



**COLUMBUS
ASTRONOMICAL
SOCIETY**

Prime Focus

Volume 58 Number 11 2009
The Columbus Astronomical Society Newsletter

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Wired for Astronomy:

Children are inquisitive. They can come up with the darnest questions, and adults have a responsibility to answer as accurately as possible. Here are a few sites that will either help you explain astronomical phenomena in terms a child can understand, and/or provide activities for the curious child.

<http://www.enchantedlearning.com/subjects/astronomy/> is chockful of data and information of interest. It is designed for easy navigation and as a safe haven for small (and not so small) children.

Another such site is <http://www.kidsastronomy.com/>. The portal is colorful and likely to attract the attention of the child. It has activity pages, as well as teacher projects.

<http://starchild.gsfc.nasa.gov/docs/StarChild/StarChild.html> has two levels, one designed for the very young with easy-to-understand language, and a second level for the older child. It also has a question and answer section, and a list of interesting links.

The NASA Space Place is a great resource for children and adults alike. This site has games, astronomy and space related projects, and a large number of activities to pique any child's interest.

There are tons of resources in the Web to help children understand the universe, from simple pages geared to the youngest child, to advanced pages for the teenager and young adult, not to mention levels of interest and proficiency. Don't leave a child in the dark without an explanation!

From the President

Dear fellow stargazers:

It's almost time for the annual election of officers and trustees. We have one candidate for each open position. If you want to be considered for an officer or trustee position, please contact me. We'll finalize the ballot at the November meeting.

There will be a speaker at the meeting this month, but I don't have the information at this time. It's my fault. I'm juggling too many things right now and it slipped my mind. Watch for an announcement on the The_CAS Yahoo group.

Get outside and take advantage of these clear nights. It may be a long, hard winter.

Clear skies!

Tom Beck
CAS, President
stargrokker@yahoo.com

What's Up Brad Hoehne

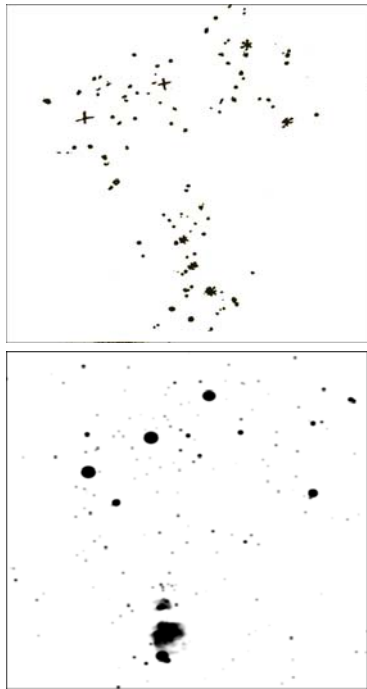
Soon after Galileo had observed the moon to be a rough, uneven world, he turned one of his telescopes to other objects in the night sky. He had, by this time, succeeded in producing a 30 power instrument. First he observed individual fixed stars. In his *Siderius Nuncius* he makes an observation that many amateurs today notice: stars do not appear bigger (or, more precisely, *much* bigger) through the telescope. He wrote:

In the stars, the increase [in magnification] appears much smaller so that you believe that a glass capable of multiplying other objects by, for example, a ratio of 100 [in area, not diameter, that is, 10x] hardly multiplies stars by a factor of 4 or 5.

Galileo had noticed that the stars are much smaller than we perceive them to be in the night sky. He surmised, correctly, that his sense of the size of stars was due to imperfections in his instrument and in the eyes of the observer himself. He demonstrated this by pointing out that brilliant Venus, seemingly so large in the inky canvas of a dark night sky, “*in broad daylight, is perceived so small that she seems hardly equal to a tiny star of sixth magnitude*”. “*Daylight,*” he said of the bright stars and planets, “*can shear them of their hair.*”

More important than the appearance of the fixed stars was their number. Everywhere he looked, Galileo found far more points of light than could be perceived with the naked eye. “*Indeed, with the glass you will detect below the sixth magnitude such a crowd of others that escape natural sight that it is hardly believable,*” Galileo wrote. He went on to note his intention of producing a complete map of all the stars in a single constellation—Orion—but “*overwhelmed by the enormous multitude of stars... I put off this assault for another time.*” In other words, there were a lot of stars. Lacking time to produce a complete sketch of the entire constellation, he presented his reader with a simple map of the belt and sword of Orion. Today this map holds up pretty well. Compare this early sketch from Galileo’s observing notebook to a modern star atlas image of the

same region of sky, which shows stars down to mag 8.5:



Though somewhat cursory, Galileo’s sketch beautifully captures the visual appearance of the central portion of Orion. Not all the stars he recorded are placed precisely. Recall, however, that he observed with a telescope that had a field of view smaller than the great Nebula in Orion (the black blob in the bottom center of the right image.) Galileo’s accomplishment is akin to drawing a picture of the Big Dipper having only seen it through a soda straw.

