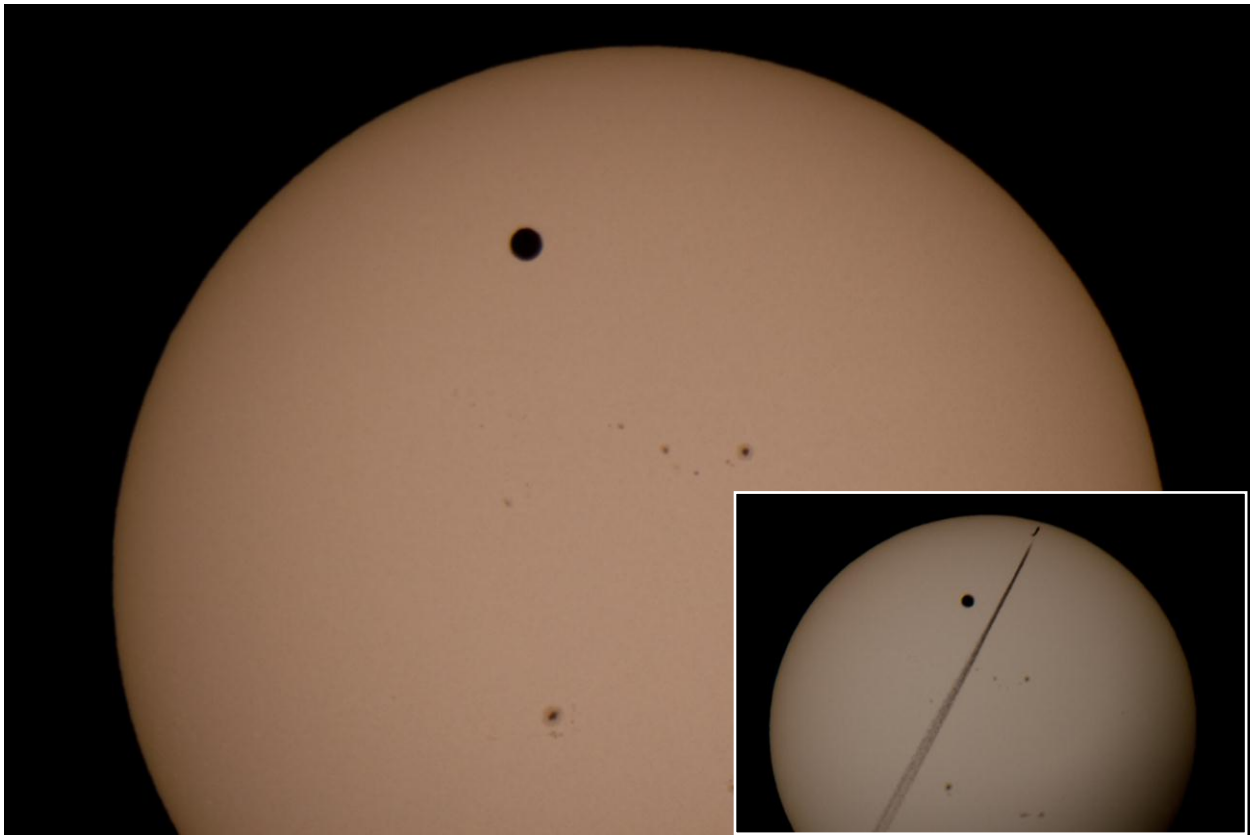
Current Astronomy

RIVER BEND ASTRONOMY CLUB NEWSLETTER

JULY/AUGUST 2012



Members of the River Bend Astronomy Club observe, share, record, and photograph the Transit of Venus on the evening of June 5, 2012, the last to occur for the next 105 years. Inset: A jet streams across the field of view in this image of the Sun at an altitude of just 5.9°.
Photos by Gary Kronk.

INSIDE THIS ISSUE

River Bend Astronomy club serves astronomy enthusiasts of the American Bottom region, the Mississippi River bluffs and beyond, fostering observation, education, and a spirit of camaraderie.

Elected Officers

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Contacts

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Affiliated with the Astronomical League, dedicated to fostering astronomical education, providing incentives for astronomical observation and research, and assisting communication among amateur astronomical societies. www.astroleague.org

Check out our **online calendar** on the NASA Night Sky Network, a nationwide coalition of amateur astronomy clubs bringing the science, technology and inspiration of NASA's missions to the general public.

Monthly Meetings

Saturday, July 21, 2012 • 7:00 PM
Saturday, August 18, 2012 • 7:00 PM
Saturday, September 15, 2012 • 7:00 PM

For meeting locations, please see our calendar at www.riverbendastro.org.

Looked Up Lately?

Join River Bend Astronomy Club

Want to learn more about astronomy? The members of River Bend Astronomy Club invite you to join. You won't need expensive tools or special skills – just a passion for observing the natural world.

- Meetings offer learning, peeks through great telescopes, and fun under the stars.
- You will receive the club newsletter, *Current Astronomy*, packed with news and photos.
- Get connected with our member-only online discussion group.
- Borrow from the club's multimedia library.
- Borrow from the club's selection of solar telescopes.
- And that's not all! Through club membership you also join the Astronomical League, with its special programs and colorful quarterly newsletter *The Reflector* to enrich your hobby.
- We meet monthly, observe regularly, email news and quips constantly, and generally have a good time. Won't you join us?

Name_____
Address_____
City_____State_____Zip_____
Phone_____
Email address_____
Where did you hear of our club?_____
_____
How long have you been interested in astronomy?_____
Do you have optical equipment?_____
Are you afraid of the dark? ___Yes ___No (just kidding)
I am submitted my application for:
_____Adult Membership(s) ___Youth Membership(s)
$20/year each (18 yrs. and up) $15/year each (17 yrs. and under)
I enclose a check for $_____ made out to:
Mike Veith, Treasurer, RBAC
Signature_____
Date_____

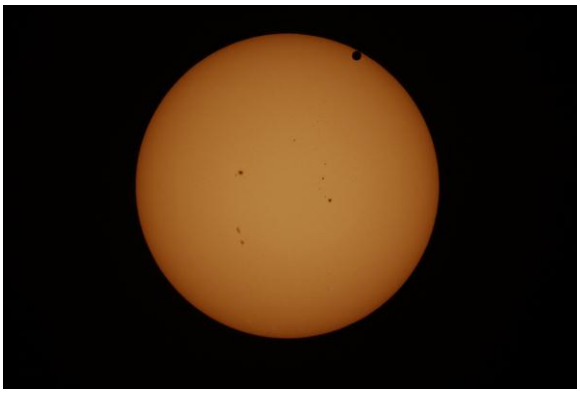
Mail to: River Bend Astronomy Club
c/o Mike Veith, 1121 St. Louis St., Edwardsville, IL 62025.

Questions? Contact us by email at rbac@riverbendastro.org.

