Roanoke Valley Astronomical Society

News About Amateur Astronomy in Southwestern Virginia

Volume 27 – Number 5 May 2010

Are the Milky Way's Globular Clusters Local or Captured?

By Michael Good

Our newsletter editor likes to task me from time to time, and this month is no different. He spotted a paper "Accreted versus In Situ Milky Way Globular Clusters," written by Duncan A. Forbes and Terry Bridges, published in the 25 January 2010 issue of the *Monthly Notices of the Royal Astronomical Society* arXiv:1001.4289v1 [astro-ph.GA]. Clark sent an email, and Dr. Forbes was kind enough to forward a PDF of this paper for our club's use.

Our galaxy has two predominant components: a disk and a halo. The disk contains the spiral arms of gas and dust and stars, including our humble solar system, and the halo is a spherical structure centered on our galactic center whose outer radius is thought to be built from the remnants of the many smaller galaxies and globular clusters that our Milky Way has eaten over the years. The paper by Forbes/Bridges presents data to answer the question of which globular clusters seen from earth are "native" to our galaxy (formed "In Situ"), and which were cannibalized (nice word: accreted) from smaller galaxies.


M54 in Sagittarius is one of several remnant galaxy cores left over from an earlier "meal" of the growing MW.

To answer this, the Forbes/Bridges team created a database containing the ages of the stars in the globs, derived from something called main sequence turnoff (see below), and spectral data on these stars (yielding what is known as "metallicity"). Metallicity refers to more than just "metal" like Iron (Fe). The astronomical definition for metallicity for an object "is the proportion of its matter made up of chemical elements other than hydrogen and helium" (Wikipedia). As you can see, the astronomical

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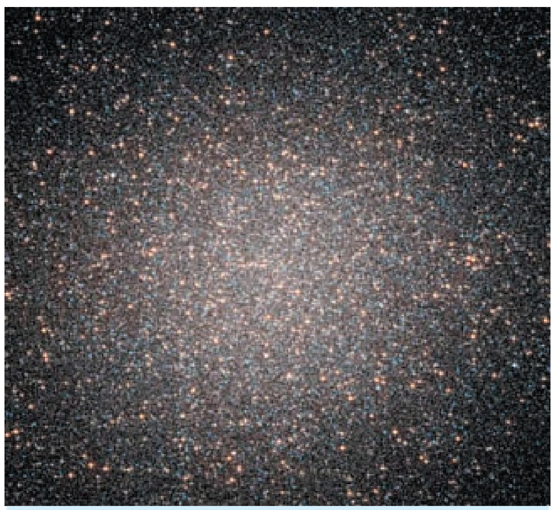
usage of the word "metal" is not the same as the chemical use of the word.

Stars are primarily hydrogen and helium, so astronomers call all the other elements "metal". It is assumed that our early universe was hydrogen, period. Every other element was made in stellar interiors as part of their impressive nuclear fusion reactions. Larger stars produce heavier elements as the hydrogen in their cores is used up, and then the Helium is used up. Novae, and in particular supernovae, produce the heaviest elements, up to and including Iron.

So if you are looking at a globular cluster, and your spectrograph sees mainly hydrogen and helium spectral lines, then you can infer an older globular cluster. If however you see heavier elements present, then cosmologically this implies the glob has been made from material that was produced more "recently," and hence is younger. (First year astronomy students must memorize Population I stars (in the disk of our galaxy), and Population II stars (in the Halo), where the latter is normally metal-poor implying older stars, and now, choke gasp, Population III stars. I digress.)



NGC 1539, Omega Centauri, in Centaurus, is the most magnificent globular in the MW – but it is also a remnant galaxy core.

As for main sequence turnoff, this requires understanding the all important Hertzsprung-Russell (HR) diagram. Remember my club talk about brightness and Absolute Magnitude in April?

When you plot the Luminosity of a star (intrinsic magnitude... Absolute Magnitude... Mv) versus the color of a star (spectral class OBAF-GKM, or the Blue minus Visual or B-V "color index"), you see distinct patterns in the data. White dwarfs show up at lower left (blue/white, very low luminosity). The main sequence stars trail from lower right to upper left, and the giant and supergiant stars are plotted in the upper right corner (red, high luminosity due to their huge sizes).

The neat thing about studying clusters is they all were formed at approximately the same time (presumably from the same large cloud, like is happening right now in the Orion nebula). As stars age, when they use up their fuel the stars become red giants.

If you plot all the stars in a glob, for instance, you will see a "turn off" to the right on the chart of a fraction of these stars from the main sequence. At first this is the larger and hotter stars, "turning off" to become red giants. As the cluster ages, the "turn off" point moves to the lower right of the HR main sequence diagram, which is smaller lower mass stars finally aging enough to become red giants. By studying a cluster, and plotting the luminosity (Mv) against colors (OBAF-GKM... or B-V), you can see how old the cluster is. The oldest clusters will only have the lowest-mass stars still on the main sequence. Back to the paper.

