



**M39, an open cluster in Cygnus, makes a nice sight in a telescope with a low-power eyepiece. It is easily observable during September and October.**

Photo by Gary Kronk.

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River Bend Astronomy Club is a member of the Astronomical League.



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.

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River Bend Astronomy Club is a member of 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



River Bend Astronomy Club is a member of 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. See our online calendar on the NASA Night Sky Network at http://nightsky.jpl.nasa.gov/

Monthly Meetings

Saturday, September 7, 2013 • 7:00 PM
Saturday, October 5, 2013 • 7:00 PM
Saturday, November 2, 2013 • 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 \$15/year each
(18 yrs. and up) (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.





## Size Does Matter, But So Does Dark Energy

By Dr. Ethan Siegel

Here in our own galactic backyard, the Milky Way contains some 200-400 billion stars, and that's not even the biggest galaxy in our own local group. Andromeda (M31) is even bigger and more massive than we are, made up of around a trillion stars! When you throw in the Triangulum Galaxy (M33), the Large and Small Magellanic Clouds, and the dozens of dwarf galaxies and hundreds of globular clusters gravitationally bound to us and our nearest neighbors, our local group sure does seem impressive.

Yet that's just chicken feed compared to the largest structures in the universe. Giant clusters and superclusters of galaxies, containing thousands of times the mass of our entire local group, can be found omni-directionally with telescope surveys. Perhaps the two most famous examples are the nearby Virgo Cluster and the somewhat more distant Coma Supercluster, the latter containing more than 3,000 galaxies. There are millions of giant clusters like this in our observable universe, and the gravitational forces at play are absolutely tremendous: there are literally quadrillions of times the mass of our Sun in these systems.

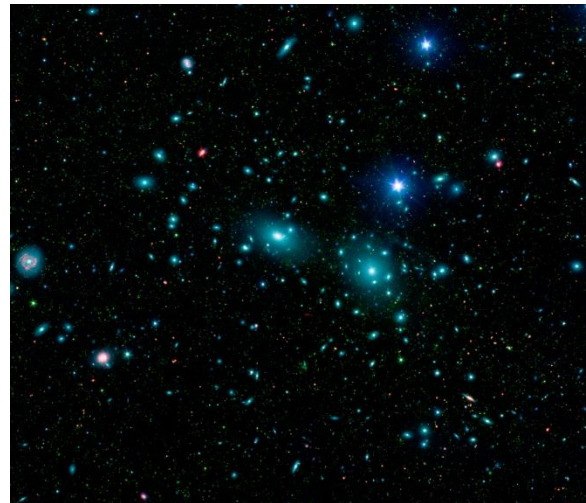
The largest superclusters line up along filaments, forming a great cosmic web of structure with huge intergalactic voids in between the galaxy-rich regions. These galaxy filaments span anywhere from hundreds of millions of light-years all the way up to more than a billion light years in length. The CfA2 Great Wall, the Sloan Great Wall, and most recently, the Huge-LQG (Large Quasar Group) are the largest known ones, with the Huge-LQG -- a group of at least 73 quasars - apparently stretching nearly 4 billion light years in its longest direction: more than 5% of the observable universe! With more mass than

a million Milky Way galaxies in there, this structure is a puzzle for cosmology.

You see, with the normal matter, dark matter, and dark energy in our universe, there's an upper limit to the size of gravitationally bound filaments that should form. The Huge-LQG, if real, is more than double the size of that largest predicted structure, and this could cast doubts on the core principle of cosmology: that on the largest scales, the universe is roughly uniform everywhere. But this might not pose a problem at all, thanks to an unlikely culprit: dark energy. Just as the local group is part of the Virgo Supercluster but recedes from it, and the Leo Cluster -- a large member of the Coma Supercluster -- is accelerating away from Coma, it's conceivable that the Huge-LQG isn't a single, bound structure at all, but will eventually be driven apart by dark energy. Either way, we're just a tiny drop in the vast cosmic ocean, on the outskirts of its rich, yet barely fathomable depths.

Learn about the many ways in which NASA strives to uncover the mysteries of the universe:

<http://science.nasa.gov/astrophysics/>. Kids can make their own clusters of galaxies by checking out The Space Place's fun galactic mobile activity: <http://spaceplace.nasa.gov/galactic-mobile/>



Digital mosaic of infrared light (courtesy of Spitzer) and visible light (SDSS) of the Coma Cluster, the largest member of the Coma Supercluster. Image credit: NASA / JPL-Caltech / Goddard Space Flight Center / Sloan Digital Sky Survey.

*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.

