



Roanoke Valley Astronomical Society



News About Amateur Astronomy
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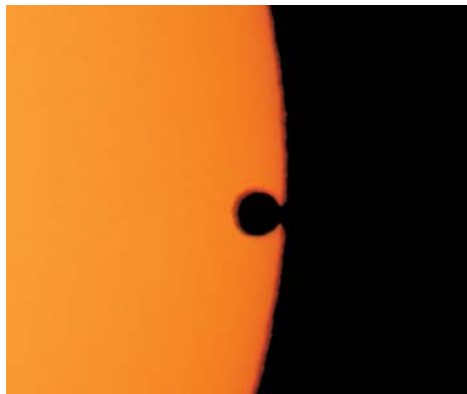
July 2004

We Saw a Beautiful Sight from a Beautiful Site...

We Have Transit!

By John Goss

Seldom are we, as amateur astronomers, confronted directly by history. Yet, this is exactly what happened on



Venus "tear drop" effect. (above)
The "troops" assemble! (right)
Photos by Mike Overacker

the morning of June 8, 2004. As we waited from the top of Roanoke Mountain, the sun emerged from the clouds with Venus unmistakably staring back at us against the fiery solar surface. We were seeing what Jeremiah Horrocks first did back in 1639, what Halley dreamed of in the early 1700s, what Captain Cook noted from the South Pacific in 1769, and what expeditions of

astronomers tried to measure in 1882.

Eight telescopes were at the ready as sunrise came and went. It may have been clear overhead, but the northeast horizon was blocked by low lying clouds. With the transit of Venus already underway for several hours, the crowd of 33 people was becoming somewhat anxious. But no one was about to give up, because no one wanted to wait another eight years for this very rare planetary alignment.

Finally, at 6:40 a.m. the sky began to brighten, and then, *POW!*, there it was, an early morning round spot on the surreal sun. "We have a sun alert!" exclaimed **Mike Good**. Yes, and we have transit, with

many unique and exciting memories of a day not seen since 1882.

It is not often you can unaidedly discern the disk of another planet. But there it was in plain sight: 8,000 miles wide Venus viewed from just 26.7 million miles. We were witnessing Venus at inferior con-



junction. All were impressed, even those who observed the Mercury transit from Mill Mountain in November 1999. Venus was substantially larger and, due to its thick atmo-

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Timeless Time

By Clark M. Thomas

So now they say our universe is 156 billion years wide, even though the Big Bang took place 13.7 billion years ago. It's possible, if you consider the distortions

in "time" that took place after the Big Bang. Subsequently, things slowed down to today's light speed. If light is not a constant, and we measure *spacetime* by the speed of light, it means that "time" is dependent on the epoch and matrix of its measurement.

Fortunately for modern astronomers, we don't need to deal with the warping factors present just after our Big Bang. Nevertheless, we are left wondering if time is truly an absolute, or just relative to a set of moving event frames.

We see *cyclical time* in recurrent comets, seasons, etc. We see *linear time* when one of our space

craft, such as Cassini, ventures outward to embrace the mysterious solar system. We experience *point time* within each existential moment of our lives.

Time is how we measure great distance, as a function of the so-called fixed speed of light; but light has also been "frozen" in laboratory experiments. If light is plastic, then time could be too.

We amateur astronomers can go about our business not bothered by the paradoxes of spacetime. The heavens seem mostly frozen to our scopes, anyway. But sometimes it is fun to contemplate the paradox which is time.

Mystery Object

"Dip" into your brain, and be smart like an "Owl" to identify this galaxy. It's not M98 or M82. Light up your cigar when you identify this spiral object nearly at the top of Messier's list.

Send your best guess to Dave Thomas, our Mystery Object Columnist, at

thomasde-ka8inl
@worldnet.att.net



Astro-Quiz

Though exceedingly thin compared to earthly standards, Mars has an atmosphere with detectable changes in pressure influenced by its polar ice caps. What is this influence?

Answer to Last Month's Astro-Quiz: The 1000-foot-diameter radio telescope in Arecibo, Puerto Rico, is the largest single area-focusing telescope of any kind in the world. Its reflecting surface is a fine wire mesh stretched to a remarkably accurate spherical curvature. Thus, it has spherical aberration. However, being a radio telescope, Arecibo uses a long needle-shaped antenna to collect signals reflected from various zones of the bowl. The signals contact different points along the antenna and are combined electronically into a coherent radio image.