Galileo also turned his sights of a few of the “nebulous” patches in the sky and discovered that they were made up of stars too faint to perceive individually with the naked eye but which, collectively, appear as a small cloud. He published drawings of the Pleiades, Prasepe (the “beehive” cluster) and “Orion’s Head” (a small cluster slightly above a line drawn between Betelgeuse and Bellatrix.) Most striking was his observation that the milky-way was made up of “*nothing else than congeries of innumerable stars distributed in clusters.*”

The planets were unlike the stars. They did appear larger in his instrument. “*The planets present entirely smooth globes... that appear as little moons, while the fixed stars are not seen*

bounded by circular outlines, but rather as pulsating all around with certain bright rays.”

He began observing Jupiter on the 7th of January, 1610. To his initial puzzlement, he noticed three tiny stars alongside the planet in line with the ecliptic. At first he considered that there have been a coincidental alignment of Jupiter with three “fixed stars.”



The next night he observed again:



Because he did not take precise note of the distances between the three smaller points of light, he considered, with this observation, that Jupiter may have simply passed across a line of three faint stars. However, he began to entertain the idea that these points might be associated with Jupiter. The next night was cloudy, so he next observed Jupiter on the 10th:



Now there were only two stars! With this observation, Galileo finally surmised that the motion of these stars was associated with Jupiter itself. The missing star, he thought, must be behind Jupiter. Since the “fixed stars” were just that, fixed, there was no way to account for the motion of these objects unless they had moved relative to one another, and to Jupiter. They were something other than fixed stars

On the 13th of January, he was surprised to note, for the first time, a fourth point of light. By this time he had become convinced that the points of light that he was seeing were, in fact, moving about the planet Jupiter as our moon

(Continued on page 3)

moves about the Earth. Though he was anxious to publish, and thereby establish priority, he wanted to make certain that he had an airtight and convincing case. (Budding scientists of today would do well to emulate Galileo's diligence.) Over the next fortnight, he continued to make observations and take notes in tedious, and ever more exact, detail. By now he was estimating distances (by tracking how long it took the motion of the sky to drag the objects across his field of view) and attempting to make several observations across a given night. He also noted that, whatever speed or direction Jupiter himself was moving against the background stars, the four points kept up, stayed within a maximum distance either before or aft of the planet, and seemed to possess clockwork motion.

Contrary to 1,500 years of tradition, not all motion, he realized, was centered on the Earth. Of these points of light, he wrote "*no one can doubt that they complete their revolutions about [Jupiter] while, in the meantime, all together they complete their 12 year revolution about the center of the world.*" By this time "world" was growing to mean "universe" and not "Earth."

To our eyes, Galileo's observations and interpretations of what he saw seem as obvious and trivial as the fact the Earth is spherical. It takes only a moment with a small telescope for us to visually confirm, to a reasonable amount of satisfaction, that the moon is not a perfect sphere, but a rough and pockmarked world. A month or two of study of the phases of Venus would convince most of us that that world goes about the sun, and not about the Earth. A few nights of careful observation of Jupiter would make clear that those small dots of light are, in fact, small worlds whirling about the great planet. In hindsight, it would seem perverse to deny these truths, but that's just what many of Galileo's time did—and often for good, even non-religious, reasons.

Galileo went on to observe that Venus waxed and waned like the moon (suggesting that it went about the sun), sunspots (which he interpreted as being on the surface of the sun), the

strange "three lobed" shape of Saturn, and the roundness of the planet Mars. Soon after Galileo published his "Starry Message" in March 1610, the criticisms began flowing in. The strongest wave of these came from fellow mathematicians who pointed out that Galileo's instruments might not have been faithfully reproducing reality. The telescope, after all, was the first instrument in history to extend the natural capabilities of the human senses. To some, a device that extended sight by a factor of 30 seemed as preposterous as a pair of shoes that would allow an ordinary man to jump 30 feet in the air. Many critics responded out of complete ignorance of the device and knee-jerk incredulity. The telescope was not yet widespread, and few mathematicians had had a chance to look through one before passing judgment. Others doubted his claims because the instruments to which they had access were inferior and, with them, they could not reproduce his extraordinary observations. Galileo, perhaps, was hallucinating.