Transit of Venus as seen by "River Bend East"

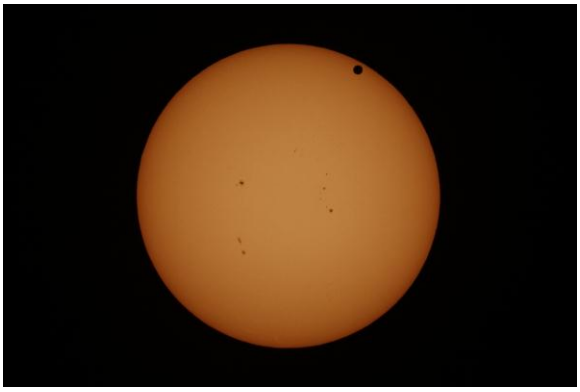
By Mark Brown

KINGS GAP ENVIRONMENTAL EDUCATION CENTER, CARLISLE, PA - For some viewers, the Venus transit of 2004 might have been a once in a lifetime opportunity. And those folks who missed the 2004 transit had to wait 8 years to truly see the "last in a lifetime" event. In Peabo Bryson's 1984 hit song: *If Ever You're in My Arms Again*, he sang, "A second once in a lifetime, may be too much to ask." As for me the Venus transit was a second once in a lifetime that almost didn't happen. The weather all throughout Pennsylvania was absolutely dismal as a low pressure center swirled off the Atlantic coast sending wave after wave of clouds and pop-up thunderstorms across the state.



Transit of Venus at Second Contact. Captured through a filtered 8-inch Celestron SCT with a Canon T2i DSLR. Exposure details: ISO 200, 1/2000 second, f/5 Imaged at: Kings Gap Environmental Education Center, Pennsylvania. Photo by Mark Brown.

I had plans to drive hundreds of miles to see Venus cross the sun if weather didn't permit at my location, but even the weather hundreds of miles away was being impacted by the low pressure system. I packed my car with the telescope and cameras and went to my place of employment. For much of the day I watched the weather and satellite images and how conditions continued to deteriorate. My colleagues were also watching because they too wanted to see the transit and I had said so much about it over the past couple of weeks and supplied everyone with several pairs of solar viewing glasses.



Transit of Venus after Second Contact. Captured through a filtered 8-inch Celestron SCT with a Canon T2i DSLR. Exposure details: ISO 200, 1/2000 second, f/5 Imaged at: Kings Gap Environmental Education Center, Pennsylvania. Photo by Mark Brown.

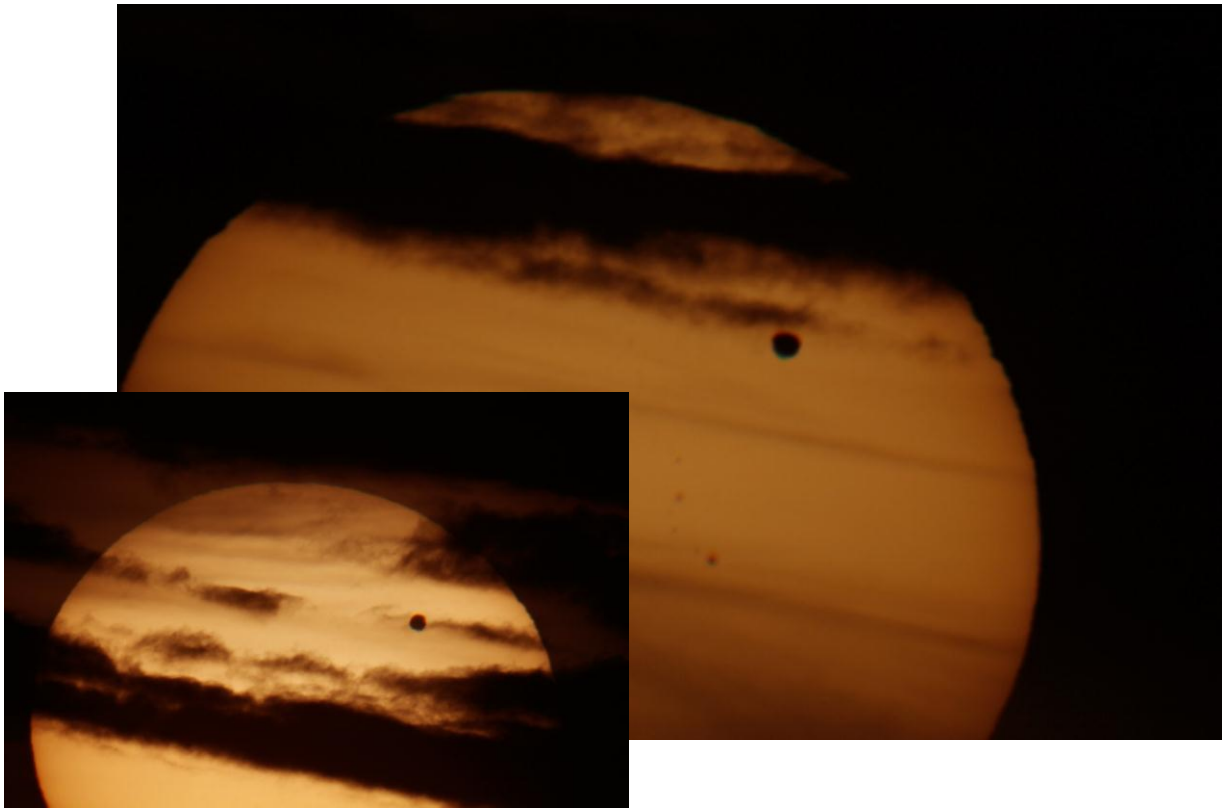
As 3:30 pm rolled around I left work and decided to drive to a mountain overlook to set up my equipment and wait it out. My hope was that I would get lucky and have a few breaks in the clouds to capture a lone shot. By 5:45 pm and after a lot of praying for skies to clear, the clouds parted like the Red Sea. It was then I knew I was going to at least see 1st and 2nd contact and even a bit more of the transit. At 22:03:58 UT, Venus kissed the edge of the solar disk and began its trek. Eighteen minutes later Venus's disk emerged as dark beauty mark on the face of the Sun, and to my surprise the clouds were not of immediate concern. For the next 2 hours I watched, imaged and enjoyed the transit with the sun skirting in and out of clouds through sunset.

I remember what a thrill it was to see the 2004 transit at Carlyle Lake, IL. But to witness our solar system in motion in this last in a lifetime event was even more exciting knowing that no one alive today would see the 2117 transit. The events of 2004 and 2012 will likely be remembered as the digital age of observing and imaging these transits. As we look back on this historic event, one can only imagine how our descendants will view and image the 2117 event and what meaning it will have for them.

The author has placed a video composition of the Transit of Venus on YouTube.

The video is a compilation of over 250 images and some video clips showing the 18-minute ingress of Venus across the face of the Sun. The images were captured through a filtered 8-inch SCT telescope. I also shot some video of the sun projected through an 80mm refractor and sun-funnel with a special rear-screen projection material.

http://www.youtube.com/watch?v=uKyJB9oat9E&feature=youtu.be



Transit of Venus just before the sun set. Note how far Venus had traveled across the Sun's disk in these images. Captured through a filtered 8-inch Celestron SCT with a Canon T2i DSLR. Exposure details: ISO 200, 1/2000 second, f/5 Imaged at: Kings Gap Environmental Education Center, Pennsylvania. Photos by Mark Brown.

