90 volumes, and most of that was produced after he went blind. In fact, he was so prolific that the printing house of the St. Petersburg Academy was backlogged for 30 years after Euler's death, trying to catch up on printing all of his work.

On September 18, 1783, Euler had a normal day lunching with his family and then conferring with colleagues about the newly discovered planet, Uranus and the calculation of its orbit. Later that day, he suffered a brain hemorrhage and died. In the eulogy written by the French mathematician Marquis de Condorcet, he wrote "...he ceased to calculate and to live."

No matter how much of a background you may have in math, odds are that you have encountered something that can be attributed to Leonhard Euler. From trigonometry to functions to calculus, Euler innovated them all. As Pierre-Simon Laplace is reported to have said, "Read Euler, read Euler, he is the master of us all."

References:

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Leonhard Euler

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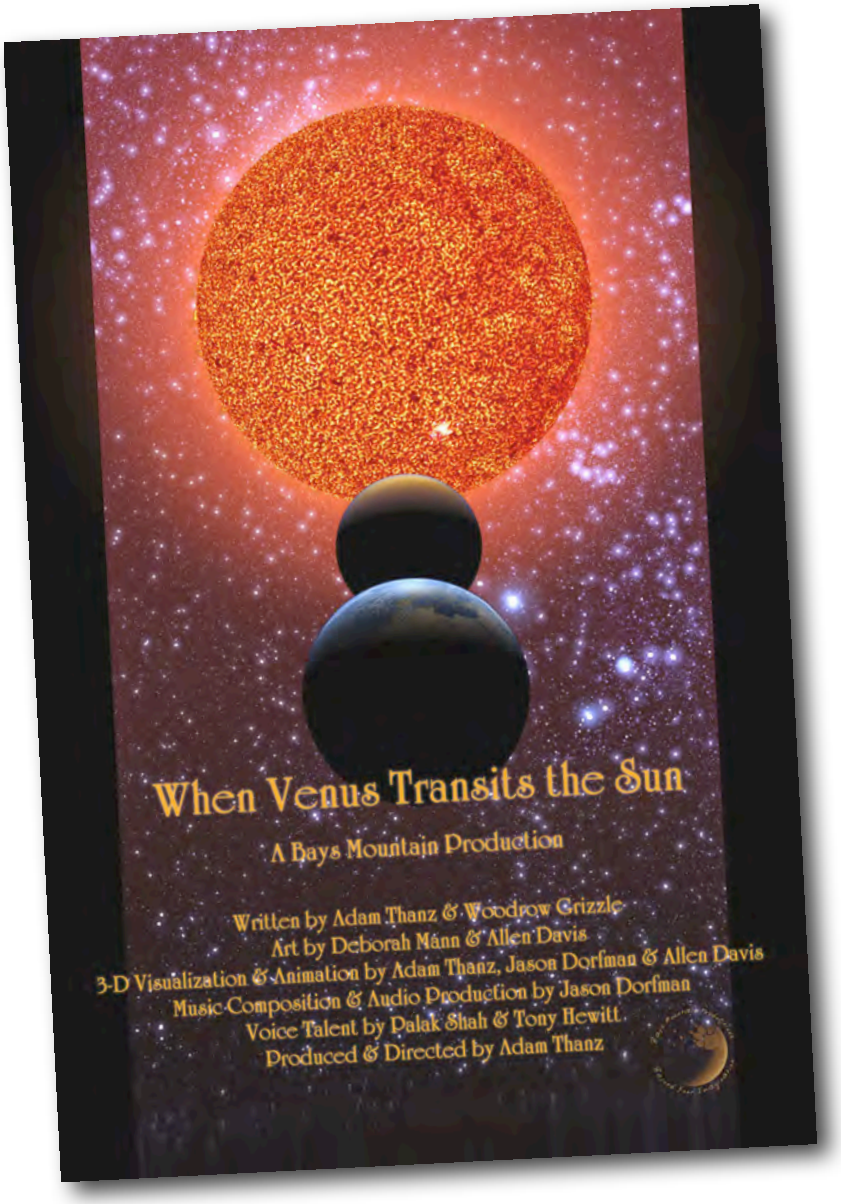

Come see the new planetarium show! This exciting program looks at the upcoming Venus transit, a past transit from 1769 with Captain James Cook, and we learn about the sun and Venus. There's even two lead activities that audience members can do in the middle of the show!

Show times are 4 p.m. Tues.-Fri. and 1 p.m. & 4 p.m. on the weekends.

The Bays Mountain Astronomy Club

Find out more at our website:
www.baysmountain.com
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Dues:

The Bays Mountain Astronomy Club requires annual dues for membership. It covers 12 months and is renewable at any time.

Rates:

$12 /person/year

$4 /additional family member

If you are a Park Association member, a 50% reduction in fees is applied.

Made on a Mac!

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