But even those who were lucky enough to look through one of his finer instruments (many of which he mailed to heads of state along with a copy of his *Siderius Nuncius*) were not necessarily won over to Galileo's thinking. While his telescope marked an extraordinary leap in mankind's ability to view the heavens, it was, by today's standards, a wretched instrument. Afflicted with severe chromatic aberration and optical imperfections (glass technology was not what it is today), having a very narrow field of view, shaky and awkward to use, and giving a dim image, Galileo's instruments struck many observers his day as suspect. Were those little points of light caused by the instrument itself? (Just as our telescopes are sometimes afflicted with internal reflections.) Did the heavens have some special property that made looking at them different than looking at objects on the ground? (How could you know?) Was the view convincing enough to undermine the elaborate model of the universe that had withstood the test of 15 centuries? (For many the answer was "no.")

Some critics, however, saw the potential of the telescope, but took issue with the interpretations of its user. One

such critic was Cristov Clavius then 74 and at the end of a long and illustrious career as a mathematician and astronomer. His greatest accomplishment was the assembly of the modern Gregorian calendar which we still use today. In early 1611, Clavius and a trio of other mathematicians were loaned an instrument that had been sent to the powerful Cardinal Bellarmine. They were given instructions to attempt to repeat Galileo's observations and report back their findings. Did this instrument really work as advertised?

While they concurred with Galileo on many accounts (there were many more stars than met the eye, Saturn looks a little funny, and Venus goes through phases, points of light move about Jupiter), they differed with him in a few key ways. Most importantly, they had trouble accepting the idea that these observations necessarily implied the Earth went about the sun, rather than vice versa. The Tychonic model, where the sun went about the Earth, but everything else went about the sun, was embraced by some. Furthermore, unwilling to completely discard the idea of the perfection of the heavens Clavius's quartet suggested that the moon might not, in fact, be rough, but instead, like a crystal ball, a smooth sphere full of inclusions of different density and opacity. The roughness, they suggested, may simply have been a trick of the light across the innards of unevenly transparent orb.

Ironically, a large crater in the moon's southern hemisphere, is now named in Clavius's honor.

However, Clavius's group pronounced the telescope a "true scientific instrument" capable of showing the universe as it truly appears. So endorsed, Galileo began receiving fame, accolades and many invitations to demonstrate his telescope before heads of state and church. He had achieved the recognition and position that he desired. The infamy that was to stain his final years, was still two decades in the future.



Staring at Lightning

There's something mesmerizing about watching a thunderstorm. You stare at the dark, dramatic clouds waiting for split-second bursts of brilliant light — intricate bolts of lightning spidering across the sky. Look away at the wrong time and (FLASH!) you miss it.

Lightning is much more than just a beautiful spectacle, though. It's a window into the heart of the storm, and it could even provide clues about climate change.earth_lightningThe

Strong vertical motions within a storm cloud help generate the electricity that powers lightning. These updrafts are caused when warm, moist air rises. Because warmth and lightning are inextricably connected, tracking long-term changes in lightning frequency could reveal the progress of climate change.

It's one of many reasons why scientists want to keep an unwavering eye on lightning. The best way to do that? With a satellite 35,800 km overhead.

At that altitude, satellites orbit at just the right speed to remain over one spot on the Earth's surface while the planet rotates around its axis — a “geostationary” orbit. NASA and NOAA scientists are working on an advanced lightning sensor called the Geostationary Lightning Mapper (GLM) that will fly onboard the next generation geostationary operational environmental satellite, called GOES-R, slated to launch around 2015.

“GLM will give us a constant, eye-in-the-sky view of lightning over a wide portion of the Earth,” says Steven Goodman, NOAA chief scientist for GOES-R at NASA's Goddard Space Flight Center. Once GLM sensors are flying on GOES-R and its sister GOES-S, that view will extend 18,000 km from New Zealand, east across the Pacific Ocean, across the Americas, and to Africa's western coast.

With this hemisphere-scale view, scientists will gather an unprecedented amount of data on how lightning varies from place to place, year to year, and even decade to decade. Existing lightning sensors are either on the ground — which limits their geographic range — or on satellites that orbit much closer to Earth. These satellites circle the Earth every 90 minutes or so, quickly passing over any one area, which can leave some awkward gaps in the data.

Goodman explains: “Low-Earth orbit satellites observe a location such as Florida for only a minute at a time. Many of these storms occur in the late afternoon, and if the satellite's not overhead at that time, you're going to miss it.”

GLM, on the other hand, won't miss a thing. Indeed, in just two weeks of observations, GLM is expected gather more data than NASA's two low-Earth orbiting research sensors did in 10+ years.

The new data will have many uses beyond understanding climate change. For example, wherever lightning flashes are abundant, scientists can warn aircraft pilots of strong turbulence. The data may also offer new insights into the evolution of storms and prompt improvements in severe weather forecasting.

Staring at (FLASH!) Did you miss another one? The time has come for GLM.