The Roanoke Valley Astronomical Society is a membership organization of amateur astronomers dedicated to pursuit of observational and photographic activities. Meetings are held at 7:30 p.m. the third Monday of each month at Center in the Square Roanoke. Meetings are open to the public. Observing sessions are held one or two weekends a month at a dark-sky site. Yearly individual dues are \$20.00. Family membership is \$25.00; student membership is \$10.00. For information, call the RVAS Message Line at 540-774-5651. Articles, quotes, etc. published in the newsletter do not necessarily reflect the views of the RVAS, its editor, officers, or individual members.

RVAS web page: <http://www.roavas.org>

Officers/Executive Committee: Katherine Hix, President (334-2443); Mike Overacker, Vice President (776-3092); Mark Hodges, Secretary (774-5039); Lynn Slonaker, Treasurer (774-5695); Sherwin Brady, Executive Committee Member-At-Large (789-7080); Paul Caffrey, Immediate Past President (345-2847); Dave Godman, Past President / New Member Coordinator (774-3337); John Goss and Genevieve Goss, Outreach Coordinators (966-4606); Frank Baratta, Membership and Public Viewing Coordinator (774-5651); Mahesh Tailor, Web Master (776-5472); Clark M. Thomas, Newsletter Editor (427-1873, clarkt7@cox.net).

The RVAS Looks to the Future

By John Goss

Summer mugginess came six weeks early this year. Not much observing was done, but that which was, was truly remarkable. RVAS members were treated to some spectacular images - shots that show off 21st century astro-imaging. When it counted, the skies cleared.

Observing Projects: Preview and Review

Due to the efforts of **Mark Hodges**, the late **Gary Close**

Last Month's Mystery Object

The June Mystery Object, M92, resides in Hercules along with the more famous M13. Shining at a magnitude of 6.4, this fine globular cluster of a few hundred thousand stars is bright enough to be seen with the naked eye under VERY dark and clear skies.

M92 is just under twenty seven thousand light years from Earth. The cluster spans twenty eight light years. On the sky it is seen at RA 17:17:07.3, and Dec. +43:08:11.



officially has an asteroid named in his honor. **Asteroid Close** currently is situated deep in the constellation Scorpius and over 100 million miles from Roanoke.

In the wee hours of June 21st, **Mike Good** attempted to locate and image this 20 mile diameter slab of rock. This was an especially challenging task owing to the asteroid's faintness (magnitude 19) among the great many background stars. Mike was successful! He obtained two images each at 2 minutes that were taken less than 2 hours apart. Even with this short time interval, Asteroid Close as well as a few others, could be seen "blinking" between his image pairs. Mike demonstrated something that just few years ago would have been impossible for the amateur. Wow!

Cloudy early June skies actually cooperated on the morning of June 8 for the much ballyhooed transit of Venus. **Paul Caffrey** brought his video images of this impressive event that he captured using a \$70 surveillance camera shooting through an 8 inch Schmidt-Cassegrain telescope. Astro-imaging amazed us all!

New Club Leadership

Every two years the RVAS goes through a leadership change without too much disruption. This month, elections were held that determined who would be steering our

club through 2006. By acclamation these new officers were installed in a smooth transfer of power:

**President:
Katherine Hix**

**Vice-President:
Mike Overacker**

**Secretary:
Mark Hodges**

**Treasurer:
Lynn Slonaker**

**Member at Large:
Sherwin Brady**

There are additional members of the Executive Committee, some voting, and some not voting. You can identify all members on page two of each RVAS newsletter.

All of us need to give a big hand to the outgoing officers for bringing the club to where it is today. **Thank you Paul Caffrey (President), Carol Mesimer (Secretary) and Dennis Stevens (M.A.L.) for all your efforts!**

We also need to remember that things don't get done unless someone does them. Please do not be shy about volunteering for various club projects, committees and activities that will be presented in the next couple of years. The more people who help, the more that will be accomplished!

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June's Meeting

"Vermin in the Sky," Presented by Mark Klosinski

As was shown by Mike Good's images of Asteroid Close, not all faint starlike objects seen through the telescope are true stars. Many are asteroids. Sometimes, too many are asteroids!

After capturing the audience's attention with "A Little Bit of Rock," by The Chromatics, **Mark Klosinski** discussed asteroid orbits, classes, physical properties and nomenclature.

