Night-Sky Objects for Southern Observers

By Rob Horvat (V5: Bookmarked & Revised January 2023)

This project emerged from a developing interest in astronomy and as a personal challenge to create some easy-to-use southern hemisphere maps. In its original version (V1), these maps and their object descriptions were the culmination of some 2000 hours of object research, data collection, programming and diagram construction. This time did not include visual observing at the eyepiece.

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About the maps and object data:

Each map is accompanied by a list of interesting and mostly do-able visual targets (some objects are great to image but poor visual targets). Each page provides a variety of target objects listing some of the best multiple stars, carbon stars, emission/reflection nebulae, planetary nebulae, open clusters, globular clusters and galaxies.

Maps are oriented for southern hemisphere observers. Looking north, the maps are oriented with Celestial North **down**, so the constellations are “the right way up” for southern observers. Looking south, the maps are oriented with Celestial North **up**. The limit of observation to the north is set to Declination +55 degrees.

Constellation diagrams show stars mostly down to visual magnitude 4. Some carbon stars and double stars are fainter than this. Where necessary, mag 5, 6 or 7 stars have also been added to help locate fainter objects (e.g. galaxies).

Each constellation map and its object descriptions fit on an A4 page. The maps can be read as a pdf document on computer or tablet. If printed out, the pages can be put into a plastic sleeve folder to protect them from dew outdoors. All maps have a white background to reduce ink usage if printed out. Personally, I think they are easier to read with a white background.

Timeline and versions to date:

Night Sky Objects V1 became available as a printed document in 2007-2008 then on the web in 2009. I used the drawing program in Appleworks and added all lines/symbols/text manually onto each template (see next page). Maps and object data were put together using the word processor in Appleworks and then converted to a pdf document.

Night Sky Objects V2 (July 2010). The obsoleted Appleworks drawing maps were converted into EazyDraw maps. The maps and object data were migrated into Microsoft Word and then converted to a pdf document.

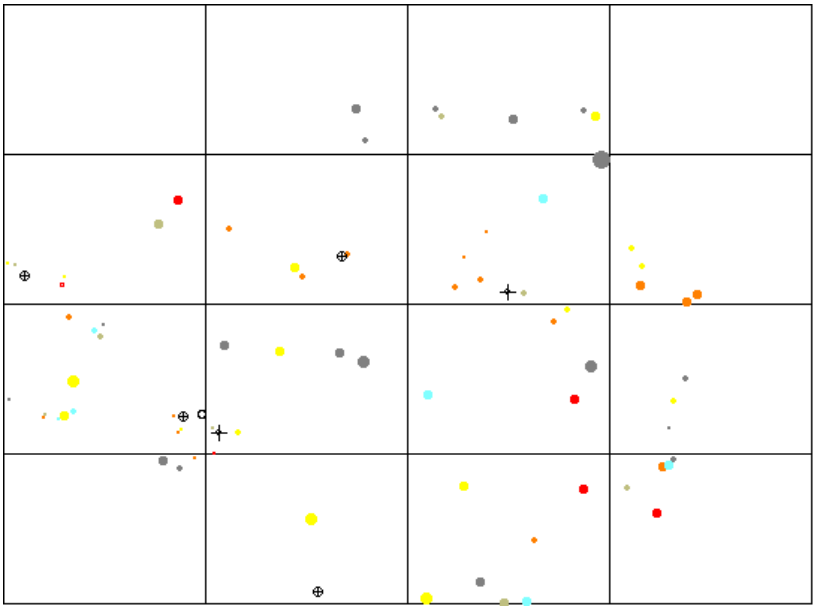
Night Sky Objects V3 (Dec 2013). All object descriptions were revised and updated.

Night Sky Objects V4 (Mar 2020) is a major revision. Many of the EazyDraw maps were expanded upon and all of them exported as eps files to be used in Microsoft Word. All object descriptions were revised and updated. Some objects were removed and a few new ones added. Quite a few extra reference stars were added. Distances were added for stars and deep sky objects.

Night Sky Objects V5 (Jan 2023). Bookmarks with links from the Index tables for constellations were added for easier navigation through the document. Distance data for objects was updated.

Creating the templates and data:

A set of constellation templates were produced by running a program I wrote in BASIC on a Mac.
The database (entered manually) of objects consists of nearly 2,000 stars and DSOs.
Sample template for Aquarius-Capricornus-Piscis Austrinus:



All lines/symbols/text were added manually onto each template using a drawing program – originally Appleworks and now EazyDraw. Maps and object data are put together in Microsoft Word.

Acknowledgements:

SIMBAD Astronomical Database (operated at CDS, Strasbourg, France) was the sole source for all J2000.0 coordinates (RA, Dec) of the objects listed. It was also useful for stellar spectral types, visual magnitudes and the calculation of distances from given parallax …
Stellar distances – Gaia EDR3 parallax, Open Cluster distances – DR2 parallax, Globular Cluster and PN distances – Gaia EDR3 parallax.

SIMBAD's **Query by criteria** was handy to estimate the number of stars to a given magnitude in an open cluster and to find the brightest stars in the cluster.

For multiple star data - **Washington Double Star Catalog** maintained at the U.S. Naval Observatory.

Distances of galaxies were sourced mainly from **NASA/IPAC Extragalactic Database (NED)**.

Other Useful References:

STARS: website by Jim Kaler, Prof. Emeritus of Astronomy, University of Illinois.

SkySafari has extensive in-built information on a huge number of stars and DSOs. SkySafari's source for NGC-IC data is Wolfgang Steinicke's Revised NGC/IC.

Wikipedia's articles on Messier and NGC objects. It also has many useful lists e.g. list of stars by constellation (given in visual magnitude order), list of globular clusters, Messier and NGC objects.

Dedication:

This work is dedicated to the memory of my wife, Leah.

Notes on Data

1 degree = 60 arcminutes (60') and 1 arcminute = 60 arcseconds (60").
D = Dist = Distance. 1 ly = 1 light year and 1 Mly = 1 million light years. About or approximately (~).

Multiple stars. The primary component (brightest usually) is labeled A, the secondary component B. The pair are designated as AB. Two stars appearing close together may be just an optical alignment (optical double) or a true binary system. For a binary star AB, the two stars orbit each other with a known or unknown period. If a third star C orbits the other two, the system would be designated AB-C. Where the BC pair orbits A, it would be designated A-BC.
Two stars AB with very similar spectral types and magnitudes are referred to here as a twin pair.

Multiple star separations are mostly given in arcseconds. For example: the components of Albireo in Cygnus have magnitudes 3.2 and 4.7 (3.2/4.7) and are separated by 35 arcseconds or 35".

Generally speaking, you should easily split two stars 10" apart at 60 magnification (60x), two stars 4" apart at 120 magnification (120x) and two stars 1.5" apart or closer at 180x or higher. Very close (tight) stars will require really good seeing conditions.

Carbon stars are classified by spectral type **Cm,n** where m is from 0 to 9 (decreasing temperature) and n is from 1 to 6 (indicating the strength of the carbon bands).

Colour index = B – V magnitude. The higher the number, the redder is the star.
For example: the white star Sirius has colour index +0.02, the orange giant Aldebaran has colour index +1.48, the red supergiant Betelgeuse has colour index +1.74, while the carbon star R Leporis has colour index +5.70.

Open clusters are loosely bound groups of about 100 to 500 stars that eventually disperse – most over a few 100 million years. Open clusters generally have an irregular (random) distribution of stars that can sometimes form an imagined outline e.g. Butterly Cluster (M6) or Wild Duck Cluster (M11).

A rough apparent size can be given in arcminutes or, if they are really large, in degrees e.g. the Beehive Cluster (M44) has size 1.5 degrees.

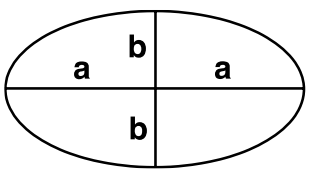
Emission Nebulae like M17 (Swan Nebula), M42 (Orion Nebula) or NGC 2070 (Tarantula) are massive ionized hydrogen gas clouds – the breeding grounds for new stars and open clusters.
Their size is measured in arcminutes or degrees e.g. Eta Carinae Nebula has size 2 x 2 degrees.

Globular clusters are tight, gravitationally bound spheres of stars (as many as hundreds of thousands or even millions of stars). Milky Way globular clusters are some 10-13 billion years old.

Being largely spherical in shape, globular clusters are given an apparent diameter in arcminutes.
For example, Omega Centauri has diameter 36 arcminutes or 36'.

Globular clusters can be classed from 1 to 12 based on central concentration. Nearer to class 1, clusters increase noticeably in concentration or density of stars towards center. Nearer to class 12, stars look more evenly spread across the cluster.

Galaxies are mostly seen as elliptical in shape with long axis 2a, short axis 2b.
The apparent dimensions of a galaxy are given as 2a x 2b in arcminutes.



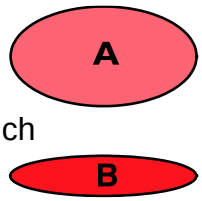
For spiral galaxies, if 2a is nearly equal to 2b then the galaxy disk is seen more **face-on**. For example, M83 in Hydra with dimensions 13.5' x 13'.
If 2a is much bigger than 2b then the galaxy disk is seen more **edge-on**.
For example, NGC 253 in Sculptor with dimensions 28' x 5.6', elongated 5:1.

Surface Brightness

Apparent or visual magnitude is a measure of the overall brightness of an object as if it were a small point of light like a star. This becomes very much an approximation for larger visual objects such as diffuse nebulae, which have irregular boundaries and uneven surface brightness.

For larger objects, surface brightness (SB) can sometimes be a better indication of brightness. However, the figure tends to be an average for the whole surface as, for example, often galaxies have bright central regions but their disks are progressively more diffuse towards edge.

SB can be measured in magnitudes per square arcsecond or, as measured here, in magnitudes per square arcminute. To illustrate the range, globular cluster Omega Centauri (naked-eye) has SB 11.2, the globular cluster M22 about 11.7, galaxy NGC 253 (visible in binoculars) about 12.4, galaxy M49 (easily seen in a 6-inch telescope) about 13, and galaxy M74 (very diffuse in a 12-inch scope) about 14.2 mags/square arcmin.



For objects of similar visual magnitude, the smaller the apparent surface area of the object, the higher the SB. For example, if galaxies A and B of similar apparent width have the same visual magnitude, then the more edge-on galaxy B will appear much brighter than the more face-on galaxy A.

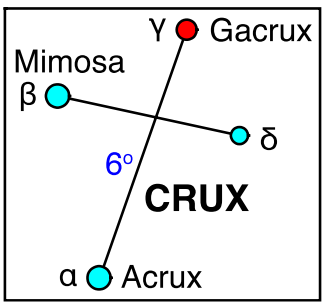
Planetary nebulae.

Many are smallish. Their visual magnitude should be a pretty good idea of brightness. For example, NGC 3242 (the Ghost of Jupiter) in Hydra has magnitude 7.3 and diameter 40” (seconds of arc). It is quite bright as expected.

But some are quite large. For example, NGC 7293 (the Helix Nebula) in Aquarius has magnitude 7.6 and size 15’ x 12’ (minutes of arc). From the magnitude alone, you might assume it to be of similar brightness to NGC 3242. However, the Helix Nebula is much larger visually and has a pretty low surface brightness of 13.8.

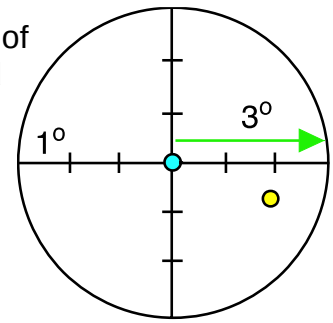
Use of Finderscopes

As a reference, the long axis of the Southern Cross from Acrux (α Crucis) to Gacrux (γ Crucis) is almost exactly 6 degrees.



For the star-hopper, the standard no-frills 8x50 finderscope has a field of view of around 5.7 degrees or approximately 6 degrees. The crosshairs divide the field into 4 quadrants, each of about 3 degrees radius.

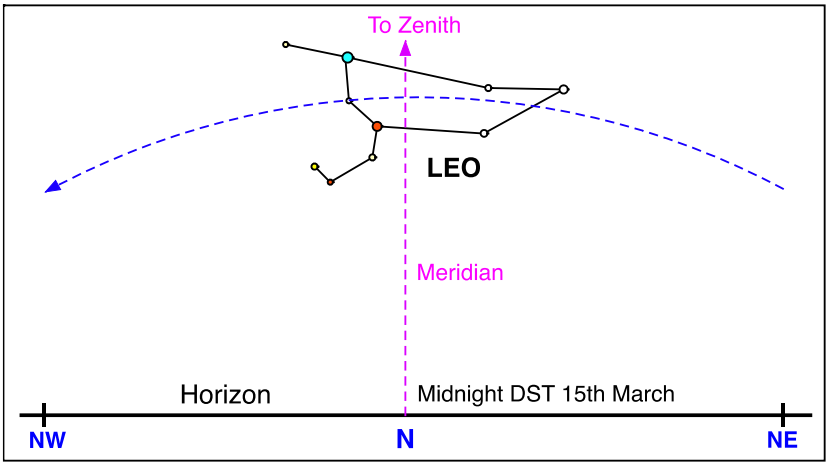
With the finderscope view at right, the blue and the yellow stars depicted would be separated by about 2 degrees.

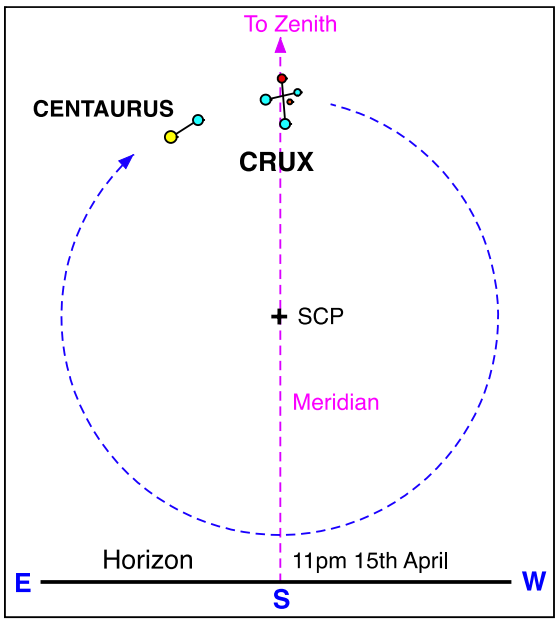


Using this type of finderscope, assuming reasonably dark skies, stars down to about 7th magnitude should be easy enough to pick out, stars of 8th magnitude are do-able but 9th magnitude stars are pushing it. Of course, other factors such as the altitude of the object, dew on lenses, cloud or haze will affect the sighting of any object.

When to Observe the Constellations

The table below shows the constellations that culminate around 10 pm (11 pm DST) +/- one hour, roughly in the middle (15th day) of each month. Culmination occurs when the constellation is centered on the meridian (a line in the sky from north to south through the zenith) and is highest in the sky.





Each constellation will, of course, culminate 2 hours later (i.e. midnight or 1am DST) in the middle of the previous month and two hours earlier (i.e. 8pm or 9pm DST) in the middle of the following month.

Click on any constellation name in the table to go to its map page …

Adjacent and like-coloured cells indicate constellations that are on the same map. Perseus laps around to Auriga so they are on the same map. Constellations in adjacent white cells are not on the same map. Constellations under each month heading are listed from north to south.

As far as is possible, constellations are grouped in order of right ascension, north to south, beginning with Orion, which culminates at around 10pm mid-January (11pm daylight savings time).

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Aur	Gem	Cnc	Cvn	Cvn	Boo	Her	Lyr	Agr	Peg	And	Per
Ori	CMi	Leo	Com	Com	CrB	Oph	Cyg	Cap	Psc	Tri	Tau
Lep	Mon	Sex	Vir	Vir	Ser 1	Ser 2	Vul	PsA	Scl	Ari	Eri
CMa		Hya	Crv	Cen		Sct	Sge			Cet	For
Col	Pup	Vel	Cru	Cru	Lib	Sco	Del	Gru	Tuc	Phe	Ret
Dor	Vol	Car	Mus	Mus	Lup		Aql			Hyi	Dor
					Nor		Sgr				
							CrA				
					TrA	Ara	Pav				

Alphabetic Index for constellations

Click on constellation name for map page …

About the Maps: Facing north, the maps are inverted so that constellations are “the right way up” for southern observers. The **RA and Dec** for these will run in the opposite directions. Facing south, the maps have the usual orientation above the South Celestial Pole.

As usual, the size of the circle for a star reflects its brightness or visual magnitude. The hottest stars are blue to white, while the coolest stars are orange to red. The star colours on each map indicates the **spectral class**. From hottest to coolest: dark-blue = blue O-class, light blue = blue-white B-class, white = white A-class, light yellow = yellow-white F-class, yellow = yellow G-class, orange = orange K-class, red = red M-class. Not indicated on the maps, each class is further graded with a number from 0 to 9 where 9 is the coolest end. Class + number = spectral type. For example, B8 for Rigel.

Symbols for other objects:

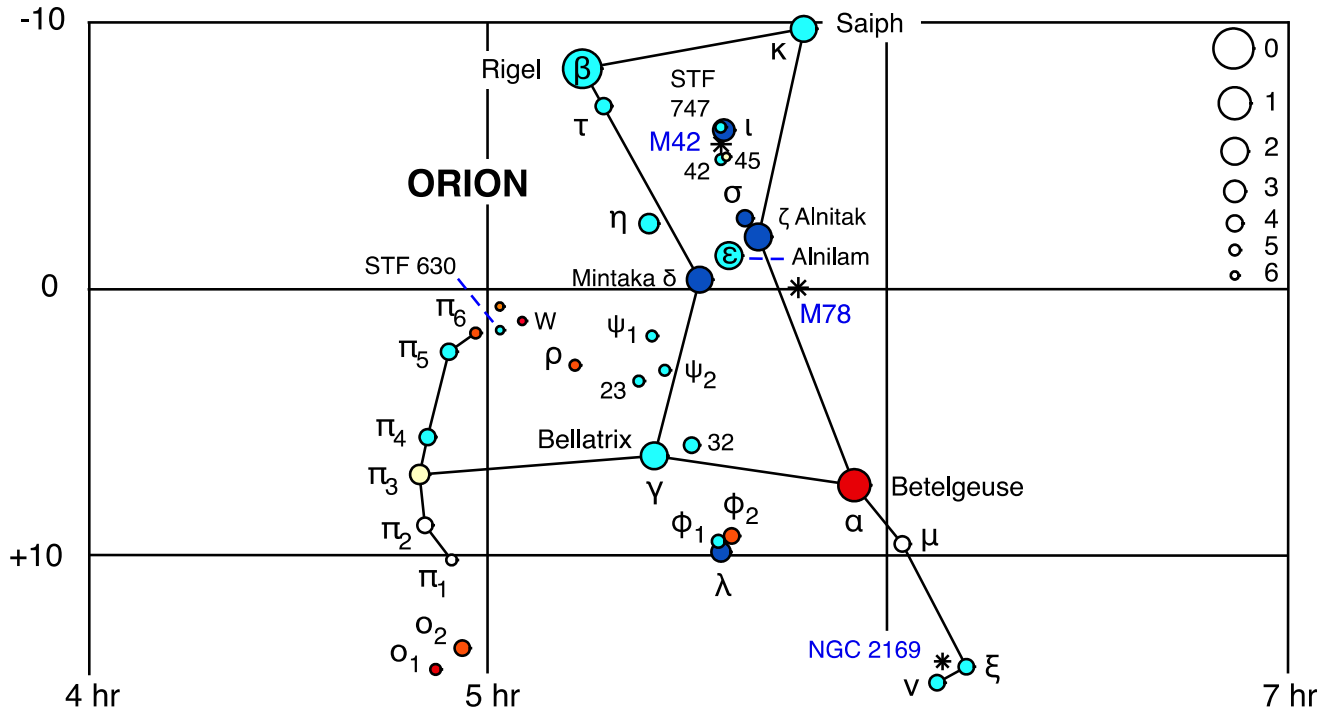
Planetary nebula 

Open Cluster or emission/reflection nebula 

Globular cluster 

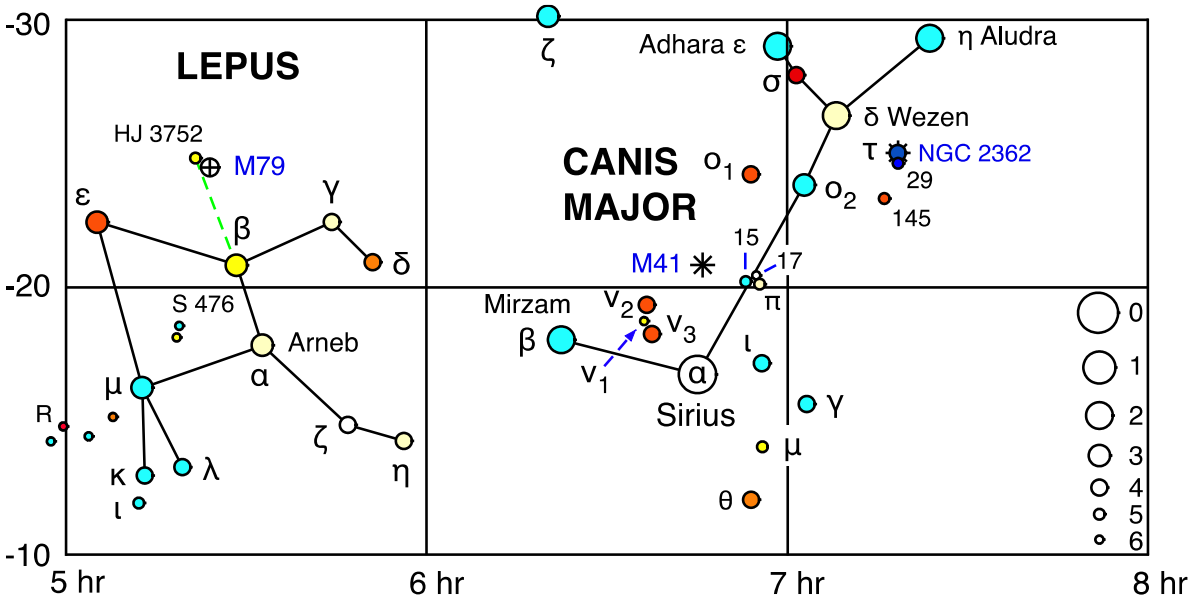
Galaxy 

“Stick” figures for constellations are in the main based on more traditional designs.



ORION Return to Index

Beta (β)	**Rigel**. Striking magnitude contrast. Magnitudes 0.3/6.8, separation 9.2". Spectral types B8/B5. Seem to be physically related. Distance ~ 860 ly.
Delta (δ)	**Mintaka**. AB-C. Mags 2.4/3.8//6.8. Separations 0.3", 56". O9.5//B2. C is optical.
Theta 1 (θ_1)	**Trapezium** star cluster in M42. In circular order ABDC. Mags 6.5/7.5/6.4/5.1. B0.5/B0/B0.5/O6. Seps from A: 8.9", 21", 12.9". Also, 2 stars of 10-11th mag.
Theta 2 (θ_2)	Magnitudes 5/6.2, separation 52". O9.5/B1. Theta 2 is 2.4' from the Trapezium. Components of Trapezium and Theta 2 Ori at roughly 1,200-1,300 light years.
Iota (ι)	Magnitudes 2.9/7, separation 12.5". O9/B7. Optical double.
Lambda (λ)	**Meissa**. Magnitudes 3.5/5.5, separation 4.3". O8/B0.5. Pair at 1,300 ly.
Rho (ρ)	Contrasting pair. Magnitudes 4.5/8.5, separation 6.4". K1/? Optical double.
Sigma (σ)	Five-star system. In linear visual order, mags 6.3/6.6/AB/8.8. B2/B2/O9.5/A2. Seps from AB: 41", 13", 11.4". AB mags 4/5.3 only 0.3" apart. Stars ~ 1,300 ly.
23	Magnitudes 5/6.8, separation 32". B1/B8. Optical double.
32	Tight binary, mags 4.2/5.8, separation 1.3". B5/? Period 614 years. D ~ 330 ly.
STF 747	Mags 4.7/5.5, sep 36". B0.5/B1. Just 8' from Iota (ι) Orionis. Optical double.
W	Carbon star, mag 5.3-8. C5,4. Period 212 days. Colour index +3.63. D 1,600 ly.
M42 (NGC 1976)	**Orion Nebula** with the Trapezium in M42 (see Theta 1 above). Dist ~ 1,400 ly. Bright emission nebula, magnitude 4, size 85' x 60'. Sub-nebula **M43** around the B0 star NU Orionis (mag 6.5-7.6) – approx. 8' north of the Trapezium.
M78 (NGC 2068)	Small reflection nebula, magnitude 8.3, size 8' x 6'. Reflected light from the stars HD 38563 AB, magnitudes 10.4/10.5, separation 50". B3/A7.
Sharpless 279	HII region and reflection nebula north of M42. Magnitude 7, size 35' x 25'. **Running Man Nebula** (NGC 1977 - photo object) lit up by the hot B1 star 42 Ori (mag 4.6). About 4' from 42 Ori, F0 giant 45 Ori (mag 5.2) is much closer to us.
NGC 2169	"37" open cluster. Mag 5.9, size 5'. About 20 stars to mag 12 with 9 stars in the "3" and 6 in the "7". Brightest: STF 848 (mag 7.3/8.2, sep 2.6") top right of "3".