Want to know how to build a weather satellite? Check the “how to” booklet at scijinks.gov/weather/technology/build_satellite.




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



The lightning mapper on the next generation of GOES satellites will detect extremely rapid transient bursts of light at near-infrared wavelengths.






November 2009

Columbus Astronomical Society Calendar

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1 Dayligh Savings time ends	2 	3 Taurids meteor shower peak	4	5 Mercury at superior conjunction	6	7 Moon at perigee
8	9 	10	11	12	13	14 CAS meeting 8PM
15	16 ● Sedna's closest approach to Earth (21st mag.!)	17 Leonids meteor shower peak	18	19	20	21
22 Moon at apogee	23	24 	25 PF Articles deadline	26	27	28
29	30					

December 2009

Columbus Astronomical Society Calendar

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		1	2  Uranus stationary	3	4 Moon at perigee	5
6	7	8 	9	10	11	12 CAS Annual holiday dinner 6 PM
13 Geminids meteor shower peak	14	15	16 ●	17	18 Mercury at greatest Eastern elongation	19
20 Moon at apogee	21 Winter solstice	22 Ursids meteor shower peak	23	24  Pluto at opposition	25 Happy Holidays! 	26
27	28	29	30 PF Articles deadline	31  Partial lunar eclipse (barely)		



Get Your Gummy Greenhouse Gases!

Got gumdrops? Then you can build models of molecules. Molecules are tiny structures that make up just about all matter—including you! Molecules themselves are made of atoms, the basic building blocks of matter.

Using just four kinds of atoms as building blocks, you can construct many different types of molecules. In this project, you will build models of some gas molecules. These kinds of gas molecules are part of the air. They are called greenhouse gases. We will explain why later.

For now, get ready for some gummy fun!

You will need:

- Gumdrops, any size, four different colors.

These atoms are usually modeled using **red** for oxygen, **white** for hydrogen, **gray** for carbon, and **blue** for nitrogen. However, some of these colors are mighty hard to find in gumdrops. So use any colors you like. Here's how many you will need of each (but don't forget to get extras for sneaking into your mouth):

Red: 13
White: 7
Gray (or black): 3
Blue: 2

- Round wooden toothpicks
- Construction paper, 1 large sheet (12x18, for example)
- Felt pen or crayons

Here are the colors we used for our gumdrop building block atoms:



Oxygen



Hydrogen








Carbon



Nitrogen

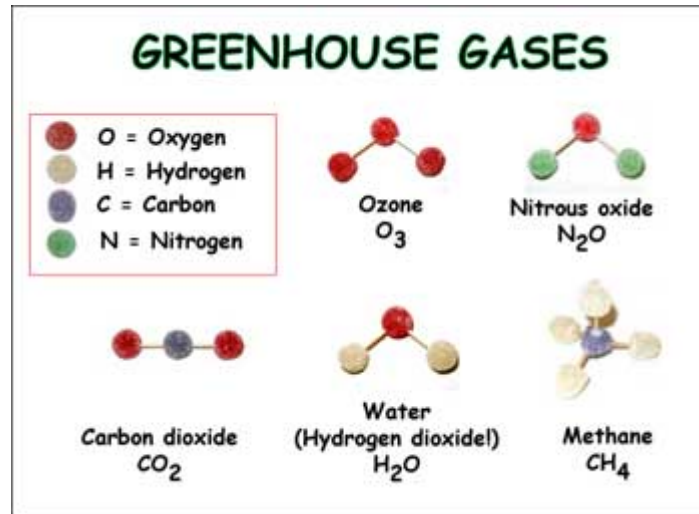
You will make . . .

. . . Gummy Greenhouse Gas models of these gases. Each molecule has a shorthand name, which also gives its recipe, or formula. For example, ozone is also called O_3 , where O stands for an oxygen atom and the little 3 means there are three of them. Here are all the greenhouse gas molecules, their formulas, and a picture of its gumdrop model.

Name of greenhouse gas	Recipe	Shortcut (formula)	Gumdrop model
Ozone	3 oxygen atoms	O_3	
Nitrous oxide	2 nitrogen atoms and 1 oxygen atom	N_2O	
Carbon dioxide	1 carbon and 2 oxygen atoms	CO_2	
Water vapor	2 hydrogen atoms and 1 oxygen atom	H_2O	
Methane	1 carbon atom and 4 hydrogen atoms	CH_4	

Here's how:

- Break several toothpicks in half. You will need only one-half a toothpick to make each "bond." The bonds are how the atoms are stuck together to make molecules.
- Build each of the greenhouse gas molecules, as shown above.
- Now, take the big piece of construction paper and your crayons or felt pen and label it something like this:



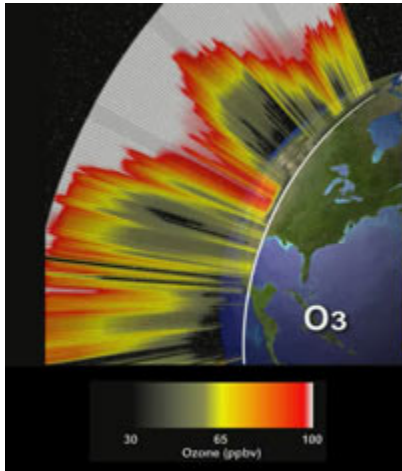
- Place your molecules above their labels.