The ratios of metallicity for stars in a glob can be used to create an age-metallicity relation (AMR), using the chemistry of the stars to help constrain the evolutionary history. Forbes et al have written other papers analyzing tidal effects between our galaxy and others, showing how these gravitational tug-of-wars can suck iron out of our galactic core, or funnel it back into the galaxy center. Others have shown how tidal interactions with our Magellanic Cloud galactic neighbors have formed new young star clusters. The effect of gravity can be shown to be like a bulldozer ramming gas and dust in shock or pressure waves. Once the material is bulldozed together,

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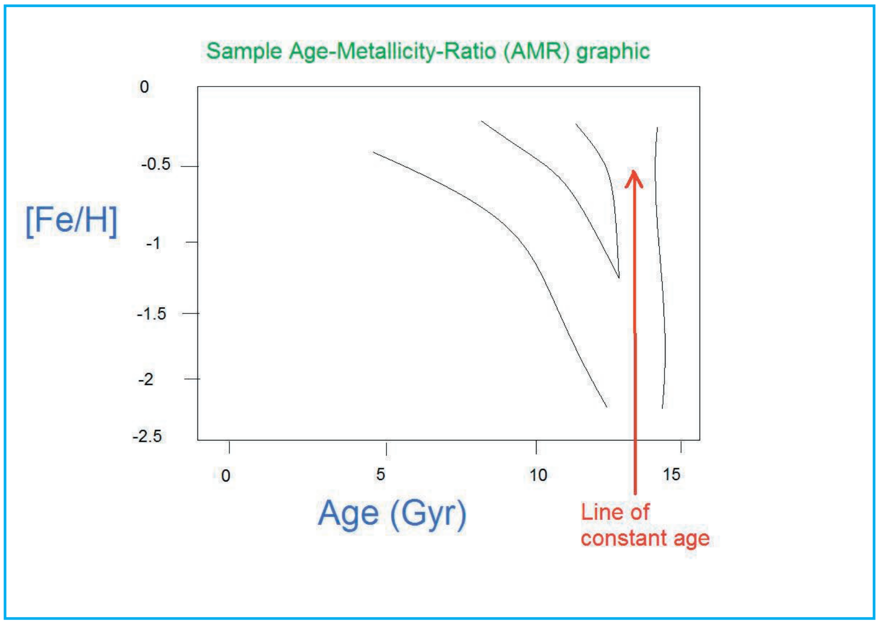
local gravitational collapse forms large star forming regions as we are accustomed to (e.g. the Orion nebula).

Forbes/Bridges compiled new catalogues of age and metallicity measurements for the globs in our galaxy and reformed the AMR relationship. They concentrated on globs that do not rotate in the same direction as the rest of the pack... a tell-tale sign of a glob whose parent was eaten. It is believed that the globulars survive the accretion into our galaxy intact due to their well formed gravitational bonds.

To determine a ratio of captured versus In Situ globs, the authors analyzed almost 2/3 of the known globs in the Milky Way, forming a database of 93 Milky Way globs, including age and metallicity estimates. They then examined the age-metallicity relationship (AMR) of the data, and see two tracks in the data – "one has a near constant old age of ~ 12.8 Gyr over the full metallicity range, the other is a track to younger ages...."



With much more data than is shared here, our authors are able to suggest that at least 27-47 globs came from 6-8 dwarf galaxies, and were summarily eaten (ok, accreted) by the Milky Way, which is about 1/4 of the known globulars in our Milky Way. Given above is a sample of what an AMR relationship might show. The metallicity [Fe/H] can go negative because it is actually given by this equation:

$$[Fe/H] = \log_{10} (\text{Fe atoms}/\text{H atoms})_{star} - \log_{10}(\text{Fe atoms} / \text{H atoms})_{our\ sun}$$

(Where the atoms counts are per unit volume), so all the stars in the globulars have LESS metal in them than our sun. This makes sense – our sun is say 5 billion years old, where the stars in the globulars are predominantly much older.

Similar to what was seen by our authors, when each globular is plotted on the AMR graphic, you see a general trend of globs that were created at the same time (hence, In Situ with age being the age of our galaxy... the red line above), and a branch of globs whose ages can vary according to when they were captured (the "envelope" that branches to the upper left).

So next time you are out gazing at the inner core of one of these gems of the night sky, stop and ask yourself if the clumping of stars on which you are gazing is being used in the fairly new field of galactic archaeology!

Legenday NBA center,
Wilt Chamberlain,
sometimes called "The Big Dipper,"
named his sprawling Bel-Air home
Ursa Major
as an ode to the stars
that make up the Big Dipper.