CANIS MAJOR

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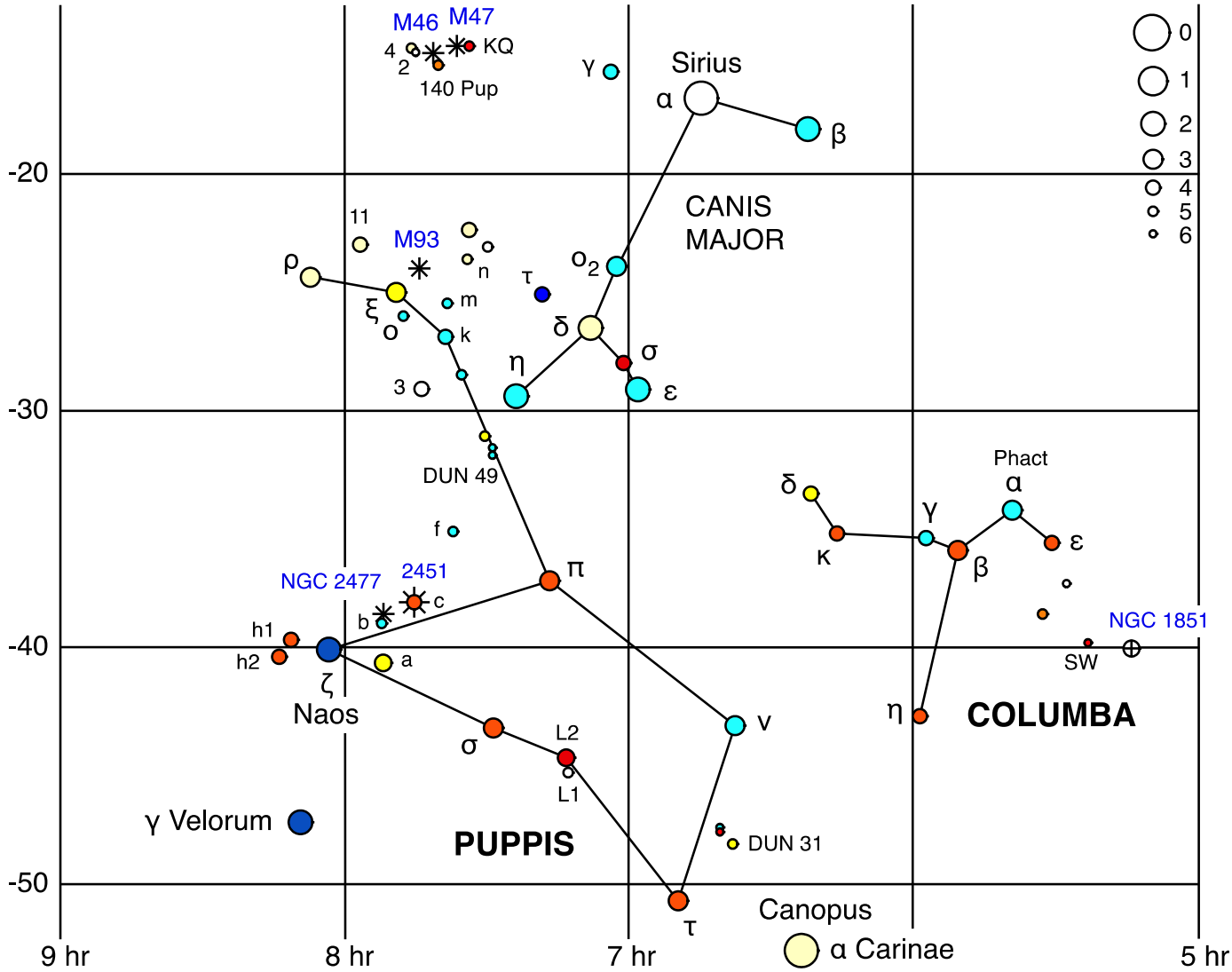
Alpha (α)	**Sirius**. Binary, magnitudes -1.4/8.5, separation 11.2”. A1/DA. Distance 9 ly. Period 50 years. Challenging due to the glare & mag difference but do-able.
Epsilon (ε)	**Adhara**. Mags 1.5/7.5, separation 7.9”. B2/A4. Binary? Distance ~ 400 ly.
Mu (μ)	Colour contrast. Mags 5.3/7.1, separation 2.9”. G5/A2. Pair at 950 ly distance.
Nu 1 (ν_1)	Magnitudes 5.8/7.4, separation 17”. G9/F3. From distances, optical only.
Pi (π)	Magnitude contrast. Mags 4.7/9.6, separation 11.6”. F2/? Both at 97 ly.
17	ABC. Mags 5.8/8.7/9.2, seps 43”, 49”. A3/K5/A3. 18’ from π. B and C optical.
145 (HJ 3945)	**“Southern Albireo”**. Magnitudes 5/5.8, separation 27”. K4/F0. Using o_1-o_2 as pointers, about 3 degrees from o_2. Also, 1.7 degs from Tau (τ). From the distances (2,700 & 350 ly), this is just an optical double.
M41(NGC 2287)	Open cluster, mag 4.5, size 35’. Distance 2,400 ly. About 130 stars to mag 12. Many blue-white and white stars but also several bright, orange (K0-3) giants. Brightest: the orange K3 star HD 49091 (magnitude 6.9) near center.
NGC 2362	**Tau Canis Majoris Cluster**. Open cluster, magnitude 3.8, size 8’. Distance 4,400 ly. Rich and compact. Brightest star is the blue O9 supergiant Tau (τ) CMa at magnitude 4.4. Otherwise, around 35 stars mag 8-12.

LEPUS

Gamma (γ)	Magnitudes 3.6/6.3, separation 96”. F6/K2. Both stars at 29 ly.
S 476 (YZ, TX)	Magnitudes 6.3/6.5, separation 39”. B3/B8. Stars at roughly 770 ly.
HJ 3752	Magnitudes 5.4/6.6, separation 3.5”. G7/A7. Stars at roughly 350 ly. Use α-β Leporis as pointers. About the same distance out from β as β-γ.
R Leporis	**Hind's Crimson Star**. Carbon star, mag 5.5-11. C7,4. Period 427 days. Colour index +5.70. Dist 1,500 ly. About 3.5 degrees from Mu (μ) Leporis.
M79 (NGC 1904)	Globular cluster, magnitude 7.7, diameter 9’. Class 5. Distance 37,000 ly. Just 36’ from the 5th magnitude double star HJ 3752.

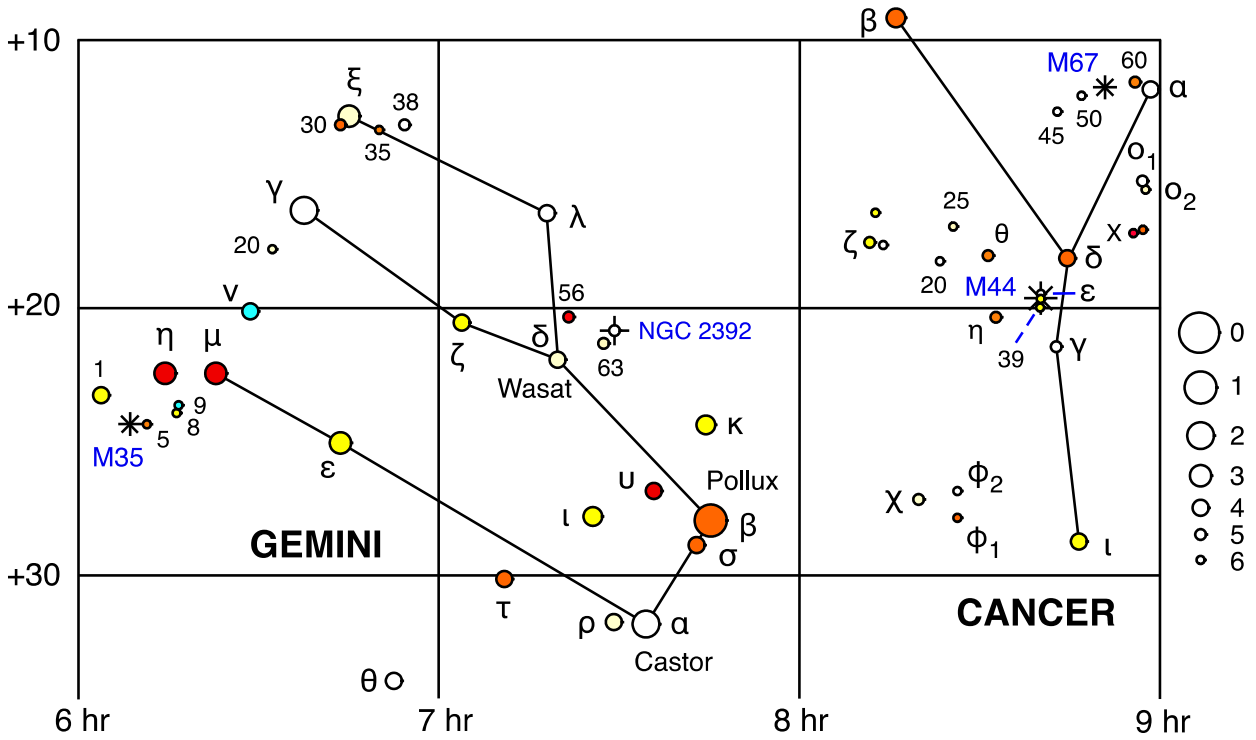


PUPPIS Return to Index

2	Magnitudes 6/6.7, separation 17”. A2/F0. Pair at 278 ly.
k (HR 2948/9)	Striking twin pair, mags 4.4/4.6, separation 10”. B6/B5. Roughly 360 ly.
n (HR 2909/10)	Twin pair. Magnitudes 5.8/5.9, separation 10”. dF4/dF6. Distance 100 ly.
DUN 31	Magnitudes 5.1/7.4, separation 13”. G8/A0. Both about 490 ly.
DUN 49	Magnitudes 6.4/7, separation 9”. B3/B4. Likely binary at 1,200 ly.
M46 (NGC 2437)	Rich open cluster, mag 6.1, size 20’. Distance 5,400 ly. Possibly 500 stars mag 9 and fainter. About 1.3 degrees from the brighter M47. Planetary nebula (foreground) - NGC 2438, mag 10.8, size ~ 70”. D ~ 2,400 ly. Looks like a small smoke ring. Remnant white dwarf is a very dim mag 17.7.
M47 (NGC 2422)	Scattered open cluster, mag 4.4, size 25’. Distance 1,600 ly. About 70 stars to mag 12. Brightest star is V378 Pup (B2 mag 5.7) towards edge. At center, is the double star STF 1121, mags 7/7.3, separation 7.2”.
M93 (NGC 2447)	Small open cluster, mag 6.2, size 10’. Distance 3,400 ly. About 45 stars to magnitude 12. Brightest is the orange K2 giant HD 62679 (mag 8.2) near edge.
NGC 2451	Large, bright cluster, magnitude 2.8, size 50’. Distance 630 ly. About 90 stars mag 6-12. Centered on the orange K2 giant c Puppis, magnitude 3.6.
NGC 2477	Open cluster, mag 5.8, size 20’. Distance 4,900 ly. About 40 stars mag 10-12. Just 21’ from b Pup.

COLUMBA

NGC 1851	Globular cluster, magnitude 7.1, diameter 11’. Class 2. High central density. Distance 37,000 ly. About 5.7 degs from ε Columbae. 1.8 degs from SW Col.

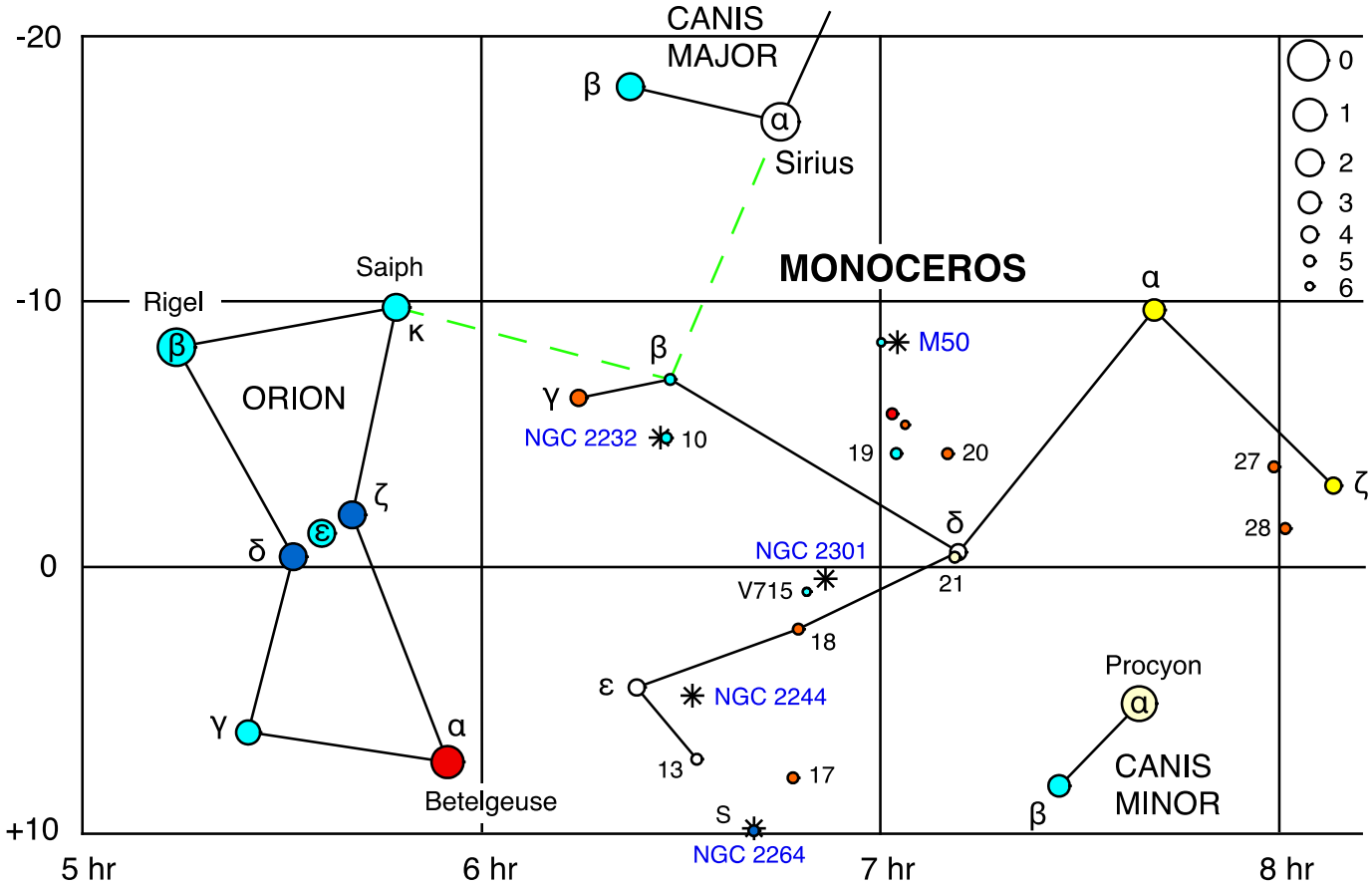


GEMINI Return to Index

Alpha (α)	**Castor**. Binary AB, mags 1.9/3, separation 5.4”. A1/A2. Period 460 years. C = YY Gem, mag 9.8, sep 72”. Spectral type dM1/dM1, eclipsing binary. Components A, B and C all spectroscopic binaries = total 6 stars. Dist 50 ly.
Delta (δ)	**Wasat**. Magnitude contrasting binary, magnitudes 3.5/8.2, separation 5.5”. F2 / (K3 orange dwarf). Period 1,200 years. Distance 60 ly.
20	Magnitudes 6.3/6.9, separation 20”. F8/F6. Both stars at 300 ly.
38	Binary, mags 4.8/7.8, separation 7.3”. F0/G6. Period 1,900 years. Dist 96 ly.
M35 (NGC 2168)	Open cluster, mag 5.1, size 25’. Distance 2,900 ly. About 120 stars to mag 12. Brightest (8’ out from center) is the yellow G0 star HD 41996 (mag 7.4).
NGC 2392	**Eskimo or Clown Face Nebula**. Planetary nebula. Double-shell structure. Mag 9.2, size ~ 50”. Mag 10.5 central star. About 38’ from 63 Geminorum. Distance about 6,000 light years.

CANCER

Zeta 1,2 ($\zeta_{1,2}$)	Multiple star system, AB-C. Mags 5.3/6.3//5.9. Seps 1.1”, 5.9”. F8/F9//G5. Zeta 1 = AB. Period AB about 60 years and AB-C 1,100 years. Distance 80 ly.
Iota (ι)	Magnitudes 4.1/6, separation 31”. G8/A3. Both at roughly 340 ly.
Phi 2 (φ_2)	Almost twin pair of mags 6.2/6.2, separation 5.2”. A3/A6. Distance 345 ly.
X	Carbon star, mag 5.6-7.4. C5,4. Period 193 days. Colour index +3.21. Distance 1860 ly.
M44 (NGC 2632)	**Beehive Cluster**. Very large open cluster, magnitude 3.1, size 1.5 degrees. One of the nearest open clusters at 610 light years distance. About 180 stars to magnitude 12 with 13 stars mag 6 to 7.5. Brightest stars: Epsilon (ε) Cancri (A8 mag 6.3) 7’ south of center (up), HR 3428 (G9 mag 6.4) at center and 39 Cancri (G8 mag 6.4) 21’ north of center (down).
M67 (NGC 2682)	Old open cluster – age 4 billion years. Mag 6.9, size 25’. Distance 2,900 ly. About 40 stars to mag 12. Many yellow and orange stars. Brightest is the orange K0 giant HD 75700 (mag 7.9) near edge. Sits halfway between 50 & 60 Cancri.



MONOCEROS Return to Index

Beta (β) — Magnificent triple system of like stars A-BC, magnitudes 4.6/5/5.3. Separations AB = 7”, BC = 3”. All blue-white B3/B3/B3. Distance ~ 690 ly. Component A assumed to orbit the BC pair. Beta Monocerotis is 10.5 degrees from both Saiph & Sirius. Line angle about 97°.

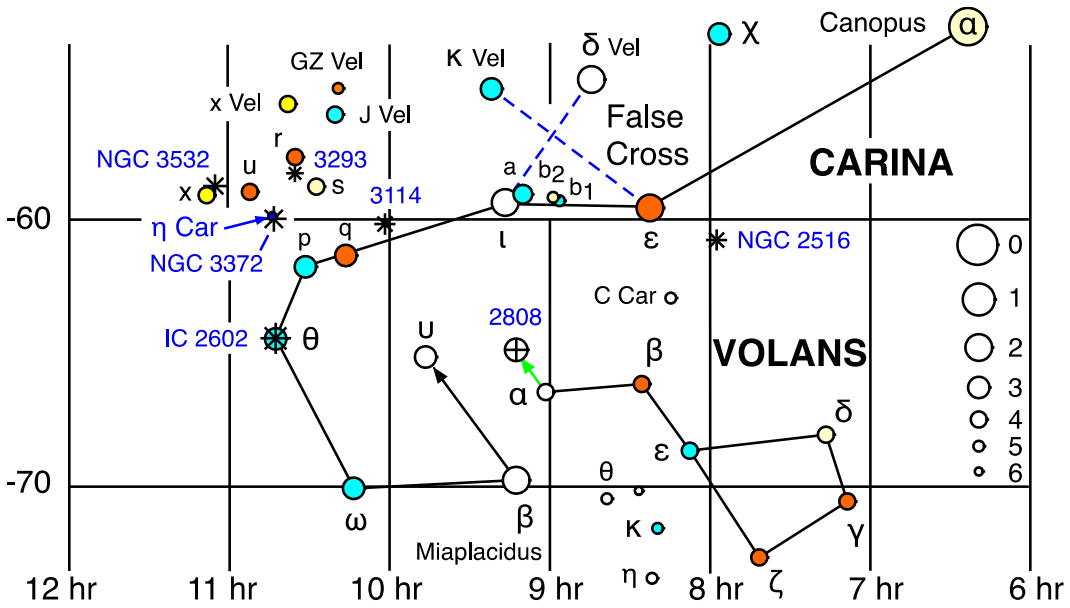
M50 (NGC 2323) — Open cluster, magnitude 5.9, size 15’. Distance ~ 3,300 ly. About 50 stars to mag 12 and 140 to mag 14. Brightest is the orange K2 giant star HD 52938 (mag 7.8) near the southern edge.

NGC 2232 — Large scattered open cluster, mag 4.2, size 50’. Distance 1,100 light years. About 50 stars to mag 12. Approximately 2.3 degrees from Beta Monocerotis. Off center is the brightest star 10 Mon (mag 5), a blue-white B2 star.

NGC 2301 — Open cluster, mag 6, size 15’. About 50 stars to mag 12. Distance 2,900 ly. Brightest is the yellow G8 central star SAO 114533 at magnitude 8.

NGC 2244 — **Rosette Cluster** within **Rosette Nebula** (a large round emission nebula). Magnitude 4.8, size 20’. The nebula itself spans about 1.5 degrees. Distance 5,300 light years. About 40 stars to mag 12.
The six brightest stars form three roughly parallel pairs, each star in the pair about 3’ to 4’ apart. The brightest is the orange K0 star 12 Mon (mag 5), which is a foreground object and not a cluster member.
Cluster sits about 2 degrees from Epsilon (ε) Monocerotis.

NGC 2264 — **Christmas Tree Cluster** and Cone Nebula (hard to see visually). Magnitude 4.1, size 55’. Distance 2,400 ly. Large, about 100 stars mag 7.5-12. Brighter stars form the tree asterism, which spans about 0.5 degrees. Brightest member is the blue O7 star S Monocerotis (mag 4.7) at the base of the tree.

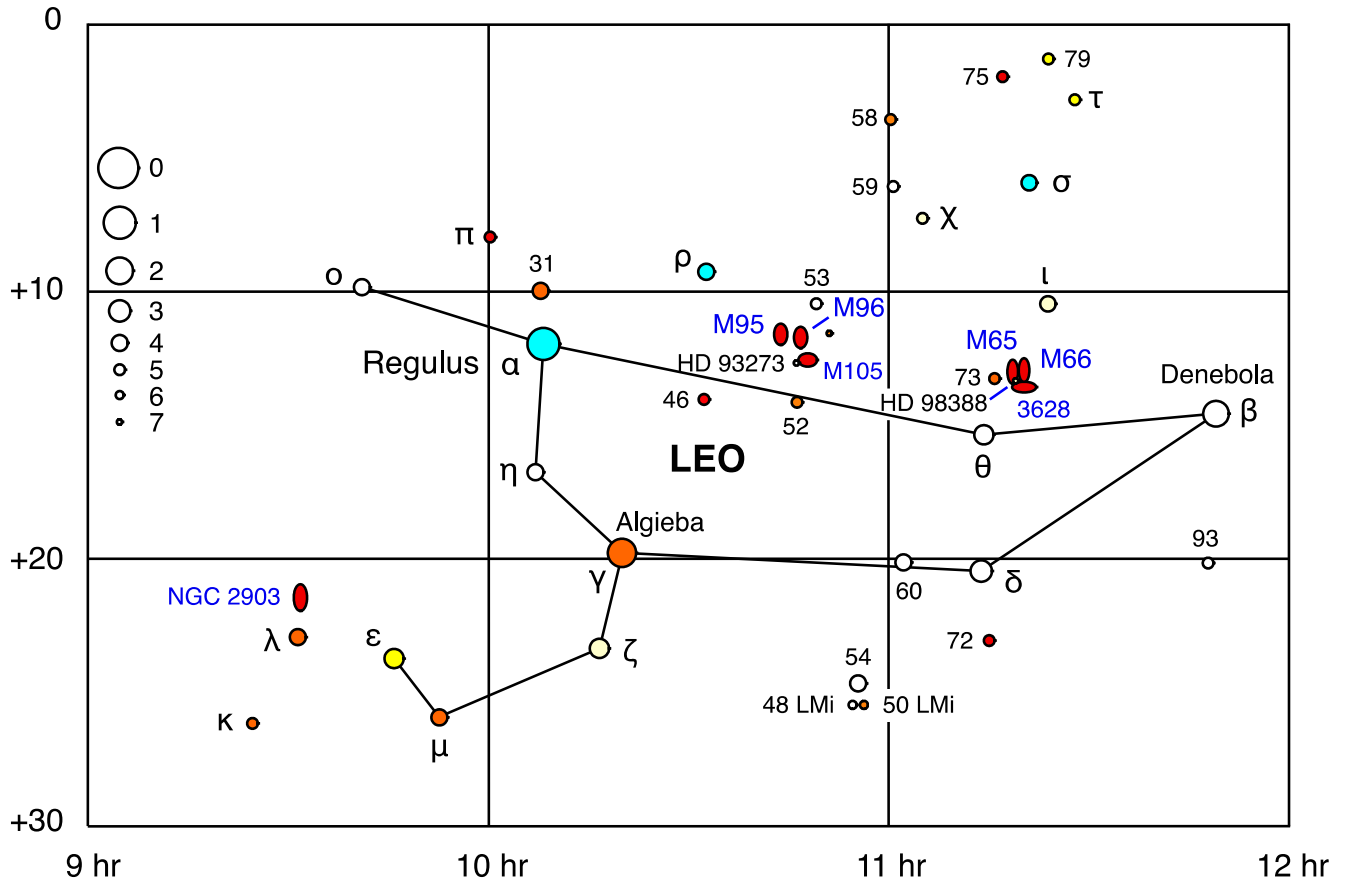


CARINA Return to Index

Upsilon (υ)	Magnitudes 3/6, separation 5.1”. A6/B7. Both at about 1,440 ly.
b1 (DUN 74)	Magnitudes 4.9/6.6, separation 40”. B2/B8. Stars at about 630 ly.
C (RMK 8)	Magnitudes 5.3/7.6, separation 4.1”. A2/F2. Both at about 255 ly.
NGC 2516	**Southern Beehive**. Mag 3.8, size 30’. Distance 1,400 light years. Bright with over 100 stars, mostly blue-white to white, mag 6 and fainter. Red M1.5 giant star V460 Car (mag 5.2) at edge lies at a similar distance.
NGC 2808	Massive globular cluster, mag 6.2, diameter 14’. Class 1. Very condensed with more than one million stars. Distance 29,000 ly. About 1.8 degs from α Volantis, which is 1/3 the angular distance between Miaplacidus and Upsilon (υ) Carinae.
NGC 3114	Open cluster, mag 4.2, size 35’. Distance 3,400 ly. About 200 stars mag 6-12. Contains several chains of stars. Sits about 2.1 degrees from q Centauri.
NGC 3293	**Gem Cluster**. Open cluster, mag 4.7, size 6’. Compact, rich. Distance 8,700 ly. About 50 mostly blue-white stars magnitude 6.5-12. Red M1.5 supergiant V361 Car (mag 6.5). About 1.9 degrees from Eta (η) Carinae and 40’ from r Carinae.
NGC 3372	**Eta Carinae Nebula**. Large naked-eye emission nebula. Mag 1, size 2 x 2 degs. Eta (η) Carinae is a very luminous (Class O) binary AB of masses 120-200 solar & 30-80 solar. It is variable and a prime supernova candidate. Dist ~ 7,500 ly. **Homunculus Nebula**. Size 18”. Consists of two bipolar lobes of dust and gas, surmised to have formed from a massive explosion when a 3rd star crashed & merged into one of the other two. Light from the eruption peaked in March 1843.
NGC 3532	**Wishing Well Cluster**. Mag 3, size 50’. Rich and spectacular. Distance 1,600 ly. Over 300 stars (many of Class A) to mag 12. Brightest (off-center) is the K2 star HR 4323 (mag 6). G4 star x Carinae (mag 3.9) at edge is actually 6,000 ly away.
IC 2602	**Southern Pleiades**. Open cluster, magnitude 1.6, size 100’. Large, bright. Distance 500 ly. About 50 stars, mag 4.5-9.5. Ten blue-white stars mag 4.5-6.5. Brightest member is the blue-white B0 Theta (θ) Carinae, magnitude 2.7.