## September Observing List

Prepared by Bill Breeden

### Double Stars (Astronomical League's Double Star List)

- \_\_\_\_\_ 87. 31 Cygni SAO 49337 Const. CYG Type DS RA 20 13.6 Decl. +46° 44' Mag. 3.8 6.7 4.8
- \_\_\_\_\_ 88. Alpha Capricorni SAO 163422 Al Giedi Const. CAP Type DS RA 20 18.1 Decl. -12° 33' Mag. 3.6 4.2
- \_\_\_\_\_ 89. Beta Capricorni SAO 163481 Dabih Const. CAP Type DS RA 20 21.0 Decl. -14° 47' Mag. 3.4 6.2
- \_\_\_\_\_ 90. Gamma Delphini SAO 106475 Const. DEL Type DS RA 20 46.7 Decl. +16° 07' Mag. 4.5 5.5
- \_\_\_\_\_ 91. 61 Cygni SAO 70919 Const. CYG Type DS RA 21 06.9 Decl. +38° 45' Mag. 5.2 6.0
- \_\_\_\_\_ 92. Beta Cephei SAO 10057 Alfirk Const. CEP Type DS RA 21 28.7 Decl. +70° 34' Mag. 3.2 7.9
- \_\_\_\_\_ 93. Struve 2816 SAO 33626 - Const. Type DS RA 21 39.0 Decl. +57° 29' Mag. 5.6 7.7 7.8
- \_\_\_\_\_ 94. Epsilon Pegasi SAO 127029 Enif Const. PEG Type DS RA 21 44.2 Decl. +09° 52' Mag. 2.4 8.4

### Carbon Stars (Astronomical League's Carbon Star List)

- \_\_\_\_\_ 80. V1469 Aquilae SAO 125356 RA 20 01 03 Decl. +09 30 51 Mag. 8.4 – 8.7 Per. 98 Class C4 (N0v)
- \_\_\_\_\_ 81. BF Sagittae GSC 1629:945 RA 20 02 23 Decl. +21 05 24 Mag. 8.5 – 10.0 Per. 177 Class C4 (N3)
- \_\_\_\_\_ 82. X Sagittae HD 190606 RA 20 05 05 Decl. +20 38 51 Mag. 7.0 – 9.7 Per. 196 Class C6 (N3)
- \_\_\_\_\_ 83. SV Cygni GSC 3563:462 RA 20 09 30 Decl. +47 52 17 Mag. 8.5 – 8.7 Per. ? Class C5 – C7462 (N3)
- \_\_\_\_\_ 84. RY Cygni GSC 2683:3082 RA 20 10 23 Decl. +35 56 50 Mag. 8.5 – 10.3 Per. Irr. Class C4 – C6 (N)
- \_\_\_\_\_ 85. RS Cygni SAO 69636 RA 20 13 23 Decl. +38 43 44 Mag. 6.5 – 9.5 Per. 417 Class C8 (N0pe)
- \_\_\_\_\_ 86. RT Capricorni GSC 6340:1015 RA 20 17 06 Decl. -21 19 04 Mag. 7.0 – 8.1 Per. 393 Class C6 (N3)
- \_\_\_\_\_ 87. U Cygni SAO 49477 RA 20 19 36 Decl. +47 53 39 Mag. 5.9 – 12.1 Per. 463 Class C7 – C9 (Npe)
- \_\_\_\_\_ 88. V Cygni SAO 49940 RA 20 41 18 Decl. +48 08 28 Mag. 7.7 – 13.9 Per. 421 Class C5 – C7 (Npe)
- \_\_\_\_\_ 89. CY Cygni SAO 50053 RA 20 46 50 Decl. +46 03 06 Mag. 7.9 – 8.4 Per. ? Class CS (M2p)
- \_\_\_\_\_ 90. SAO 106516 (Delphinus) GSC 1651:1359 RA 20 48 36 Decl. +17 50 23 Mag. 7.9 – 8.1 Per. ? Class C1

### (R0)

- \_\_\_\_\_ 91. NSV 13571 (Vulpecula) SAO 89499 RA 21 09 59 Decl. +26 36 54 Mag. 8.1 – 8.2 Per. ? Class C1 (Kp)
- \_\_\_\_\_ 92. S Cephei SAO 10100 RA 21 35 12 Decl. +78 37 28 Mag. 7.4 – 12.9 Per. 487 Class C7 (N8e)
- \_\_\_\_\_ 93. V460 Cygni SAO 71613 RA 21 42 01 Decl. +35 30 36 Mag. 5.6 – 7.0 Per. 180 Class C6 (N1)
- \_\_\_\_\_ 94. RV Cygni SAO 71642 RA 21 43 16 Decl. +38 01 02 Mag. 7.1 – 9.3 Per. 263 Class C6 (N5)
- \_\_\_\_\_ Mu Cephei (not carbon) RA 21 43 30 Decl. +58 47 48 Mag. 3.4 - 5.1 Per. Class
- \_\_\_\_\_ 95. RX Pegasi HD 208526 RA 21 56 22 Decl. +22 51 39 Mag. 7.7 – 9.5 Per. 629 Class C4 (N3)