Highlights from the April 2010 RVAS Monthly Meeting

Our late April and early May skies: *What's Up?*

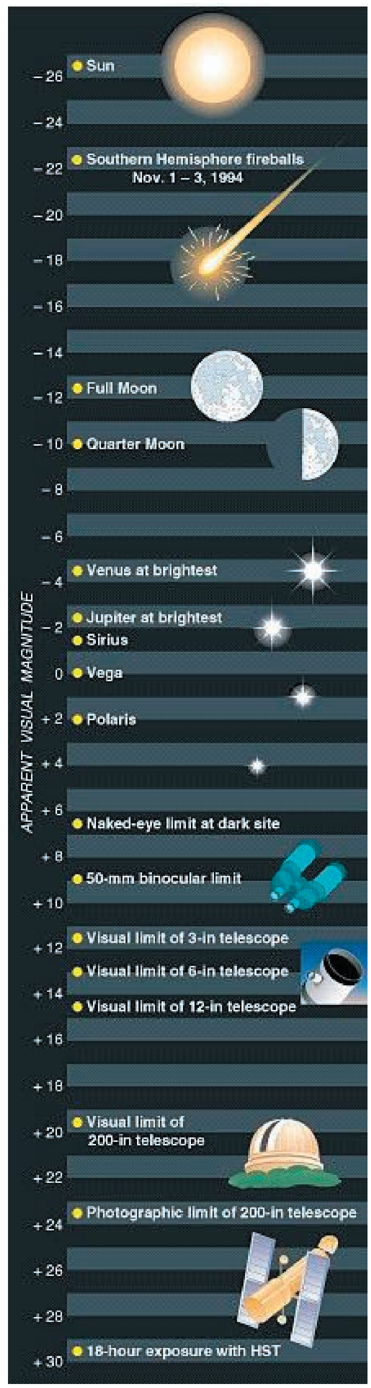
Just in time for the arrival of warmer, clear skies, Paul Caffrey provided a tour of late April's and early May's early evening sky. This is the time of year that the bright stars of winter sink low in the west, soon disappearing after darkness falls. Orion, and Taurus, and Sirius all say "goodbye" for this observing season, while Lyra, Hercules and Virgo say "hello." Celestial objects in the ecliptic constellations of Libra, Virgo, Leo, Cancer and, for a while longer, Gemini still give some interesting observing opportunities.

Brilliant Venus commands the western sky directly after sunset. It climbs higher each evening over the next several months. Drifting eastward through Cancer shines ruddy Mars, remaining visible until 3:00 a.m.. Saturn, located high in the south and situated to Mars' southeast, gives a great target until it drops low in the west before 5:00 a.m. As Saturn disappears, bright Jupiter rises in Capricorn in the east.

Auriga is known for being a winter constellation, but because of its high declination, it continues providing a fertile open cluster hunting ground for a few more weeks. Try spotting M36, M37, and M38 for their many sparkling stellar gems.

Galaxies are what many amateurs peruse this time of year and there certainly are many prime choices. M81 and M82 in Ursa Major; M65, M66, and NGC 3628 in Leo; M51 in Canes Venatici; and M104 in southern Virgo are all favorites and very worthy targets.

ABCs of amateur astronomy: "B" is for Brightness



One descriptive term that all amateurs need to be familiar with is the brightness whose scale is described in magnitudes. After all, if you are discussing a celestial object, you naturally want to describe its relative brightness. It doesn't really convey much helpful information just to state that a particular object looks "pretty bright!"

Michael Good discussed how astronomers have come to use express brightness. Over two thousand years ago, Hipparchus created the first star catalogue and ranked its stars according to their perceived brightness. He designated the twenty brightest ones as being 1st magnitude and deemed the dimmest stars as representing 6th magnitude.

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By a happy coincidence, modern photometric measurements have found that the true brightness difference between a 1st magnitude object and a 6th magnitude one is almost one-hundred times. That means that the difference in brightness between any two objects of adjacent magnitudes is the fifth root of 100, or 2.51.

Here are a few objects whose magnitudes can be used as a handy reference:
Sun: -26.5
Moon: -12
Venus: -4
Jupiter (at maximum): -2.5
Vega: 0
Spica: 1
Most stars of the Big Dipper and the North Star: 2

The illustrated scale of magnitudes on the previous page comes from the very helpful site: http://calgary.rasc.ca/stellarmagnitudes.htm#scale

Radio Sun Update

Our sun is one celestial body which not only can be seen but can be heard — given the right equipment. Solar sound bites were featured in a talk given by RVAS member Dave Thomas. Over the past couple of years, Dave has been refining his radio antenna assembly to capture better signals from the sun. He explained that there are five distinctive types of solar radio bursts, each resulting from different forms of solar activity. While displaying strip charts of their intensity, he then played how their variations would sound on a receiver.