So, now that you know all your greenhouse gases, you might be wondering . . . [why should you care?](#)

A mission to understand . . .

We must understand Earth in order to take care of it and keep it healthy.

Gathering information about Earth is part of NASA's mission. NASA launched the **Aura** satellite in 2004 as part of its **Earth Observing System**. Aura has four science instruments aboard. They all study the atmosphere from about 20 miles high down to Earth's surface. One instrument is called **TES**, which is short for **Tropospheric Emission Spectrometer**. The troposphere is the lowest part of the atmosphere. It's down here where we live—and pollute, unfortunately. A spectrometer is an instrument that uses light to identify the chemical composition of matter. The TES mission is particularly interested in ozone and how it is distributed up and down through the different layers of the atmosphere.



As TES passes over Earth's surface, it gathers data that can be made into a profile of the atmosphere, like this one. The profile shows with different colors how much ozone (or other greenhouse gas) is in the atmosphere at different altitudes. In this image, the areas of highest ozone levels are shown in red. Notice that where the red is closest to Earth's surface is near large cities in the U.S. Find out more about TES and ozone on our [greenhouse gas Amazing Fact](#) page.

From NASA Space Place

<http://spaceplace.nasa.gov/en/kids/tes/gumdrops/index.shtml>

Columbus Astronomical Society
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Columbus, Oh 43216-3004

The Prime Focus is the monthly newsletter of the Columbus Astronomical Society, a not for profit group of amateur astronomers interested in the night sky. Information can be obtained by writing to the address below. Society members build telescopes, observe the splendors of the universe, contribute to scientific research and educate the public at public programs around the city and at Perkins Observatory.
 CAS web site - <http://www.the-CAS.org/>.
 For Advertising info contact the editor.

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*Must be a club member to qualify for discount magazine subscription rates. If you are renewing a magazine subscription please send your magazine renewal notice from the publisher along with this form and your check to ensure proper credit toward your subscription.

Columbus Astronomical Society
Membership Application/Renewal Form

Please indicate whether a new member membership renewal magazine subscription magazine subscription renewal.

I have checked the class of membership and magazine/s subscription/s desired and enclosed a check made payable to the Columbus Astronomical Society for:

Annual Regular Membership Fee: \$20 _____

Annual Student Membership Fee: (under 18) \$10 _____

Annual Family Membership Fee: \$25 _____

Annual Patron Membership Fee: \$50 _____

Annual Corporate Membership Fee: \$150 _____

Astronomy Magazine: \$34.00/1 year * _____

Sky & Telescope: \$32.95/1 year * _____

Trial - 3 issues of PRIME FOCUS while I decide: \$2 _____

Tax Deductible Donation: _____

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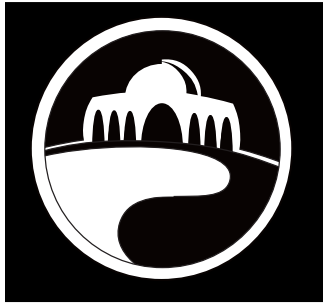
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Address _____

City _____ State _____ Zip _____

Phone _____ (E-Mail) _____

Today's Date _____



NIGHTTIMES

The Newsletter of Perkins Observatory Nov. 2009

'Tis the Season . . .

. . . when Perkins Observatory needs your help the most! For starters, please come to a program and see all that the universe has to offer -- and visit our gift shop to pick up a few inexpensive stocking stuffers for the holiday season.

Need to find a gift for the recipient who already has everything? By participating in our 2,000 Points of Light program, you can get his or her (or your) name up on our big star map downstairs. Half of your gift will go toward our operating fund, and half goes to our Endowment program, which will help to keep the "O" going long into the future.

Or how about adopting some part of the Observatory in his or her name? Certificates can be sent to either you or the honoree. Enclosed is a copy of the brochure, which outlines the myriad adoption opportunities. You can also download a copy from our web site: <<http://www.perkins-observatory.org>>.

Members of Friends of Perkins Observatory, now is the time to renew your memberships. Come spring, Saturn will be visible at our weekend programs. FOPO members can attend all those programs for free. Please see the FOPO form on the reverse to renew.

