Current Astronomy

RIVER BEND ASTRONOMY CLUB NEWSLETTER

MAY/JUNE 2012

Venus appears paired with Alnath (Beta Tauri) in this image, captured on May 5, 2012, exactly one month prior to the upcoming and rare Transit of Venus. The transit will occur the evening of June 5, 2012.
Inset, top-left: Venus sporting a 25% phase.
Photos by Mark Brown.

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

PRESIDENT	Jeff Menz
VICE-PRESIDENT	Joe Lopinot
TREASURER	Mike Veith
SECRETARY	Mary Hebert

Volunteer Administrators

NEWSLETTER EDITOR	Bill Breeden
LEAGUE CORRESPONDENT	Rich Dietz
OUTREACH COORDINATOR	Terry Menz
LIBRARIAN	Rita Breeden

Founding Members
Ed Cunnius · Gary Kronk · Kurt Sleeter · Eric Young

Contacts

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Bill Breeden
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St. Louis, MO 63109
WEB www.riverbendastro.org
EMAIL rbac@riverbendastro.org

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, May 19, 2012 • 7:00 PM
Saturday, June 16, 2012 • 7:00 PM
Saturday, July 21, 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.

Congratulations to New Leadership of the River Bend Astronomy Club

By Bill Breeden

The results of our online election and volunteer process are in, and I am proud to announce the new leadership team of the River Bend Astronomy Club! This team will be responsible for running the club for the next three years.

4 Elected Officers' Positions:

PRESIDENT: Jeff Menz
VICE-PRESIDENT: Joe Lopinot
TREASURER: Mike Veith
SECRETARY: Mary Hebert

4 Volunteer Administrators' Positions

NEWSLETTER EDITOR: Bill Breeden
LEAGUE CORRESPONDENT: Rich Dietz
OUTREACH COORDINATOR: Terry Menz
LIBRARIAN: Rita Breeden

New terms run from May 2012 to May 2015. The four elected positions must be held by four different people. The four volunteer positions may be held by as many or as few people as needed.

Congratulations to the new leadership! The four founding members of RBAC intended for the club to be based upon camaraderie: Just a group of people getting together to look at the night sky and talk about astronomy. The founders wanted to avoid political pitfalls, and just make new friends and get together every month. I think this club continues in that spirit.

Our club also has a reputation for outreach and bringing astronomy to the public and to schools, churches, and scout groups.

Although our club is informal, there is still work to do, which is why we have these officers and volunteers. Here are the duties of the four elected officials: The president runs the club, the vice-president helps the president, the treasurer handles the money, and the secretary takes notes.

The four volunteers have these duties: The Newsletter editor puts together and publishes the newsletter, the League Correspondent handles Astronomical League business, the Outreach Coordinator sets up outreach sessions, and the Librarian keeps track of the club's books and media resources.

I look forward to the new directions our club can go; with new leadership comes new ideas and new ways of sharing our knowledge of the night sky.

I also need to thank the leadership and volunteers who have chosen to continue in their positions. I know that it takes a commitment of time and resources to run an astronomy club, and this club would not exist without you. I am honored to serve this club with such a dedicated and selfless group of people.

RBAC

Astronomy Day – the Showcase for Space

By Mark Brown

Carlisle, Pennsylvania - National Astronomy Day kicked off at Lamberton Middle School on Saturday, April 28th offering nearly 300 youth and adults a way to learn more about the science of astronomy. The weather outside didn't exactly cooperate for the much anticipated solar and night time viewing, but inside the school hallway was filled with excitement as the members from River Bend Astronomy Club, TriState Astronomers and Dickinson College AstroClub enticed visitors with an array of telescopes designed to capture distant photons.

Just some of the varieties of telescopes available in our Tour of Telescopes display. Photo by Katie Brown.

This was Lamberton Middle School's second annual Astronomy Day celebration. In addition to astronomy club members, Carlisle students, parents and teachers volunteered their time to staff two dozen activity stations with the purpose of promoting education about amateur astronomy through observing the universe and presenting educational displays and demonstrations.

Visitors show off their coloring skills at the Venus Transit Coloring Station. Photo by Katie Brown.

Lamberton Middle School student Henry Pluta holds a pose as teacher Barb McMullin paints a celestial figure on his face at the Cosmic Face-painting Station. Photo by Katie Brown.