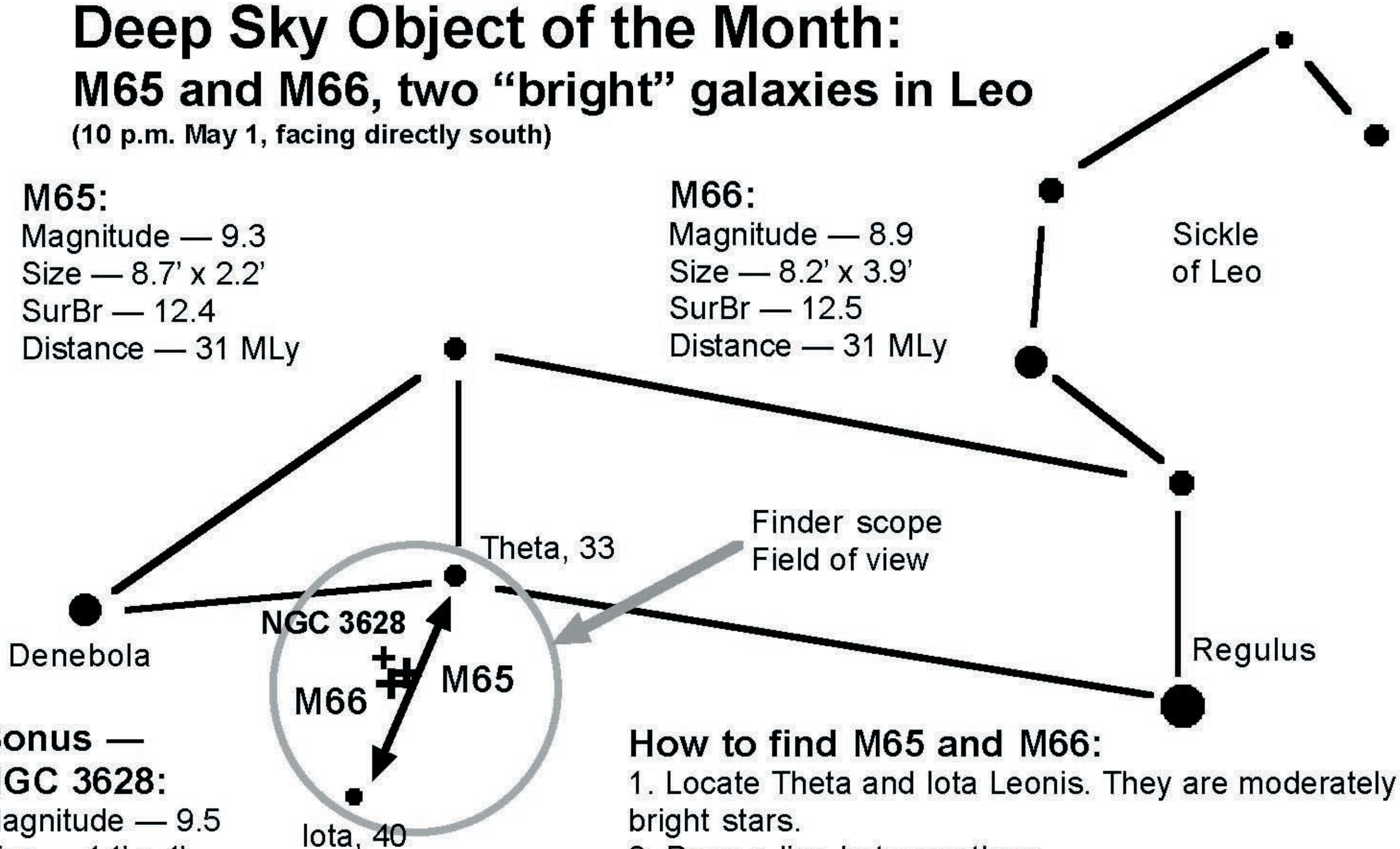
Just by listening, Dave is able to tell what just transpired 93 million miles away. As the sun's activity cycle increases, Dave and we will be hearing more out of our nearest star.

Frank Baratta's Astro-Quiz

Which of the 48 constellations listed by the ancient astronomer Ptolemy is the only one no longer recognized?

Answer to Last Month's Astro-Quiz: **North of Dublin, Ireland, lies the Megalithic Passage Tomb at Newgrange. Constructed about 3,200 BCE, Newgrange may be somewhat older than the first building phase at Stonehenge, and pre-dates the Great Pyramids by 600 years. Said to be the abode of Oenghus, the god of love, the mound covers over an acre, and contains a 60-foot inner passage leading to a cross-shaped chamber. Light of the rising winter solstice Sun entering a precisely aligned roof box penetrates the passage and illuminates the chamber, allowing exact determination of the solstice. Today, admission to the chamber to witness the 17-minute-long winter solstice event is by application and lottery; nearly 30,000 apply each year, with no more than 100 admitted.**

Deep Sky Object of the Month:
M65 and M66, two "bright" galaxies in Leo
(10 p.m. May 1, facing directly south)



M65:
Magnitude — 9.3
Size — 8.7' x 2.2'
SurBr — 12.4
Distance — 31 MLy

M66:
Magnitude — 8.9
Size — 8.2' x 3.9'
SurBr — 12.5
Distance — 31 MLy

Bonus — NGC 3628:
Magnitude — 9.5
Size — 14' x 4'
SurBr — 13.7 (dim)
Distance — 31 MLy

How to find M65 and M66:
1. Locate Theta and Iota Leonis. They are moderately bright stars.
2. Draw a line between them.
3. Half way along that line lies M65. M66 sits at the southeastern edge of a low power eyepiece.

The Roanoke Valley Astronomical Society is a membership organization of amateur astronomers dedicated to the pursuit of astronomical observational and photographic activities. **Meetings are held at 7:30 p.m. on the third Monday of each month, at the Center in the Square in downtown Roanoke, Virginia. 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 dues are $25.00. Student dues are $10.00. Articles, quotes, etc. published in the newsletter do not necessarily reflect the views of the RVAS or its editor.

RVAS web page: *http://rvasclub.org*

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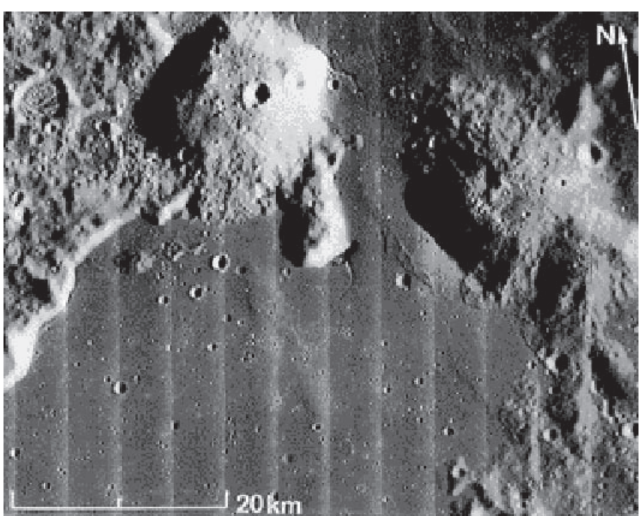
Triple Moon Oddities