Donations to our endowment provide a permanent source of funding for the "O" and are tax deductible at the same time.

NightTimes by Email: Last Call (Really)

Starting with the January newsletter (the Postal Service keeps postponing the date, but this time they really mean it), the cost of mailing will increase dramatically.

You can help us to continue and enhance our public activities at Perkins by receiving NightTimes by email. **Just send an email to <perkinsw@owu.edu> (note the "w" after "perkins"), and we'll email you a copy of the newsletter every month.**

November Skies

The Schottland Reflecting Telescope stands ready to show you the splendors of our crisp autumn nights.

Rising high are the best objects of autumn. The gorgeous globular M15 in Pegasus provides a great view. Stare with starry-eyed wonder at the Double Star Cluster in Perseus. Look deeply into space at the Great Galaxy in Andromeda, over two million light years away.

Later in the month, we should be able to give you a glimpse of the splendors of winter, including the unforgettable Great Nebula in Orion.

On cloudy nights, we'll tell you all about those objects using our computer-projection pseudo-planetarium and regale you with stories about the history of the observatory while we show you the beauty of the place.

Through the end of the year, programs happen every Friday at 8 P.M.

Program attendance is free for members of the Friends of Perkins. A small fee is charged to everyone else. Advanced tickets are strongly recommended. Members of FOPO, please call ahead to let us know you're coming. All others can order tickets by mail or by phone using a major credit card. Please call (740) 363-1257 for details.

Public Programs, 2010

Remember, we'll be doing our regular Guest Nights on Friday nights in 2010. That schedule allows us to schedule larger groups on a group-by-group basis on Saturday nights, except, of course for the second Saturday of the month, which is in perpetuity reserved for the Columbus Astronomical Society.

If you wish to reserve the "O" for your group on a Saturday (or a Monday, Tuesday, etc.), please call Tom at (740) 363-1257.

Saturn will be back in the evening sky by April. Reserve your place by the telescope by joining the Friends of Perkins today!

Observatory Angels

This month, we received several notable gifts of equipment. (Yes, we can really use your old computer equipment and telescopes.)

Michael Henry, a longtime friend of the "O," gave us a Reliant 12-inch Planer, which we will use to plane many things.

Scott Callahan of Powell donated a very fine Dell dual-core server.

Bruce Browder of Columbus participated in our "2,000 Points of Light" program, \$200.

Rachel M. Thurston of Columbus increased the size of the Perkins Observatory Endowment by \$200.

Frederick Thurston of Columbus contributed \$160 to our operating fund.

Patricia Furst of New Albany contributed \$50 to our operating fund.

Scott Beatty renewed his individual membership in the Friends of Perkins, \$50.

Taurus The Bulletin Board

CAS members, please bring your telescopes to our public programs!

- ★ November 4 (Wednesday) 5:30 P.M. for OWU Admissions and Financial Aid programs.
- ★ November 5 (Thursday) 7 P.M. Monett Group, alumna of OWU.
- ★ November 6 (Friday) 8 P.M. Guest Night. Sold out!
- ★ November 7 (Saturday) 12 - 6 P.M. CAS Amateur Telescope Making (ATM) and Radio Astronomy Telescope (RATS) groups.
- ★ November 7 (Saturday) 7:30 P.M. Special program for brownie troop.
- ★ November 10 (Tuesday) 9:45 A.M. Plain City Elementary second-graders.
- ★ November 12 (Tuesday) 9:45 A.M. Plain City Elementary second-graders, round 2.
- ★ November 13 (Friday) 12:30 P.M. Community Connections MRDD.
- ★ November 14 (Saturday) 12 - 6 P.M. CAS ATM and RATS groups.
- ★ November 14 (Saturday) 8 P.M. Regular meeting of the Columbus Astronomical Society.
- ★ November 19 (Thursday) 8 P.M. New Vistas in Astronomy, featuring Scott Gaudi on "The Long-Term Fate of Life in the Universe."
- ★ November 20 (Friday) 8 P.M. Guest Night. Sold out!
- ★ November 21 (Saturday) 12 - 6 P.M. CAS ATM and RATS groups.
- ★ November 21 (Saturday) 5:30 P.M. Special program, "Sky-High Fun" for girl scouts.
- ★ November 26 - 30 (Thursday - Monday) No programs. Enjoy your turkey.

Lots of Ways to Reach Us

Phone:

(740) 363-1257

Mail:

P. O. Box 449, Delaware, OH 43015

Email:

perkins@owu.edu

Web site:

www.perkins-observatory.org

Fax:

(740) 363-1258

2,000 Points of Light

Perkins Observatory Needs Your Help

On any given night of the year from a dark, rural location, 2,000 stars light up the sky.