Lamberton Middle School assistant principal Michael Gogoj tries his hand at matching an Oreo Cookie moon phase with the correct moon phase description. Visitors who correctly matched the moon phases were treated to an Oreo Cookie prize. Photo by Katie Brown.

The displays not only took up space, but they also took in space. It was a way to see space without the visitors ever leaving the Earth. The displays and activity stations consisted of crafts, hands on games and demonstrations to help visitors learn about the moon, our solar system, stars and the upcoming Venus Transit – a last in a life time event. Astronomy Day also featured a homemade planetarium constructed entirely of cardboard where visitors could lay back and gaze up at a view of the current spring time sky.

Mark Brown brews a mixture of cosmic ice, gas and dust during his comet demonstration. Photo by Katie Brown.

Homemade 5-meter geodesic dome constructed entirely of cardboard and binder clips showcased the springtime sky for Astronomy Day visitors. The dome holds up to 25 people. Photo by Katie Brown.

(Left to Right) Julie Ashton (Dickinson College AstroClub), Reese Davis (TriState Astronomers), Mark Brown (River Bend Astronomy Club – East) join forces at Astronomy Day 2012 in Carlisle, Pa. Photo by Katie Brown.

What it boiled down to was bringing astronomy to the human level of understanding, and to spark the interest in children so they might pursue a career in science or astronomy.

Participants learn how meteoroids, asteroids and planetesimals once bombarded the moon and Earth billions of years ago. Visitors created their own craters using Earthly projectiles. Photo by Katie Brown.

Visitors were also able to take part in hourly door prize drawings with the chance to win a number of posters, astronomy software, model rocket kits, binoculars and telescopes. Ethan Rose was the grand prize winner of a 4.5-inch SkyQuest Dobsonian telescope.

A display case showcases several everyday products with an Astro-theme or astronomy related nomenclature. Photos by Katie Brown.

Students carefully cut out their own star and planet finders so they can navigate the night sky. Photo by Katie Brown.

Students making solar cookies. Photo by Katie Brown.

Can you find your way around on the Moon? Visitors embarked on a scavenger hunt to find various lunar features. Photo by Katie Brown.

Mark Brown explains to visitors why the Venus Transit is a “last in a lifetime event” and how to safely view the transit. Brown used materials/ideas from the Night Sky Network “Shadows and Silhouettes” toolkit. Photo by Katie Brown.

At the end of the day, Ethan Rose walked away with the grand prize - a 4.5-inch SkyQuest Dobsonian telescope donated by an anonymous donor. Photo by Katie Brown.

TriState Astronomer Reese Davis discusses the various types of telescopes, their importance, and how they capture photons. Photo by Katie Brown.

Sponsors and supporters of Astronomy Day 2012 included:

Astrographics.com
Astronomy.com
Astronomical League
Carlisle Area School District
Carlisle Container Company
Dickinson College
Dickinson College AstroClub
Kalmbach Publishing – Astronomy Magazine
Lamberton Middle School
Lamberton PTO
National Science Foundation
TriState Astronomers
(http://tristateastronomers.org/)
River Bend Astronomy Club
Simulation Curriculum
Sky Publishing - Sky & Telescope Magazine
Wards Natural Science
RBAC

The Pleiades
(Third of a Series)

By Gary Kronk

Star Clusters and Stellar Distances

I came across an interesting article many years ago that was published in 1767 in the Philosophical Transactions of the Royal Society of London. The article was written by John Mitchell, who was known as an English natural philosopher and a geologist. The title of the article was "An Inquiry into the probable Parallax, and Magnitude, of the Fixed Stars, from the Quantity of Light which they afford us, and the particular Circumstances of their Situation."

Mitchell mentioned how the constellations were arbitrarily constructed "for the sake of remembering and distinguishing [the stars, but] nature herself however seems to have distinguished them into groups. What I mean is, that, from the apparent situation of the stars in heaven, there is the highest probability, that, either by the original act of the Creator, or in consequence of some general law (such perhaps as gravity) they are collected together in great numbers in some parts of space, whilest in others there are either few or none."

Mitchell was particularly interested in the Pleiades and said that the odds of six similarly bright stars appearing so close to each other in the sky was 500,000 to 1. He concluded that this indicates that the Pleiades were a physical group. He said an examination of the area using a telescope revealed a large number of smaller stars between and surrounding the six bright stars, which he said increased the odds to "many millions to one" that the Pleiades were a physical group. He even took his argument a step further by suggesting other groupings of stars, such as "the Praesepe Cancri, the nebula in the hilt of Perseus' sword, …and those stars which appear double, treble, etc. when seen through telescopes" were also individual physical groups. He suggested the reason for this would be due to "their mutual gravitation, or to some other law or appointment of the Creator."