By Dave Thomas

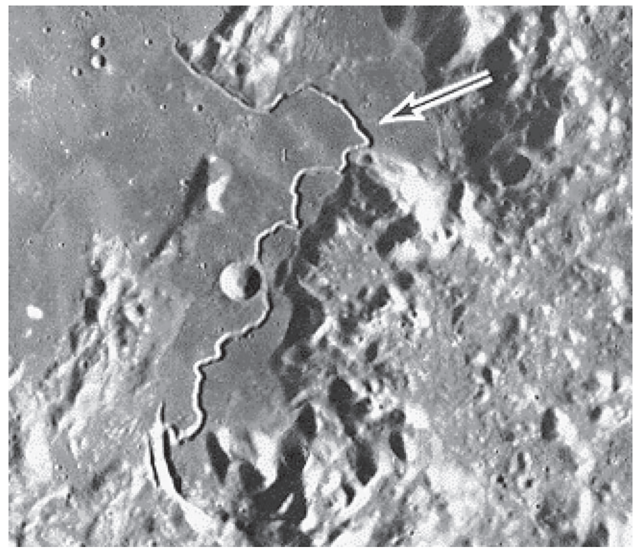
When we view the Lunar surface we see a surface pockmarked with craters, most of which were produced by meteors or asteroid impacts. This is true for most but not all craters.

Some features on the Lunar surface are of volcanic origin, although there has been no volcanic activity for about two billion years.. There are cone and dome shaped features and sinuous rilles. There were also basaltic lava flows from cracks in the Lunar surface that filled up impact craters.

The cone and dome shaped features vary from 10 miles across to a few thousand feet high. Because of the low Lunar gravity the eruptions propelled the material ejected from the volcanic vents over a much wider area than would be the case on Earth. These events were probably less explosive because the Moon is practically devoid of water. One example of a group of domes are the Gruitheisen Domes in the northwestern Mare Imbrium.

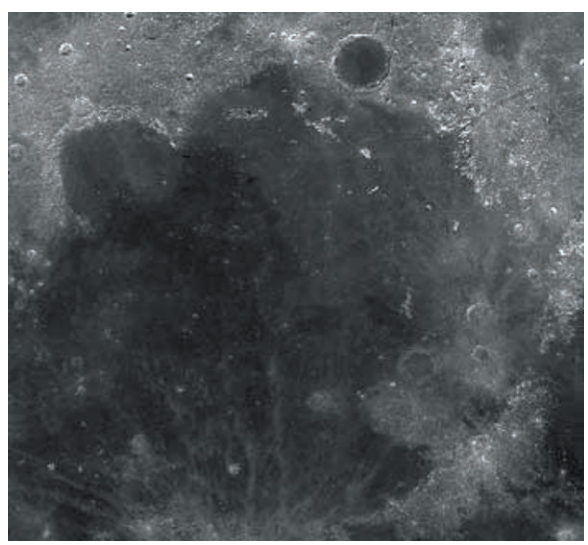


The sinuous rilles are probably lava channels or collapsed lava tubes that formed when the Moon was volcanicly active. The most well known rille is the Hadley Rille on the southwest edge of the Mare Imbrium. This was the site of the Apollo 15 Moon landing. The rille is over 75 miles long, almost a mile across, and over 900 feet deep in some places.



The Mare Imbrium, and the other Mare on the visible side, as well as the far side, of the Moon are examples of basaltic lava flows. Most of these features are several billion years old.

Even though it has been billions of years since the Moon has been volcanically active, the signs are there because of the lack of erosion other than that of mostly small meteors and micro-meteors.



The Struve Family of Astronomers

By Genevieve Goss

Talk about starstruck families..... May's astro-celebrity birthday belongs to **Otto Wilhelm von Struve**, a member of the five-generation-astronomer Struve family. Born on May 7, 1819, Otto Wilhelm von Struve, a Russian of German descent, received the Gold Medal of the (British) Royal Astronomical Society in 1850.

He was the distinguished son of a distinguished father, Friedrick Georg Wilhelm Struve. The elder Struve, himself a son of renowned astronomer Jacob Struve, focused his observations on double stars, furthering the findings of the work done by the Herschels. He died in Karlsruhe, Baden, Germany on April 14, 1905. Asteroid 768 Struveana was named for Otto and his two astronomer sons.

Pictured here is the 2.1 meter, 84 inch, Otto Struve Telescope at the University of Texas Observatory near the annual Texas Star Party. It may be the largest scope open to public visual observing. Check out this report from 2001: http://www.rodnorden.com/TSP2001.html

Otto Wilhelm von Struve began his astronomy work as his father's assistant and succeeded him as director of the Pulkovo Obsevatory (near St. Petersburg, Russia) which at that time, had a 30-inch refractor, the world's largest!

He continued his father's work in double stars, adding his own planetary observations (including movement in the rings of Saturn and observations of moons of Neptune and Uranus), and studies of the velocity of the solar system.

Two of Otto Struve's children also became astronomers: Karl Hermann Struve, who also joined the staff at the Pulkovo Observatory, where he studied Saturn's moons; and Gustav Ludwig Struve, who began work at the Pulkovo Observatory, but then moved to the Ukraine to become director of the Kharkiv University Observatory. Neither of these fourth-generation astronomers had the notoriety that their father and grandfather had, but were active in the field throughout their lives.