RBAC

Transit of Venus Report

By Bill Breeden

ST. LOUIS, MO – Success! I was able to observe the Transit of Venus on June 5, 2012 from my backyard. My wife and I had my LX90 SCT telescope all to ourselves, and we were able to observe the transit until 6:45pm, until the Sun dropped below the bushes and fence on the west side of our yard.

This is me with my LX90, all set up to observe and record the Transit of Venus. Photo by Rita Breeden.

I rushed home from work and had my telescope set up with a Thousand Oaks white-light solar filter at 4:40pm. The transit was supposed to begin at approximately 5:04pm Central Daylight time. I had missed the 2004 Transit of Venus, so I was really looking forward to this second chance to witness this rare event. The next time Venus crosses the face of Sun will be in December 2117!

Local astronomy clubs here in St. Louis held Transit of Venus viewing sessions for members of the public today. The St. Louis Astronomical Society held a session at Forest Park, under the Pavilion. The River Bend Astronomy Club held an event in Alhambra, Illinois at Salem United Church of Christ. I would have loved to participate in these events, but my work schedule allowed me just enough time to get home and get the telescope set up in the backyard. By the time I got home, set up the telescope, and snapped my first image of the Sun (before the transit), it was already 4:49pm, just 15 minutes before First Contact.

My 8-inch LX-90 Schmidt-Cassegrain telescope outfitted with a Thousand Oaks white light solar filter. Photo by Bill Breeden.

I set up the telescope with safe solar observing being the most important factor. I did not install the finderscope, nor did I install the Rigel finder. These instruments can be damaged by the intense light of the Sun, and I certainly did not want us to 'accidentally' look through the finder at the Sun! I turned the telescope well away from the Sun, then installed the Thousand Oaks solar filter. Only at this point was it safe to point the LX90 at the Sun.

The weather today for this transit was good, with clear skies and 80 degrees. A few clouds rolled in deeper into the transit, but this did not hinder viewing First and Second Contacts. First Contact occurs when Venus first begins to move in front of the Sun. Second Contact occurs when Venus finally completely enters the

Sun's disk. Third and Fourth Contacts occur when Venus leaves the Sun's disk, which would not be visible from St. Louis for this transit.

The Sun, just before the Transit of Venus. Photo by Bill Breeden, June 5, 2012, 4:49pm. Samsung Galaxy S II through a 26mm Plossl eyepiece.

I tried my best to determine the exact times that I observed First and Second Contacts. These timings are somewhat subjective, as determining the exact times of these contacts depends greatly on seeing conditions, and the observing skills and determination of the observer. To help with this task, my wife ran a video camera during my observations of First and Second Contacts. I recorded the time (to the second) during the video, and I announced contact times while at the eyepiece. This way, I could determine the times of First and Second Contacts simply by reviewing the video and noting the elapsed times.

Taking photographs of the transit itself was not my first priority, as I just wanted to be at the eyepiece, especially during First and Second Contacts. Since my wife and I were making a video with my cell phone, I figured it wouldn't hurt to try to capture a few images through the eyepiece (if that was even possible). I took my first image through the eyepiece before the transit began. Interestingly, this was one of my best pictures of the Sun!

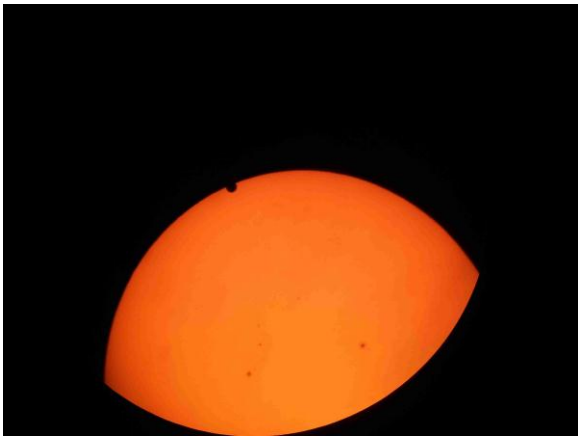
I am awaiting a view of the Sun and the Transit of Venus through my LX90. The transit would begin about 14 minutes after this photo was taken. Photo by Rita Breeden.

My wife began recording me while I was observing the Sun, starting at 5:01pm. This way, I could simply announce when I see First Contact, and then the video could be reviewed to determine the exact time of contact. As I observed the Sun, I looked all around the limb for that tell-tale little "bite" that Venus would soon take out of the sun.

"First Contact!! We have First Contact! I believe I'm seeing it!" I announced for the camera.

At first I was not sure it was really there – several seconds passed before I could really be sure it was happening. In reviewing the video, I decided to place the time of first contact at my first "First Contact!" announcement – at 5:05:06pm (22:05:06 UT).

After determining that First Contact had happened, I asked my wife to look through the eyepiece. "Wow!," she said, "it's so easy to see!"



Venus Transit approaching Second Contact, taken at 5:16:11pm (22:16:11 UT). Photo by Bill Breeden, Samsung Galaxy S II through a 26mm Plossl eyepiece.

As Venus's disk grew larger at the Sun's limb, I was struck by how large Venus appeared. It currently subtends an angle of 1 arcminute, which is quite large as planets go! This is probably as large as Venus ever appears, and this is obvious when Venus is observed at night as a growing crescent.

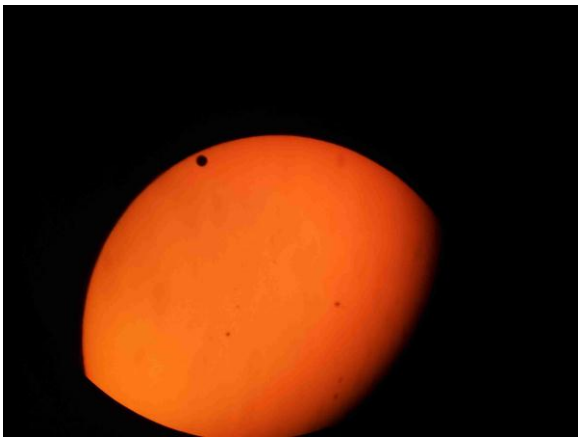
Between First and Second Contacts, I looked at Venus' partial disk against the bright Sun, and noticed that I could see the rest of Venus' disk beyond the Sun's limb. How? The part of Venus outside the Sun's disk was gently outlined by the so-called "ring of fire," which is caused by the Sun illuminating Venus' atmosphere. I stepped away from the eyepiece so that Rita could take a look. She could also easily see the "ring of fire." Awesome!

At 5:17pm, my wife began another video recording, and I again peered through the eyepiece so that I could announce Second Contact. I also eagerly awaited the renowned "black drop effect," which has been reported just before Second Contact. The effect appears as a stretching out of the black disk of Venus against the Sun's bright limb, which makes the timing of Second Contact difficult. No one is really sure what causes this effect. It could be turbulence inside the telescope tube, atmospheric seeing, or simply an optical illusion. No matter, I was going to announce it if I spotted it.

And I did spot it!

"There's the black drop, and…very small…" I said, as I watched the black drop effect unfold at the eyepiece! As Venus completed its ingress into the Sun's disk, the edge of it seemed to remain annoyingly attached to the Sun's limb. I announced the effect at 5:22:20pm (22:22:20 UT).