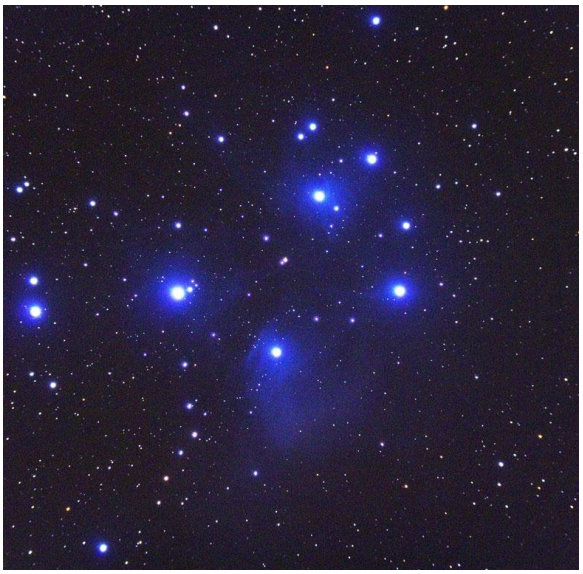
"The Praesepe Cancri," known today as the Beehive Cluster, M44. Photo by Gary Kronk.

Mitchell then suggested the Sun might also be part of a physical group. He had no evidence to suggest that stars varied greatly in size and luminosity, mostly working on the premise that the difference in brightness was more a matter of distance. He concluded that the stars of second magnitude and brighter could very well be part of the same physical group that included the Sun. On the other hand, he did venture to suggest that stars "of a redder hue than the rest" were probably "a good deal bigger, in proportion to their brightness, than the whiter stars." Nevertheless, Mitchell proceeded with his attempt to determine how far away the Pleiades were from Earth.

The brightest star in the sky is Sirius and Mitchell believed it was the closest star to our Sun. This is of course, wrong, but Mitchell was not that far off, as Sirius is only 8.6 light years away and only four other star systems are known to be closer to us than Sirius. By determining how far the Sun would have to be from Earth to reach the brightness of Sirius, Mitchell determined that Sirius was located 440,000 solar distances from Earth. Through a convoluted argument that spanned several pages, Mitchell then came to the conclusion that that Pleiades were 57 times further from Earth than was Sirius.

Converting these figures to more modern values, it appears that Mitchell's calculations revealed values of 6.95 light years for the distance to Sirius and 396 light years for the distance to the Pleiades.

Now the distance to Sirius was first measured in the mid-1800s as 14 light years. It was revised to 8.6 light years only two decades later and this value still holds true today.



The Pleiades (M45). Photo by Gary Kronk.

What is the actual distance to the Pleiades? Prior to the launch of the Hipparcos satellite in 1989, the distance was thought to be 440 light years. Following the end of the Hipparcos mission in 1993, astronomers spent three years analyzing the data and came up with high-precision measurements of the parallax of over 118 thousand stars. For the stars in the Pleiades, it was concluded that the distance was 385 light years. During the early years of the 21st century, astronomers used an infrared color-magnitude diagram with data from the Hubble Space Telescope and determined the likely distance as 440-456 light years. A revision of the Hipparcos data was published in 2009 which gave the distance to the Pleiades as 391 light years.

It might be a few more years before the distance to the Pleiades is firmly established, but, as of right now, the estimate that Mitchell made is in within the range of current estimates made by large telescopes on Earth and in orbit. This is not bad for calculations carried out 245 years ago, at a time when the distances to the stars and the characteristics of stars were unknown.

RBAC

The Transit of Venus: Last Time for a Lifetime!

By Bill Breeden

The last time Venus passed directly in front of the Sun's disk (from Earth's perspective) was on June 8, 2004. But the last time before that was in December of 1882. That is because these transits occur in pairs eight years apart, and these pairs are separated by gaps of 121 ½ years and 105 ½ years.

We are getting ready for the second one in this transit pair, to occur on the evening of June 5, 2012 (from the United States). What this means is that this is the last Transit of Venus until December 2117 and December 2125. If you want to see a Transit of Venus, now is the time to prepare!