Gustav Ludwig Struve's son, Otto, makes the fifth generation in this family lineup of astronomers. As one of the few pre-space age astronomers to do so, he announced his belief that intelligent life would be statistically probable in the universe. His studies of slow-rotating stars prompted him to estimate in 1960 that there could be as many as 50 billion planets in our galaxy alone. He did not have any children, thus ending the Struve astronomy dynasty.

Olbers' Paradox: Why Is The Night Sky Dark?

By Jack Gross

Somewhere in forgotten box of old college textbooks hidden away in my attic, you'll find the 60's explanation of cosmology – specifically an explanation of the origins of the Universe.

My personal hero back then was Fred Hoyle and his "Steady State Theory." You see, back in those days we knew that the Universe was expanding, but it was still pretty much infinite in size and age. Freddy's "perfect cosmological principle" resolved the average density of the universe issue by a mathematical modification to Einstein's general relativity theory which allowed hydrogen atoms to be created from nothing at the needed rate – and so the Universe was happy, and my brain could move on to more important issues like memorizing useless things for tests.

However, a solution to Wilhelm Olbers' paradox (he's the gent pictured on this page) would require drastic revisions to fondly held assumptions about the Universe for both Fred and me.

So, what is/was Olbers' Paradox? If you can control your go-to telescope from your iPhone, or you have gotten as far as lecture 79 of Alex Filippenko's Teaching Company's Great Courses series, you probably know the real reason why the night sky isn't as bright as the surface of the Sun. The rest of us just assume it's because the Sun has set.

OK, here's Olber's logical inconsistency:

If the Universe has an infinite number of stars lasting an infinite period of time, then presumably everywhere above should be at least as bright as the Sun.

if you move the Sun twice as far away from us, our eyes will catch only one quarter as many photons according to the inverse square of light law. Here's the thing: the Sun's angular area against the sky background will also have now dropped to a quarter of what it was. So, its intensity remains constant – just smaller size-wise. That's basic physics!

With infinitely many stars existing for eternity, everywhere you look in the night sky you should see a star, and the entire heavens should then be as bright as an average star like the Sun. It took me a while to get my head around that thought, but there it is.

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An object's apparent brightness decreases with the square of the distance. But, here's the catch, the size of the object also decreases by the square if the distance, so the squares cancel out. Remember we're talking about surface brightness here, meaning the intrinsic brightness per unit area - not the total apparent brightness of the object. The surface brightness of an object does not decrease with distance. Like the total light output from a 100 watt light bulb, it is an inherent property of the object, not dependent on the observer.

When an object is twice as far away, it appears one quarter as bright; however, it also appears to be half as big, or one quarter the area, so the surface brightness, or brightness per unit area, remains the same. Think of half the area of a10 X 10 square which would become 25 not 50 at half the size and twice the distance.

So if you're still with me, Olbers argues that with an infinite number of stars, everywhere you look in the night sky, you should see a star, with no gaps between them, filling the sky with bright light. Since the Sun heats us while being only one-half of one degree in diameter, imagine all the photons blasting Earth from everywhere. Pretty brilliant thought, huh?

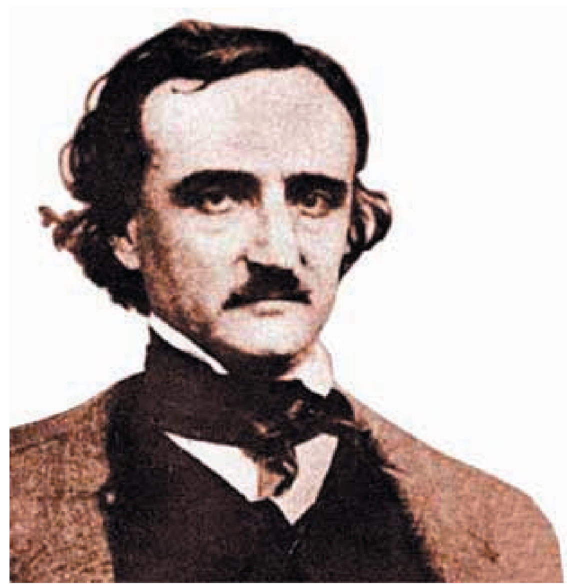
The argument sounds even better if you define "light" as forms of electromagnetic radiation to which our eyes are not sensitive, but then I guess the sky still wouldn't appear "bright" to us, assuming we weren't already vaporized.

What's wrong here? The night sky isn't as bright as the Sun, and we do see great gaps between the stars. At least one of our cosmological assumptions has to be wrong. While Mr. Hoyle didn't like a universe with a beginning, even coining the derisive term "big bang," a name which eventually stuck, the overwhelming evidence is convincing.

Our entire Universe is probably "infinite enough" to have stars fill most all the gaps. However, at around 14.7 billion years old it just isn't old enough for us to see all those stars. It might get brighter as additional starlight arrives here on Earth, at least for a while. Meanwhile, a portion of the light from many stars is absorbed by interstellar dust clouds.

As the very fabric of our known universe expands, more and more of that light will be red-shifted from our vision. Even the cosmic microwave background will fade. Distant stars and galaxies will drift farther away, and we'll be left with only the light from the stars in our local group. Both Fred Hoyle and I were left with a total cosmological paradigm shift; such is the stuff of scientific theory.