Finally, after what seemed like the longest 7 seconds, at 5:22:27pm (22:22:27 UT), it was obvious that Venus had (finally) completely entered the Sun's disk. I announced with a little hesitation - "and I'm gonna say that…Second Contact is…now!"

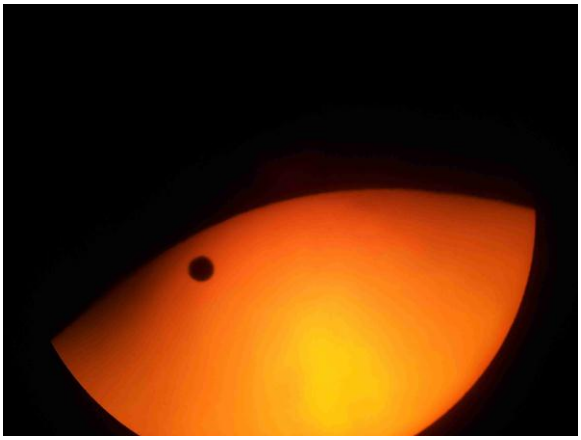


Venus Transit after Second Contact, taken at 5:26:58pm (22:26:58 UT). Photo by Bill Breeden, Samsung Galaxy S II through a 26mm Plossl eyepiece.

We continued to observe the Transit of Venus well after Second Contact. As Venus moved further into the Sun's disk, its stark, round disk stood out nicely in the 26mm Plossl eyepiece. The Sun was also

showing several nice sunspots, making this observing session even more exciting.

After a while, I decided to see what Venus would look like at higher magnification. The 26mm Plossl provides a view at 77x, so I tried my 12.4mm Plossl. This would provide 161x.



Venus Transit after Second Contact, taken at medium power, at 5:37:14pm (22:37:14 UT). Photo by Bill Breeden, Samsung Galaxy S II through a 12.4mm Plossl eyepiece.

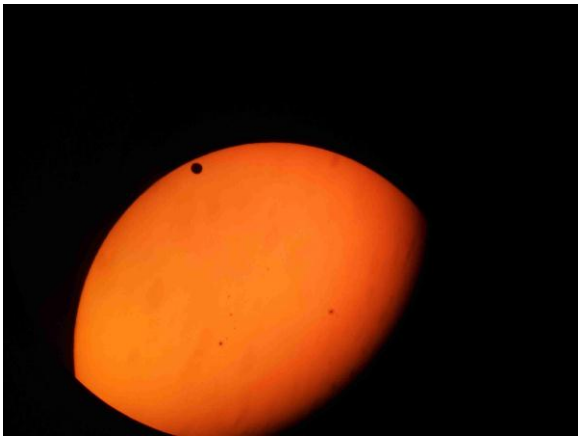
Fantastic view! Venus appeared surprisingly large at this "medium" magnification. I did my best to capture a quick image using my cell phone, but with this shorter focal length Plossl, it was just tad tricky to get the cell phone camera in just the right place. I did manage to capture an "okay" image, which shows Venus' amazing 1-arcminute wide, black disk against the dazzling Sun.

Observed Times of Venus Contacts, June 5, 2012:

First Contact: 5:05:06 PM Central Daylight Time, 22:05:06 UT.

Black Drop: 5:22:20 PM Central Daylight Time, 22:22:20 UT.

Second Contact:5:22:27 PM Central Daylight Time, 22:22:27 UT.



Venus Transit after Second Contact, taken at 5:27:10pm (22:27:10 UT). Photo by Bill Breeden, Samsung Galaxy S II through a 26mm Plossl eyepiece.

Observation Location: 5340 Chippewa St, St. Louis, MO 63109, USA.
Latitude: 38 deg 35 min 30.62 sec N
Longitude: 90 deg 16 min 57.78 sec W

This is a summary of the video files that we recorded during the Transit of Venus, June 5, 2012. These videos are currently available to watch on YouTube:

Part 1: Preparation
http://youtu.be/BjeNl5vk1e0
This video was shot starting at 4:28:58pm and ran for 1 minute and 20 seconds. It was recorded to simply prepare for the transit, and shows the sky visible from my backyard.

Part 2 : Telescope Setup
http://youtu.be/hdgIWBCV5YI
This video was shot starting at 4:32:47pm and ran for 5 minutes and 41 seconds. It simply shows me setting up the telescope equipment.

Part 3: Solar Filter Installation
http://youtu.be/VuKNmvkhHRU
This video was shot starting at 4:40:22pm and ran for 6 minutes and 20 seconds. It shows me preparing the telescope for solar

viewing, and safe solar observing techniques. I also demonstrate my Thousand Oaks solar filter, and show a brief view of the Sun through the eyepiece. The transit had not yet begun.

Part 4: First Contact
http://youtu.be/tRhr7vH_ZpY
This video was shot starting at 5:00:58pm and ran for 7 minutes and 10 seconds. It was recorded so that I could announce the start of First Contact, then determine the time by reviewing this video. A brief look through the eyepiece is shown just after First Contact.

Part 5: Second Contact
http://youtu.be/qQrZUOU-3rc
This video was shot starting at 5:16:46pm and ran for 8 minutes and 17 seconds. It was recorded so that I could announce the "black drop effect" and Second Contact, then determine the times by reviewing this video. A brief look through the eyepiece is shown just after Second Contact. RBAC

The Importance of Right Ascension

By Bill Breeden

What is right ascension? Astronomers throw this term around all the time, but it might as well be Greek to anyone new to the hobby of amateur astronomy.

Simply put, right ascension is one of the celestial coordinates of the sky, the other being declination. Right ascension serves the same purpose as longitude on earth, whereas declination is the equivalent of latitude.

If you look at a globe of the Earth, you will see lines running from the north pole to the south pole. These are lines of longitude on Earth. If you were to extend these lines to the sky above you, you would have lines similar to the lines of right ascension on the sky.

Unlike earthly longitude lines, which are measured as degrees east or west of the prime meridian, right ascension is measured in hours. There are 24 lines of right ascension on the sky, numbered from zero to 23 hours. This is done because the sky appears to rise and set above you as the Earth turns. So, the sky moves through one hour of right ascension, in, you guessed it, one hour.

When observing deep sky objects, you can tell what time of year an object will be well-placed in the sky by looking at its right ascension coordinate. For example, M4, the globular cluster in Scorpius near the star Antares, has a right ascension of 16 hours and 24 minutes. This makes it primarily a summertime object, since the 16 hour line of right ascension crosses the meridian by 10:00PM in July and August.