Only Mercury and Venus are closer to the Sun than the Earth, so they are the only planets capable of a transit across the Sun's disk. This only happens when the viewing geometry between the Sun, Venus (or Mercury) and the Earth are in just the right positions relative to each other.

You will want to be prepared with either a solar filter, a solar telescope, or use a pinhole projection to observe the Sun's disk projected onto a white sheet of poster board. DO NOT LOOK AT THE SUN WITHOUT PROPER PROTECTION.

The transit will begin at 5:04pm for Illinois, and second contact happens at 5:22. Third and fourth contacts (Venus exiting from in front of the Sun) will occur after the Sun has set, at 11:32 and 11:50pm, respectively.

Find an observing location with flat, clear western and northwestern horizons, and be sure to have your equipment ready before the transit begins. And let's hope for clear skies, of course! RBAC

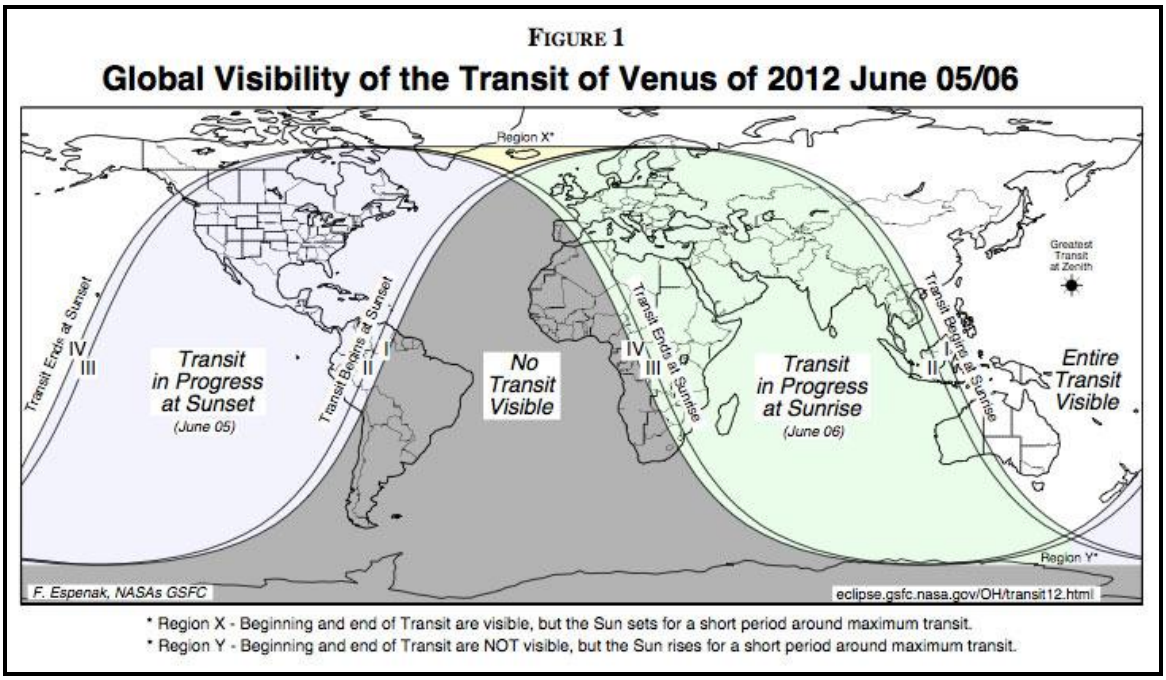


Diagram courtesy of NASA.

NASA Helps Europe Study a Comet – Up Close and Personal

By Dr. Tony Phillips

Europe's Rosetta spacecraft is on its way to intercept comet 67P/Churyumov-Gerasimenko. Comets have been intercepted before, but this mission is different. Rosetta aims to make history by landing a probe on the comet's surface while the mother ship orbits overhead.

"Rosetta is the European equivalent of a NASA flagship mission," explains Claudia Alexander, project scientist for the U.S. Rosetta Project at NASA's Jet Propulsion Laboratory. "It will conduct the most comprehensive study of a comet ever performed."

Rosetta's payload contains 21 instruments (11 on the orbiter, 10 on the lander) designed to study almost every aspect of the comet's chemistry, structure, and dynamics. Three of the sensors were contributed by the U.S.: Alice (an ultraviolet spectrometer), IES (an ion and electron sensor), and MIRO (a microwave sounder).