An interesting footnote to Olbers' Paradox is that it was apparently solved by Edgar Allan Poe in 1848 when he wrote "Eureka: A Prose Poem":



"Were the succession of stars endless, then the background of the sky would present us a uniform luminosity, like that displayed by the Galaxy - since there could be absolutely no point, in all that background, at which would not exist a star. The only mode, therefore, in which, under such a state of affairs, we could comprehend the voids which our telescopes find in innumerable directions, would be by supposing the distance of the invisible background so immense that no ray from it has yet been able to reach us at all."

Stars and Flowers

By Clark Thomas

Last month I visited a cattle rancher in a nearby county. Because his medium-sized farm has fabulous night skies, I asked him how impressed he was with all the sparkling wonders overhead.

His response surprised me: He said he has no idea what his night skies are like.

He and his one helper go nonstop from dawn to dusk. When he's through with the day, he barely has time and energy to eat supper and then sleep.

Beauty forms much of the rancher's world during the day, and his farm in a secluded valley has one of the most romantic landscapes you could imagine. Yes, this fine man does appreciate the natural beauty he sees during the day. I feel he could become an enthusiastic astronomer, if only he had the time and energy to look up when the Sun is down.

The Rosette Nebula
Source: APOD, Februrary 14, 2008

Ephemeral flowers seem to be the opposite of apparently eternal stars. Nevertheless, flowering plants have been with us since the dinosaurs. Individual flowers come and go, as do individual stars come and go. People with their busy lives come and go. Everything seems both eternal and ephemeral. Even the farmer's mountains will erode and change.

Personally, I don't worry about naturally eroding Appalachian mountains. I do care about the changing opportunities I have to see the beauty above. For example, a pair of binoculars can now show Mars less than two degrees from M44, the Beehive cluster, even from within a light-saturated city.

We all appreciate hybrid flowers planted by the side of road, and flowering trees nearby – but how many of us appreciate our wild "celestial flowers" above? Artificial lights flooding the atmosphere steal our easy access to the untamed beauty above. Hybrid flowers along divided highway medians are nice, but hardly a sufficient substitute for floral wilderness.

There is no quick and easy fix, so we stars-starved urbanites drive to dark areas — when we aren't glued to our computers looking at digital space images, while eating hamburgers made from our rancher's previously contented cows.

M81 - BODE'S NEBULA

By Michael Good

Before I saw the RVAS Club yahoo postings from Clem and Gary concerning M81, I had already started trying to capture an image of this galaxy. Guess it is just that time of year when M81 comes calling.

The image here is of M81, Bode's "nebula". This galaxy presents a grand spiral design, but is slightly challenging to photograph well. In this image, a 14" Schmidt Cassegrain was used on two different nights of cool dry atmospheric conditions.

On March 5, 2010, the luminosity data was obtained, as well as 30 minutes of color data for each channel (RGB). Processing indicated the color data was simply too weak, given this distant galaxy is predominantly blue with patches of HII regions in the outer spiral arms. So this image was attacked again with another entire imaging session just for color data.

Severe temperature changes modified the focus of the color data to where the image was literally out of focus, but by combining with Mar 5 data, all the data was useable.

Black and white data was captured as follows:
20 mins using 4x5 min exposures
40 mins using 4x10 min exposures
120 mins using 6x20 min exposures to go deep.
Total Luminosity (B&W) data: 3 hours

Color data:
30 mins using 3x10 mins
30 mins using 2x10 mins
Total color data 60mins, with an extra 15min exposure used to try and eek out more of the

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atmospherically absorbed blue photons. (It does not help that M81 rises out of the light pollution of Salem/Roanoke, on the other side of Long Ridge (12 o'clock knob mtn) from my observatory.)

Total combined data is therefore 6 hours and 15 minutes worth of gathered photons on this target.

The data was combined using AIP4Win by choosing the Sigma Clip Average Stacking algorithm which helps eliminate some of the noise from gamma rays. Sky flat frames were taken with two new udershirts stretch and duct-taped to a foam core board frame with the 14" aperture cut out of the middle. Flat frame dark frames were of course taken as well, for both luminosity as well as color data. Luminosity was shot at full resolution 1x1 binning, with color data shot at 2x2, so every 4 pixels was combined to allow greater light gathering power when shooting through the color filters.

After combining, a gamma-log was applied in AIP4Win, followed by a linear stretch before importing into Photoshop CS4. An entire evening was devoted to Photoshop, attempting to enhance the faint galactic color data against the luminosity mask, applying levels, curves, removing the blooming spikes present in the lum data when shooting 20 minute sub-exposures, removing additional gradients with Russel Croman's GradientXTerminator (de-selecting the galaxy and brighter stars before applying the filter), and finally using selective regions within the brighter parts of the galaxy to apply strong unsharp masking to bring out the faint detail of the inner spiral arms and dust in this galaxy. The latter was over-done for any purists, but I REALLY like seeing strong gradients in this data.

Finally, Carboni's PS actions were used to reduce star size, increase star color, add a few small star spikes, and add a frame to the finished product.

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VAAS 2010 April Planning Committee Meeting

From notes taken by Mark Poore

RVAS is hosting the 2010 Virginia Association of Astronomical Societies annual gathering, with excellent help from Roanoke College.

A group of RVAS members is the core of a community group planning this event. We want to showcase our club and the area. This event will occur in October, but already serious planning is underway. Any RVAS member can join in the planning, formally or ad hoc.