VOLANS

Gamma 2,1 ($\gamma_{2,1}$)	Magnitudes 3.9/5.4, separation 15”. K0/F2. Possible pair. Distance ~ 135 ly.
Epsilon (ε)	Magnitudes 4.4/7.3, separation 5.7”. B6/? Stars at about 640 ly distance.
Kappa 1,2 ($\kappa_{1,2}$)	Triple star ABC, mags 5.3/5.6/7.7. Sep AB 64”, BC 37”. B9/A0/? C is optical.



LEO [Return to Index](#)

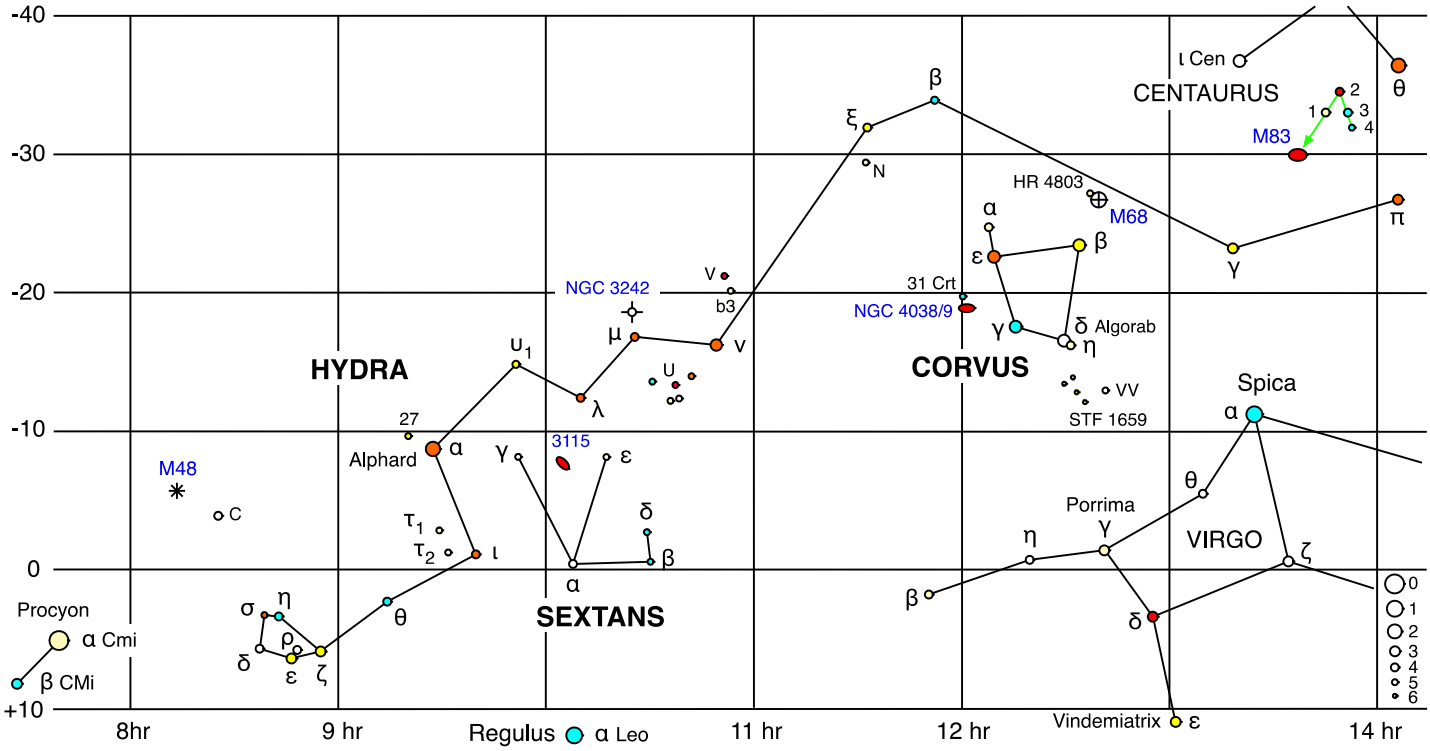
Alpha (α)	**Regulus**. Magnitudes 1.4/8.2, separation 179”. B7/K1. Pair at 79 ly distance.
Gamma (γ)	**Algieba**. Binary, mags 2.4/3.6, sep 4.7”. K1/G7. Period 554 years. Dist 130 ly.
Tau (τ)	Magnitudes 5/7.5, separation 89”. G8/G5. From distances, optical only.
54	Magnitudes 4.5/6.3, separation 6.8”. A1/A2. Stars at about 305 ly.
83	Not shown on map. Just 20’ from Tau. Magnitudes 6.5/7.5, separation 29”. K0/K4. Pair at 59 ly distance.

Leo Triplet The 7th mag star HD 98388 sits 48’ from 73 Leo in the direction of Denebola. The galaxies of the Leo Triplet sit around HD 98388: M65 is 18’ from it, M66 is 29’ from it and NGC 3628 is 21’ from it. Galaxies at about 34 Mly distance. M65 & M66 are 20’ apart and easily fit in the same low power field. Depending on your scope, it may be possible to frame all 3 galaxies with a widefield EP.

M65 (NGC 3623)	Spiral galaxy, magnitude 9.3, dimensions 9’ x 2.4’. SB 12.4.
M66 (NGC 3627)	Spiral galaxy, magnitude 8.9, dimensions 9’ x 3’. SB 12.2.
NGC 3628	Spiral galaxy, magnitude 9.5, dimensions 13’ x 3’. SB 13.2.

M95, M96, M105, NGC 3384 all members of the **M96 Group** of galaxies at about 35 Mly distance.

M95 (NGC 3351)	Spiral galaxy, mag 9.7, dimensions 7’ x 4.5’. SB 13.2. Sits 42’ from M96.
M96 (NGC 3368)	Spiral galaxy, mag 9, dimensions 8’ x 5’. SB 12.7. Sits 48’ from M105.
M105 (NGC 3379)	Elliptical galaxy, magnitude 9.3, dimensions 5.5’ x 5’. SB 12.6. About 1.6 degrees from 52 Leonis and 24’ from HD 93273 (mag 6.9).
NGC 3384	Just 7’ from M105. Elliptical galaxy, mag 9.9, 6’ x 3’. SB 12.8.
NGC 2903	Spiral galaxy, magnitude 9, dimensions 12’ x 5’. SB 13.2. Distance 26 Mly. The galaxy lies 1.5 degrees south (up) of Lambda (λ).



HYDRA

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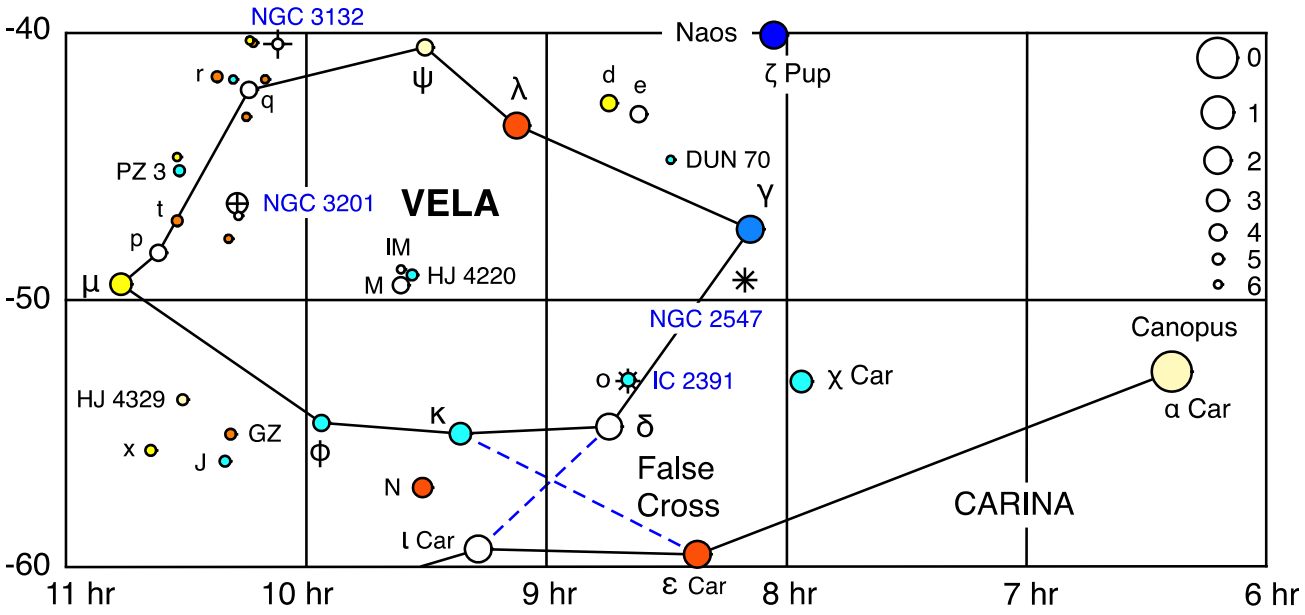
Epsilon (ε)	AB-C. Mags 3.4//6.7, seps 0.1”, 2.9”. G5//F5. Period AB-C 900 years. D 129 ly.
Tau 1 (τ_1)	Magnitudes 4.6/7.3, separation 66”. F6/K0. Pair at 59 ly distance.
N (17 Crt)	Twin pair. Magnitudes 5.6/5.7, separation 9.6”. F8/F8. Pair at 92 ly.
U	Carbon star, mag 4.5-6.2. C5,4. Period 450 days. Colour index +2.70. D 680 ly.
V	One of the reddest carbon stars. Magnitude 6.5-9.5. C6,5. Distance 1,400 ly. Period 531 days. Colour index +4.15. About 1.2 degrees from b3 Hydrae.
NGC 3242	**Ghost of Jupiter**. Blue-green planetary nebula, magnitude 7.3, size ~ 40”. Double-shell structure. Bright inner shell with fainter outer envelope. Magnitude 12.1 central white dwarf. Distance about 4,400 light years.
M48 (NGC 2548)	Open cluster, mag 5.8, size 30’. Distance 2,500 ly. About 80 stars mag 8-12.
M68 (NGC 4590)	Globular cluster, magnitude 7.8, diameter 11’. Class 10. Distance 29,000 ly. About 3.5 degrees form Beta (β) Corvi and 33’ from 5th mag star HR 4803.
M83 (NGC 5236)	**Southern Pinwheel Galaxy**. Bright face-on barred spiral. Distance 15 Mly. Mag 7.5, dimensions 13.5’ x 13’. SB 12.8. About 3.7 degs from 1 Centauri. Forming an arc with M83 is a 7th mag star 18’ away & a 6th mag star 28’ away.

CORVUS

Delta (δ)	**Algorab**. Magnitudes 3/8.5, separation 24”. B9.5/K2. Pair at 87 ly.
VV (STF 1669)	Twin pair, mags 5.9/5.9, separation 5.2”. F3/F5. Distances indicate optical. About 1.6 degrees from STF 1659 (“Stargate”) near M104. See Virgo map.
NGC 4038/9	**Antennae Galaxies**. Galaxies in collision – both barred spiral galaxies around mag 11. Similar dimensions 3.4’ x 1.7’ and 3.3’ x 1.7’. Distance 69 Mly. About 50’ from 31 Crateris.

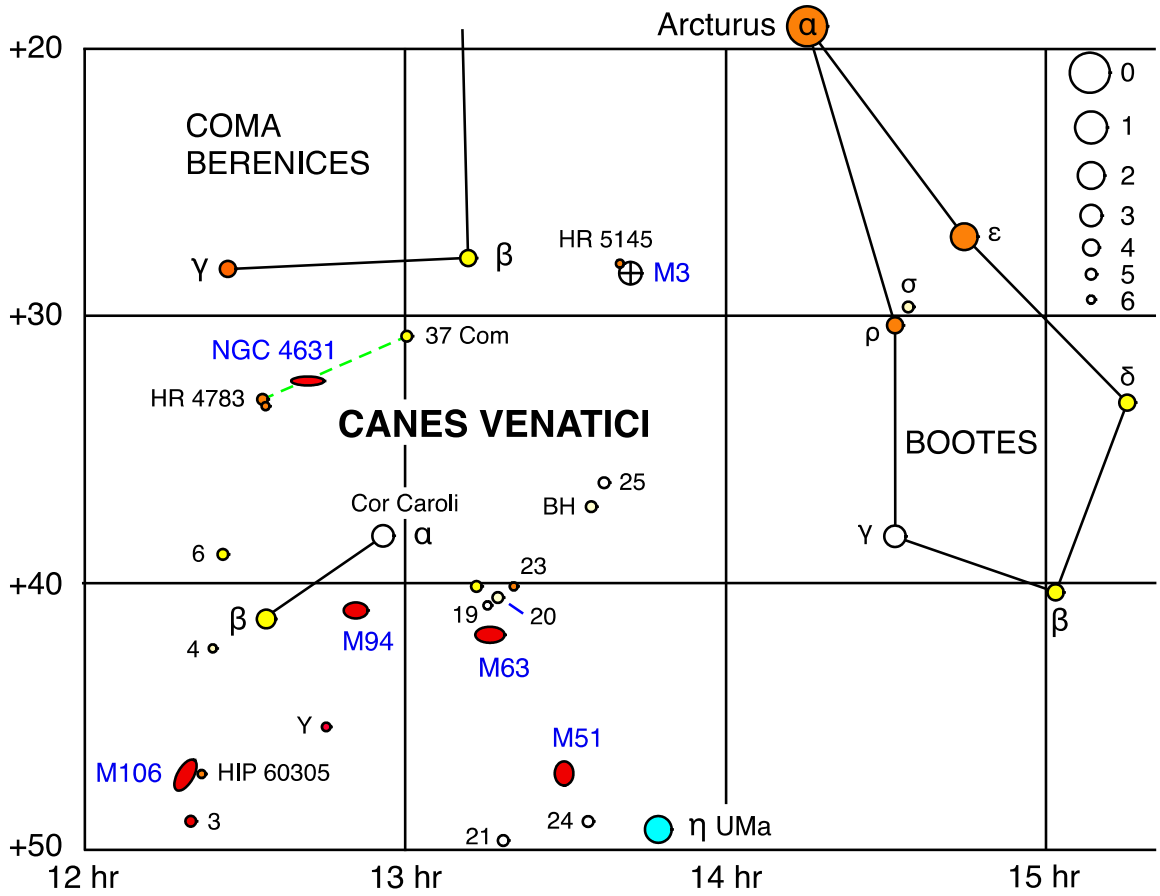
SEXTANS

NGC 3115	Bright lenticular galaxy known as the **Spindle Galaxy**. Distance 34 Mly. Magnitude 9, dimensions 7’ x 2.5’. SB 11.8. Elongated 3:1. About 3 degs from both Gamma (γ) & Epsilon (ε) Sextantis. Not quite in-line.



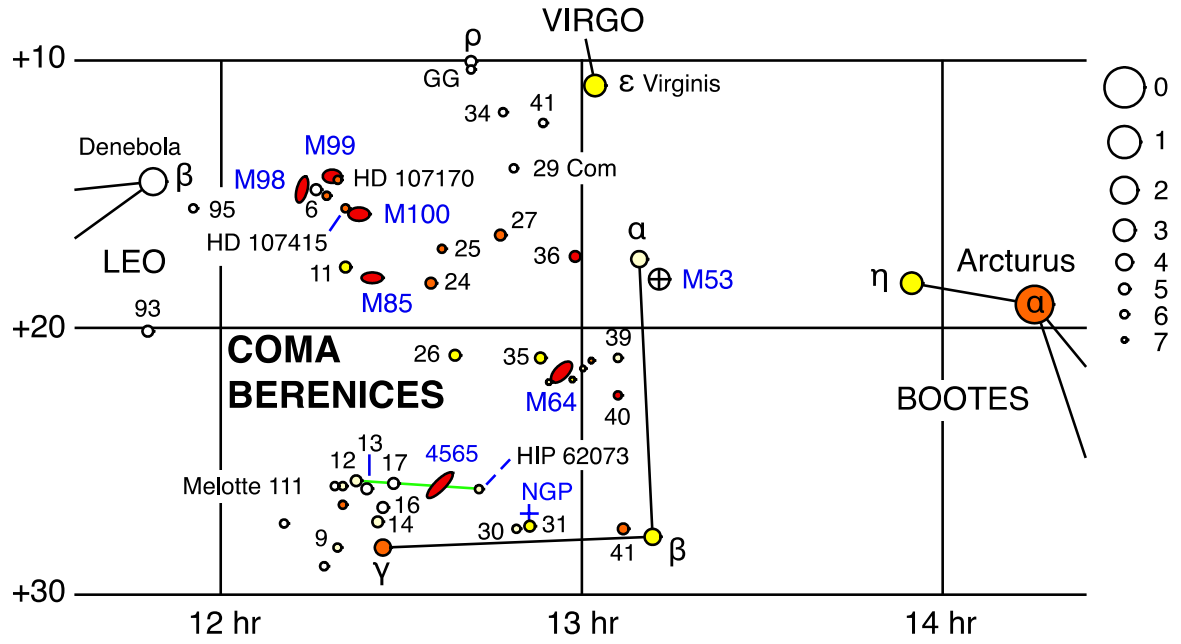
VELA Return to Index

Gamma 2,1 ($\gamma_{2,1}$)	**Regor**. Multiple star ABCD. Mags 1.8/4.1/7.3/9.4, separations 41”, 62”, 94”. (WC8+O7.5)/B1/F0/F0. Gamma 2 – brightest known Wolf-Rayet star. Overall shape of the four stars is a capital “Y”. All stars at roughly 1,100 ly.
Mu (μ)	Tight binary. Mags 2.8/5.7, separation 2.3”. G5/G2. Period 149 yrs. Distance 117 light years.
J (RMK 13)	Magnitudes 4.5/7.2/9.2, separations 7.2”, 36”. B3/B9/? AB at 1,440 ly. C is much further away and is just an optical alignment.
x (DUN 95)	Striking colour contrast. Mags 4.4/6, separation 52”. G2.5/B8. Likely optical.
DUN 70	Magnitudes 5.2/7, separation 4.7”. B2/B2.5. Optical only.
HJ 4220	Magnitudes 5.5/6.2, separation 2”. B4/? Stars at roughly 860 ly.
HJ 4329	Magnitudes 5/8.6, separation 81”. F6/K7. Definitely optical only.
PZ 3	Magnitudes 5.7/6, separation 14”. B6/B8. Stars at roughly 820 ly.
NGC 2547	Open cluster mag 4.7, size 40’. Distance 1,300 ly. About 80 stars to mag 12. 1.8 degs from Gamma (γ) Velorum. Central is a relatively bright arc of stars. Brightest star and also in the arc is the B3 star HD 68478 (mag 6.4).
NGC 3132	**Eight Burst Nebula**. Planetary nebula, mag 9.7. Size ~ 50”. Dist ~ 2,500 ly. About 1.8 degrees from q Velorum. The 10th mag star at center is not the remnant star. A 16th mag star 1.6” from it created the planetary nebula.
NGC 3201	Loose globular cluster, mag 6.8, diameter 18’. Class 10. Distance 14,700 ly. Seen as a small round hazy patch of about 3’ diameter in 10x60 binoculars.
IC 2391	**Omicron Velorum Cluster**. Large, bright. Distance only about 500 ly. Scattered open cluster mag 2.6, size 1 degree. Around 90 stars to mag 12. Brightest 7 stars (mag 3.5-6.5) are all blue-white class B stars. HR 3448 (mag 5.6) is at center. NZ is a mag 5.2/8.7 double (separation 17”) to one side of it. On the other side is the brightest star – Omicron (o) Velorum (of spectral type B3) at magnitude 3.6. HY and KT Velorum (mag 4.8/5.5) are a wide 76” bright pair nearer to edge.



CANES VENATICI Return to Index

Alpha (α)	**Cor Caroli**. Mags 2.9/5.5, separation 19”. A0/F0. Stars at roughly 100 ly.
25	Tight binary, mags 5/7, separation 1.6”. A5/F0. Period 228 years. Dist 184 ly.
Y	**La Superba**. Carbon star, magnitude 5-6.4. C5,5. Period 157 days. Colour index +3.24. One of the brightest carbon stars in the sky. Distance 1,000 ly. About 4.5 degrees from Beta (β) Cvn.
M3 (NGC 5272)	Globular cluster, magnitude 6.2, diameter 18’. Class 6. Distance 30,000 ly. Made up of about 500,000 stars. About 27’ from mag 6 orange star HR 5145. β and γ Com 10 degrees apart. M3 is 2/3 this distance (6.7 degrees) away.
M51 (NGC 5194)	**Whirlpool Galaxy**. Magnitude 8.4, dimensions 11’ x 7’. SB 12.9. Distance 24 Mly. Interacting with the close companion galaxy M51B (mag 9.5). About 2 degrees from 24 CVn.
M63 (NGC 5055)	**Sunflower Galaxy**. Part of the M51 Group of galaxies. Distance 25 Mly. Spiral galaxy, magnitude 8.6, dimensions 12’ x 7’. SB 13.1. Indistinct flocculent (fluffy) spiral arms. About 1.5 degrees from 20 CVn.
M94 (NGC 4736)	Spiral galaxy, magnitude 8.2, dimensions 11’ x 9’. SB 12.9. Distance 17 Mly. Bright core and inner disk, diffuse outer disk. About 3 degrees from Cor Caroli.
M106 (NGC 4258)	Spiral galaxy, mag 8.4, dimensions 19’ x 7’. SB 13.4. Distance 24 Mly. About 31’ from orange 6th mag star HIP 60305 and 1.7 degrees from 3 CVn.
NGC 4631	**Whale Galaxy**. Magnitude 9, dimensions 15’ x 3’. SB 12.9. Distance 17 Mly. Edge-on 5:1 but wedge-shaped. Small companion NGC 4627 (mag 12.4). About 2 degrees from HR 4783 and 4 degrees from 37 Com.



COMA BERENICES

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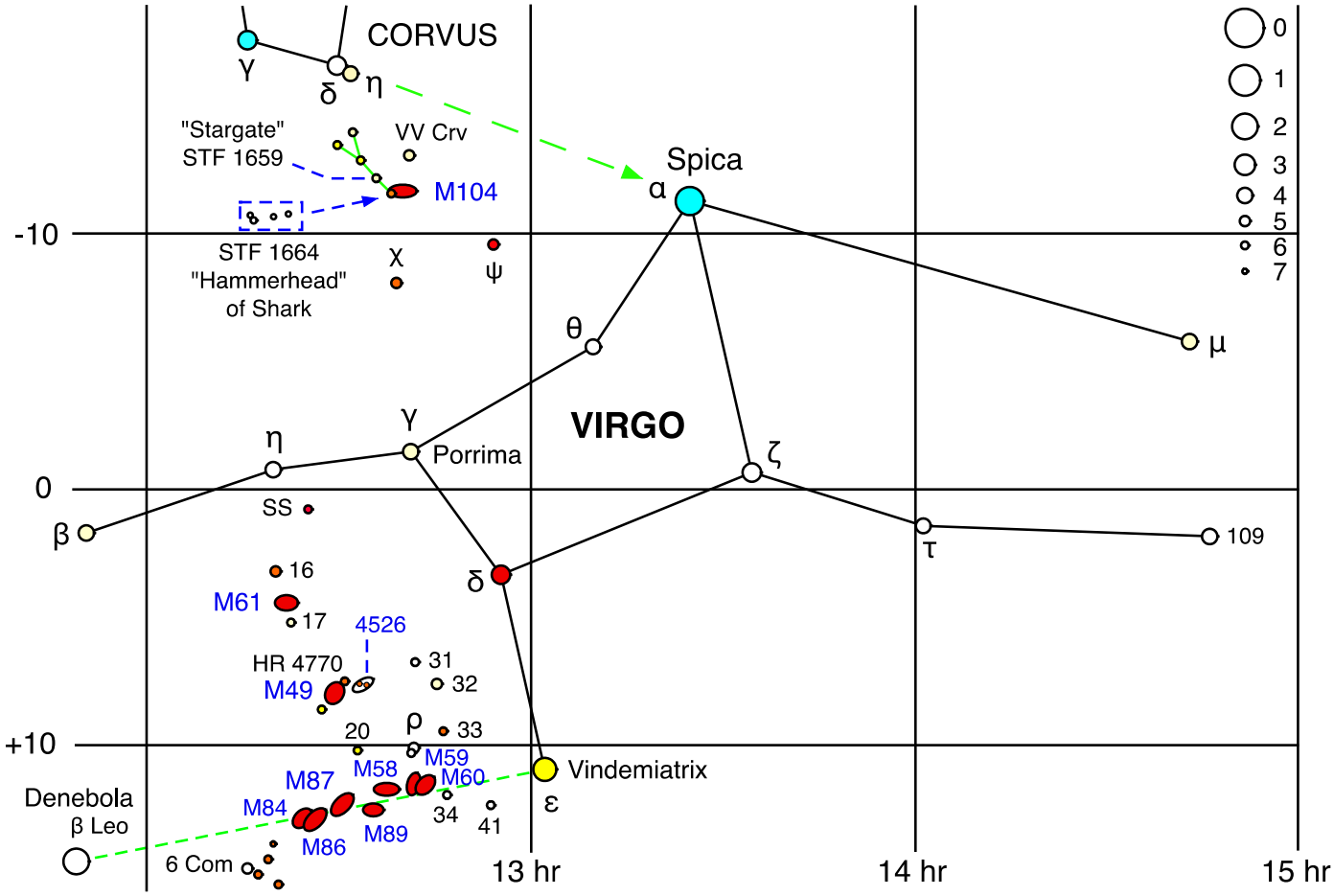
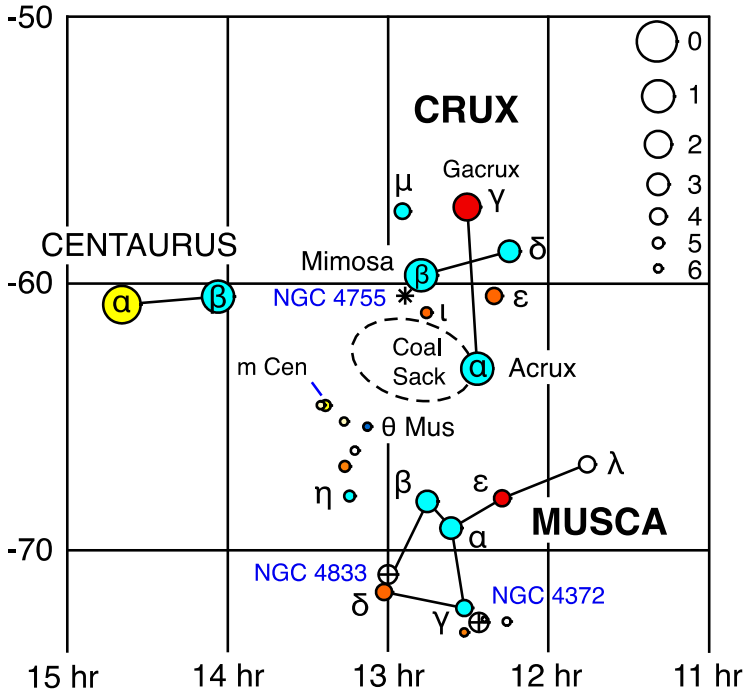
12	In Mel 111, magnitudes 4.8/8.6, separation 65”. G0/F7. Stars at 284 ly.
17	In Mel 111, magnitudes 5.2/6.6, separation 146”. A1/A2. Stars roughly 250 ly.
24	Mags 5.1/6.3, separation 20”. K2/A9. Nice colour contrast. Pair at 366 ly.
NGP	North Galactic Pole. 31 Com (mag 4.9) is the brightest star near the NGP.
Melotte 111	**Coma Star Cluster (Berenice’s Hair)**. Magnitude 1.8, size nearly 5 degrees. Distance only 280 ly. About 40 stars mag 5 to 10.5. γ Com is not a member. Brightest is F1 star 14 Com (mag 4.9) in northern part (bottom) of cluster.
M53 (NGC 5024)	Globular cluster, magnitude 7.6, diameter 13’. Class 5. Distance 49,000 light years. Just 57’ from α Com.
M64 (NGC 4826)	**Black Eye Galaxy**. Spiral galaxy, mag 8.5, dimensions 10’ x 5.4’. SB 12.6. Distance 18 million light years. In the center of a “bowl” of four 7th mag stars with 35 Com (mag 5) at one lip. Base of bowl about 1 degree across.
M85 (NGC 4382)	Lenticular galaxy, magnitude 9, dimensions 7’ x 5.5’. SB 12.7. Distance 50 Mly. About 1.2 degrees from 11 Com. Smaller companion NGC 4394 (mag 10.8) about 7.6’ away.
M98 (NGC 4192)	Spiral galaxy, mag 10, dimensions 10’ x 3’. SB 13.4. Distance 46 Mly. About 32’ from 6 Com (mag 5.1). 6 Com is 6.5 degrees from Denebola.
M99 (NGC 4254)	**Coma Pinwheel**. Spiral galaxy, mag 9.9, dimensions 5.5’ x 5’. SB 13.2. Distance 50 Mly. Only about 10’ from the K0 giant HD 107170 (mag 6.5).
M100 (NGC 4321)	Spiral galaxy, mag 9.4, dimensions 7.5’ x 6’. SB 13.3. Distance 53 Mly. About 35’ from the star HD 107415 (mag 6.5), in-line with a mag 6.3 star and the star 6 Com (mag 5.1). 6 Com is also 5 degrees from 95 Leonis (mag 5.5).
NGC 4565	**Needle Galaxy**. Spiral galaxy, mag 9.6, dimensions 16’ x 2’. SB 13.1. Distance 38 Mly. Seen virtually edge-on 8:1. A must for the astro-photographer. NGC 4565 is about midway between 17 Com & HIP 62073 (mag 6.7), roughly 1.6 degrees from each star.