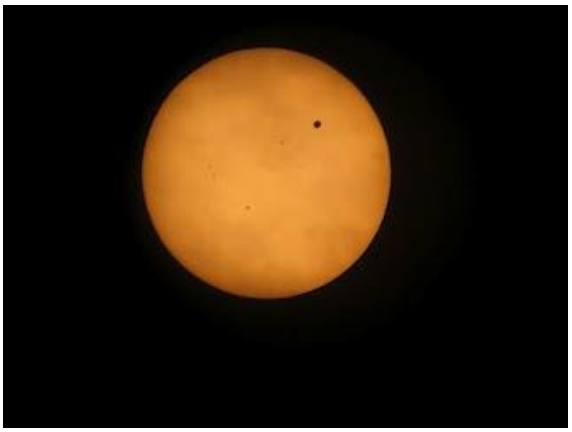
You will also notice the importance of right ascension when looking at many observing lists. They are often sorted or grouped by right ascension. This allows the observer to look for objects in the west first, before they set. Then, as the observer moves down through the list, she is steadily moving her way eastward across the sky. This gives objects in the east time to rise toward the meridian. RBAC

Venus Transit in India

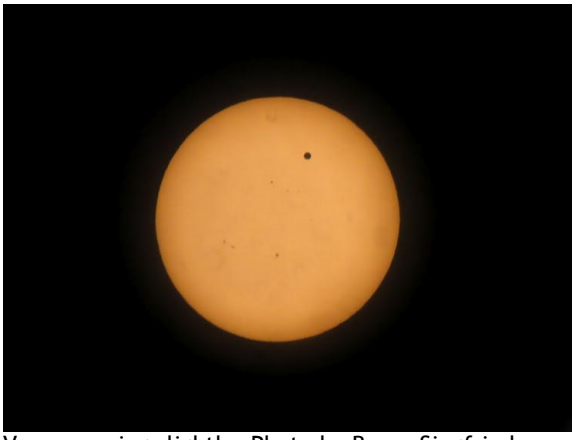
By Bryan Siegfried

MARTALLI, INDIA – We had some great viewing for the Transit of Venus here in Martalli. Towards the end we had a few clouds, but we did get to see the black drop effect. I don't know about the Post-Dispatch, but the transit was front page news, above the fold, on the local Kannada paper, Prajavani.

Charley gets ready with his telescope: 5-inch Mak-Cass with solar filter. Photo by Bryan Siegfried.



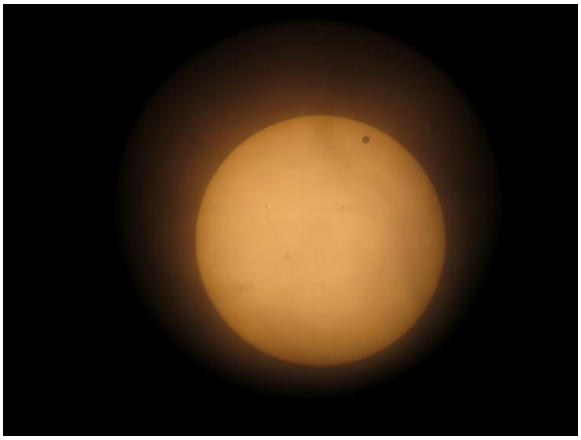
First good view of Venus. Photo by Bryan Siegfried.



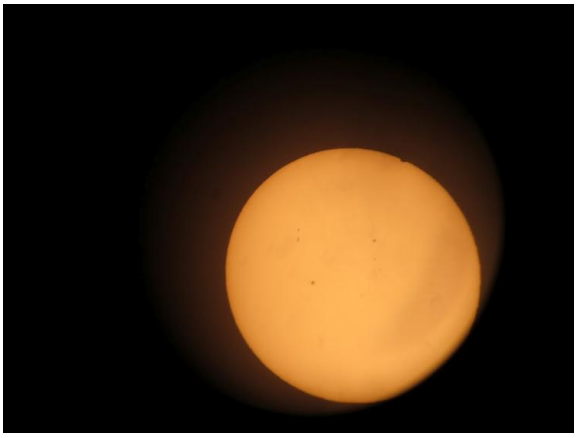
Venus moving slightly. Photo by Bryan Siegfried.

The area is mountainous, sort of like Kentucky but with banana plants and coconut trees, which limited me from a perfect sunrise. On the other hand, watching the sunrise climb down the western hills is also a bit of a sight. I took snaps with my point and shoot camera, with the eye relief folded down. The results aren't perfect, but better than I expected I could do.

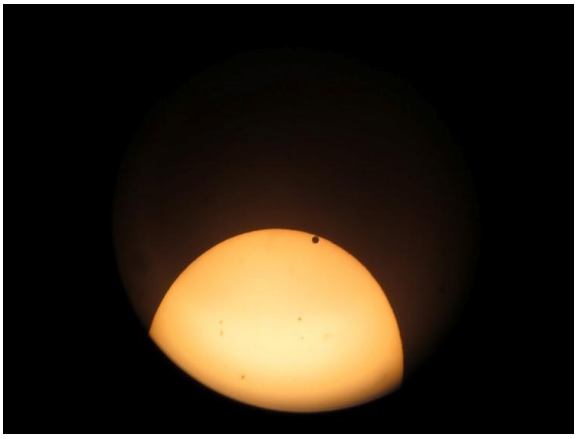
Indirect observation will show the approaching sunrise on the western hill. Photo by Bryan Siegfried.



Nearing the end – 25 minutes to go. Photo by Bryan Siegfried.



Venus approaches fourth contact. Photo by Bryan Siegfried.



Approaching third contact – nearly the dew-drop effect. Photo by Bryan Siegfried.

Salit Mary observing Venus. Photo by Bryan Siegfried.

Occasional cloudy intervention provided some respite, without completely stopping our observation. Photo by Bryan Siegfried.

That is my brother-in-law's wife in the picture. We had several neighbors over for the transit, although it went on long enough that people sort of tended to drift in and out as they went about their other morning tasks. The kids spent most of the time climbing the mango trees, popping down every so often for a peek at Venus.

Editor's note - It was really exciting to know that a member of River Bend Astronomy Club got to witness Third and Fourth Contacts of the Transit of Venus from the "other side of the world." We are truly an international club!

RBAC

River Bend Member Lauren Miller Named National Merit Scholar

Reprinted from the Belleville News-Democrat, May 2, 2012.

Lauren F. Miller of Highland High School has been named by the National Merit Scholarship Corporation (NMSC) as one of the first group of winners in the 57th annual National Merit Scholarship Program.

Miller was one of approximately 1,000 distinguished high school seniors to have won corporate-sponsored National Merit Scholarship awards financed by about 200 corporations, company foundations, and other business organizations.

Miller, whose intended career field is biomedical engineering, won the Charles J. Dougherty/Ameren Corporation Scholarship.

Scholars were selected from students who advanced to the Finalist level in the National Merit Scholarship competition and met criteria of their scholarship sponsors. Corporate sponsors provide National Merit Scholarships for Finalists who are children of their employees, who are residents of communities the company serves, or who plan to pursue college majors or careers the sponsor wishes to encourage.

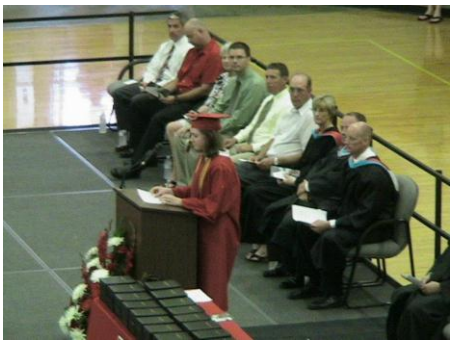
Most of these awards are renewable for up to four years of college undergraduate study and provide annual stipends that range from $500 to $10,000 per year. Some provide a single payment between $2,500 and $5,000. Recipients can use their awards at any regionally accredited U.S. college or university of their choice.