### Messier Objects

- \_\_\_\_\_ M2 NGC7089 Const. AQR Type GC RA 21 33.5 Decl. -00 49 Mag. 6.3
- \_\_\_\_\_ M15 NGC7078 Const. PEG Type GC RA 21 30.0 Decl. +12 10 Mag. 6
- \_\_\_\_\_ M29 NGC6913 Const. CYG Type OC RA 20 23.9 Decl. +38 32 Mag. 7.1
- \_\_\_\_\_ M30 NGC7099 Const. CAP Type GC RA 21 40.4 Decl. -23 11 Mag. 8.4
- \_\_\_\_\_ M39 NGC7092 Const. CYG Type OC RA 21 32.2 Decl. +48 26 Mag. 5.2
- \_\_\_\_\_ M72 NGC6981 Const. AQR Type GC RA 20 53.5 Decl. -12 32 Mag. 9.8
- \_\_\_\_\_ M73 NGC6994 Const. AQR Type A RA 20 58.9 Decl. -12 38 Mag. 9
- \_\_\_\_\_ M75 NGC6864 Const. SGR Type GC RA 20 06.1 Decl. -21 55 Mag. 8

### Caldwell Objects

- \_\_\_\_\_ C4 NGC7023 Const. CEP Type BN RA 21 01 48.00 Decl. +68 12 00.0 Mag. 6.8
- \_\_\_\_\_ C12 NGC6946 Const. CEP Type SG RA 20 34 48.00 Decl. +60 09 00.0 Mag. 9.7
- \_\_\_\_\_ C19 IC5146 Cocoon Nebula Const. CYG Type BN RA 21 53 30.00 Decl. +47 16 00.0 Mag. 10
- \_\_\_\_\_ C20 NGC7000 North America Nebula Const. CYG Type BN RA 20 58 48.00 Decl. +44 20 00.0 Mag. 6
- \_\_\_\_\_ C27 NGC6888 Crescent Nebula Const. CYG Type BN RA 20 12 00.00 Decl. +38 21 00.0 Mag. 7.5
- \_\_\_\_\_ C3 NGC6992/5 East Veil Nebula Const. CYG Type SN RA 20 56 24.00 Decl. +31 43 00.0 Mag.
- \_\_\_\_\_ C34 NGC6960 West Veil Nebula Const. CYG Type SN RA 20 45 42.00 Decl. +30 43 00.0 Mag.

\_\_\_\_\_ C37 NGC6885 Const. VUL Type OC RA 20 12 00.00 Decl. +26 29 00.0 Mag. 5.7  
\_\_\_\_\_ C42 NGC7006 Const. DEL Type GC RA 21 01 30.00 Decl. +16 11 00.0 Mag. 10.6  
\_\_\_\_\_ C47 NGC6934 Const. DEL Type GC RA 20 34 12.00 Decl. +07 24 00.0 Mag. 8.9  
\_\_\_\_\_ C55 NGC7009 Saturn Nebula Const. AQR Type PN RA 21 04 12.00 Decl. -11 22 00.0 Mag. 8.3

Royal Astronomical Society of Canada Objects

\_\_\_\_\_ 1. NGC7009 Saturn Nebula Const. AQR Type PN RA 21 04.2 Decl. -11 02 Mag. 8.3  
\_\_\_\_\_ 98. NGC6888 Const. CYG Type SNR? RA 20 12.0 Decl. +38 21 Mag.  
\_\_\_\_\_ 99a. NGC6960 West Veil Nebula Const. CYG Type SNR RA 20 45.7 Decl. +30 43 Mag.  
\_\_\_\_\_ 99b. NGC6992/5 East Veil Nebula Const. CYG Type SNR RA 20 56.4 Decl. +31 43 Mag.  
\_\_\_\_\_ 100. NGC7000 North America Nebula Const. CYG Type EN RA 20 58.8 Decl. +44 20 Mag. 6  
\_\_\_\_\_ 101. NGC7027 Const. CYG Type PN? RA 21 07.1 Decl. +42 14 Mag. 10.4  
\_\_\_\_\_ 106. NGC6940 Const. VUL Type OC RA 20 34.6 Decl. +28 18 Mag. 6.3  
\_\_\_\_\_ 107. NGC6939 Const. CEP Type OC RA 20 31.4 Decl. +60 38 Mag. 7.8  
\_\_\_\_\_ 108. NGC6946 Const. CEP Type G-Sc RA 20 34.8 Decl. +60 09 Mag. 8.9  
\_\_\_\_\_ 109. NGC7129 Const. CEP Type RN RA 21 44.4 Decl. +66 10 Mag.