VIRGO [Return to Index](#)

Gamma (γ)	**Porrima**. Mags 3.5/3.5, separation 2.5". F0/F0. Period 169 yrs. Dist ~ 39 ly.
SS	Carbon star, mag 6-10.5. C6,3. Period 364 days. Colour index +4.19. Distance 1,800 ly. About 2 degrees from Eta (η) Virginis.
M49 (NGC 4472)	Giant elliptical galaxy, mag 8.4, 10' x 8'. SB 12.9. Distance ~ 52 Mly. Brightest in Virgo Cluster. About 33' from the star HR 4770 (mag 6).
NGC 4526	Spiral galaxy, magnitude 9.6, dimensions 7' x 2.5'. SB 12.4. Distance 48 Mly. Located halfway between two 7th mag stars in-line with HR 4770.
M58 (NGC 4579)	Spiral galaxy, magnitude 9.7, 6' x 4.8'. SB 13.1. About 1 degree from M59.
M59 (NGC 4621)	Elliptical galaxy, magnitude 9.6, 5.5' x 4'. SB 12.7. About 25' from M60.
M60 (NGC 4649)	Giant elliptical galaxy, magnitude 8.8, 7.4' x 6'. SB 12.7. Distance 54 Mly. Spiral galaxy NGC 4647 is only 2.5' from M60. No apparent interaction.
M61 (NGC 4303)	Face-on spiral galaxy, mag 9.7, 6.5' x 6'. SB 13.4. Distance 48 Mly. Outlier of Virgo Cluster. 16 & 17 Virginis 2 degrees apart.
M84 (NGC 4374)	Elliptical galaxy, mag 9, dimensions 6.5' x 6'. SB 12.7. Distance 55 Mly.
M86 (NGC 4406)	Elliptical galaxy, mag 8.9, size 9' x 6'. SB 13. M87 1.2 degrees away. M86 almost exactly halfway between Denebola and Vindemiatrix. M84 and M86 at the start of **Markarian's Chain** of 8 galaxies.
M87 (NGC 4486)	**Virgo A**. Giant elliptical galaxy, mag 8.6, dim 7' x 6.8'. SB 12.5. Dist 55 Mly. Center of Coma-Virgo Supercluster. Estimated 200 x mass of Milky Way Galaxy. Supermassive black hole with jet (HST).
M89 (NGC 4552)	Elliptical galaxy, magnitude 9.8, 5' x 5'. SB 13. Distance 54 Mly. About 54' from M58 and 1.2 degrees from Virgo A (M87).
M104 (NGC 4594)	**Sombrero Galaxy**. Spiral galaxy. Mag 8, dimensions 9' x 4'. High SB 11.6. Distance 37 Mly. Prominent dust lane. Central supermassive black hole. "Hammerhead" asterism of 4 stars (STF 1664) point to M104 about 20' away.



CRUX

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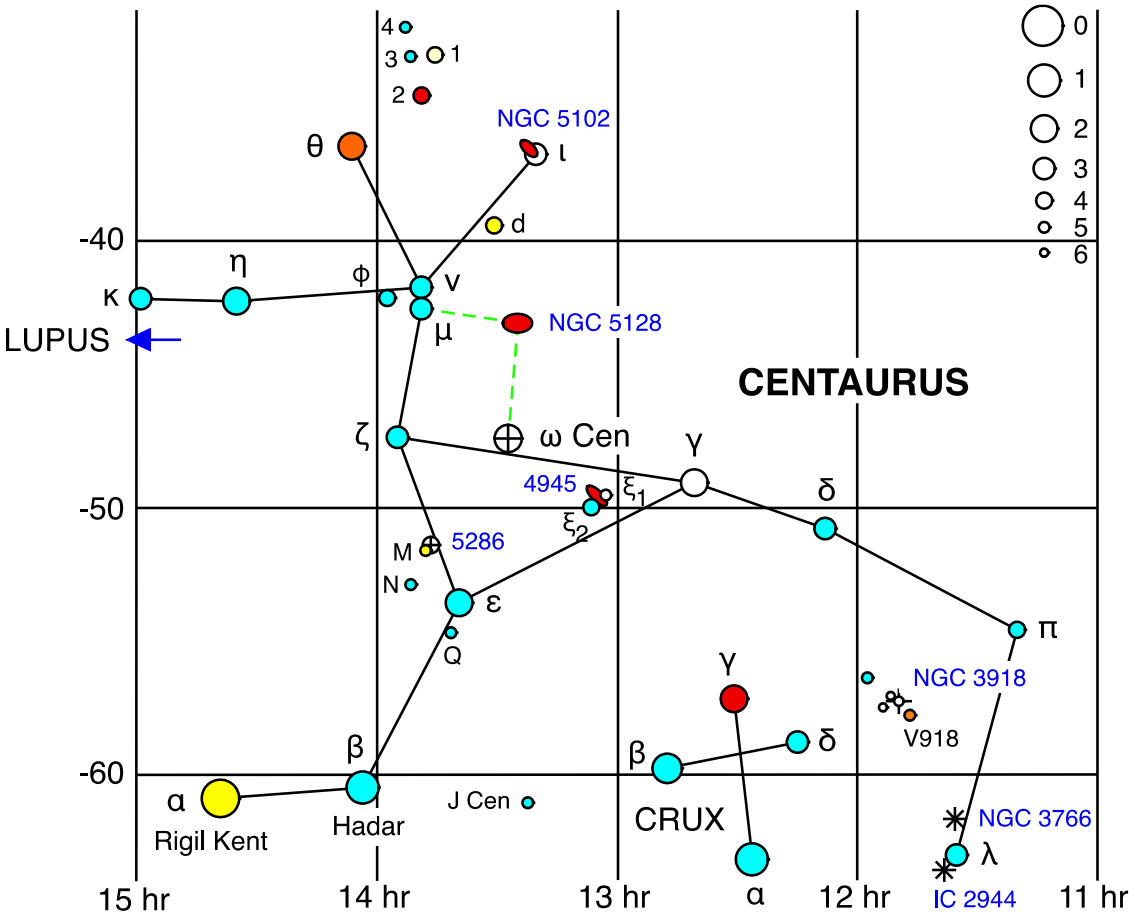
Alpha (α)	**Acrux**. Binary AB, mags 1.3/1.6, separation 3.5”. B0.5/B1. Period>1,500 yrs. Distance 320 ly. Magnitude 4.8 component C (spectral type B4) is 90” away. Also, at similar distance.
Gamma (γ) Mu (μ)	**Gacrux**. Magnitudes 1.8/6.5, separation 133”. M3.5/A3. Optical double. Magnitudes 3.9/5, separation 35”. B2/B5. Stars at roughly 400 ly.
DY	**Ruby Crucis**. Carbon star, magnitude 8.5-10. C5,5. Irregular cycle. D 3,900 ly. Close to Beta Crucis (Mimosa), 142” away. Colour index +5.6.
NGC 4755	**Jewel Box**. Beautiful compact open cluster, magnitude 4.2, size 10’. Distance about 7,000 light years. About 60 stars to mag 12 and 160 stars to mag 14, mostly blue-white. The 6 brightest stars (mag 5.5-8) form a capital “A” asterism. Mag 6 Kappa (κ) Crucis is at the base of the right leg of the “A”. Mag 7.7 red M2 star DU Crucis at center of the “A”.
Coal Sack	Dark nebula. Large cloud of interstellar dust adjacent to Acrux and Iota (ι). About 5 x 3 degrees. Also, the head of the emu (Australian Aboriginal culture).

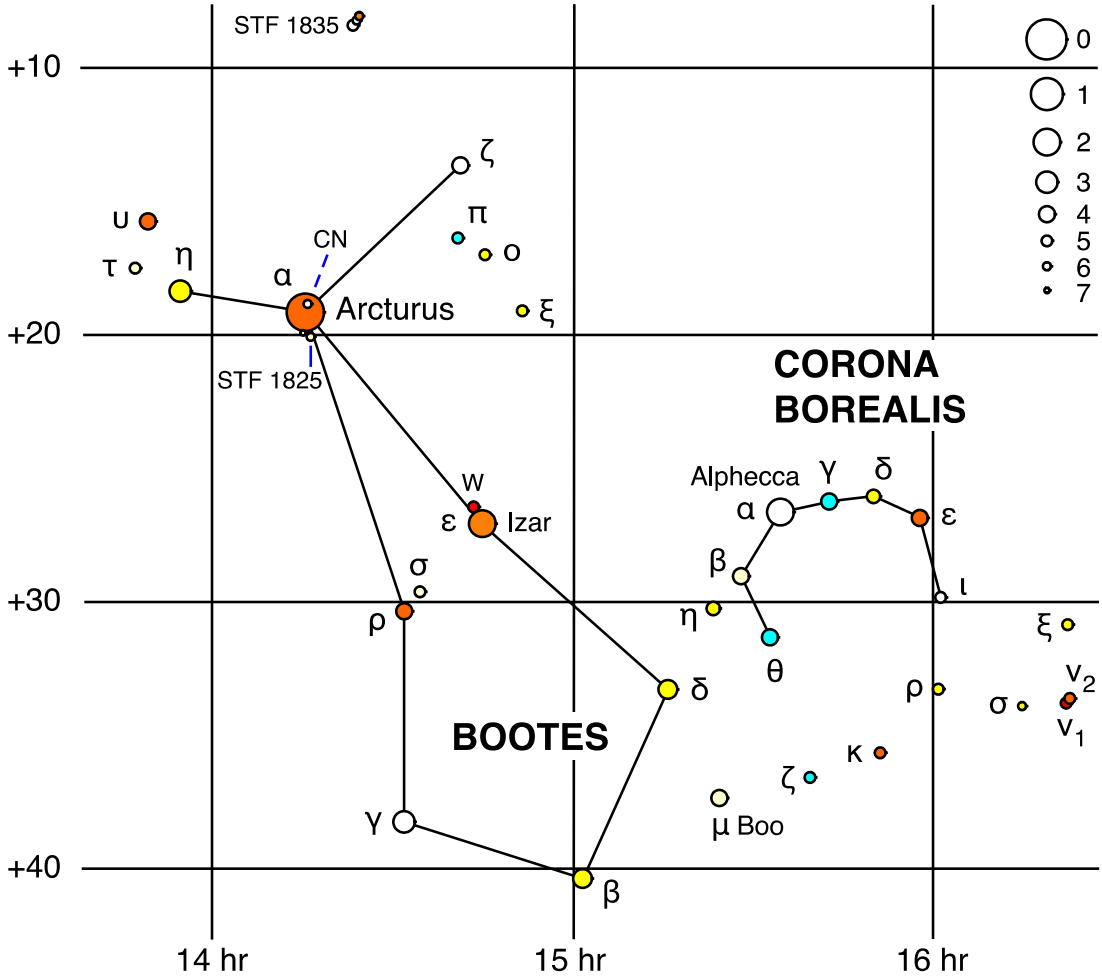
MUSCA

Beta (β)	Binary, magnitudes 3.5/4, separation 1.1”. B2.5/B2. Period 194 years. Distance about 340 light years. Test of good seeing conditions.
Eta (η)	Magnitudes 5.1/7.2, separation 58”. B8/F0. Stars at roughly 380 ly.
Theta (θ)	Mags 5.7/7.5, separation 5.5”. (WC5+B0+O6) / O9. Stars ~ 7,000 ly. Second brightest known Wolf-Rayet star after Gamma (γ) Velorum.
NGC 4372	Loose globular cluster, mag 7.5, diameter 19’. Low concentration class 12. Distance 17,400 light years. Fainter than NGC 4833 as in a much dustier region near the Dark Doodad. HD 107947 (mag 6.6) about 5’ from center is a foreground star.
NGC 4833	Globular cluster, mag 6.9, diameter 14’. Class 8. Distance 20,000 light years. About 42’ from Delta (δ).



CENTAURUS Return to Index

Alpha (α)	**Rigil Kent**. System AB-C. AB mags 0/1.3, sep 5.3”. G2/K2. Period 80 years. C = Proxima Centauri (M5 dwarf), mag 11-13. About 2.2 degrees from AB pair. Closest stars – AB at 4.36 light years distance and Proxima at 4.24 light years.
J	DUN 133. Mags 4.5/6.2, separation 60”. B3/B2.5. Optical only.
N (RMK 18)	Mags 5.2/7.5, separation 19”. B9/A7. Possible pair. Pair at 303 ly.
Q	Magnitudes 5.2/6.5, separation 5.6”. B8/A2.5. Pair at 289 ly.
3	Mags 4.5/6, separation 7.8”. B5/B8. Stars at about 330 ly.
4	Magnitudes 4.7/8.5, separation 15”. B4/A3. Distances infer optical only.
NGC 3918	**Blue Planetary**. Small, round, striking blue. Mag 8.2, size ~ 15”. Dist 15,000 ly.
NGC 3766	**Pearl Cluster**. Dense, rich open cluster, mag 5.3, size 15’. Distance 7,100 ly. The “eyelet” of a “hook” of stars ending at Lambda (λ) Cen 1.4 degrees away. About 100 stars to mag 12 and 300 stars to mag 14. Red M1 supergiant V910 Cen (mag 6.9) and red M0 supergiant HD 306799 (mag 7.5) on opposite sides.
IC 2948+2944	**Lambda Centauri Cluster** with Running Chicken Nebula. Size 1 degree. Many stars scattered throughout a faint emission nebula. Distance 8,400 ly. The B9 star Lamda (λ) Centauri (magnitude 3) at edge is not a member!
ω Cen (NGC 5139)	**Omega Centauri**. Largest & brightest (naked eye) globular cluster in Milky Way. Contains 5 million or more stars. Mag 3.7, diam 36’. Class 8. Distance 17,000 ly.
NGC 5286	Globular cluster, magnitude 7.3, diameter 9’. Class 5. Distance 37,000 ly. Only 4’ from M Centauri.
NGC 4945	Spiral galaxy, mag 8.6, dimensions 20’ x 4’. SB 13.1. Large, edge-on 5:1. Distance about 14 Mly. About 19’ from Xi 1 (ξ_1) and 30’ from Xi 2 (ξ_2).
NGC 5102	Elliptical galaxy, mag 9.6, dimensions 8.7’ x 3’. SB 12.9. Distance 12 Mly. Just 17’ from Iota.
NGC 5128	**Centaurus A**. Lenticular galaxy. Mag 6.6, dim 26’ x 20’. SB 13.1. Dist 12 Mly. Elliptical + spiral galaxy merger. Supermassive black hole & jet (Chandra X-ray). Centaurus A is 4.5 degrees from both Mu (μ) and ω Centauri. Line angle 92°.



BOOTES

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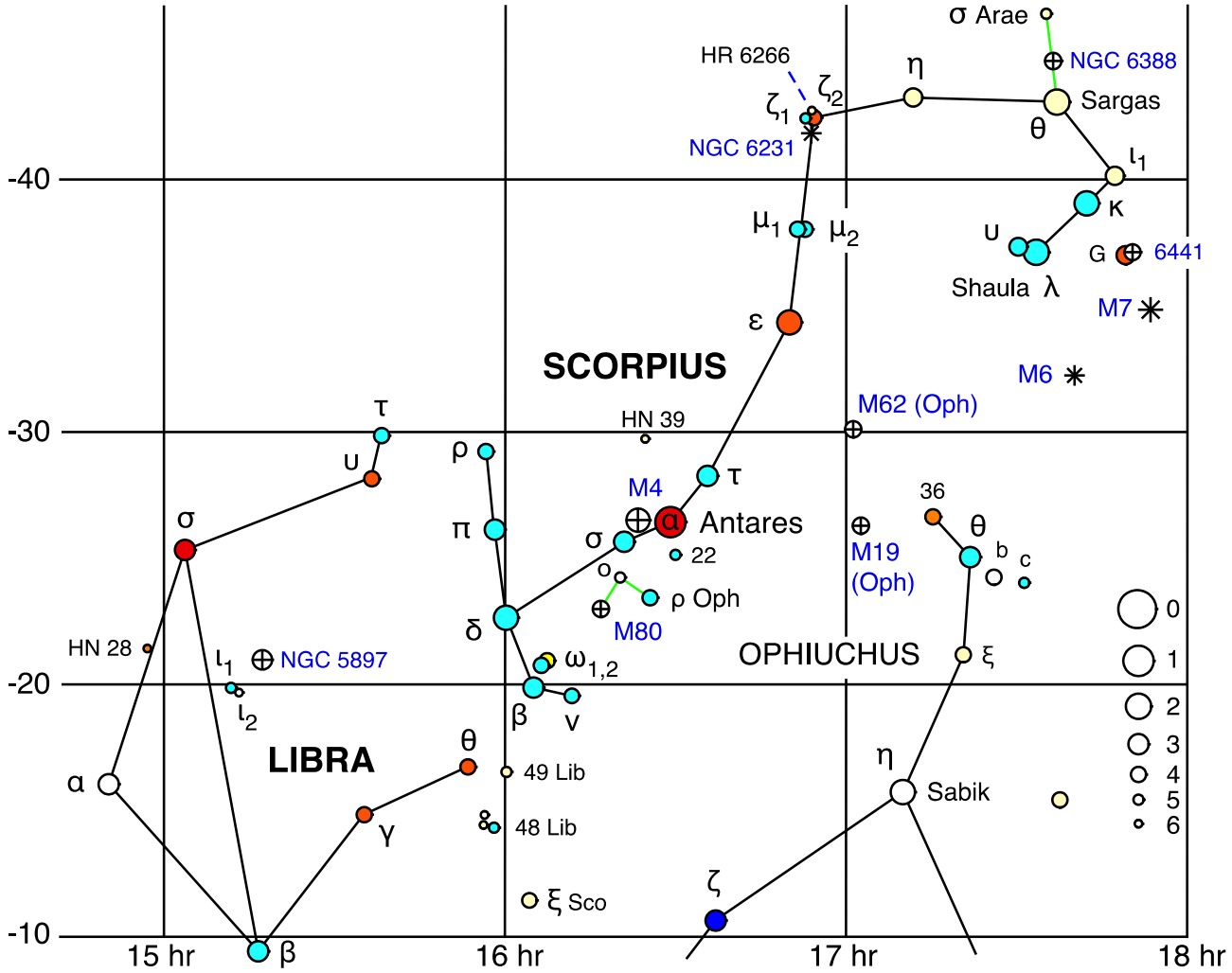
Delta (δ)	Magnitudes 3.6/7.9, sep 105”. G8/G0. Period 76,000 years. Pair at 120 ly.
Epsilon (ε)	**Izar**. Striking colour contrast (golden yellow + bluish). Magnitudes 2.5/4.8, separation 2.9”. K0/A2. Stars at about 200 ly.
Mu (μ)	System A-BC. Magnitudes 4.3//7/7.6. 109”, 2.2”. F2//G1/G1. Dist ~ 120 ly. Period for BC pair is 260 years.
Xi (ξ)	Binary, mags 4.8/7, separation 5.2”. G8/K5. Period 152 years. Distance 22 ly.
Pi (π)	Magnitudes 4.9/5.8, separation 5.4”. B9/A6. Stars at about 315 ly.
STF 1825	Binary, mags 6.4/8.4, separation 4.2”. F8/? Period of orbit 957 years. Distance 108 ly. Sits about 1 degree from Arcturus.
STF 1835	Magnitudes 5/6.8, separation 6.4”. A0/F0. Distances imply optical only. Brightest in a small arc of three stars mag 5, 5.9 and 6.2 (see map).
W	Pulsating red (M3) giant that varies in magnitude from 4.4 to 5.6 over 25 days. At about 590 light years distance, it is 2.5 times further away than Izar.

CORONA BOREALIS

Zeta 2,1 ($\zeta_{2,1}$)	Magnitudes 5/5.9, separation 6.3”. B7/B9. Pair at 507 ly distance.
Nu 1,2 ($\nu_{1,2}$)	Wide binocular double, mags 5.4/5.6. Separated by 355”. M2/K5. Optical.
Sigma (σ)	Binary, magnitudes 5.6/6.5, sep 7.2”. G0/G1. Period 726 years. Dist 74 ly.