To be considered for a National Merit Scholarship, Semifinalists had to fulfill requirements to advance to Finalist standing. Each Semifinalist was asked to complete a detailed scholarship application, which included writing an essay and providing information about extracurricular activities, awards, and leadership positions. Semifinalists also had to have an outstanding academic record, be endorsed and recommended by a high school official, and earn SAT scores that confirmed their qualifying test performance.

From the Semifinalist group, some 15,000 met Finalist requirements.

By the conclusion of the 2012 competition, about 8,300 Finalists will have been selected to receive National Merit Scholarships totaling over $35 million. Winners are the Finalist candidates judged to have the strongest combination of academic skills and achievements, extracurricular accomplishments, and potential for success in rigorous college studies.

NMSC, a not-for-profit organization that operates without government assistance, was established in 1955 to conduct the annual National Merit Scholarship Program. The majority of National Merit Scholarships offered each year are underwritten by some 440 independent corporate and college sponsors that support NMSC's efforts to honor the nation's scholastically talented youth and encourage academic excellence at all levels of education.



The Highland News Leader also reports that the Highland High School Class of 2012 had two co-valedictorians, and that River Bend's own Lauren Faith Miller (GPA 5.38), the daughter of Krista Miller and Wade Miller, was one of the two. Congratulations, Lauren! RBAC

How Many Discoveries Can You Make in a Month?

By Dr. Tony Phillips

This year NASA has announced the discovery of 11 planetary systems hosting 26 planets; a gigantic cluster of galaxies known as "El Gordo;" a star exploding 9 billion light years away; alien matter stealing into the solar system; massive bullets of plasma racing out of the galactic center; and hundreds of unknown objects emitting high-energy photons at the edge of the electromagnetic spectrum. That was just January. Within NASA's Science Mission Directorate, the Astrophysics Division produces such a list nearly every month. Indeed, at this very moment, data is pouring in from dozens of spacecraft and orbiting observatories.

"The Hubble, Spitzer, Chandra, and Fermi space telescopes continue to make groundbreaking discoveries on an almost daily basis," says NASA Administrator Charlie Bolden .

NASA astrophysicists and their colleagues conduct an ambitious research program stretching from the edge of the solar system to the edge of the observable Universe. Their work is guided in large part by the National Research Council's Decadal Survey of Astronomy and Astrophysics, which identified the following priorities:

- Finding new planets—and possibly new life—around other stars.
- Discovering the nature of dark energy and dark matter.
- Understanding how stars and galaxies have evolved since the Big Bang.
- Studying exotic physics in extreme places like black holes.

Observing time on Hubble and the other "Great Observatories" is allocated accordingly.
Smaller missions are important, too: The Kepler spacecraft, which is only "medium-sized" by NASA standards, has single-handedly identified more than 2300 planet candidates. Recent finds include planets with double suns, massive "super-Earths" and "hot Jupiters," and a miniature solar system. It seems to be only a matter of time before Kepler locates an Earth-sized world in the Goldilocks zone of its parent star, just right for life.

A future astrophysics mission, the James Webb Space Telescope, will be able to study the atmospheres of many of the worlds Kepler is discovering now. The telescope's spectrometers can reveal the chemistry of distant exoplanets, offering clues to their climate, cloud cover, and possibilities for life.
That's not the telescope's prime mission, though. With a primary mirror almost 3 times as wide as Hubble's, and a special sensitivity to penetrating infrared radiation, Webb is designed to look into the most distant recesses of the universe to see how the first stars and galaxies formed after the Big Bang. It is, in short, a Genesis Machine.

Says Bolden, "We're on track in the construction of the James Webb Space Telescope, the most sophisticated science telescope ever constructed to help us reveal the mysteries of the cosmos in ways never before possible." Liftoff is currently scheduled for 2018.

How long will the list of discoveries be in January of that year? Stay tuned for Astrophysics.
For more on NASA's astrophysics missions, check out http://science.nasa.gov/astrophysics/. Kids can get some of their mind-boggling astrophysics questions answered by resident Space Place astrophysicist "Dr. Marc" at http://spaceplace.nasa.gov/dr-marc-space.

Artist's concepts such as this one are based on infrared spectrometer data from NASA's Spitzer Space Telescope. This rendering depicts a quadruple-star system called HD 98800. The system is approximately 10 million years old and is located 150 light-years away in the constellation Crater. Credit: NASA/JPL-Caltech/T. Pyle (SSC)

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

RBAC's Monthly Observing Lists

These lists include brighter deep-sky objects that transit near 10:00 PM each month.