Why are there asteroids and why are they concentrated between Mars and Jupiter? The key player, Mark explained, seems to be massive Jupiter with its intense gravitational influences preventing the

formation of a nearby rocky planet. In fact, there are orbital gaps, called Kirkwood Gaps, in the main asteroid region. These empty regions, or resonances, are found at orbital ratios with Jupiter of 3:1, 5:2, 7:3, and possibly at 2:1.

Our understanding of asteroids has greatly increased lately because of exploring spacecraft. The Galileo craft, en route to Jupiter, passed near the asteroid Gaspra. Mark displayed images detailing a lumpy worldlet misshapen with impact craters. The NEAR space craft revealed a similar scene as it orbited Eros. Near destruction from numerous large impacts must have been common for most of the smaller asteroids, and each sharp collision must have generated many smaller fragments. How many asteroids are there?

Beginning in 1800 with Baron Franz Xaver von Zach's forma-

tion of the "Celestial Police," the search for a missing body between the orbits of Mars and Jupiter was official underway. Father Giuseppe Piazzi found the prize in observations begun on the night of December 31, 1800. After its orbital elements were calculated by Carl Friedrich Gauss, the object was given the name Ceres and, spanning nearly 600 miles, is now known to be the largest asteroid. One year later, Pallas was found. Then another was located. And another. By the end of 1807 there were four bodies known that were in roughly the same orbit. That wasn't nearly the end of it.

Today, there have been some 400,000 bodies found and 85,000 of them have had their orbital elements established. Evidently, "Vermin in the Sky" is very appropriate for these small and mostly dim objects. Astro-imagers beware!

DUES and SUBSCRIPTION NOTICE

It's renewal time for RVAS memberships, most of which expire on June 30, 2004. Check the club directory emailed to you last month, which shows your expiration date. If you don't have email, and your membership expires at another time, you'll receive a special notice. If you want to know now when your membership expires, call Frank Baratta at 774-5651. Membership categories are:

- ★ INDIVIDUAL (\$20.00 per year) -- RVAS and Astronomical League membership for you.
- ★ FAMILY (\$25.00 per year) -- RVAS and Astronomical League membership for you and your family.
- ★ STUDENT (\$10.00 per year) -- RVAS and Astronomical League membership for a full-time student.

Make checks payable to "RVAS," and forward to: **Lynn Slonaker, RVAS Treasurer, 3548 Kenwick Trail, Roanoke, VA 24018.**

MAGAZINES: Members may subscribe to *Astronomy* (\$29.00) and/or *Sky & Telescope* (\$32.95) at the indicated substantial club discount rates. Subscriptions are sent to the publishers each April 15th, August 15th and December 15th. Renewal payments should be submitted by whichever of these dates is at least 4 months prior to the expiration of your magazine(s). Orders may be added to dues payments, or submitted separately

The Local Group

By Genevieve Goss

Lest RVAS members languish in their lawn chairs this hazy summer, perhaps a suggestion or two for fun road trips will prompt them to expand their astronomical horizons!

The RVAS has been invited to attend **NASA Goddard Space Flight Center's Community Day** in Greenbelt, MD, on July 31, from 10:00 a.m. to 6:00 p.m. The event features "free, exciting and educational activities for all ages", with interactive exhibits, speakers, and a variety of children's activities. Contact John Goss for more information.

Also beckoning is the new **Smithsonian Air and Space Museum's Steven F. Udvar-Hazy Center**, located south of the main terminal at Dulles Airport near the intersection of Routes 28 and 50 (<http://www.nasm.si.edu/>). The museum has over 80 aircraft on display, including the Space Shuttle "Enterprise".

Of course, the original **Smithsonian Air and Space Museum** on the National Mall alone is worthy of a trip to the District, especially with its current exhibits (see: <http://www.nasm.si.edu/exhibitions/current.cfm>), the "Infinity Express" show at the **Albert Einstein Planetarium**, and "Space Station 3D" at the museums' **IMAX theater**. While on the mall, drop by the meteorite display at the **Natural History Museum**.

If the idea of a road trip to the city makes your eyes spin, try a leisurely drive to the **NRAO facility at Green Bank**, WV. Although the club has taken trips there in the past, the new **Educational Facility** merits another visit to Pocahontas County. Take a break from summer heat and view a cool image of the world's largest fully steerable single aperture antenna (in the snow!) at <http://www.gb.nrao.edu/>. You'll want to make the peaceful, 2-hour drive to see the real thing!