The main event of the mission will likely be the landing. The 100-kg lander, which looks a bit like a cross between NASA's old Viking Mars landers and a modern microsatellite, will spend two weeks fastened to the comet's icy surface. The European-built probe will collect samples for analysis by onboard microscopes and take stunning panoramic images from ground level.

"First the lander will study the surface from close range to establish a baseline before the comet becomes active," explains Alexander. "Then the orbiter will investigate the flow of gas and dust around the comet's active, venting nucleus."

Rosetta's sensors will perform the experiments that reveal how the chemicals present interact with one another and with the solar wind. Alice and MIRO detect uncharged atoms and molecules, while IES detects the ions and electrons as the solar wind buffets the nucleus.

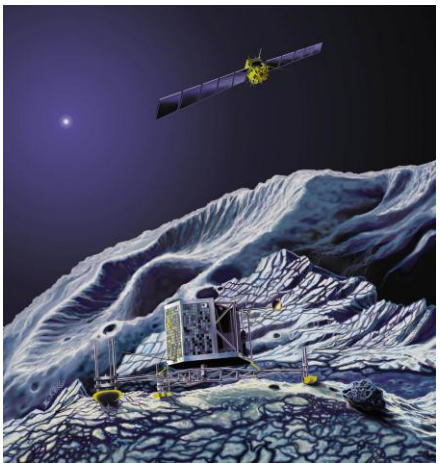
One problem that often vexes astronomers when they try to study comets is visibility. It's hard to see through the dusty veil of gas billowing away from the heated nucleus. The microwaves MIRO detects can penetrate the dust, so MIRO can see and measure its target molecules even when other instruments can't.

MIRO is one of several experiments focused on the comet's structural properties. It will determine the comet's dielectric constant, emissivity, and thermal conductivity to determine whether it is made of a powdery loose material, has a detectable layer of loose material, or is hard as rock.

"We want to find out whether comets have retained material from when the solar system formed," says Alexander. "If the ancient materials are still there, we can get an idea of what conditions were like at the dawn of the solar system."

Rosetta enters orbit in 2014. Stay tuned for updates!

Check out "Comet Quest," the new, free iPhone/iPad game that has you operating the Rosetta spacecraft yourself. Get the link at spaceplace.nasa.gov/comet-quest.



Rosetta's lander Philae will eject from the spacecraft, touch down on the comet's nucleus, and immediately fire a harpoon into the surface to anchor itself so it won't drift off in the weak gravity

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.