July Observing List
Prepared by Bill Breeden

Double Stars (Astronomical League's Double Star List)
_____ 61. Xi Scorpii SAO 159665 - Const. SCO Type DS RA 16 04.4 Decl. -11° 22' Mag. 4.8 7.3
_____ 62. Struve 1999 SAO 159670 - Const. Type DS RA 16 04.4 Decl. -11° 27' Mag. 7.4 8.1
_____ 63. Beta Scorpii SAO 159682 Graffias Const. SCO Type DS RA 16 05.4 Decl. -19° 48' Mag. 2.6 4.9
_____ 64. Kappa Herculis SAO 101951 Const. HER Type DS RA 16 08.1 Decl. +17° 03' Mag. 5.3 6.5
_____ 65. Nu Scorpii SAO 159763 Const. SCO Type DS RA 16 12.0 Decl. -19° 28' Mag. 4.3 6.4
_____ 66. Sigma Coronae Borealis SAO 65165 Const. COB Type DS RA 16 14.7 Decl. +33° 52' Mag. 5.6 6.6
_____ 67. 16 / 17 Draconis SAO 30012 Const. DRA Type DS RA 16 36.2 Decl. +52° 55' Mag. 5.4 6.4 5.5
_____ 68. Mu Draconis SAO 30239 - Const. DRA Type DS RA 17 05.3 Decl. +54° 28' Mag. 5.7 5.7
_____ 69. Alpha Herculis SAO 102680 Rasalgethi Const. HER Type DS RA 17 14.6 Decl. +14° 23' Mag. 3.5 5.4
_____ 70. Delta Herculis SAO 84951 Sarin Const. HER Type DS RA 17 15.0 Decl. +24° 50' Mag. 3.1 8.2
_____ 71. 36 Ophiuchi SAO 185199 - Const. OPH Type DS RA 17 15.3 Decl. -26° 36' Mag. 5.1 5.1
_____ 72. Omicron Ophiuchi SAO 122387 - Const. OPH Type DS RA 17 18.0 Decl. -24° 17' Mag. 5.4 6.9
_____ 73. Rho Herculis SAO 66000 Const. HER Type DS RA 17 23.7 Decl. +37° 09' Mag. 4.6 5.6
_____ 74. Nu Draconis SAO 30447 Kuma Const. DRA Type DS RA 17 32.2 Decl. +55° 11' Mag. 4.9 4.9
_____ 75. Psi Draconis SAO 8890 - Const. DRA Type DS RA 17 41.9 Decl. +72° 09' Mag. 4.9 6.1
Carbon Stars (Astronomical League's Carbon Star List)
_____ 59. RR Herculis SAO 29781 RA 16 04 13 Decl. +50 29 56 Mag. 7.8 – 12.5 Per. 240 Class C5 – C8 (N0e)
_____ 60. V Ophiuchi SAO 159916 RA 16 26 43 Decl. -12 25 35 Mag. 7.3 – 11.6 Per. 297 Class C5 – C7 (N3e)
_____ 61. SAO 46574 (Hercules) GSC 3081:810 RA 17 13 31 Decl. +42 06 22 Mag. 7.3 – 7.7 Per. ? Class C3 (R0)
810
_____ 62. TW Ophiuchi GSC 6243:462 RA 17 29 43 Decl. -19 28 22 Mag. 7.0 – 9.0 Per. 185 Class C5 (Nb)
_____ 63. SZ Sagittarii SAO 160795 RA 17 44 56 Decl. -18 39 26 Mag. 8.2 – 9.2 Per. 73 Class C7 (Nb)
_____ 64. T Draconis GSC 3914:546 RA 17 56 23 Decl. +58 13 06 Mag. 7.2–13.5 Per. 422 Class C6 – C8 (N0e)
Messier Objects
_____ M4 NGC6121 Const. SCO Type GC RA 16 23.6 Decl. -26 32 Mag. 6.4
_____ M6 NGC6405 Const. SCO Type OC RA 17 40.1 Decl. -32 13 Mag. 5.3
_____ M7 NGC6475 Const. SCO Type OC RA 17 53.9 Decl. -34 49 Mag. 4.1
_____ M9 NGC6333 Const. OPH Type GC RA 17 19.2 Decl. -18 31 Mag. 7.3
_____ M10 NGC6254 Const. OPH Type GC RA 16 57.1 Decl. -04 06 Mag. 6.7
_____ M12 NGC6218 Const. OPH Type GC RA 16 47.2 Decl. -01 57 Mag. 6.6
_____ M13 NGC6205 Great Hercules Cluster Const. HER Type GC RA 16 41.7 Decl. +36 28 Mag. 5.7
_____ M14 NGC6402 Const. OPH Type GC RA 17 37.6 Decl. -03 15 Mag. 7.7
_____ M19 NGC6273 Const. OPH Type GC RA 17 02.6 Decl. -26 16 Mag. 6.6
_____ M23 NGC6494 Const. SGR Type OC RA 17 56.8 Decl. -19 01 Mag. 6.9
_____ M62 NGC6266 Const. OPH Type GC RA 17 01.2 Decl. -30 07 Mag. 6.6
_____ M80 NGC6093 Const. SCO Type GC RA 16 17.0 Decl. -22 59 Mag. 7.7
_____ M92 NGC6341 Const. HER Type GC RA 17 17.1 Decl. +43 08 Mag. 6.5
_____ M107 NGC6171 Const. OPH Type GC RA 16 32.5 Decl. -13 03 Mag. 9.2
Caldwell Objects
_____ C6 NGC6543 Cat's Eye Nebula Const. DRA Type PN RA 17 58 36.00 Decl. +66 38 00.0 Mag. 8.8

_____ C69 NGC6302 Bug Nebula Const. SCO Type PN RA 17 13 42.00 Decl. -37 06 00.0 Mag. 12.8
_____ C75 NGC6124 Const. SCO Type OC RA 16 25 36.00 Decl. -40 40 00.0 Mag. 5.8
_____ C76 NGC6231 Const. SCO Type OC RA 16 54 00.00 Decl. -41 48 00.0 Mag. 2.6
_____ C81 NGC6352 Const. ARA Type GC RA 17 25 30.00 Decl. -48 25 00.0 Mag. 8.1
_____ C82 NGC6193 Const. ARA Type OC RA 16 41 18.00 Decl. -48 46 00.0 Mag. 5.2
_____ C86 NGC6397 Const. ARA Type GC RA 17 40 42.00 Decl. -53 40 00.0 Mag. 5.6
_____ C89 NGC6067 S Norma Cluster Const. NOR Type OC RA 16 18 54.00 Decl. -57 54 00.0 Mag. 5.4
_____ C95 NGC6025 Const. TRA Type OC RA 16 03 42.00 Decl. -60 30 00.0 Mag. 5.1
_____ C107 NGC6101 Const. APS Type GC RA 16 25 48.00 Decl. -72 12 00.0 Mag. 9.3

Royal Astronomical Society of Canada Objects

_____ 88. NGC6503 Const. DRA Type G-Sb RA 17 49.4 Decl. +70 09 Mag. 10.2
_____ 89. NGC6543 Cat's Eye Nebula Const. DRA Type PN RA 17 58.6 Decl. +66 38 Mag. 8.8
_____ 90. NGC6210 Const. HER Type PN RA 16 44.5 Decl. +23 49 Mag. 9.3
_____ 91. NGC6369 Const. OPH Type PN RA 17 29.3 Decl. -23 46 Mag. 10.4
_____ 102. NGC6445 Const. SGR Type PN RA 17 49.2 Decl. -20 01 Mag. 11.8

August Observing List
Prepared by Bill Breeden

Double Stars (Astronomical League's Double Star List)

_____ 76. 40 / 41 Draconis SAO 8994 Const. DRA Type DS RA 18 00.2 Decl. +80° 00' Mag. 5.7 6.1
_____ 77. 95 Herculis SAO 85647 Const. HER Type DS RA 18 01.5 Decl. +21° 36' Mag. 5.0 5.1
_____ 78. 70 Ophiuchi SAO 123107 Const. OPH Type DS RA 18 05.5 Decl. +02° 30' Mag. 4.2 6.0
_____ 79. Epsilon Lyrae SAO 67310 Double Double Const. LYR Type DS RA 18 44.3 Decl. +39° 40' Mag. 5.0 6.1 5.2 5.5
_____ 80. Zeta Lyrae SAO 67321 Const. LYR Type DS RA 18 44.8 Decl. +37° 36' Mag. 4.3 5.9
_____ 81. Beta Lyrae SAO 67451 Sheliak Const. LYR Type DS RA 18 50.1 Decl. +33° 22' Mag. 3.4 8.6
_____ 82. Struve 2404 SAO 104170 - Const. Type DS RA 18 50.8 Decl. +10° 59' Mag. 6.9 8.1
_____ 83. Otto Struve 525 SAO 67566 Const. Type DS RA 18 54.9 Decl. +33° 58' Mag. 6.0 7.7
_____ 84. Theta Serpentis SAO 124068 Alya Const. SER Type DS RA 18 56.2 Decl. +04° 12' Mag. 4.5 5.4
_____ 85. Beta Cygni SAO 87301 Albireo Const. CYG Type DS RA 19 30.7 Decl. +27° 58' Mag. 3.1 5.1
_____ 86. 57 Aquilae SAO 143898 - Const. AQL Type DS RA 19 54.6 Decl. -08° 14' Mag. 5.8 6.5

Carbon Stars (Astronomical League's Carbon Star List)