## October Observing List

Prepared by Bill Breeden

### Double Stars (Astronomical League's Double Star List)

- \_\_\_\_\_ 95. Xi Cephei SAO 19827 Kurhah Const. CEP Type DS RA 22 03.8 Decl. +64° 38' Mag. 4.4 6.5
- \_\_\_\_\_ 96. Zeta Aquarii SAO 146107 - Const. AQR Type DS RA 22 28.8 Decl. -00° 01' Mag. 4.3 4.5
- \_\_\_\_\_ 97. Delta Cephei SAO 34508 - Const. CEP Type DS RA 22 29.2 Decl. +58° 25' Mag. 3.9 6.3
- \_\_\_\_\_ 98. 8 Lacertae SAO 72509 - Const. LAC Type DS RA 22 35.9 Decl. +39° 38' Mag. 5.7 6.5
- \_\_\_\_\_ 99. 94 Aquarii SAO 165625 - Const. AQR Type DS RA 23 19.1 Decl. -13° 28' Mag. 5.3 7.3

### Carbon Stars (Astronomical League's Carbon Star List)

- \_\_\_\_\_ 96. RZ Pegasi GSC 2724:1872 RA 22 05 52 Decl. +33 30 24 Mag. 7.6 – 13.6 Per. 439 Class C9 (Ne)
- \_\_\_\_\_ 97. RU Aquarii SAO 165676 RA 23 24 24 Decl. -17 19 08 Mag. 8.5 – 10.1 Per. 69 Class C6 (M5e)
- \_\_\_\_\_ 98. ST Andromedae GSC 2778:765 RA 23 38 45 Decl. +35 46 21 Mag. 7.7 – 11.8 Per. 328 Class C4 – C6 (R3e)
- \_\_\_\_\_ 99. TX Piscium SAO 128374 RA 23 46 23 Decl. +03 29 12 Mag. 4.8 – 5.2 Per. Irr. Class C7 (N0)
- \_\_\_\_\_ 100. SAO 128396 (Pisces) GSC 592:649 RA 23 49 05 Decl. +06 22 56 Mag. 8.5–8.8 Per. ? Class C3 (R3)

### Messier Objects

- \_\_\_\_\_ M52 NGC7654 Const. CAS Type OC RA 23 24.2 Decl. +61 35 Mag. 7.3

### Caldwell Objects

- \_\_\_\_\_ C9 Sh2-155 Cave Nebula Const. CEP Type BN RA 22 56 48.00 Decl. +62 37 00.0 Mag. 7.7
- \_\_\_\_\_ C11 NGC7635 Bubble Nebula Const. CAS Type BN RA 23 20 42.00 Decl. +61 12 00.0 Mag. 7
- \_\_\_\_\_ C16 NGC7243 Const. LAC Type OC RA 22 15 18.00 Decl. +49 53 00.0 Mag. 6.4
- \_\_\_\_\_ C22 NGC7662 Const. AND Type PN RA 23 25 54.00 Decl. +42 33 00.0 Mag. 9.2
- \_\_\_\_\_ C30 NGC7331 Const. PEG Type SG RA 22 37 06.00 Decl. +34 25 00.0 Mag. 9.5
- \_\_\_\_\_ C44 NGC7479 Const. PEG Type SG RA 23 04 54.00 Decl. +12 19 00.0 Mag. 11
- \_\_\_\_\_ C63 NGC7293 Helix Nebula Const. AQR Type PN RA 22 29 36.00 Decl. -20 48 00.0 Mag. 6.5

### Royal Astronomical Society of Canada Objects

- \_\_\_\_\_ 2. NGC7293 Const. AQR Type PN RA 22 29.6 Decl. -20 48 Mag. 6.5
- \_\_\_\_\_ 3. NGC7331 Const. PEG Type G-Sb RA 22 37.1 Decl. +34 25 Mag. 9.5
- \_\_\_\_\_ 4. NGC7635 Const. CAS Type EN RA 23 20.7 Decl. +61 12 Mag. -
- \_\_\_\_\_ 5. NGC7789 Const. CAS Type OC RA 23 57.0 Decl. +56 44 Mag. 6.7
- \_\_\_\_\_ 11. NGC7662 Blue Snowball Const. AND Type PN RA 23 25.9 Decl. +42 33 Mag. 9.2

Have you checked off all of the objects from these 12 monthly observing lists yet? Or perhaps you have checked off all of a certain category of objects from these lists, such as Double Stars? If so, we would like to know about it! Send your story to us at [rbac@riverbendastro.org](mailto:rbac@riverbendastro.org).