May Observing List
Prepared by Bill Breeden

Double Stars

_____ 24 Comae Berenices SAO 100160 Const. COM Type DS RA 12 35.1 Decl. +18° 23' Mag. 5.2 6.7

_____ 32 Camelo- pardalis SAO 2101 Const. CAM Type DS RA 12 49.2 Decl. +83° 25' Mag. 5.3 5.8

_____ Alpha Canum Venaticorum SAO 63256 Cor Caroli Const. CVN Type DS RA 12 56.0 Decl. +38° 19' Mag. 2.9 5.5

_____ Delta Corvi SAO 157323 Algorah Const. CRB Type DS RA 12 29.9 Decl. -16° 31' Mag. 3.0 9.2

_____ Gamma Virginis SAO 138917 Porrima Const. VIR Type DS RA 12 41.7 Decl. -01° 27' Mag. 3.5 3.5

_____ Zeta Ursae Majoris SAO 28737 Mizar Const. UMA Type DS RA 13 23.9 Decl. +54° 56' Mag. 2.3 4.0 4.0

Messier Objects

_____ M3 NGC5272 Const. CVN Type GC RA 13 42.2 Decl. +28 23 Mag. 6.3

_____ M40 WIC4 Const. UMA Type DS RA 12 22.4 Decl. +58 05 Mag. 9.1

_____ M49 NGC4472 Const. VIR Type GAL RA 12 29.8 Decl. +08 00 Mag. 8.5

_____ M51 NGC5194 Whirlpool Galaxy Const. CVN Type GAL RA 13 29.9 Decl. +47 12 Mag. 8.1

_____ M53 NGC5024 Const. COM Type GC RA 13 12.9 Decl. +18 10 Mag. 7.6

_____ M58 NGC4579 Const. VIR Type GAL RA 12 37.7 Decl. +11 49 Mag. 9.2

_____ M59 NGC4621 Const. VIR Type GAL RA 12 42.0 Decl. +11 39 Mag. 9.6

_____ M60 NGC4649 Const. VIR Type GAL RA 12 43.7 Decl. +11 33 Mag. 8.9

_____ M61 NGC4303 Const. VIR Type GAL RA 12 21.9 Decl. +04 28 Mag. 10.1

_____ M63 NGC5055 Const. CVN Type GAL RA 13 15.8 Decl. +42 02 Mag. 9.5

_____ M64 NGC4826 Black Eye Galaxy Const. COM Type GAL RA 12 56.7 Decl. +21 41 Mag. 8.8

_____ M68 NGC4590 Const. HYA Type GC RA 12 39.5 Decl. -26 45 Mag. 8

_____ M83 NGC5236 Const. HYA Type GAL RA 13 37.0 Decl. -29 52 Mag. 7.6

_____ M84 NGC4374 Const. VIR Type GAL RA 12 25.1 Decl. +12 53 Mag. 9.3

_____ M85 NGC4382 Const. COM Type GAL RA 12 25.4 Decl. +18 11 Mag. 9.3

_____ M86 NGC4406 Const. VIR Type GAL RA 12 26.2 Decl. +12 57 Mag. 9.7

_____ M87 NGC4486 Const. VIR Type GAL RA 12 30.8 Decl. +12 24 Mag. 9.2

_____ M88 NGC4501 Const. COM Type GAL RA 12 32.0 Decl. +14 25 Mag. 10.2

_____ M89 NGC4552 Const. VIR Type GAL RA 12 35.7 Decl. +12 33 Mag. 9.5

_____ M90 NGC4569 Const. VIR Type GAL RA 12 36.8 Decl. +13 10 Mag. 10

_____ M91 NGC4548 Const. COM Type GAL RA 12 35.4 Decl. +14 30 Mag. 9.5

_____ M94 NGC4736 Const. CVN Type GAL RA 12 50.9 Decl. +41 07 Mag. 7.9

_____ M98 NGC4192 Const. COM Type GAL RA 12 13.8 Decl. +14 54 Mag. 11.7

_____ M99 NGC4254 Const. COM Type GAL RA 12 18.8 Decl. +14 25 Mag. 10.1

_____ M100 NGC4321 Const. COM Type GAL RA 12 22.9 Decl. +15 49 Mag. 10.6

_____ M104 NGC4594 Sombrero Galaxy Const. VIR Type GAL RA 12 40.0 Decl. -11 37 Mag. 8.7

_____ M106 NGC4258 Const. CVN Type GAL RA 12 19.0 Decl. +47 18 Mag. 8.6

Caldwell Objects

_____ C003 NGC4236 Const. DRA Type SG RA 12 16 42.00 Decl. +69 28 00.0 Mag. 9.7
_____ C021 NGC4449 Const. CVN Type IG RA 12 28 12.00 Decl. +44 06 00.0 Mag. 9.4
_____ C026 NGC4244 Const. CVN Type SG RA 12 17 30.00 Decl. +37 49 00.0 Mag. 10.6
_____ C029 NGC5005 Const. CVN Type SG RA 13 10 54.00 Decl. +37 03 00.0 Mag. 9.8
_____ C032 NGC4631 Const. CVN Type SG RA 12 42 06.00 Decl. +32 32 00.0 Mag. 9.3
_____ C035 NGC4889 Const. COM Type EG RA 13 00 06.00 Decl. +27 59 00.0 Mag. 11.4
_____ C036 NGC4559 Const. COM Type SG RA 12 36 00.00 Decl. +27 58 00.0 Mag. 9.8
_____ C038 NGC4565 Const. COM Type SG RA 12 36 18.00 Decl. +25 59 00.0 Mag. 9.6
_____ C045 NGC5248 Const. BOO Type SG RA 13 37 30.00 Decl. +08 53 00.0 Mag. 10.2
_____ C052 NGC4697 Const. VIR Type EG RA 12 48 36.00 Decl. -05 48 00.0 Mag. 9.3
_____ C060 NGC4038 The Antennae Const. CRV Type SG RA 12 01 54.00 Decl. -18 52 00.0 Mag. 11.3
_____ C061 NGC4039 The Antennae Const. CRV Type SG RA 12 01 54.00 Decl. -18 53 00.0 Mag. 13
_____ C077 NGC5128 Cen A Radio Source Const. CEN Type EG RA 13 25 30.00 Decl. -43 01 00.0 Mag. 7
_____ C080 NGC5139 Omega Centauri Const. CEN Type GC RA 13 26 48.00 Decl. -47 29 00.0 Mag. 3.6
_____ C083 NGC4945 Const. CEN Type SG RA 13 05 24.00 Decl. -49 28 00.0 Mag. 9.5
_____ C084 NGC5286 Const. CEN Type GC RA 13 46 24.00 Decl. -51 22 00.0 Mag. 7.6
_____ C094 NGC4755 Jewel Box Cluster Const. CRU Type OC RA 12 53 36.00 Decl. -60 20 00.0 Mag. 4.2
_____ C098 NGC4609 Const. CRU Type OC RA 12 42 18.00 Decl. -62 58 00.0 Mag. 6.9
_____ C099 Coal Sack Const. CRU Type DN RA 12 53 00.00 Decl. -63 00 00.0 Mag.
_____ C105 NGC4833 Const. MUS Type GC RA 12 59 36.00 Decl. -70 53 00.0 Mag. 7.3
_____ C108 NGC4372 Const. MUS Type GC RA 12 25 48.00 Decl. -72 40 00.0 Mag. 7.8