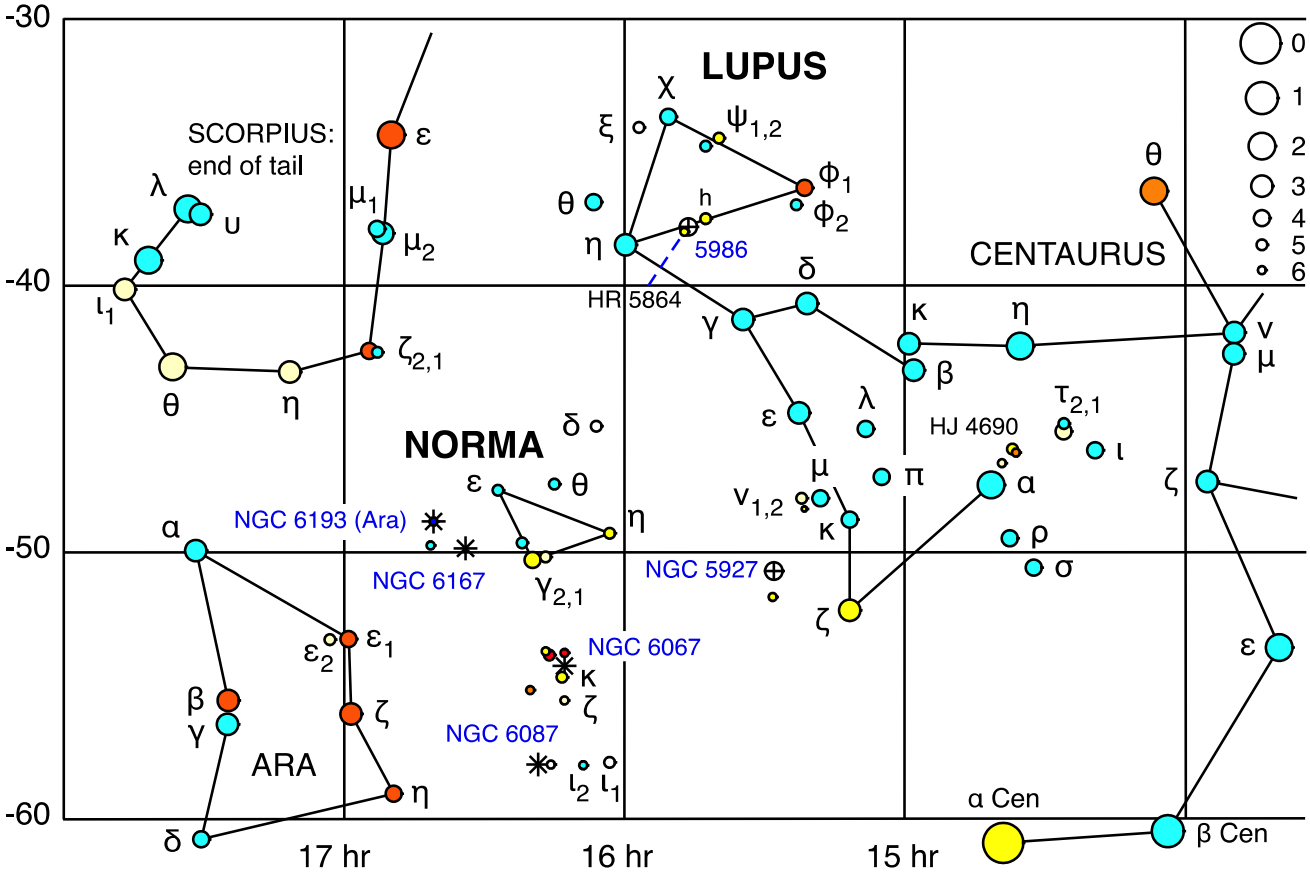


SCORPIUS [Return to Index](#)

Alpha (α)	**Antares**. Mags 1/5.4, sep 2.7”. M1.5/B2.3. Period 1,218 years. Dist 550 ly.
Beta 1,2 ($\beta_{1,2}$)	**Graffias**. Mags 2.6/4.9, separation 13”. B1/B2. Pair at 400 ly.
Nu (v)	System AB-CD, magnitudes 4.4/5.3//6.6/7.2. Separations 1.4”, 41”, 2.4”. B2/B2//B8/B9. All at roughly 450 ly.
Xi (ξ)	Multiple star system, STF 1998 + STF 1999, AB-C + DE. All at 91 ly distance. Mags 5.2/4.9//7.3 + 7.5/8. Seps (1.2”, 7.2”), 279”, (12”). F5/F5//G8 + G8/K1.
M4 (NGC 6121)	Globular cluster, mag 5.6, diam 26’. Class 9. Nearest glob at 5,900 light years.
M6 (NGC 6405)	**Butterfly Cluster**. Open cluster, mag 4.2, size 25’. Distance 1,500 ly. 90 stars to mag 12. Brightest – orange giant BM Scorpii (mag 5.5-7) near edge.
M7 (NGC 6475)	**Ptolemy's Cluster**. Impressive open cluster of magnitude 3.3, size 80’. Distance 900 ly. About 270 stars to magnitude 12 with 8 stars mag 5.5-6.5. Brightest is the orange K3 star HR 6658 (mag 5.6) of big “X” group at center.
M80 (NGC 6093)	Dense globular cluster, mag 7.3, diam 10’. Class 2. Distance 32,000 light years. Omicron (o) is about 1.4 degs from both M80 and the multiple star Rho (ρ) Oph.
NGC 6231	Rich open cluster mag 2.6, size 15’, near Zeta trio. Distance 5,500 light years. About 100 stars mag 5-12.
NGC 6388	Globular cluster mag 6.7, diam 10’. Class 3. Halfway between θ Sco & σ Arae.
NGC 6441	Globular cluster, magnitude 7.2, diameter 8’. Class 3. Only 4’ from G Scorpii.

LIBRA

Alpha 2,1 ($\alpha_{2,1}$)	**Zubenelgenubi**. Mags 2.7/5.2, separation 231”. A3/F4. Super-wide pair at 76 ly.
HN 28 (KX Lib)	Binary, mags 5.8/8, separation 26”. K4/M1.5. Period 2,130 years. Distance 19 ly.
NGC 5897	Loose globular cluster, mag 8.5, diam 13’. Class 11. About 1.7 degs from ι_1 Lib.

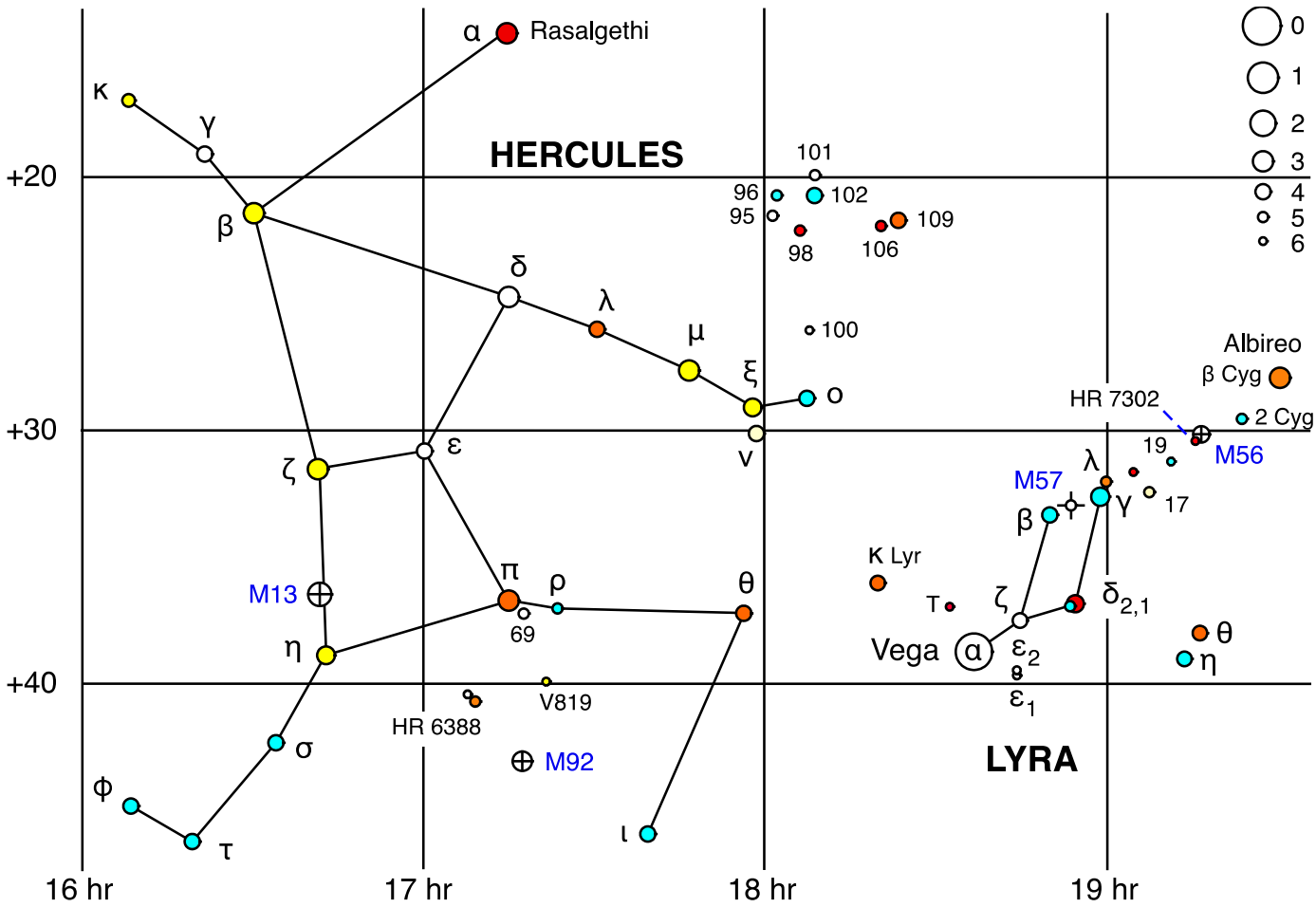


LUPUS [Return to Index]

Zeta (ζ) Eta (η)	Magnitudes 3.5/6.7, separation 72”. G8/F8. Possible pair at about 117 ly. AB-C. Mags 3.4/7.5//9.4. Seps 15”, 115”. B2.5/A5//F5. Stars roughly 460 ly.
Kappa(κ) Mu (μ) Xi 1,2 ($\xi_{1,2}$) HJ 4690	Magnitudes 3.8/5.5, separation 26”. B9.5/A3. Both at about 185 ly. DUN 180. AB-C, mags 4.9/5//6.3, separation 0.7”, 23”. B8//A2. C is optical only. Magnitudes 5/5.6, separation 10.2”. A3/B9. Stars at roughly 217 ly. Mags 5.4/7.7, separation 19”. G8/A1. Likely to be an optical double.
NGC 5927 NGC 5986	Globular cluster, mag 8.1, diameter 6’. Class 8. Distance 25,700 light years. About 2.8 degrees from Zeta (ζ) Lupi. Globular cluster, mag 7.5, diameter 10’. Class 7. Distance 29,400 light years. About 18’ from HR 5864 (mag 6).

NORMA

Epsilon (ε) Iota1 (ι_1)	Magnitudes 4.5/6.1, separation 23”. B4/A5. Looks to be optical only. System AB-C. Magnitudes 5.2/ 5.8//8, separations 0.3”, 11”. A7//G8. Orbital period for AB about 27 years. All stars at roughly 130 ly.
NGC 6067 NGC 6087	Superb rich open cluster, mag 5.6, size 15’. Distance 7,400 ly. About 100 stars mag 8-12. Sits 25’ from the G8 Kappa (κ) Normae (mag 4.9). **S Normae Cluster**. Open cluster, magnitude 5.4, size 12’. Distance 3,200 ly. About 40 stars to mag 12 – most blue-white. Seen as a small fuzzy region around S Normae in binoculars. Several small groups of stars seen in a telescope. Brightest star is the Cepheid variable S Normae (mag 6.1-6.8).
NGC 6167	Open cluster, mag 6.7, size 10’. Distance 5,000 light years. Brightest stars give an impression of a wine goblet. White supergiant HIP 81144 (mag 7.4) towards edge is a foreground object.

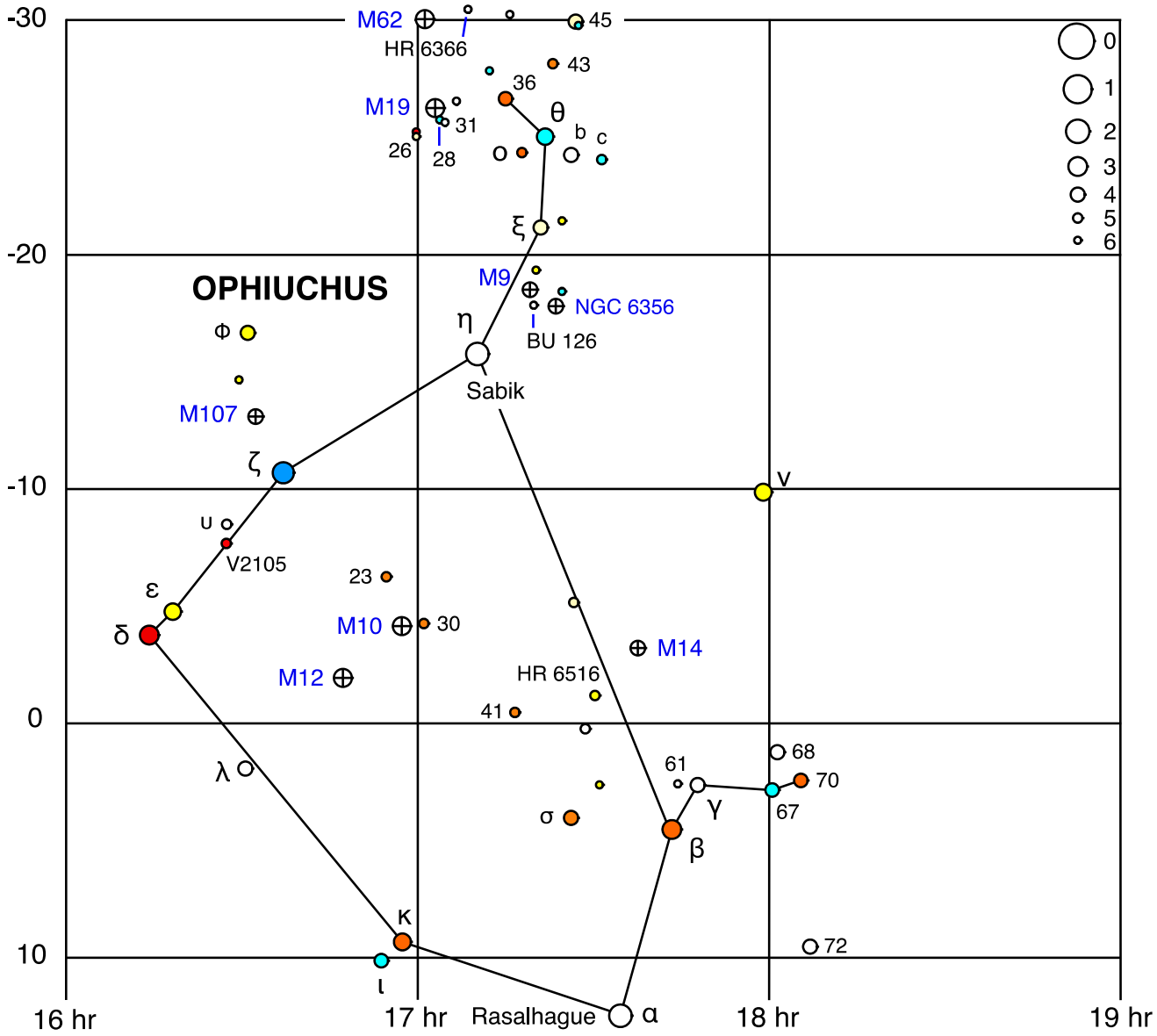


HERCULES Return to Index

Alpha (α)	**Rasalgethi**. Binary, mags 3.5/5.4, sep 4.7”. M5/G5. Period 3,600 yrs. D 360 ly.
Rho (ρ)	Mags 4.5/5.4, separation 4.1”. B9.5/A0. May be optical.
95	Magnitudes 4.9/5.2, separation 6.4”. A5/G8. Pair at 432 ly.
100	Striking twin pair. Magnitudes 5.8/5.8. Separation 14”. A3/A3. Dist 208 ly.
M13 (NGC 6205)	**Great Hercules Cluster**. Globular Cluster mag 5.8, diameter 23’. Class 5. Estimated population of 300,000 stars. Distance 25,700 light years. One of the brightest in northern skies.
M92 (NGC 6341)	Globular cluster, mag 6.4, diameter 11’. Class 4. Distance 29,000 ly. About 6.3 degrees north of Pi (π) & 2.7 degrees from the mag 5 orange giant HR 6388.

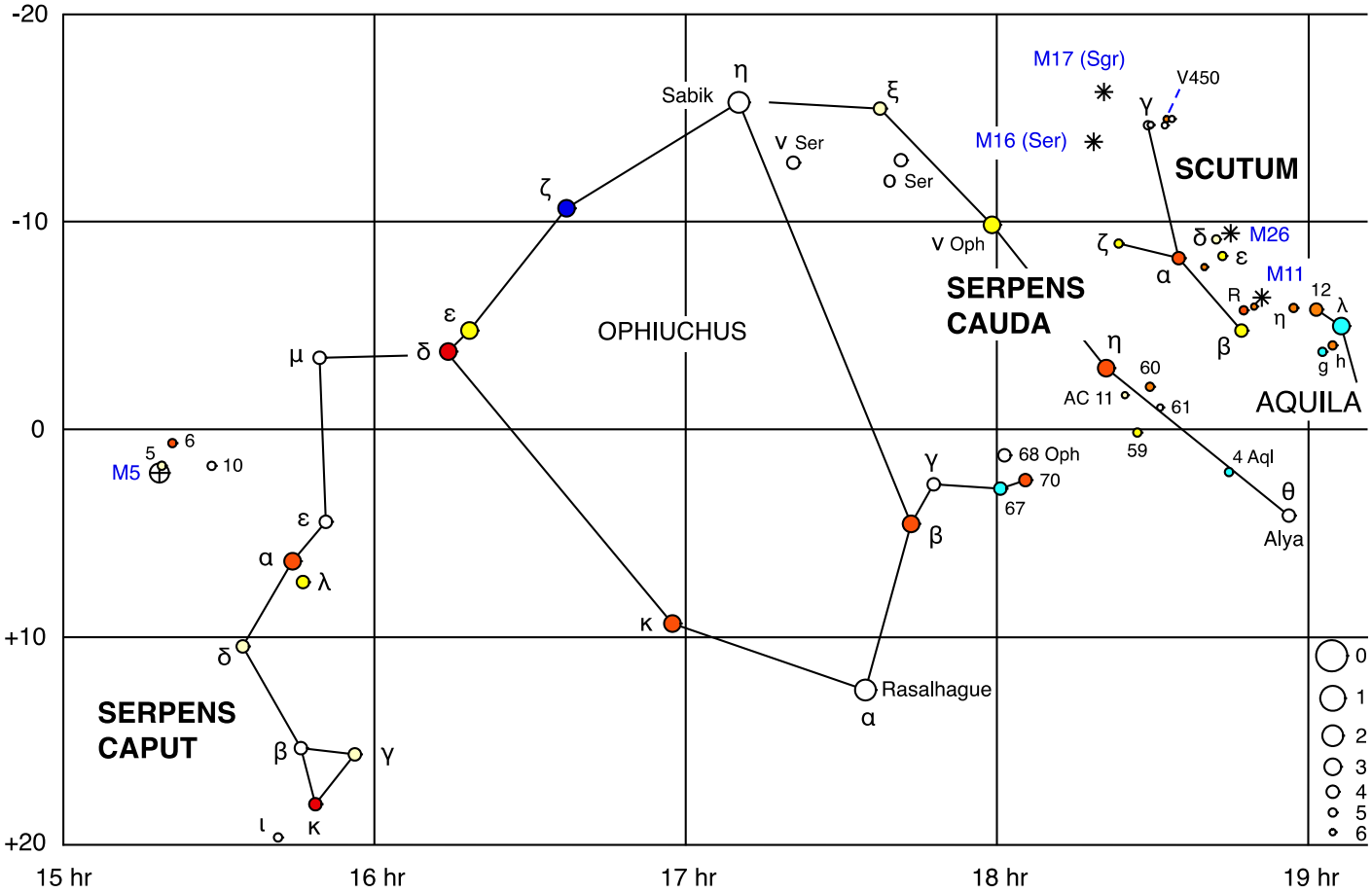
LYRA

Beta (β)	Magnitudes 3.6/6.7, separation 46”. B9/B8. Stars at roughly 960 ly.
Epsilon 1,2 ($\varepsilon_{1,2}$)	Multiple star system known as the **Double-Double** (AB-CD). Distance 160 ly. Magnitudes 5.2/6.1//5.3/5.4. Separations 2.2”, 210”, 2.4”. A4/F1//A8/F0. Period AB pair 1,200 years, CD pair about 600 years, AB-CD > 100,000 years.
Zeta 1,2 ($\zeta_{1,2}$)	Magnitudes 4.3/5.6, separation 44”. A4/F0. Pair at 156 ly.
T	Carbon star, mag 7.5-9.6. C6,5. Irregular cycle. Colour index +5.51. D 1,400 ly.
M56 (NGC 6779)	Globular cluster, magnitude 8.3, diameter 9’. Class 10. Low concentration. Distance 36,000 light years. About 1.7 degrees from 2 Cygni and 25’ from the M0 giant HR 7302 (mag 5.9).
M57 (NGC 6720)	**Ring Nebula** (planetary). Mag 8.8, size 84” x 65”. Looks like a smoke ring. Distance about 2,600 ly. About 2/5th of the way from β Lyrae to γ Lyrae.



OPHIUCHUS [Return to Index]

Lambda (λ)	Tight binary, mags 4.2/5.2, separation 1.4”. A0/A0. Period 129 yrs, D 173 ly.
Omicron (o)	Magnitudes 5.2/6.6, separation 11”. K0/F6. Both stars at roughly 280 ly.
Rho (ρ)	AB-C-D, mags 5/5.7//7.3//6.8, Separations 3”, 151”, 156”. See Scorpius map. B2/B2//B7//B3. Delta wing shape. Period AB ~ 2,400 years. Dist ~ 450 ly.
36	Binary of twin orange dwarfs. K0/K1. Mags 5.1/5.1, sep 5.1”. Distance 19 ly. Each about 85% of the mass of the Sun. Period of orbit about 470 years.
70	Binary, mags 4.2/6.2, separation 6.6”. K0/K4. Period 88.4 years. Dist 17 ly.
M9 (NGC 6333)	Globular cluster, magnitude 7.7, diameter 12’. Class 8. Distance 24,000 ly. About 47’ from the double star BU 126 (HR 6435), mags 6.3/7.6, sep 2.4”.
NGC 6356	Globular cluster, mag 8.3, diameter 10’. Class 2. Distance 34,000 light years. 53’ from the mag 6 double star BU 126 (see M9).
M10 (6254)	Globular cluster, mag 6.6, diameter 20’. Class 7. About 1 degree from 30 Oph.
M12 (6218)	Globular cluster, mag 6.7, diameter 16’. Class 9. About 3.3 degrees from M10. M10 at 16,600 light years distance and M12 at 15,700 light years.
M14 (NGC 6402)	Globular cluster, magnitude 7.6, diameter 12’. Class 8. Distance 25,300 ly. About 2.8 degrees from HR 6516 (mag 5).
M19 (NGC 6273)	Globular cluster, mag 6.8, diameter 17’. Class 8. About 39’ from 28 Ophiuchi.
M62 (NGC 6266)	Globular cluster, mag 6.4, diameter 15’. Class 4. About 4.7 degs from 36 Oph.
M107 (NGC 6171)	Globular cluster, mag 7.9, diameter 13’. Class 10. Very loose. Dist 16,800 ly.



SERPENS

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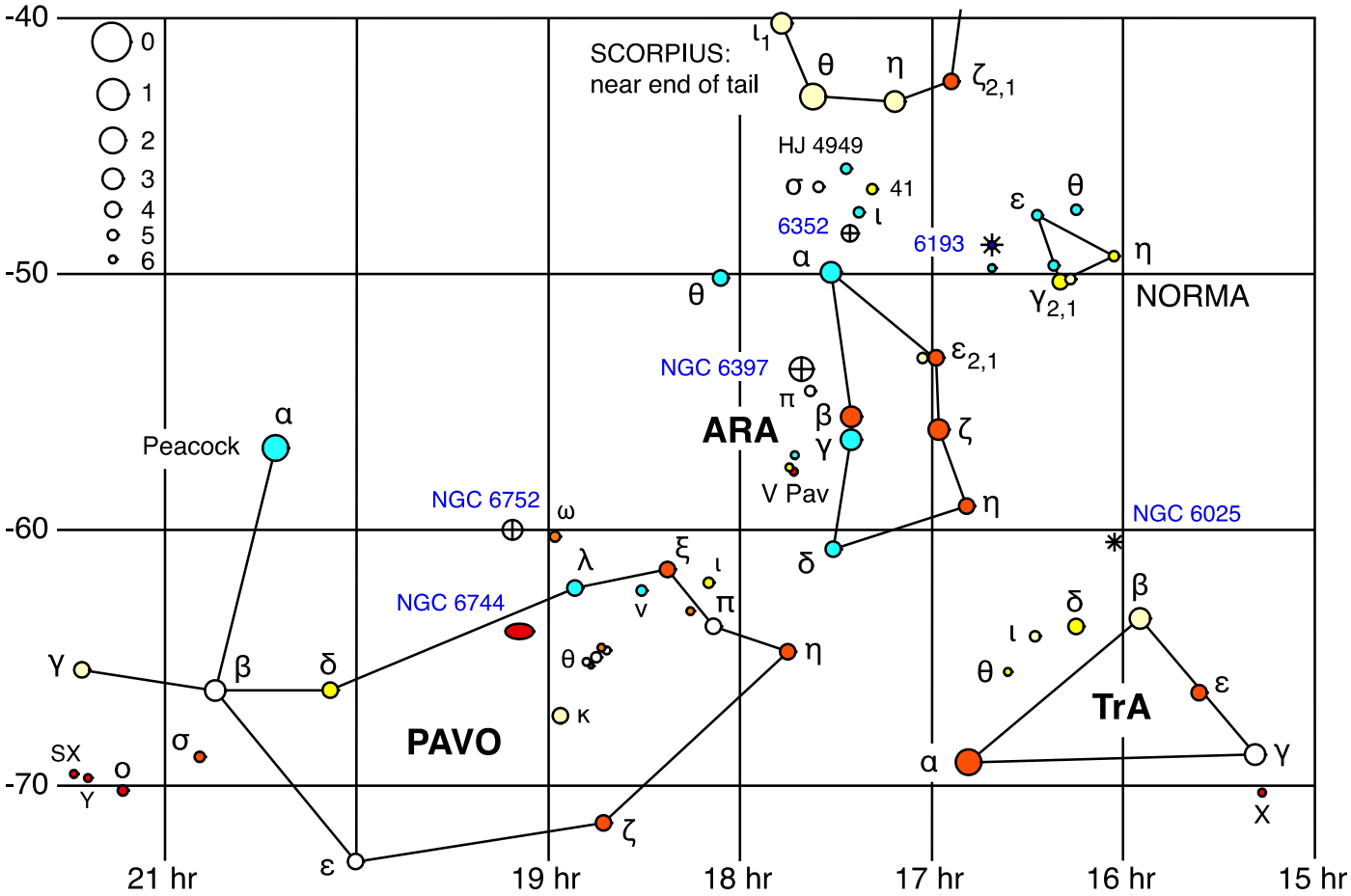
Delta (δ)	Binary, mags 4.2/5.2, separation 4”. F0/F0. Period given as 1,040 years.
Theta 1,2 ($\theta_{1,2}$)	**Alya**. Magnitudes 4.6/4.9, separation 22”. Twins A5/A5. Both at 134 ly.
6	Striking, mags 5.5/8.8, separation 3.4”. K3/? Possible pair at about 249 ly.
59	Magnitudes 5.4/7.6, separation 3.9”. G0/F5. Optical only.
AC 11 (HR 6898)	Alvan Clark tight binary, mags 6.7/7.2, separation 0.9”. F6/A9. Period 340 yrs. Distance 435 ly.
M5 (NGC 5904)	Globular cluster, magnitude 5.7, diameter 23’. Class 5. Distance 23,000 ly. May contain as many as 500,000 stars. Center just 22’ from 5 Serpentis.
M16 (NGC 6611)	**Eagle Nebula**. Diffuse emission nebula over 30’ in size and about mag 6.4. Distance 5,700 light years. More of a photographic object. The “Eagle” is in the upper loop of a visual “S” asterism of stars 25’ in height with a small star cluster (size 6’) at the top of the “S”. Both M16 and M17 are about 2.6 degrees from Gamma (γ) Scuti.