If member interest merits it, the possibility exists of reserving an Abbott tour bus for a club field trip this fall to DC, or even to the **Hayden Planetarium in NYC**. It may be possible to make a marathon one-day trip to Washington to see both the new **Air & Space museum at Dulles** and the **Einstein planetarium**, or to include an overnight stay for more time at museums on the mall. A trip to NY requires a weekend. Neighboring astronomy clubs, such as BRAC in Forest, and Echo Ridge could be invited to help reach bus capacity.

Please voice your opinion at the July RVAS meeting, or e-mail me, indicating (1) if you are interested in a field trip, (2) if any other family members would attend, (3) your choice of field trip location, (4) whether you would prefer a day trip or an overnight trip, and (5) possible dates.

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Venus Transit a Treat for the Troops

sphere, its image was slightly softer than what was seen at the last Mercurian event. Telescopes were tracking, filters were adjusted, and video images were shot. Even the local press was in attendance.

Mark Hodges with his 11" Celestron, and **Paul Caffrey** with his 80mm refractor were quickly flipping between filter/no filter arrangements, so their video images would show the event while not burning their CCD chips! Their agile work luckily saved this transit for posterity.

Meanwhile, **Mike Overacker** was capturing some great shots with his Canon 10D Digital SLR/8" SCT combination. **Bill Green** used his TeleVue binocular telescope to bring in some eery, almost 3-D visual views.

At 7:00 a.m., with a mere nine minutes left until "third contact," transiteers again became nervous when the sun played hide and seek in the shifting clouds. Would we all miss the much anticipated black drop effect?

Again, the sun answered our hopes and popped back out. The black drop? It was there, or at least we thought it was there. Ever so slowly, Venus seemed to melt off the solar limb. By 7:27 it was over.

Did someone say "Mercury on November 8, 2006?"

Head Lights and Star Lights

By Clark M. Thomas,

Who hasn't noticed those horribly bright blue-violet automobile head lights? They nearly drive us to crash at night, yet they are legal. Why?

The manufacturers say they are merely the same wattage as regular halogen lights — so it must be OUR fault; or maybe we are just unaccustomed to better lighting, and we need time to adapt to progress.

The problem with those new light sources is not their wattage — it is where they emit light on the visible spectrum. Measurements of light intensity are made in laboratories with silicon devices, which are not equally sensitive to the same frequencies as our eyes. Furthermore, our eyes have two types of sensory cells (rods and cones), with very different frequency sensitivities.

As astronomers, we well know that certain things are easy to see with the naked eye, and some things are either hard to see, or impossible. Planetary nebulae, emission nebulae, and even such exotics as the Horsehead and California nebulae, all are helped by different filters that remove competing light to leave very narrow bands of light for our eyes.

The scotopic (dark-adapted, rod-using) human eye is most sensitive to blue and green light. That is why green laser pointers work great, but red lasers operating at longer frequencies appear much less bright, even with equal output energy.

CCD chips are more sensitive toward the red end of the spectrum, which is why they shine with emission nebulae, and with H-Beta sources such as the Horsehead and California nebulae.

In contrast, visual OIII filters enhance planetary nebulae which are brighter toward the blue and green frequencies where the scotopic human eye is most sensitive. A CCD chip can image planetary nebula anyway, but less efficiently.

I had already figured out in my mind the basic reason for why those blue car lights are so offensive, but a technical article by W. J. Collins, of Collins Electro Optics LLC, in Colorado, provided the hard numbers. You can access this article at the following URL: http://ceoptics.com/ccd/ccd_tech_report.html

It also goes into fascinating detail about the spectral frequencies of different types of galaxies, stars, etc.

It is generally agreed that the spectral range of human vision is between ~380 to ~760 nanometers (nm = billionths of a meter). At 505 nm (which is green) the minimum threshold of perceptible vision is 1. In comparison, yellow light requires 100 times the intensity to produce the equivalent scotopic response, orange 1,000x, and red 10,000x — but blue requires only 2x, and violet 20x.

During photopic (cone) vision (light levels above approximately 10 LUX), the peak visual sensitivity shifts upwards to 555 nm, which is closer to yellow. It is interesting to note that those bluish car lights, when we see them on during the day under blue skies, are not as irritating. But then no head light is as bright as the sun.



These Facts Might Make Your Head Spin!

How fast are we moving, due to the spinning of the earth once a day around the axis?