Royal Astronomical Society of Canada Objects

_____ RASC46 NGC4088 Const. UMA Type G-Sc RA 12 05.6 Decl. +50 33 Mag. 10.5
_____ RASC47 NGC4157 Const. UMA Type G-Sb RA 12 11.1 Decl. +50 29 Mag. 11.9
_____ RASC48 NGC4605 Const. UMA Type G-SBcp RA 12 40.0 Decl. +61 37 Mag. 9.6
_____ RASC59 NGC4111 Const. CVN Type G-S0 RA 12 07.1 Decl. +43 04 Mag. 10.8
_____ RASC60 NGC4214 Const. CVN Type G-Irr RA 12 15.6 Decl. +36 20 Mag. 9.7
_____ RASC61 NGC4244 Const. CVN Type G-S RA 12 17.5 Decl. +37 49 Mag. 10.2
_____ RASC62 NGC4449 Const. CVN Type G-Irr RA 12 28.2 Decl. +44 06 Mag. 9.4
_____ RASC63 NGC4490 Const. CVN Type G-Sc RA 12 30.6 Decl. +41 38 Mag. 9.8
_____ RASC64 NGC4631 Const. CVN Type G-Sc RA 12 42.1 Decl. +32 32 Mag. 9.3
_____ RASC65 NGC4656/7 Const. CVN Type G-Sc RA 12 44.0 Decl. +32 10 Mag. 10.4
_____ RASC66 NGC5005 Const. CVN Type G-Sb RA 13 10.9 Decl. +37 03 Mag. 9.8
_____ RASC67 NGC5033 Const. CVN Type G-Sb RA 13 13.4 Decl. +36 36 Mag. 10.1
_____ RASC68 NGC4274 Const. COM Type G-Sb RA 12 19.8 Decl. +29 37 Mag. 10.4
_____ RASC69 NGC4414 Const. COM Type G-Sc RA 12 26.4 Decl. +31 13 Mag. 10.2
_____ RASC70 NGC4494 Const. COM Type G-E1 RA 12 31.4 Decl. +25 47 Mag. 9.8
_____ RASC71 NGC4559 Const. COM Type G-Sc RA 12 36.0 Decl. +27 58 Mag. 9.8
_____ RASC72 NGC4565 Const. COM Type G-Sb RA 12 36.3 Decl. +25 59 Mag. 9.6
_____ RASC73 NGC4725 Const. COM Type G-Sb RA 12 50.4 Decl. +25 30 Mag. 9.2
_____ RASC74 NGC4038/9 Antennae Galaxies Const. CRV Type G-Sc RA 12 01.9 Decl. -18 52 Mag. 10.7
_____ RASC75 NGC4361 Const. CRV Type PN RA 12 24.5 Decl. -18 48 Mag. 10.3
_____ RASC76 NGC4216 Const. VIR Type G-Sb RA 12 15.9 Decl. +13 09 Mag. 9.9
_____ RASC77 NGC4388 Const. VIR Type G-Sb RA 12 25.8 Decl. +12 40 Mag. 11
_____ RASC78 NGC4438 Const. VIR Type G-Sap RA 12 27.8 Decl. +13 01 Mag. 10.1