SCUTUM

M11 (NGC 6705)	**Wild Duck Cluster**. Rich, compact open cluster, magnitude 5.8, size 15’. Distance 7,600 light years. Looks a lot like a globular cluster in binoculars. Fan-shaped. Estimated 2,900 stars with over 300 stars listed to mag 14. Brightest star is the A0 giant HD 174512 (mag 8.6) near the head of the fan. About 2.7 degs from the “beak” (12-λ) of Aquila & 1.5 degs from Eta (η) Scuti.
M26 (NGC 6694)	Open cluster, magnitude 8, size 8’. Distance about 6,200 light years. About 40 stars magnitude 9 and fainter. Sits 49’ degrees from Delta (δ) Scuti.



ARA Return to Index

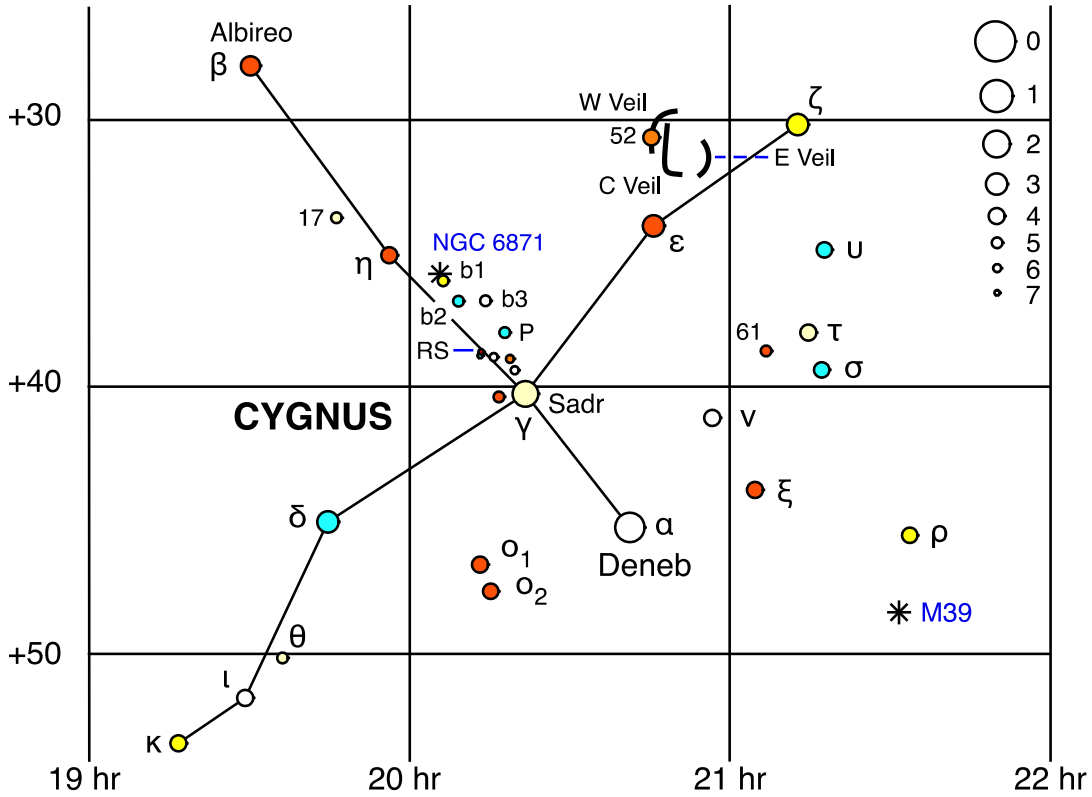
41	Mags 5.6/8.9, separation 10.6”. G8/M0. Period 953 yrs. Distance 29 ly.
HJ 4949	Tight pair. Magnitudes 5.6/6.5, separation 2.1”. B8/B9. Stars roughly 660 ly.
NGC 6193	Open cluster, mag 5.2, size 15’. Embedded in a large emission nebula. Distance about 4,000 ly. Scattered with about 30 stars to magnitude 12. Brightest stars: At center is the double star DUN 206 (HR 6187), mags 5.7/6.8, separation 10.2”. Hot pair O5/O7. At edge is B0 supergiant HD 150041 (mag 7).
NGC 6352	Globular cluster, mag 8, diameter 7’. Class 11. About 1.8 degs from α Arae.
NGC 6397	Globular cluster, mag 5.9, diameter 26’. Class 9. About 3 degs from β Arae. NGC 6397 is our second nearest globular cluster at 7,800 ly distance.

PAVO

V	Carbon Star, mag 6.3-8.2. C6,4. Period 225 days. Colour index +3.45. Distance 1,800 ly.
NGC 6752	**Pavo Globular Cluster**. Mag 5.4, diameter 20’. Class 6. Distance 12,800 ly. Fourth brightest in the sky after Omega Centauri, 47 Tuc and M22. About 3 degrees from Lambda (λ) Pavonis.
NGC 6744	Spiral galaxy, mag 8.3, size 20’ x 13’. Low SB 14.1. Distance 24 Mly. 2.6 degs from λ. Indistinct flocculent (fluffy) spiral arms. Poor visual object.

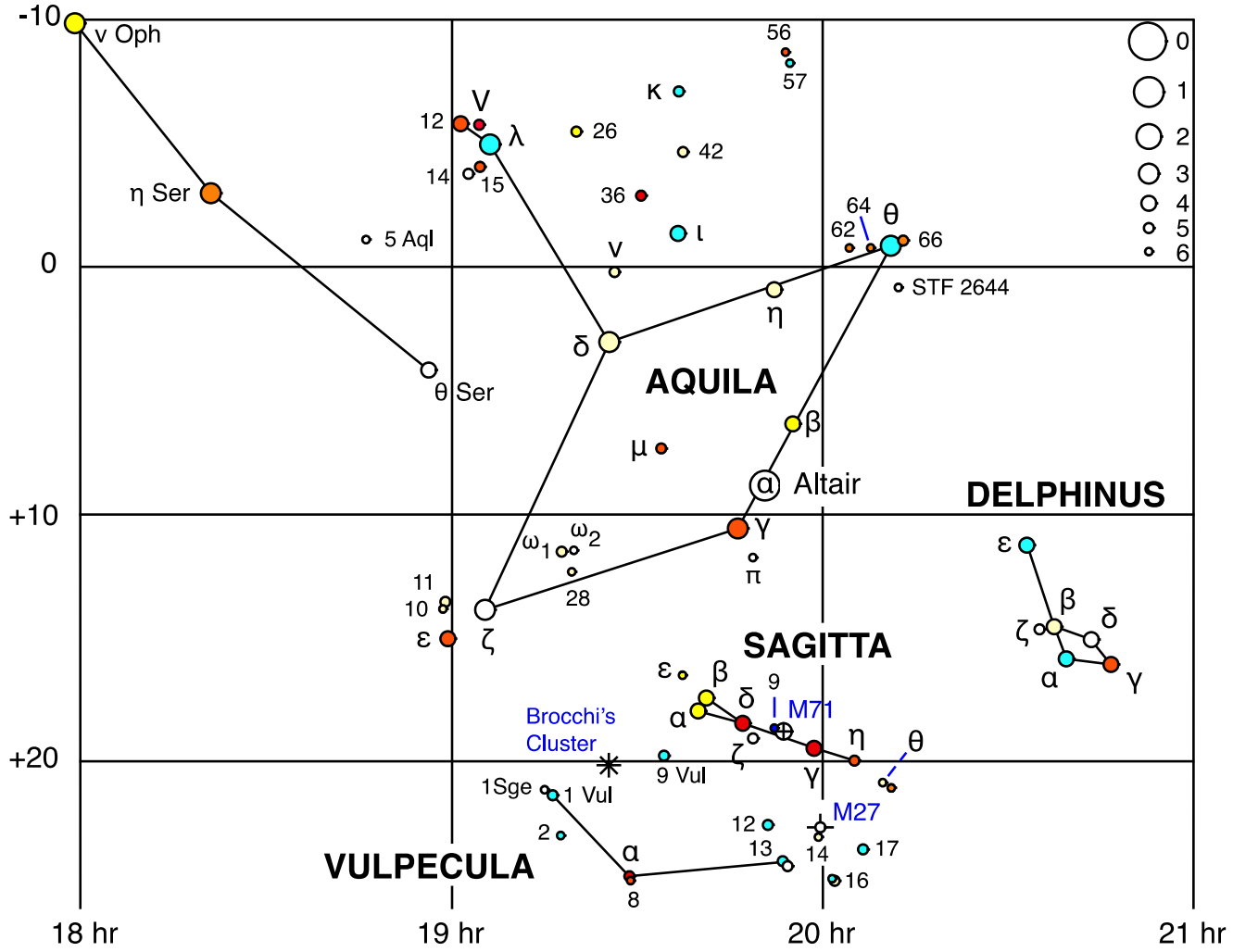
TRIANGULUM AUSTRALE

Iota (ι)	Magnitudes 5.3/9.4, separation 17”. F4/F4. Optical only.
X TrA	Bright carbon star, mag 5-6.4. C5,5. Period unknown. Colour index +3.56. Dist 1,140 ly. One of the brightest and easiest to find carbon stars in the sky.
NGC 6025	Scattered open cluster, magnitude 5.1, size 15’. Distance 2,600 ly. Roughly 30 stars to 11th magnitude. Mostly blue-white. Brightest is the blue-white B3 star MQ TrA (mag 7.1) near edge.



CYGNUS [Return to Index](#)

Alpha (α)	**Deneb**. A2 supergiant (19 solar masses and diameter 200 times the Sun). Furthest 1st magnitude star at 1,400 light years distance.
Beta 1,2 ($\beta_{1,2}$)	**Albireo**. Striking orange/blue pair. Magnitudes 3.2/4.7, separation 35”. K3/B8. Calculated distances (430 & 400 ly) seem to imply optical only.
Delta (δ)	Binary, mags 2.9/6.3, separation 2.7”. B9.5/F1. Period 920 years. Dist 165 ly.
17	Magnitudes 5/9.3, separation 26”. F7/K5. Both stars at 68 ly distance.
52	Mags 4.2/9.5, separation 5.9”. K0/? Superimposed on W Veil. Pair at 200 ly.
61	Binary of two orange dwarfs, mags 5.2/6. Separated by 32”. K5/K7. D 11 ly. Period 678 years. Amongst the closest stars to the Earth (11 light years). First star to have its distance measured by trigonometric parallax (Bessel 1838).
RS	Carbon star, mag 6.5-9.7. C8,2. Period 417 days. Colour index +3. D 2,450 ly. Makes a mag 7 wide double with the (B0.5) star HD 192422, separation 132”.
M39 (NGC 7092)	Large scattered open cluster, magnitude 4.6, size 35’. Distance 1,000 ly. About 50 stars to magnitude 12, with 7 stars to magnitude 8. Brightest stars are HD 205116 (mag 6.8), HD 205210 (mag 6.6), HD 205331 (mag 6.8). More or less in-line, 10’ and 12’ apart.
NGC 6871	Open cluster, magnitude 5.2, size 20’. Distance 6,300 ly. About 55 stars to mag 12. b1 Cygni (mag 5.4) at edge is a foreground star. Brightest near center is the Wolf-Rayet star V1676, mag 6.8. It forms a bright double with a mag 7.3 star 36” away. Nearby is a mag 7.9/8.7 pair (SHJ 315), 20” apart. Several other stars cluster around each double.
Veil Nebula	**Western** (NGC 6960)/**Central** (NGC 6974/9)/**Eastern Veil** (NGC 6992/5). Faint supernova remnant about 3 degrees across – the remains of a star that exploded 5000-8000 years ago. Very diffuse. Distance 2,400 light years. Brightest part is the Eastern Veil about 1.3 degrees long. Best observed with an O-III filter, whereby it magically appears out of nowhere!



AQUILA [Return to Index](#)

Pi (π)	Tight pair. Magnitudes 6.3/6.8, separation 1.4”. Distance 510 ly.
5	Magnitudes 5.9/7, separation 12.5”. A2/F0. Pair at 299 ly.
57	Magnitudes 5.7/6.4, separation 36”. B7/B8. Pair at 450 ly.
STF 2644	Magnitudes 6.9/7, separation 2.6”. A2/A0. Twin stars at 507 ly.
V	Striking carbon star, mag 6.5-8. C5,4. Period 400 days. Distance 1,400 ly. Colour index +3.86.

DELPHINUS

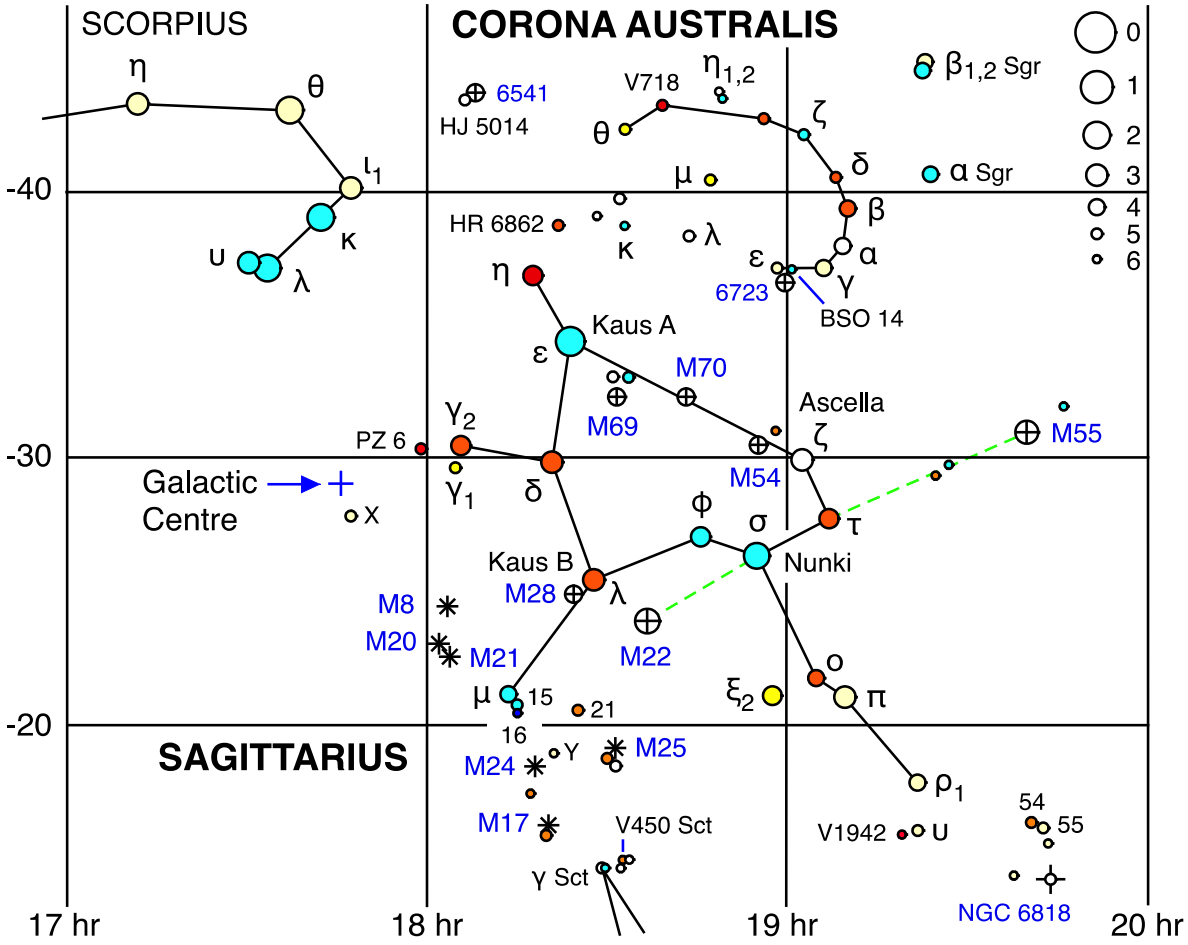
Gamma 2,1 ($\gamma_{2,1}$)	Striking binary. Mags 4.4/5, separation 8.9”. K1/F7. Period 3,249 years. Distance 115 ly.

SAGITTA

Theta (θ)	Magnitudes 6.5/8.9/7.4, separations 11.6”, 92”. F5/F4/K2. The closer AB pair is at 146 ly. C is purely optical at 840 ly.
M71 (NGC 6838)	Loose globular cluster, mag 8.2, diameter 7’. Class 10. Distance 13,000 ly.

VULPECULA

M27 (NGC 6853)	**Dumbbell Nebula**. Also known as the Apple Core Nebula. Large bright planetary nebula, magnitude 7.1, size ~ 8’ x 6’. Dist ~ 1,270 ly. About 3 degrees from Eta (η) Sagittae and 24’ from 14 Vulpeculae.
Coathanger	Brocchi’s Cluster or Collinder 399. Popularly known as the Coathanger. Asterism, magnitude 3.6, size about 1.5 degrees. The coathanger consists of 10 stars magnitude 5-7: six along the bar and four around the hook. Brightest is the K0 star 4 Vul (mag 5.2) in the top of the hook.



SAGITTARIUS

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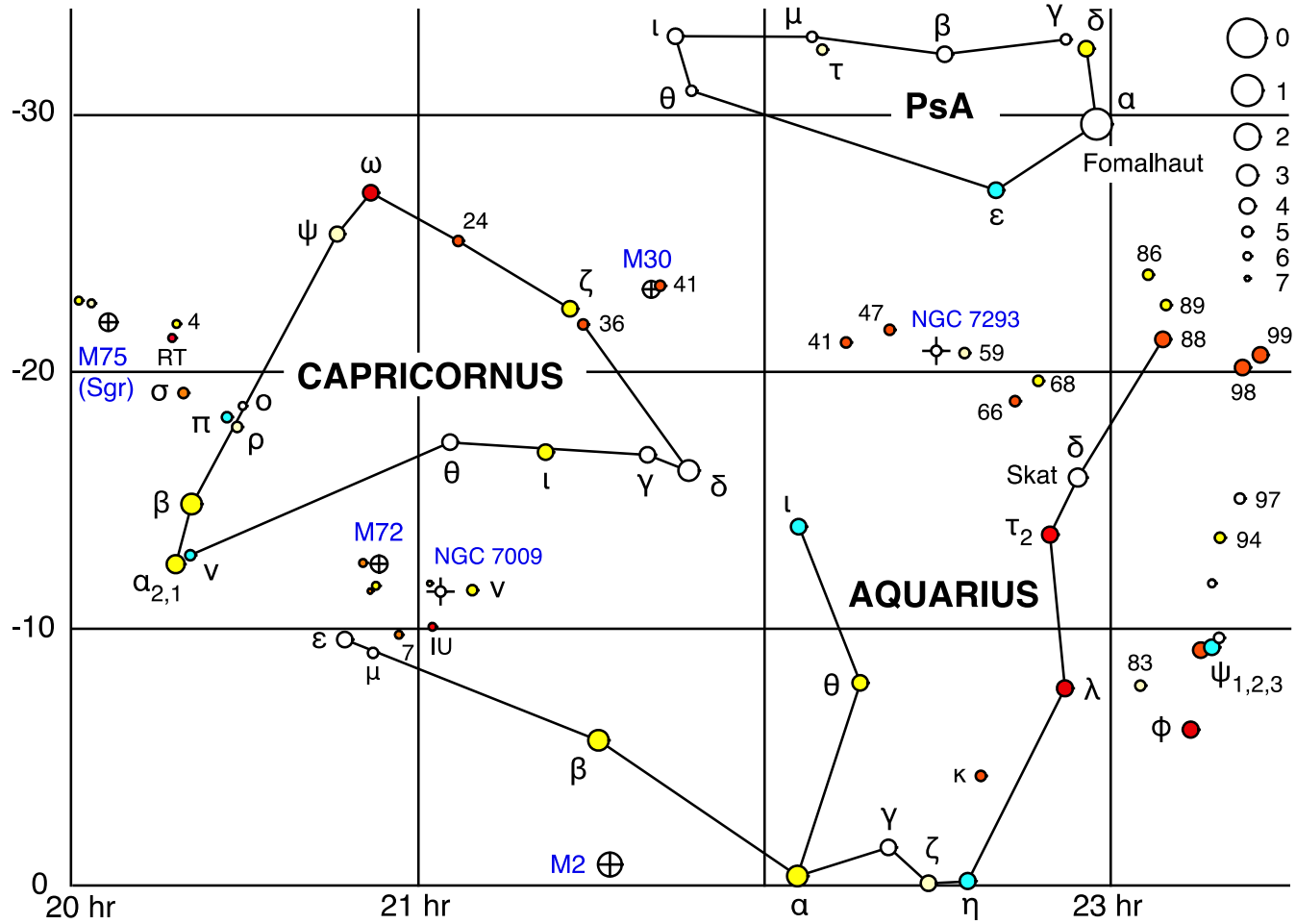
Beta1 (β_1)	Binary, mags 4/7.2, separation 28”. B9/F0. Distances infer optical only.
PZ 6 (HR 6693)	Magnitudes 5.4/7, separation 5.9”. M1/G8. Both stars at 2,500 ly.
M8 (NGC 6523)	**Lagoon Nebula**. Large naked-eye emission nebula + cluster. Size 90’ x 40’. Open cluster NGC 6530 (mag 4.6, size 14’) on one side of the lagoon.
M17 (NGC 6618)	**Omega or Swan Nebula**. Mag 6, size 46’ x 37’. Actual swan is about 10’ x 5’.
M20 (NGC 6514)	**Triffid Nebula** + cluster, mag 6.3, size 25’. Emission & reflection nebulae.
M21 (NGC 6531)	Open cluster. Mag 5.9, size 14’. Distance 4,100 ly. About 35 stars mag 8.5-12.
M22 (NGC 6656)	Third brightest glob in the sky. Mag 5.1, diam 24’. Class 7. Distance 10,650 ly.
M24 (IC 4715)	**Sagittarius Star Cloud**. Dense, bright. Magnitude 4.6, size 1.5 degrees.
M25 (IC 4725)	Open cluster, mag 4.6, size 30’. Dist 2,200 ly. About 100 stars mag 6.5-12.
M28 (NGC 6626)	Globular cluster, mag 6.8, size 11’. Class 4. Dist 16,300 ly. ~1° from Kaus B.
M54 (NGC 6715)	Massive globular cluster at 61,500 ly distance, mag 7.6, diam 12’. Class 3.
M55 (NGC 6809)	Loose globular cluster, mag 6.3, diameter 19’. Class 11. Distance 15,600 ly.
M69 (NGC 6637)	Globular cluster, mag 7.6, diameter 10’. Class 5. Distance 28,000 ly.
M70 (NGC 6681)	Globular cluster, mag 7.9, diam 8’. Class 5. Roughly midway Kaus A to Ascella.
NGC 6723	Globular cluster, magnitude 7, diameter 11’. Class 7. Just 30’ from Eps CrA.
NGC 6818	**Little Gem**. Small bluish planetary nebula, magnitude 9.4, size ~ 20” x 15”.

CORONA AUSTRALIS

Gamma (γ)	Tight binary, mags 4.2/6.4, separation 1.5”. F8/F8. Period 122 years. Dist 56 ly.
Kappa 2,1 ($\kappa_{2,1}$)	Magnitudes 5.6/6.2, separation 21”. B9/A0. Stars at about 700 ly.
HJ 5014	Tight twin pair. Mags 5.7/5.7, sep 1.8”. A5/A5. Period 450 years. Dist 143 ly.
BSO 14	Mags 6.4/6.6, sep 13”. B8/B9. At 500 ly. Same field as Eps CrA & NGC 6723.
NGC 6541	Globular cluster, magnitude 6.3, diameter 13’. Class 3. About 22’ from HJ 5014.



CAPRICORNUS Return to Index

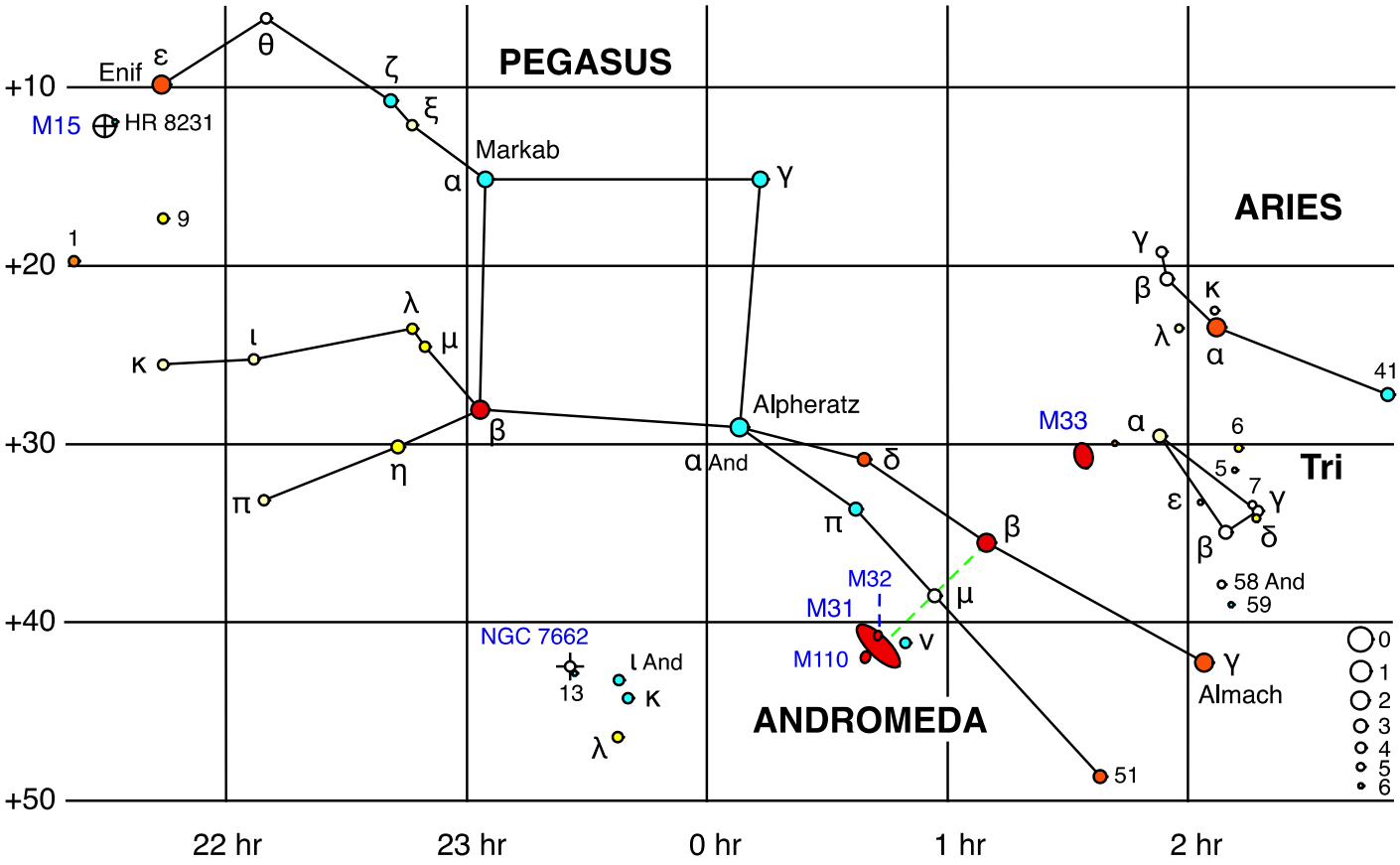
Alpha 2,1 ($\alpha_{2,1}$)	**Algedi**. Mag 3.8/4.2, separation 381”. Spectral types G9/G3. One for the binoculars. Distance 100 & 810 ly. Optical only.
Beta 1,2 ($\beta_{1,2}$)	Very wide double, mags 3.2/6, separation 205”. G9/A0. Distances infer optical.
Omicron (o)	Magnitudes 5.9/6.7, separation 22”. A3/A7. Pair at 233 ly.
RT	1,800 ly. Carbon star, mag 6.8-8. C6,4. Period 423 days. Colour index +4.03.
M30 (NGC 7099)	Globular cluster, magnitude 7.2, diameter 12’. Class 5. Distance 24,000 ly. Over 200,000 stars.
M75 (NGC 6864)	In Sagittarius. Globular cluster, mag 8.5, diameter 7’. Class 1. Compact and highly condensed. Distance 47,000 light years.