In Virginia, we move slower around the axis than someone standing on the equator. The circle we spin on is smaller than the equator by a factor of cosine of the latitude. Naturally, you need an equation using math to measure the speed at a location "L," where L is the latitude. The equator is $\pi * r$, where $r = 7927$ miles is the radius of our globe. Therefore we cover a distance of $\pi * r * \cos L = 19830$ miles in 23 hours and 56 minutes. Dividing yields 828.539 mph.

A jet plane with a fierce tail wind just about could make this pace, which is why an afternoon flight westward to San Francisco will provide an extended sunset for the passengers. Note that the person standing on the equator moves roughly 24,000 miles in 24 hours, but that is 24,000 miles per day, rather than 24,000 miles per hour. At 24,000 mph, we would all be whirled off the globe and flung into space.

How fast are we moving around the Sun in our annual revolution?

Assuming the average distance is 93 million miles, the formula is $2 * \pi * r / t = 2 * \pi * 93000000 / 365.2564 / 24 = 66,658$ miles per hour.

How fast are we and other parts of the Milky Way galaxy moving through intergalactic space?

Roughly 360,000 mph.

More Head Spinners:

One **day** is NOT the time it takes for the earth to revolve around its axis completely. It is the time from mean noon to mean noon. The two differ because the earth revolves around the sun a little while it rotates once.

A **lunar month** is NOT the time it takes for the moon to revolve around the earth. It is the average time it takes for the phases to repeat. The revolution period is 27.5 days. During this time, the earth has gone about 1/12.7 of the way around the sun. It takes an extra two days for the moon to catch up. So the phases repeat every 29.53 days.

A **year** is NOT the time it takes for the earth to revolve around the sun. It is instead the time it takes for the seasons to repeat. That's the tropical year of 365.2422 days. The revolution time is 365.2564 days. The two are different because of precession - the earth revolves around like a top in 26,000 years. We go by the tropical year since it is more important that there be no snow in July than it is that we can see Scorpius and Sagittarius on July nights.

History of RVAS

Our new Prez, Katherine Hix, is inspired to write a history of our world-famous society. If you can help even a little bit, please respond to her comments below:

"One of the things I want to do as Queen is to write a history of the RVAS, and post it on our web site. I would like to ask the members via the NL, especially those who have been around for awhile — or who were members, left, and then came back — to try to come up with documents or memories of the club from as far back as they can go, and provide them (or copies of them) to me.

I will assemble information from the documents, and try to write a concise, but accurate, history that can be posted for everyone to read. If a history has already been written, I have not heard about it, and I would be glad to take that document and add more recent history to it, if someone will provide it.

Some documents that would be helpful would be old newsletters or meeting minutes; letters; notes people have taken during meetings; etc."

Call or email Katherine soon!

Society Calendar of Events and Activities for July 2004

JULY MEETING: Monday, July 19th, 7:30 p.m. fifth floor meeting room, Center in the Square, Roanoke. Tonight's meeting program will be focused on sundials, and on the Cassini-Huygens mission to Saturn. (See the June RVAS newsletter for the sundials article!)

"MEMBERS ONLY" WEEKEND OBSERVING SESSIONS: Unless otherwise noted, observing sessions are held at Cahas Mountain Overlook, milepost 139 on the Blue Ridge Parkway.

◆ Friday and Saturday, July 9th and 10th. Sunset is at 8:42 p.m. Astronomical twilight ends at 10:33 p.m. The Moon rises at 1:23 and 1:49 a.m., respectively.

◆ Friday and Saturday, June 16th and 17th. Sunset is at 8:39 p.m. Astronomical twilight ends at 10:27 p.m. The Moon sets at 8:37 and 9:19 p.m., respectively.

◆ August Sessions: 6th and 7th; 13th and 14th.

FRANKLIN CO. PARKS DEPT./RVAS PUBLIC STARGAZE: Next session: August 7th, 9:15 p.m.

ROANOKE CITY PARKS DEPT./RVAS PUBLIC STARGAZE: Saturday, July 17th, 9:30 p.m., Cahas Overlook, milepost 139, Blue Ridge Parkway. For City, County and other area residents. RVAS members welcome to participate. Call the RVAS Message Line, 540-774-5651, for information. (Next session: August 14th, 9:00 p.m., Cahas Overlook.)

RVAS EXECUTIVE COMMITTEE MEETING: Meetings are now held the first Tuesday of each month; contact one of the officers regarding specific location and time information.

Roanoke Valley Astronomical Society
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