You can light up the sky over Perkins Observatory in the same way. Rising costs have made it increasingly difficult for its small but dedicated staff to engage in its public mission: to show the people of Central Ohio the wonder and majesty of the universe they live in.

Over the years, we have reduced our staff to the bare bones. With the switch of our Building Superintendent to part-time status, Perkins no longer has a single full-time employee. Despite those reductions, we have managed to increase our public activities and the number of people, especially children, we serve.

Those of you who love the night sky have been extraordinarily generous with both your time and financial help, and we thank you. Now, we need your help one more time.

If 2,000 people, 2,000 Points of Light, will contribute \$200 each, we can continue our mission unimpaired.

Half of your gift will go into the Perkins Endowment, the interest on which will keep us open for decades to come. The other \$100 will be used to make building repairs (including much-needed repairs to our roof), build new exhibits and displays, and help with ongoing costs.

To show our gratitude, we will associate your name (or the name of any honoree you pick) with one of the over 2,000 stars on our large, publicly-displayed star map. (Sorry, we get to pick the star). We will also send you a certificate honoring your help, mention your contribution in this newsletter, and add you to the monthly newsletter mailing list at your request.

Families, corporations, and fraternal organizations need not limit themselves to a single Point of Light. Why not honor several -- or many -- members of your group by making them a "star" on our map?

You can mail your contribution by using the handy form below or by writing 2KPL and the name of your honoree on the memo line of your check. Please mail to

Perkins Observatory 2KPL
PO Box 449
Delaware, OH 43015

Or give us a call at (740) 363-1257 and schedule a trip to one of our weekend public programs. We'd be honored to receive your gift in person.

Please don't lay this newsletter aside. We need your help today. If you become a Point of Light, Perkins can continue its public stargazing sessions for many years to come.

Yes, I want to be a Point of Light (@ \$200 per "Point"). Amount enclosed: _____

Yes, I want to donate to the Perkins Endowment. Amount enclosed: _____

Yes, I want to donate to the Operating Fund. Amount enclosed: _____

Name _____

Honoree(s) for "2,000 Points of Light" _____

Address _____

City _____ State _____ Zip Code _____ Phone: _____

(Please mail to Perkins Observatory, P. O. Box 449, Delaware, OH 43015. Make checks payable to "Perkins Memorial Observatory.")

Friends of Perkins Observatory

Membership in FOPO entitles you to attend any or all of our weekend public programs.

Yes, I want to be a member of the Friends of Perkins Observatory. Enroll me at the level of sponsorship checked below:

Individual (\$50) Sponsor (\$100) Family (\$90) Family Sponsor (\$200) Corporate (\$300)

Name _____

Names of family members (for family memberships) _____

Address _____

City _____ State _____ Zip Code _____ Phone: _____

(Please mail to Perkins Observatory, P. O. Box 449, Delaware, OH 43015. Make checks payable to "Perkins Memorial Observatory.")

Other Programs at Perkins

Perkins sponsors many more programs and activities than the weekend activities detailed in this brochure.

Special programs, slide shows, and tours for school classes, clubs, and other organizations may be arranged by calling (740) 363-1257.

Daytime Field Trips

Daytime programs at Perkins may consist of a slide show, a computerized planetarium demonstration, a tour of the Observatory, and/ or observations of the sun using solar-safe telescopes.

The Observatory may be reserved for such a program for a nonrefundable fee of \$150 per presentation, payable in advance. In addition, a fee of \$1.00 will be charged at the door for each person who attends.

Nighttime Programs

You may schedule a special nighttime program during the week and on some Saturdays for your organization (up to 80 people). Programs consist of a talk about stargazing, a tour of the Observatory, and observing with the Perkins telescope, weather permitting. A nonrefundable fee of \$300 must be paid in advance for each program.

You can also reserve one of our regular Friday programs for your group for the same price but only if no other members of the public have already signed up for that night. Thus, we recommend calling well in advance to attempt to exercise this option.

Programs Away from Perkins

Tom Burns, Director of Perkins Observatory and author of the astronomy column in the Monday *Delaware Gazette*, is available for day or nighttime astronomy talks at locations other than Perkins Observatory. Tom will bring along a large, portable telescope if the weather permits a bit of stargazing. The fee of \$250 will be used to support our public activities at Perkins.

New Vistas in Astronomy

This astronomy mini-course allows you to learn about the latest discoveries by astronomers and to observe a variety of celestial objects with the Observatory's Schottland reflecting telescope. The presenters are professors from Ohio State's and Ohio Wesleyan's astronomy departments. The series meets one Thursday each month. Call (740) 363-1257 for information.

Perkins Observatory



2010

Weekend Public Programs

Ohio Wesleyan University

The Columbus Astronomical Society

January 2010 through December 2010

Celebration of the Sun!