_____ RASC79 NGC4517 Const. VIR Type G-Sc RA 12 32.8 Decl. +00 07 Mag. 10.5
_____ RASC80 NGC4526 Const. VIR Type G-E7 RA 12 34.0 Decl. +07 42 Mag. 9.6
_____ RASC81 NGC4535 Const. VIR Type G-Sc RA 12 34.3 Decl. +08 12 Mag. 9.8
_____ RASC82 NGC4567/8 Const. VIR Type G-Sc RA 12 36.5 Decl. +11 15 Mag. ~11
_____ RASC83 NGC4699 Const. VIR Type G-Sa RA 12 49.0 Decl. -08 40 Mag. 9.6
_____ RASC84 NGC4762 Const. VIR Type G-SB0 RA 12 52.9 Decl. +11 14 Mag. 10.2
Carbon Stars (Astronomical League)
_____ ALCS54 SS Virginis GSC 282:753 RA 12 25 14 Decl. +00 46 10 Mag. 6.0 – 9.6 Per. 364 Class C6 (Ne)
_____ ALCS55 Y Canum Venaticorum SAO 44317 RA 12 45 07 Decl. +45 26 24 Mag. 4.8 – 6.4 Per. 157 Class C5 (N3)
_____ ALCS56 RY Draconis SAO 15945 RA 12 56 25 Decl. +65 59 39 Mag. 6.0 – 8.0 Per. 200 Class C4 (N4p)
_____ ALCS57 SAO 157721 (Virgo) GSC 6118:1194 RA 13 06 24 Decl. -20 03 31 Mag. 8.5 – 8.5 Per. ? Class C2 (K5p) 1194

June Observing List
Prepared by Bill Breeden

Double Stars
_____ Alpha Librae SAO 158836 Zuben El Genubi Const. LIB Type DS RA 14 50.9 Decl. -16° 02' Mag. 2.8 5.2
_____ Delta Bootis SAO 64589 Alrakis Const. BOO Type DS RA 15 15.5 Decl. +33° 19' Mag. 3.5 8.7
_____ Delta Serpentis SAO 101623 Const. SER Type DS RA 15 34.5 Decl. +10° 32' Mag. 4.2 5.2
_____ Epsilon Bootis SAO 83500 Izar Const. BOO Type DS RA 14 45.0 Decl. +27° 04' Mag. 2.5 4.9
_____ Iota Bootis SAO 29071 Const. BOO Type DS RA 14 16.2 Decl. +51° 22' Mag. 4.9 7.5
_____ Kappa Bootis SAO 29045 Const. BOO Type DS RA 14 13.5 Decl. +51° 47' Mag. 4.6 6.6
_____ Mu Bootis SAO 64686 Const. BOO Type DS RA 15 24.5 Decl. +37° 23' Mag. 4.3 7.0
_____ Pi Bootis SAO 101138 Const. BOO Type DS RA 14 40.7 Decl. +16° 25' Mag. 4.9 5.8
_____ Xi Bootis SAO 101250 Const. BOO Type DS RA 14 51.4 Decl. +19° 06' Mag. 4.7 7.0
_____ Zeta Coronae Borealis SAO 64833 Const. CRB Type DS RA 15 39.4 Decl. +36° 38' Mag. 5.1 6.0
Messier Objects
_____ M5 NGC5904 Const. SER Type GC RA 15 18.6 Decl. +02 05 Mag. 6.2
_____ M101 NGC5457 Pinwheel Galaxy Const. UMA Type GAL RA 14 03.2 Decl. +54 21 Mag. 9.6
_____ M102 NGC? 5866 Const. DRA Type GAL RA 15 06.5 Decl. +55 46 Mag. 10
Caldwell Objects
_____ C066 NGC5694 Const. HYA Type GC RA 14 39 36.00 Decl. -26 32 00.0 Mag. 10.2
_____ C088 NGC5823 Const. CIR Type OC RA 15 05 42.00 Decl. -55 36 00.0 Mag. 7.9
Royal Astronomical Society of Canada Objects
_____ RASC85 NGC5746 Const. VIR Type G-Sb RA 14 44.9 Decl. +01 57 Mag. 10.6
_____ RASC86 NGC5466 Const. BOO Type GC RA 14 05.5 Decl. +28 32 Mag. 9.1
_____ RASC87 NGC5907 Const. DRA Type G-Sb RA 15 15.9 Decl. +56 19 Mag. 10.4
Carbon Stars (Astronomical League)
_____ ALCS58 V Coronae Borealis SAO 64929 RA 15 49 31 Decl. +39 34 17 Mag. 6.9 – 12.6 Per. 358 Class C6 (N2e)