AQUARIUS

Zeta 2,1 ($\zeta_{2,1}$)	Binary, mags 4.3/4.5, separation 2.4”. F3/F6. Period 540 years. Dist 94 ly.
41	Magnitudes 5.6/6.7, separation 5.2”. K0/F2. Both stars at about 240 ly.
94	Magnitudes 5.3/7, separation 12.1”. G5/G6. Optical only.
M2 (NGC 7089)	Dense globular cluster, mag 6.5, diameter 16’. Class 2. Distance 40,000 ly.
M72 (NGC 6981)	Globular cluster, mag 9.3, diameter 7’. Class 9. Distance 39,000 ly. Dimmest of the Messier globular clusters.
NGC 7009	**Saturn Nebula**. Blue-green planetary nebula, mag 7.8. Size about 30” x 25”. Rounded outer shell with elongated bright inner shell and projections (ansae). Central star mag 11.5. Dist ~ 4,000 ly. About 1.3 degrees from Nu (v) Aquarii.
NGC 7293	**Helix Nebula**. Large planetary nebula. Mag 7.6. Size 15’ x 12’. Low SB 13.8. Closest known planetary nebula. Distance ~ 650 light years.

PISCIS AUSTRINUS

Beta (β)	Mags 4.3/7.1, separation 30”. A0/? Stars at roughly 140 ly.



ANDROMEDA

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Gamma (γ)	**Almach**. Mags 2.3/5, separations 9.5”. Striking orange/blue pair, K3/B8. Distances (390 ly and 270 ly) imply optical only.
Pi (π)	Magnitudes 4.4/7, separation 36”. B5/A6. Stars at roughly 550 ly.
59	Magnitudes 6/6.7, separation 17”. B9/A1. Pair at 436 ly distance.
M31 (NGC 224)	**Andromeda Galaxy**. Largest member of the Local Group. Magnitude 3.4, dimensions 190’ x 60’. SB 13.3. Distance 2.5 million light years. Dwarf satellite galaxies M32 & M110. Both magnitude 8.1. Dimensions 9’ x 7’ and 20’ x 12’. M110 has lower SB. Mu (μ) Andromedae is halfway between M31 and Beta (β) Andromedae.
NGC 7662	**Blue Snowball**. Planetary nebula, mag 8.4, size ~ 30”. Double-shell. About 26’ from the blue-white B9 star 13 And (magnitude 5.8).

PEGASUS

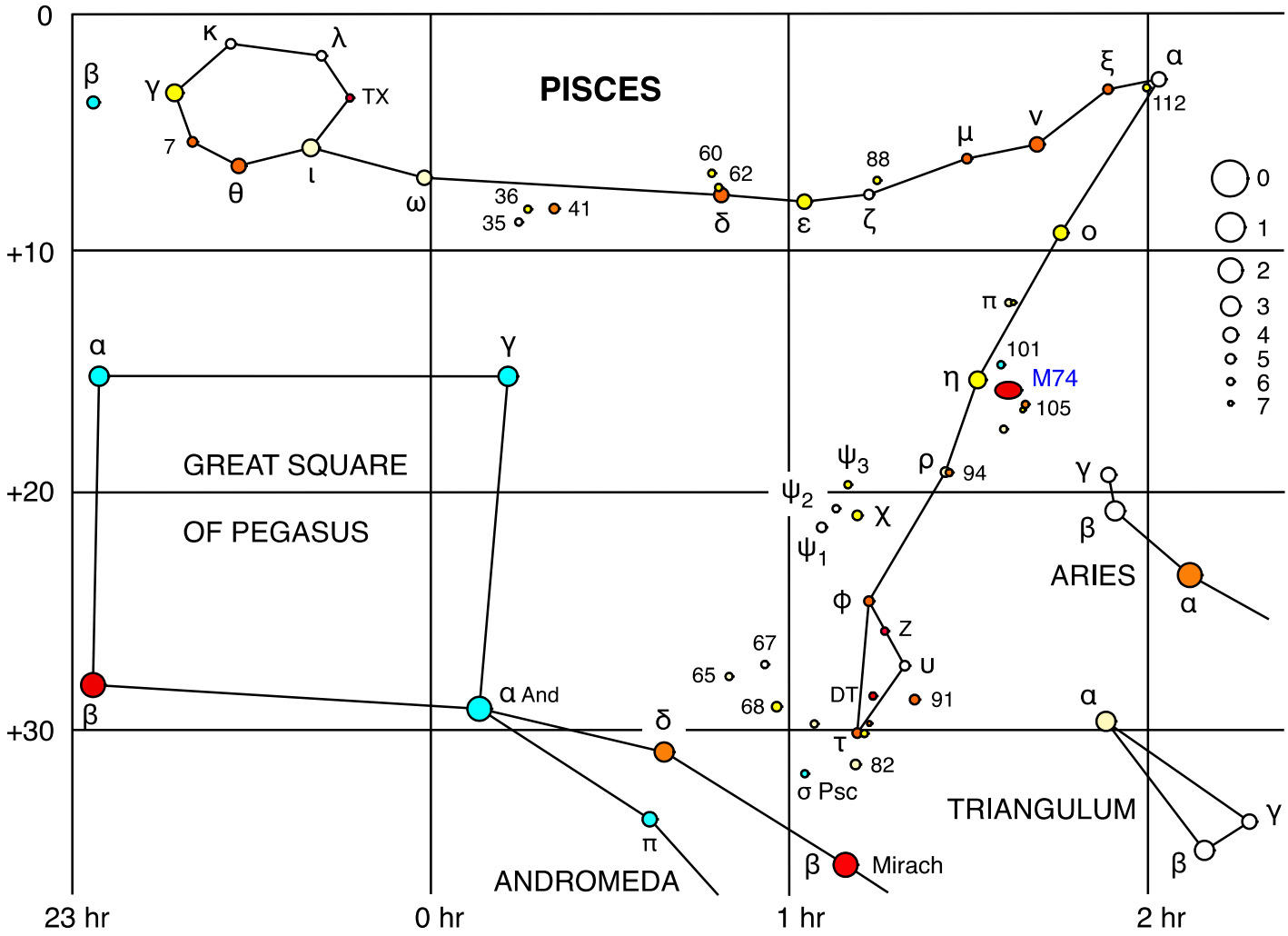
Epsilon (ε)	**Enif**. Orange supergiant (10 solar masses). Mags 2.5/8.7, separation 144”. K2/F8. Optical only.
M15 (NGC 7078)	Globular cluster, magnitude 6.2, diameter 18’. Class 4. Densely packed. Distance 33,600 ly. About 4.2 degrees from Enif and just 18’ from the star HR 8231 (mag 6.1).

ARIES

Gamma (γ)	Striking pair, mags 4.5/4.6, separation 7.4”. A2/B9. Stars at roughly 166 ly.
Lambda (λ)	Magnitudes 4.8/6.7, separation 37”. F0/G0. Both stars at 131 ly.

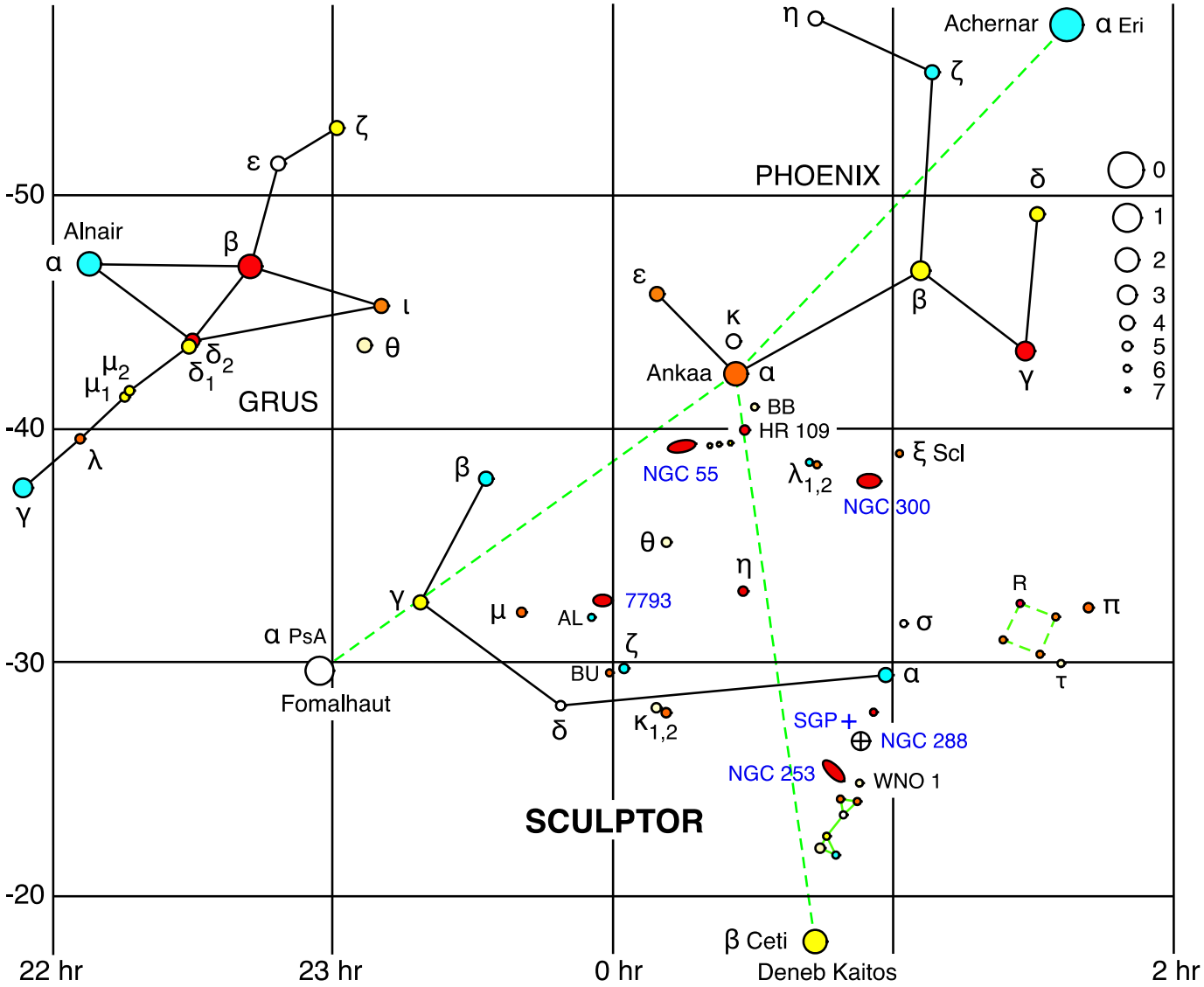
TRIANGULUM

6	Magnitudes 5.3/6.7, separation 4”. G5/F5. Might be optical.
M33 (NGC 598)	**Triangulum Galaxy**. Spiral galaxy, mag 5.8, size 70’ x 40’. Low SB 14.2. Distance 2.8 million light years. Third largest galaxy in the Local Group.



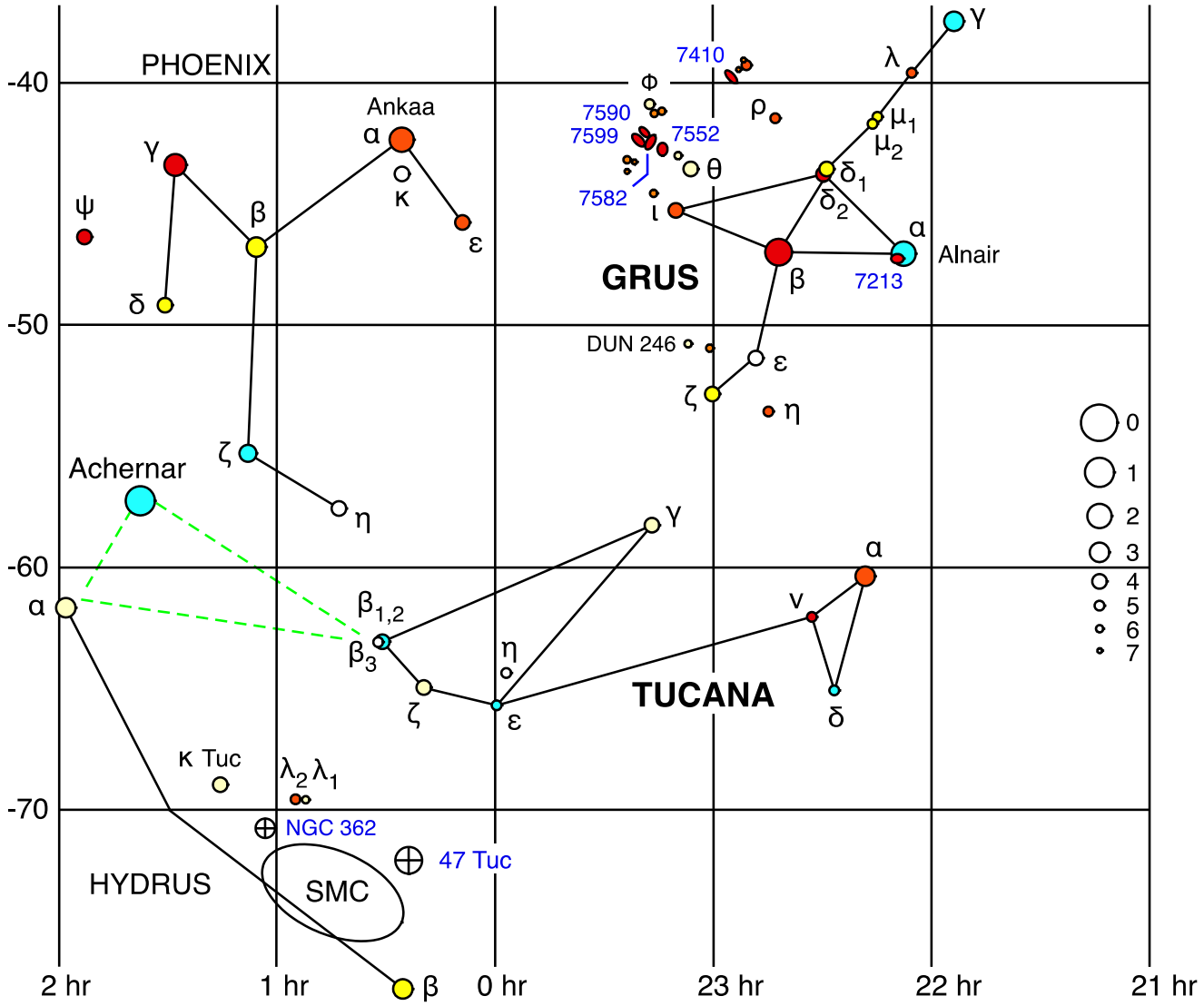
PISCES [Return to Index](#)

Alpha (α)	Tight binary, mags 4.3/5.2, separation 1.9”. A3/A2. Period 3,270 years. Distance 165 ly.
Zeta (ζ)	Magnitudes 5.2/6.2, separation 23”. A7/F7. Both stars at about 133 ly.
Phi (φ)	Magnitudes 4.7/9, separation 7.5”. K0/? Both stars at about 400 ly.
Psi1 (ψ_1)	Twin pair, mags 5.3/5.5, separation 30”. A1/A0. May be related.
35 65	Magnitudes 6/7.5, separation 11.2”. F0/F4. Both stars at about 240 ly. Twin pair of magnitudes 6.3/6.3, separation 4.4”. F5/F4. Distance 290 ly.
Z	Carbon star, magnitude 6.3-7.9. C7,2. Period 144 days. Distance 2,100 ly. Colour index +2.79.
DT	Mag 6.4, spectral type S3. Colour index +1.67. D 974 ly. S-type stars have about equal amounts of carbon & oxygen in their atmosphere. Class M giants have more oxygen than carbon. C-type carbon stars have more carbon than oxygen.
TX (19 Psc)	Bright carbon star, magnitude 4.8-5.8. C7,2. Irregular cycle. Distance 800 ly. One of the brightest but not reddest carbon stars in the sky. Colour index +2.67.
M74 (NGC 628)	Spiral galaxy, magnitude 9.4, dimensions 11’ x 10’. Distance about 24 Mly. Seen face-on. Low surface brightness SB 14.2. About 1.3 degrees from Eta (η) Piscium. Tough visual object.



SCULPTOR Return to Index

Kappa 1 (κ_1)	Tight binary, mags 6.1/6.2, sep 1.3”. F2/? Period 616 years. Dist ~ 224 ly.
AL	Magnitudes 6/6.8, separation 134”. B6/B8. Stars at roughly 710 ly.
WNO 1 (HR 251)	Watson 1. Mags 6.6/9.2, separation 5.4”. F6/G0. Both stars at about 240 ly.
R	Carbon star, mag 6-8.5. C6,5. Period 370 days. Colour index +4.15. D 1,300 ly. Sits in the corner of a square of 6th magnitude orange stars.
SGP	South Galactic Pole. Near NGC 288.
NGC 55	Asymmetric barred spiral galaxy, mag 7.9, dimensions 30’ x 6’. SB 13.3. Distance 6 Mly. Large, edge-on 5:1. Mottled disk. Just seen with 10x60 binos. Three in-line 7th mag stars near the 5th mag HR 109 point to NGC 55.
NGC 253	**Sculptor Galaxy**. Spiral galaxy, mag 7.2, dimensions 28’ x 5.6’. SB 12.4. Distance about 11 Mly. Large, edge-on 5:1. Mottled disk. One of the brightest galaxies in the sky. Easily seen with 10x60 binos. Most easily found from Beta Ceti (Deneb Kaitos).
NGC 288	Globular cluster, mag 8.1, diameter 14’. Class 10. Not very concentrated. Dist 23,000 ly. About 1.7 degs from NGC 253 and 3 degs from α Sculptoris.
NGC 300	Spiral galaxy, mag 8, dimensions 22’ x 16’. Distance 6.3 Mly. About 2.2 degrees from λ_2 Scl. Low SB 14.1. Tough visual object.
NGC 7793	Spiral galaxy, mag 9.2, size 9’ x 6’. SB 13.3. Distance 13 Mly. Indistinct flocculent (fluffy) spiral arms. About 52’ from the AL Scl double.

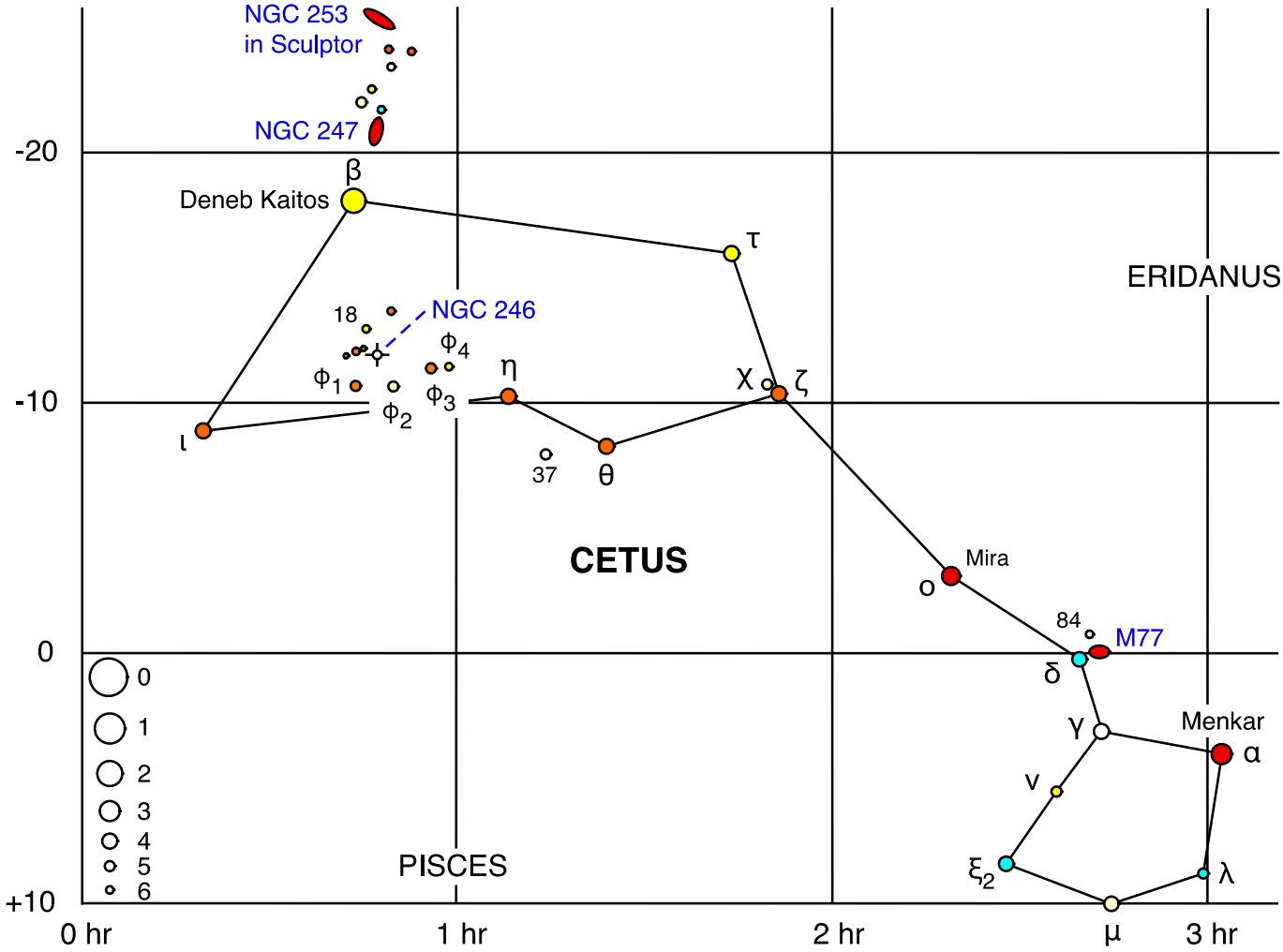


GRUS Return to Index

Theta (θ)	AB-C. Mags 4.5/6.6//7.8, separations 1.5”, 159”. F5//G2. All at 129 ly.
DUN 246	Magnitudes 6.3/7, separation 8.9”. F6/F8. Both stars at 134 ly.
Grus Quartet	Interacting spiral galaxies. Distance roughly 70 million light years. NGC 7582, mag 10.6, 5’x 2.5’, SB 13.1. NGC 7590, mag 11.4, 3’x 1.2’, SB 12.5. NGC 7599, mag 11.4, 4.8’ x 1.5’, SB 13.3. Trio roughly 5’-13’ from each other. Outlier NGC 7552, mag 10.6, 3.5’ x 3.5’, SB 13.1. 28’ away.
NGC 7213	Spiral galaxy, mag 10.1, 3’ x 3’. Bright core but faint halo. Just 16’ from Alnair.
NGC 7410	Spiral galaxy, mag 10.3, 5’ x 1.6’. Elongated 3:1. Bright core. High SB 12.3. Distance is a whopping 120 million light years!