During early summer, when the sun sets too late to schedule evening programs, Perkins will instead host late-afternoon activities to celebrate, talk about, and observe with special telescopes (weather permitting) our incredible "day star," the sun! Those programs all begin promptly at 4 P.M. and in 2010 will be held on the following Saturday afternoons:

July 10, 17, 24

Please use the order form on the reverse to request tickets.

Directions to Perkins

The Observatory is located on U. S. Route 23, four miles south of Delaware and ten miles north of the I-270 Columbus outerbelt. Our driveway is on the left if you are driving south on Rt. 23 and on the right if you are driving north.

For more detailed directions, please check out our web site (address below) or call us at (740) 363-1257.

Perkins Web Page

The Perkins web page contains plenty of information about astronomy, amateur stargazing, and telescope buying. You'll also find up-to-date information about our public programs, ticket availability, etc. Check us out at

<http://www.perkins-observatory.org>

Friends of Perkins Observatory

Please join the Friends of Perkins Observatory. Membership entitles you to attend any of our weekend programs for free. You will also receive our monthly newsletter, which will announce special programs for members only. To receive a membership form, call (740) 363-1257

Gift Shop and Exhibits

The Perkins gift shop is stocked with a wide variety of astro-goodies, from T-shirts to meteorites. Our ever-increasing collection of educational displays includes a not-to-be-missed 3-D model of the Local Group of galaxies.

Regularly Scheduled Evening Programs

Perkins Observatory hosts stargazing nights on most Friday nights, except for some holiday weekends. The second Saturday of the month is traditionally reserved for the meeting of the Columbus Astronomical Society. On other Saturday's, we will offer occasional special stargazing programs for the members of the Friends of Perkins Observatory and the CAS, but only on clear nights. Call to find out if a program is being held on any given Saturday.

Also, we limit Friday nighttime programs in July to accommodate our special daytime series, "Celebration of the Sun." (See the reverse for details.)

Program content varies depending on sky conditions. A program may include a planetarium show (on a flat screen), tours of the Observatory, and/or observing with the 32-inch Schottland Telescope and other telescopes, weather permitting.

Parents with children, school groups, and youth organizations are especially encouraged to request reservations.

A limit of 90 people will be scheduled for each program. **Please arrive on time. For the safety of all participants, latecomers will be denied entry.**

The programs will be held on the following dates:

Starting at 8 P.M.:

January 8, 15, 22, 29
February 5, 12, 19, 26
March 5, 12, 19, 26
April 2, 9, 16, 23, 30

Starting at 9 P.M.:

May 7, 14, 21, 28
June 4, 11, 18, 25
July 30 (For the rest of July, see "Celebration of the Sun" on the reverse.)
August 6, 13, 20, 27

Starting at 8 P.M.:

September 3, 10, 17, 24
October 1, 8, 15, 22, 29
November 5, 12, 19
December 3, 10, 17

TICKET RESERVATIONS

Admission to all programs is BY TICKET ONLY. Tickets may be requested by filling out the form to the right and enclosing a check or money order covering the ticket fees, which are as follows:

Adults (18 -61) \$7.00/person

Children (3- 17) \$5.00/person

Seniors (62 and over) \$5.00/person

Please send your request to

Perkins Observatory Tickets

P. O. Box 449

Delaware, OH 43015

Tickets may also be ordered by telephone with a major credit card. **For more information, please call us at**

(740) 363-1257

PLEASE NOTE: We hold the programs rain or shine, so refunds on ticket fees are not possible. Tickets are good only for the date specified.

Tickets may be purchased on the day of the program or at the door for \$2.00 more per ticket than the prices listed above.

Tickets at the Door

Our programs are often full, and at-the-door tickets are often not available. **Before you make the long drive to Perkins, CALL FIRST at (740) 363-1257 an hour or two before the program to find out about at-the-door ticket availability.**

Observatory Temperatures

The Observatory is maintained at standard room temperature, but the telescope dome cannot be heated. Please wear sufficient outer clothing to insure comfort while observing.

TICKET ORDER FORM

Please print your name, address, city, state, and zip code in the box below. The box will become your mailing label, so print carefully.

Mail to Perkins Observatory, P. O. Box 449, Delaware, OH 43015.
Make checks payable to Perkins Observatory.

Single-Night Tickets

PROGRAM DATE _____

Adults _____ tickets @ \$7.00 each = \$_____

Children _____ tickets @ \$5.00 each = \$_____

Seniors _____ tickets @ \$5.00 each = \$_____

Total enclosed \$_____

Phone: _____

Ohio Wesleyan University
61 South Sandusky Street
Delaware, OH 43015