_____ 65. FO Serpentis SAO 161327 RA 18 19 21 Decl. -15 36 46 Mag. 8.5 – 8.7 Per. Irr. Class C4 (R6)
_____ 66. AC Herculis SAO 86134 RA 18 30 16 Decl. +21 52 00 Mag. 6.9 – 9.0 Per. 75 Class C0 (F2pIb – K4e)
_____ 67. T Lyrae SAO 67087 RA 18 32 20 Decl. +36 59 55 Mag. 7.5 – 9.3 Per. Irr. Class C6 (R6)
_____ 68. HK Lyrae GSC 2649:507 RA 18 42 50 Decl. +36 57 30 Mag. 7.8 – 9.6 Per. Irr. Class C6 (N4)
_____ 69. S Scuti SAO 142674 RA 18 50 20 Decl. -07 54 27 Mag. 6.3 – 9.0 Per. 148 Class C6 (N3)
_____ 70. UV Aquilae GSC 1051:51 RA 18 58 32 Decl. +14 21 49 Mag. 8.0 – 9.6 Per. 386 Class C5 (N4)
_____ 71. V Aquilae SAO 142985 RA 19 04 24 Decl. -05 41 05 Mag. 6.6 – 8.4 Per. 353 Class C5 – C6 (N6)
_____ 72. V1942 Sagittarii SAO 162465 RA 19 19 09 Decl. -15 54 30 Mag. 6.7 – 7.0 Per. Irr. Class C6 (N2/R8)
_____ 73. U Lyrae GSC 3134:1708 RA 19 20 09 Decl. +37 52 36 Mag. 8.3 – 13.5 Per. 452 Class C4 (N0e)
_____ 74. UX Draconis SAO 9404 RA 19 21 35 Decl. +76 33 34 Mag. 5.9 – 7.1 Per. 168 Class C7 (N0)
_____ 75. NSV 11960 (Aquila) SAO 162551 RA 19 23 10 Decl. -10 42 11 Mag. 7.0 – 7.1 Per. ? Class C2 (R0)

_____ 76. AW Cygni GSC 3543:2275 RA 19 28 47 Decl. +46 02 38 Mag. 7.1 – 8.5 Per. 340 Class C4 (N3)
_____ 77. AQ Sagittarii SAO 162777 RA 19 34 18 Decl. -16 22 27 Mag. 6.6 – 8.5 Per. 200 Class C7 (N3)
_____ 78. TT Cygni SAO 68688 RA 19 40 57 Decl. +32 37 05 Mag. 7.0 – 9.1 Per. 118 Class C5 (N3e)
_____ 79. AX Cygni GSC 3149:942 RA 19 57 12 Decl. +44 15 40 Mag. 7.9 – 8.8 Per. Irr. Class C4 (N6)

Messier Objects

_____ M8 NGC6523 Lagoon Nebula Const. SGR Type EN RA 18 03.8 Decl. -24 23 Mag. 6
_____ M11 NGC6705 Wild Duck Cluster Const. SCT Type OC RA 18 51.1 Decl. -06 16 Mag. 6.3
_____ M16 NGC6611 Eagle Nebula Const. SER Type OC RA 18 18.8 Decl. -13 47 Mag. 6.4
_____ M17 NGC6618 Swan Nebula Const. SGR Type EN RA 18 20.8 Decl. -16 11 Mag. 7.5
_____ M18 NGC6613 Const. SGR Type OC RA 18 19.9 Decl. -17 08 Mag. 7.5
_____ M20 NGC6514 Trifid Nebula Const. SGR Type EN RA 18 02.6 Decl. -23 02 Mag. 9
_____ M21 NGC6531 Const. SGR Type OC RA 18 04.6 Decl. -22 30 Mag. 6.5
_____ M22 NGC6656 Const. SGR Type GC RA 18 36.4 Decl. -23 54 Mag. 5.9
_____ M24 NGC>6603 Sagittarius Star Cloud Const. SGR Type RA 18 16.9 Decl. -18 29 Mag. 4.6
_____ M25 IC4725 Const. SGR Type OC RA 18 31.6 Decl. -19 15 Mag. 6.5
_____ M26 NGC6694 Const. SCT Type OC RA 18 45.2 Decl. -09 24 Mag. 9.3
_____ M27 NGC6853 Dumbbell Nebula Const. VUL Type PN RA 19 59.6 Decl. +22 43 Mag. 7.4
_____ M28 NGC6626 Const. SGR Type GC RA 18 24.5 Decl. -24 52 Mag. 7.3
_____ M54 NGC6715 Const. SGR Type GC RA 18 55.1 Decl. -30 29 Mag. 8
_____ M55 NGC6809 Const. SGR Type GC RA 19 40.0 Decl. -30 58 Mag. 5
_____ M56 NGC6779 Const. LYR Type GC RA 19 16.6 Decl. +30 11 Mag. 8.2
_____ M57 NGC6720 Ring Nebula Const. LYR Type PN RA 18 53.6 Decl. +33 02 Mag. 8.8
_____ M69 NGC6637 Const. SGR Type GC RA 18 31.4 Decl. -32 21 Mag. 8.9
_____ M70 NGC6681 Const. SGR Type GC RA 18 43.2 Decl. -32 18 Mag. 9.6
_____ M71 NGC6838 Const. SGE Type GC RA 19 53.8 Decl. +18 47 Mag. 9

Caldwell Objects

_____ C15 NGC6826 Blinking Planetary Const. CYG Type PN RA 19 44 48.00 Decl. +50 31 00.0 Mag. 9.8
_____ C57 NGC6822 Barnard's Galaxy Const. SGR Type IG RA 19 44 54.00 Decl. -14 48 00.0 Mag. 9.3
_____ C68 NGC6729 R CrA Nebula Const. CRA Type BN RA 19 01 54.00 Decl. -36 57 00.0 Mag. 9.7
_____ C78 NGC6541 Const. CRA Type GC RA 18 08 00.00 Decl. -43 42 00.0 Mag. 6.6
_____ C93 NGC6752 Const. PAV Type GC RA 19 10 54.00 Decl. -59 59 00.0 Mag. 5.4
_____ C101 NGC6744 Const. PAV Type SG RA 19 09 48.00 Decl. -63 51 00.0 Mag. 9

Royal Astronomical Society of Canada Objects

_____ 92. NGC6572 Const. OPH Type PN RA 18 12.1 Decl. +06 51 Mag. 9
_____ 93. NGC6633 Const. OPH Type OC RA 18 27.7 Decl. +06 34 Mag. 4.6
_____ 94. NGC6712 Const. SCT Type GC RA 18 53.1 Decl. -08 42 Mag. 8.2
_____ 95. NGC6781 Const. AQL Type PN RA 19 18.4 Decl. +06 33 Mag. 11.8
_____ 96. NGC6819 Const. CYG Type OC RA 19 41.3 Decl. +40 11 Mag. 7.3
_____ 97. NGC6826 Const. CYG Type PN RA 19 44.8 Decl. +50 31 Mag. 9.8
_____ 103. NGC6520 Const. SGR Type OC RA 18 03.4 Decl. -27 54 Mag. 8.1
_____ 104. NGC6818 Const. SGR Type PN RA 19 44.0 Decl. -14 09 Mag. 9.9
_____ 105. NGC6802 Const. VUL Type OC RA 19 30.6 Decl. +20 16 Mag. 8.8

Happy Observing!