Mark Poore took lengthy notes at the April 15th planning meeting, and here are some of the highlights, in no particular order:

★ Last year had 40 VAAS attendees. This year, including students and other community attendees, the available space in Roanoke College will be almost five times that much.

★ Banners from different organizations and causes will be hung. Astrophotography and space artwork will be displayed on two floors.

★ A how-to workshop will be held concerning hooking cameras to telescopes.

★ Registration should include lunch with a speaker, or you could opt to buy your own lunch and not attend that speech.

★ Multiple speakers and workshops are under consideration. Our emphasis will be on people from VA and WV. That list includes experts from NASA, Greenbank, local astronomy clubs, etc. We may also have contributors from TN and NC. Our honoraria budget is not huge.

★ Superb door prizes and other attractive elements are all being assembled. More info. in next month's RVAS newsletter.

★ **Next meeting will be May 17th. This VAAS 2010 Planning session will be a dinner meeting at 6 p.m., upstairs at Cornerstone. Our regular May club meeting will follow thereafter.**

My Neat Time at NEAF 2010

By Jack Gross

I happily attended the 19th Annual Northeast Astronomy Forum & Telescope Show. It is difficult to think back about attending NEAF – the world's largest astronomy Expo, held on April 17th & 18th - without drooling all over my keyboard. With over 125 dealers and manufacturers bringing their products for hands-on demonstration and sale, NEAF has a reputation for being a hardware show with discount prices.

And it's true - this is certainly the place to kick tires and haggle over prices, but it is also a forum with world-class speakers and workshops! Hearing the great speakers made for me the long trip to Suffern, NY worth the difficult drive.

After watching all 96 lectures of Alex Filippenko's "Understanding the Universe: An Introduction to the universe, 2nd Edition," produced by The Teaching Company, I really wanted to meet the guy in person and get him to sign my study guide.

Also, Attilla Danko (seen here above), who is the creator of our beloved and often used Clear Sky Clock, gave a fascinating look at the trials and tribulations of constructing and maintaining this famously successful website.

Sunday's lineup of fabulous speakers was slightly delayed by the Science Channel's "Meteorite Men" (Steve Arnold and Geoff Notkin). They rushed on stage 20 minutes late after an all-night flight back from Wisconsin. They carried with them two fragments from the fireball which was seen in five Midwestern states on the night of April 14. How's that for breaking news? By the way, they have been picked up for another TV season – more breaking news.

Only a slightly older news story was a briefing by Jennifer Lynne Heldmann from NASA Ames Research Center on the LCROSS mission. An awful lot goes on behind the scenes at NASA.

I was able to meet another of my favorite astronomy personalities, Dr. Pamela Gay. If you are not familiar with the free podcast called "Astronomy Cast," rush to *http://www.astronomycast.com/*, and sign up .... but there's more! If you act now you'll also receive all of the archived downloads from previous programs. All, absolutely free! Don't wait; pick up your mouse and take advantage of this free offer now.

Another treat for NEAF attendees was a preview of "Blast, The Movie." BLAST (Balloon-Borne, Large-Aperture, Submillimeter Telescope) was a recent project to lift a sophisticated scanning device suspended beneath a NASA high-altitude balloon to the top of the atmosphere. The apparatus detected light from distance star-forming dust clouds much more economically than a satellite launch, but required recovery of the data stored on hard drives in the balloon gondola... which proved to be a daunting Antarctic rescue. Mark Devlin, who is a cosmologist at University of Pennsylvania and the BLAST Principal Investigator, gave a firsthand account of this adventure. This movie would make a great program for our club.

In addition to the many other great speakers, there were workshops on telescope making, telescope buying, telescope observing and astrophotographies, just to name a few.

Oh yes, I did buy another telescope. Just one more.

Calendar of Events

by Frank Baratta

MONTHLY MEETING: **Monday, May 17th, 7:30 p.m., Center in the Square, Roanoke.**

The May meeting will feature cool astronomy cell phone applications. Here is your chance to learn how cell phones can help your pursuit of amateur astronomy. It is amazing what today's technology gives us!

RVAS WEEKEND OBSERVING SESSIONS: Observing sessions are held at Cahas Mountain Overlook, milepost 139 on the Blue Ridge Parkway.

- **Friday and Saturday, 7th and 8th.** Sunset is at 8:16 p.m. Astronomical twilight ends at 9:57 p.m. The Moon rises at 3:09 and 3:33 a.m., respectively.

- **Friday and Saturday, 14th and 15th.** Sunset is at 8:22 p.m. Astronomical twilight ends at 10:06 p.m. The Moon sets at 9:27 and 10.29 p.m., respectively.

- **June Sessions: 4th and 5th; 11th and 12th.**

ROANOKE CITY PARKS and RECREATION PUBLIC STARGAZE: Saturday, May 8th, 8:45 p.m., Cahas Overlook, milepost 139, Blue Ridge Parkway. Nonmembers must register with Parks & Rec. at 540-853-2236. Members can call 540-774-5651 for information. (Next session: June 12th, 9:30 p.m., Cahas Overlook.)

FRANKLIN COUNTY PARKS DEPT. PUBLIC STARGAZE: Saturday, May 1st , 8:45 p.m., Franklin Co. Recreational Park. For Franklin County residents, who must register with Parks & Rec. at 540-483-9293. RVAS members can call 540-774-5651 for information. (Next session: July 31st, 9:30 p.m., FCRP.)