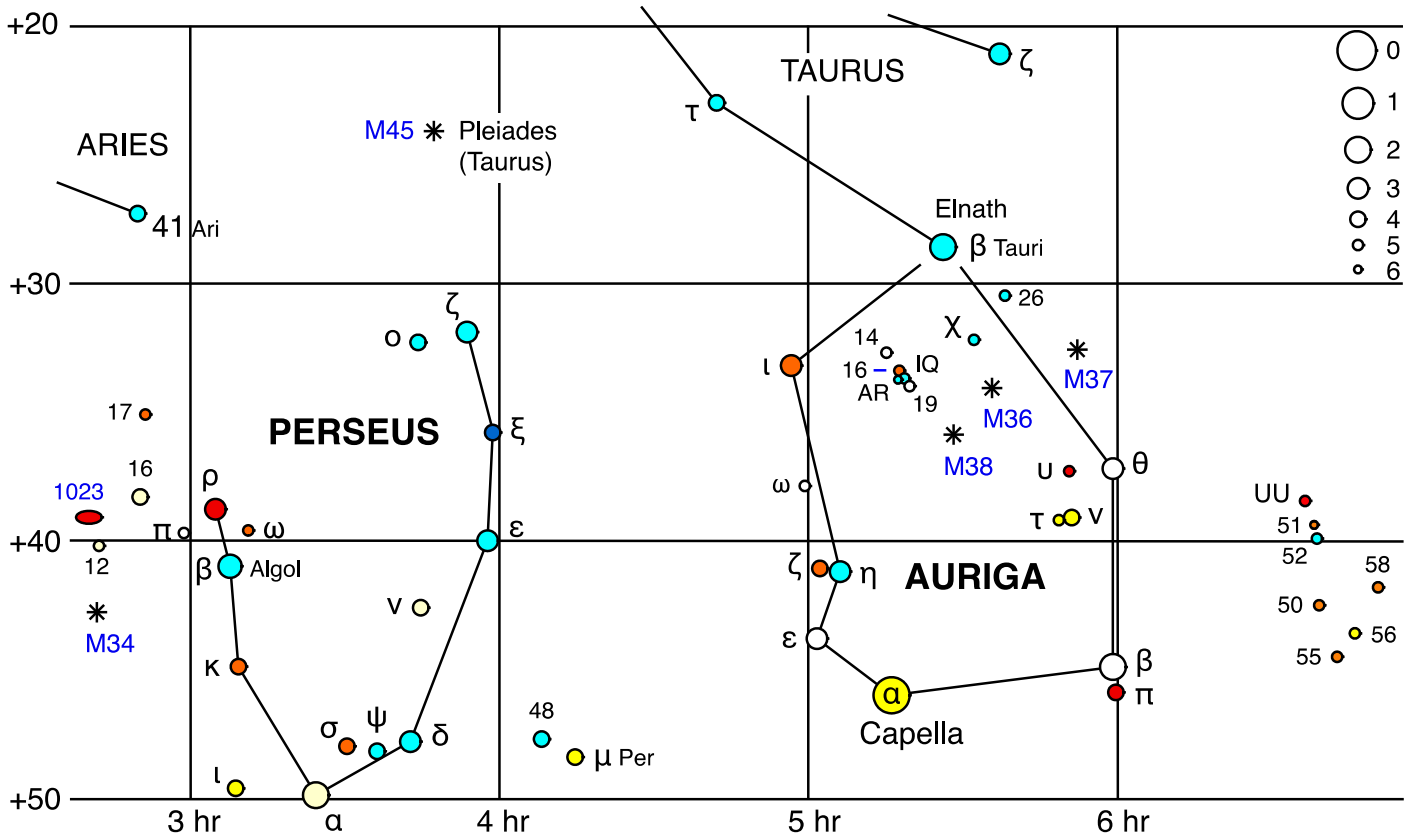
TUCANA

Beta 1,2,3 ($\beta_{1,2,3}$)	B9/A2//A0 magnitudes 4.4/4.5//5 separations 27”, 549” (9’). Could all be bound or they could be just optical at distances 140-160 ly. Achernar to α Hydri is about 5 degs. β Tuc lies about 10 degs from both stars.
Kappa (κ)	System AB-CD, mags 5/7.7//7.8/8.4, separations 4.6”, 319”, 1”. F6/K1//K2/K3. Period of orbit for AB pair 857 years, CD pair 85 years. Stars at about 68 ly.
Lambda1 (λ_1)	Magnitudes 6.7/7.4, separation 20”. F7/G1. Both stars at 197 ly.
47 Tuc (NGC 104)	Massive globular cluster, mag 4, diam 31’. Class 3. Second only to omega Cen. Distance about 14,000 light years.
NGC 362	Globular cluster, mag 6.8, diameter 13’. Class 3. Distance 28,600 ly.
SMC (NGC 292)	**Small Magellanic Cloud**. Dwarf satellite galaxy of the Milky Way. Mag 2.3. Size about 5 x 3 degrees. Distance 200,000 light years.



CETUS Return to Index

Gamma (γ)	Tight pair, magnitudes 3.5/6.2, separation 1.9”. A3/F3. Dist 80 ly.
Nu (ν)	Magnitudes 5/9, separation 8.1”. G8/? Stars at about 380 ly.
Chi (χ)	Wide pair (B = EZ Ceti), magnitudes 4.7/6.8, separation 184”. F3/G3. Both around 77 ly distance.
37	Magnitudes 5.2/7.9, separation 47”. F5/K1. Both stars at 78 ly.
84	Contrasting. M77 nearby. Mags 5.8/9.7, separation 3.9”. F7/? Dist 72 ly.
Omicron (Mira)	Red giant Mira A is a pulsating variable star (M5.5-9). Distance 300 ly. Magnitude varies from 2 to 10 over a period of 332 days. Brightest periodic variable that is not visible naked eye for part of its cycle.
M77 (NGC 1068)	**Cetus A.** Spiral galaxy. Mag 9, dimensions 7’ x 6’. SB 12.8. Distance 35 Mly. Bright inner disk with spiral arms but weak low SB outer spiral structure. Strong radio source. Central supermassive black hole. About 52’ from Delta (δ) Ceti and 46’ from 84 Ceti.
NGC 246	**Skull Nebula**. Fairly large planetary nebula, mag 10.4, size 4’ x 3.5’. SB 13. Central white dwarf (HIP 3678) is mag 11.8. Distance ~ 1,800 ly. A mag 11.2 star near edge and a mag 11.7 star half way out from center are foreground objects. Nebula shows more detail with an O-III filter.
NGC 247	Spiral galaxy, magnitude 9.1, dimensions 20’ x 6’. Distance 11 Mly. Large, elongated 4:1. Member of the Sculptor Group. Low surface brightness SB 14 with indistinct spiral structure. About 2.9 degrees from Beta (β) Ceti. Tough visual object.



AURIGA

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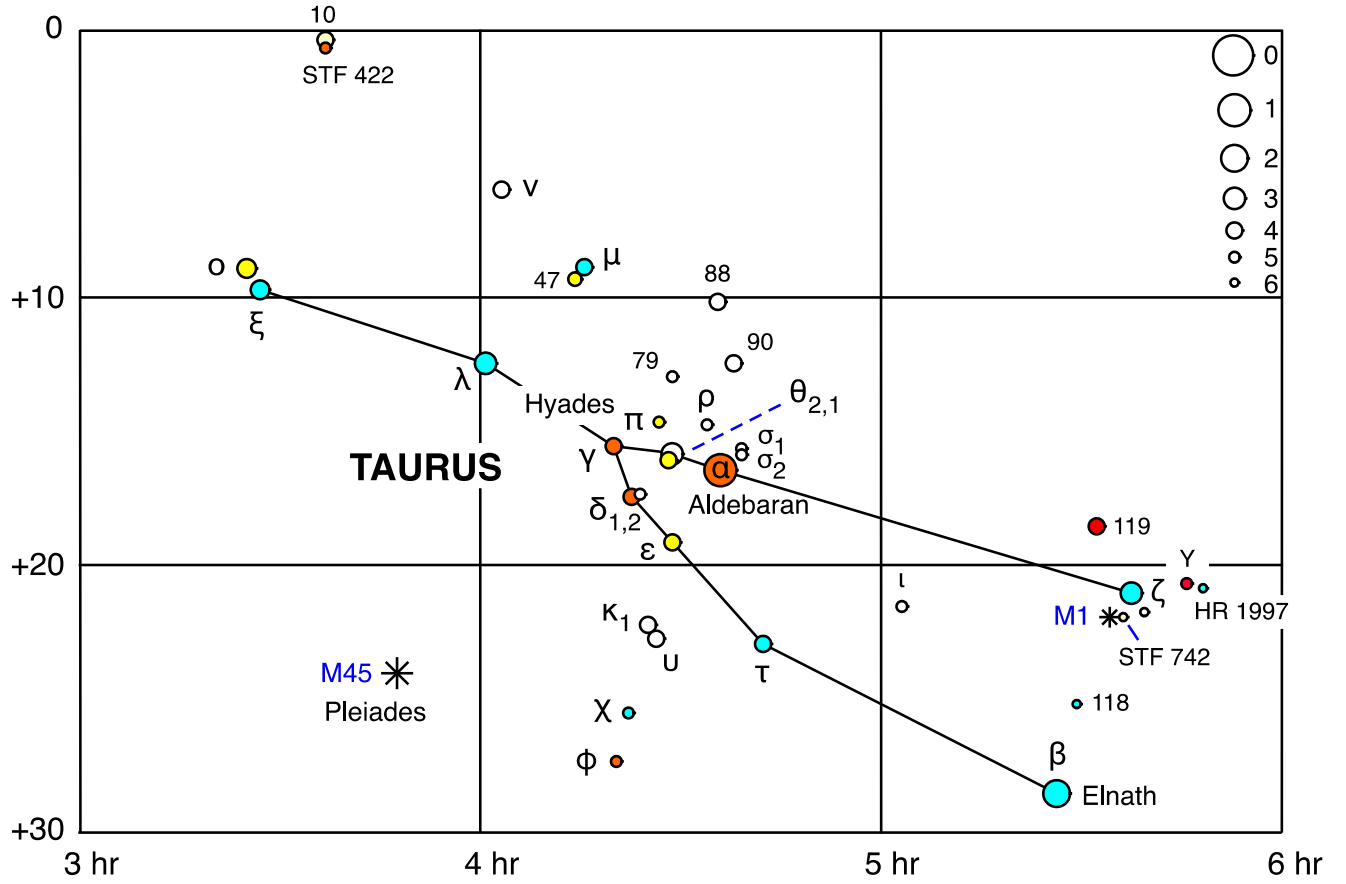
Theta (θ)	Magnitudes 2.6/7.2, separation 4.2”. A0/? Could be optical.
Omega (ω)	Magnitudes 5/8.2, separation 4.7”. A1/F9. Pair at 160 ly.
14	Magnitudes 5/7.3, separation 14.3”. A9/F5. Stars at about 270 ly.
UU	Carbon star, mag 5-7. C5,4. Period 441 days. Colour index +3. Dist 1,600 ly.
M36 (NGC 1960)	**Pinwheel Cluster**. Open cluster, magnitude 6, size 15’. Distance 3,900 ly. About 50 stars to mag 12. Brightest star SAO 58230 mag 8.8 near center. Not far away is the double STF 737, mags 9.1/9.4, separation 11”. B2/ B2.
M37 (NGC 2099)	Open cluster, magnitude 5.6, size 25’. Rich cluster with perhaps 500 stars. Distance 4,900 ly. About 120 stars to mag 12. Looks a lot like a globular cluster. Brightest star dead center is the red M1 giant HD 39183 at magnitude 9.2. Older cluster with many white to yellow (not bluish) stars.
M38 (NGC 1912)	**Starfish Cluster**. Open cluster, magnitude 6.4, size 20’. Distance 3,700 ly. About 80 stars to 12. Brightest is the G5 star HD 35878 (mag 8.4) near edge.

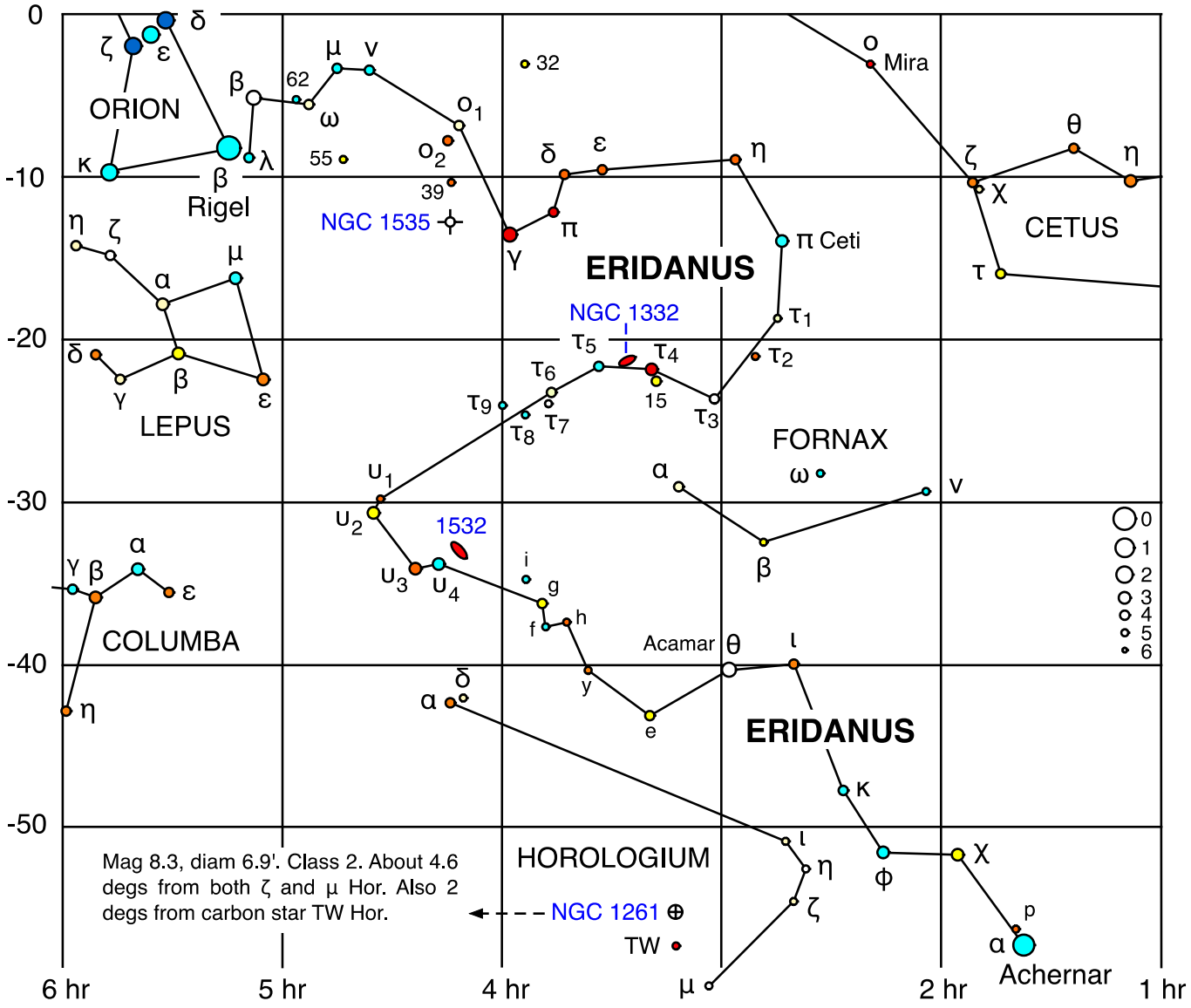
PERSEUS

Zeta (ζ)	Rigel-like pair. Mags 2.9/9.2, separation 12.8”. B1/B8. Stars at roughly 960 ly. Zeta A is an ultra-luminous B1 supergiant, which will explode as a supernova.
Beta (β)	**Algol**. Famous eclipsing binary and the first discovered. Distance 90 ly. Magnitude normally 2.1 but drops to 3.4 every 2.87 days during primary eclipse.
M34 (NGC 1039)	**Spiral Cluster**. Open cluster, mag 5.2, size 35’. Distance 1,700 light years. About 100 stars mag 8-12. Brightest but not a member is the G5 star HD 16771 (mag 7.3) towards edge.
NGC 1023	Lenticular galaxy, magnitude 9.4, dimensions 8.7’ x 3’. SB 12.7. Distance 35 Mly. About 1.2 degrees from 12 Persei.



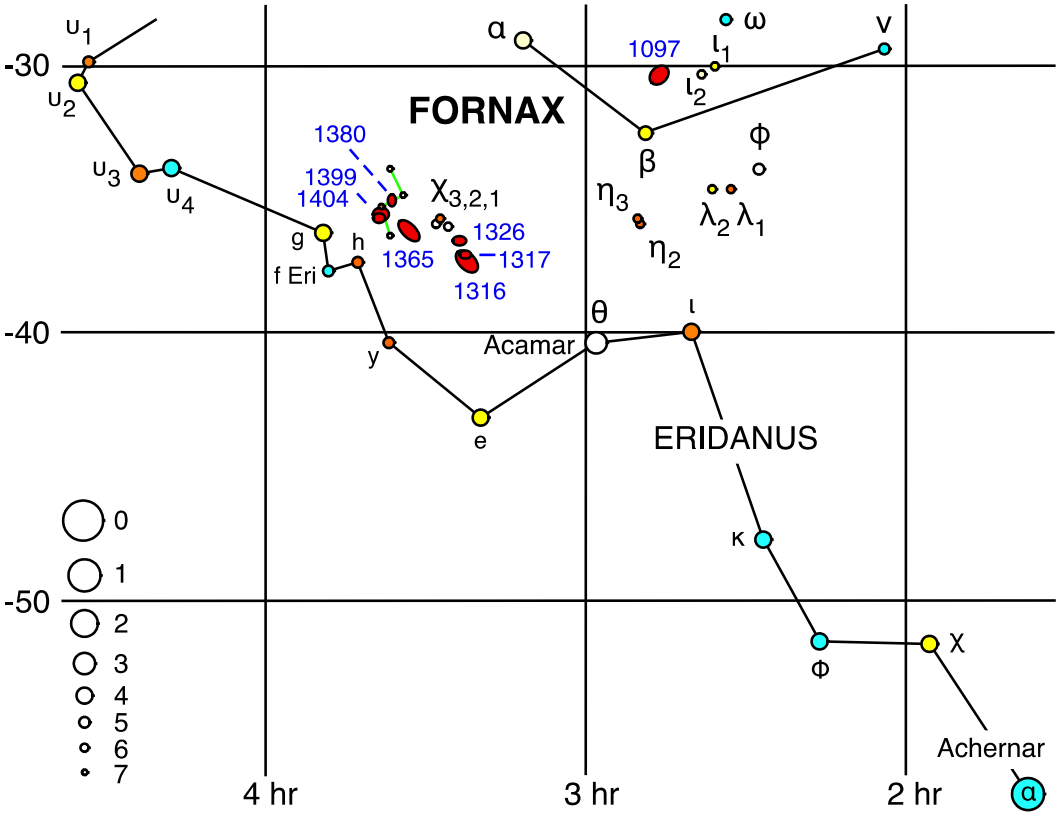
TAURUS Return to Index

Theta 2,1 ($\theta_{2,1}$)	Naked-eye double. Mags 3.4/3.9. Separation 337”. A7/G9. Distance ~ 150 ly. Theta 2 is the brightest star in the Hyades Cluster.
Phi (φ)	Magnitudes 5/7.5, separation 49”. K1/F8. Distances infer optical only.
118	Mags 5.8/6.7, separation 4.6”. B8.5/A0. Stars at roughly 350 ly.
STF 422 (V711)	Binary, mags 6/8.9, separation 6.7”. G8/K6. Period 2,100 years. Dist 97 ly. Just 11’ from the star 10 Tauri (mag 4.3).
STF 742	Binary, magnitudes 6.9/7.5, separation 4.2”. F8/? Period 3,000 years. Distance about 250 ly. Crab Nebula just 27’ away.
Y	Carbon star, mag 6.5-8.7. C6,4. Period 242 days. Colour index +3.35. Distance 2,170 ly. About 2 degrees from ζ Tauri and 40’ from HR 1997 wide double (mag 6/8.3, 75”).
M1 (NGC 1952)	**Crab Nebula**. Magnitude 8.4, size 6’ x 4’. Distance about 6,500 light years. Remnant of the supernova recorded by Chinese astronomers in the year 1054. At the center of the nebula is the Crab Pulsar (CM Tau, mag 16), which is a rotating neutron star. About 1 degree from Zeta (ζ) Tauri.
Hyades (Mel 25)	Nearest open cluster. Centered roughly around Theta 2,1. Bright at magnitude 0.5 and large 330’ in size. Distance 155 light years. A roughly spherical group (diameter 15 light years) of 300 to 400 stars. Aldebaran at 67 light years distance is not a cluster member.
M45 (Melotte 22)	**Pleiades (Seven Sisters)**. Known since antiquity across many cultures. Magnitude 1.5, size 90’. Distance 440 light years, size 12 light years. Contains at least 500 stars. Brightest 10 stars all blue-white, mag 2.9-5.8. At least 6 stars naked-eye. Alcyone mag 2.9, Atlas mag 3.6, Electra mag 3.7, Maia mag 3.9, Merope mag 4.2, Taygeta mag 4.3. Pleione is mag 5.1.



ERIDANUS Return to Index

Theta 1,2 ($\theta_{1,2}$)	**Acamar**. Striking pair. Mags 3.2/4.1, separation 8.2”. A4/A1. Dist ~ 164 ly.
Omicron2 (o_2)	Triple star system A-BC. Mags 4.4//9.7/11.5. Separated by 83” & 8.2”. D 16 ly. A is main-sequence. BC – white dwarf & red dwarf. K0.5//DA4/M4.5. Period A-BC more than 7,200 years. Period BC pair about 252 years.
32	Magnitudes 4.8/5.9, separation 6.9”. G8/A2. Stars at about 340 ly.
55	Mags 6.7/6.8, separation 9.3”. G8/F4. Stars at about 470 ly.
62	Mags 5.5/8.9, separation 66”. B6/B8. May be just optical.
f (DUN 16)	Magnitudes 4.7/5.3, separation 8.2”. B9/A1. Almost twins. Distance 173 ly.
p (DUN 5)	Binary. Striking twin orange pair, mags 5.8/5.9, separation 11.3”. K0/K5. Orbital period about 475 years. Distance 27 ly. One degree from Achernar.
NGC 1332	Lenticular galaxy, mag 10.3, size 4.7’ x 1.5’. SB 12.2. Distance 74 Mly. Small companion NGC 1331 (mag 13.4) out to side 3’ away.
NGC 1532	Barred spiral galaxy, mag 9.8, size 11’ x 3’. SB 13.3. Distance 58 Mly. Edge-on (4:1). Small companion NGC 1531 (mag 12) near core only 1.8’ away. About 1.5 degs from Upsilon 4 (υ_4) Eri. Sits just 13’ from a nearby mag 7 star.
NGC 1535	**Cleopatra’s Eye**. Planetary nebula. Greenish double-shell structure. Magnitude 9.4, size about 40” x 35”. Mag 12.5 central star. Dist ~ 4,500 ly.

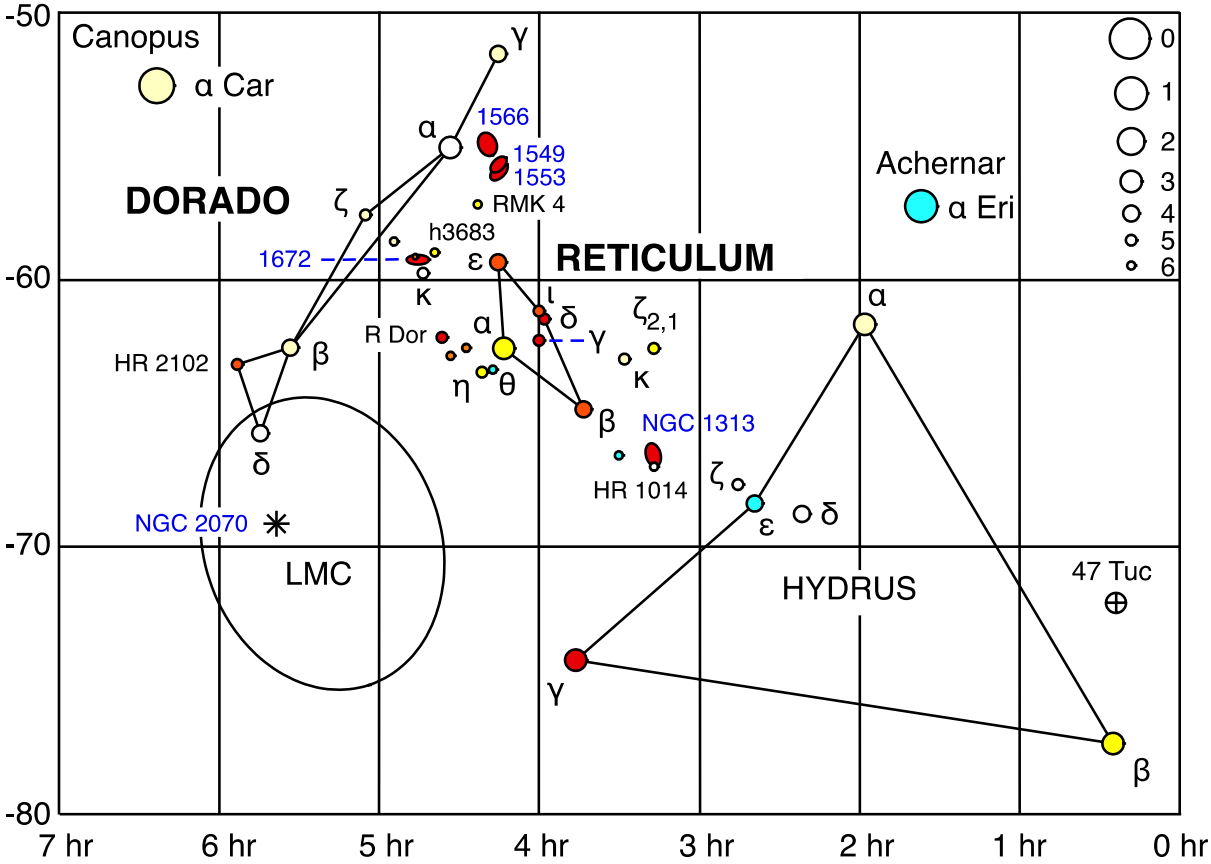


FORNAX Return to Index

Alpha (α)	Binary, mags 4/7.2, separation 5.4”. F8/G7. Period 269 years. Distance 46 ly.
Eta 3,2 ($\eta_{3,2}$)	Wide binocular double. Mags 5.5/6, separation 11.3 arcminutes. K5/K0. Eta 2 is also double, mags 6/10, separation 4.7”. This pair at about 420 ly.
Omega (ω)	Magnitudes 5/7.7, separation 11”. B9.5/A5. Could be just optical.
NGC 1097	Barred spiral galaxy, mag 9.3, dimensions 9.5’ x 7’. SB 13.6. Distance 56 Mly. It has a long bar and bright core, which houses a supermassive black hole. About 2.2 degs from β Fornacis. Satellite elliptical galaxy NGC 1097A (mag 13) is 3.5’ from the center of NGC 1097 and lies just out from its bar.
NGC 1316	**Fornax A**. Lenticular galaxy, magnitude 8.5, dimensions 11’ x 7’. SB 13. Distance about 63 Mly. Strong radio source. Central supermassive black hole. Bright core. Interacting with nearby spiral galaxy NGC 1317 about 6.5’ away.
NGC 1317 (1318)	Spiral galaxy, mag 10.9, size 3’ x 2.6’. SB 12.9. Just 6.3’ from Fornax A.
NGC 1326	Lenticular galaxy, mag 10.5, dimensions 4’ x 3’. SB 12.9. Distance 49 Mly.
NGC 1365	**The Great Barred Spiral Galaxy**. Mag 9.6, dimensions 11’ x 6’. SB 13.9. Distance about 54 Mly. Central supermassive black hole. One the most striking barred spirals in the sky but needs larger aperture for decent views of the bar & spiral arms. It has a long bar with dust lane across a bright core. About 2.2 degrees from h Eridani.

A “step” of four 7th mag stars (each about one degree apart) helps to locate these galaxies:

NGC 1380	Lenticular galaxy, mag 9.9, dimensions 4’ x 2.5’. SB 12.1. Distance 60 Mly.
NGC 1399	Elliptical galaxy, mag 9.4, dimensions 7’ x 6.5’. SB 13.3. Distance 58 Mly. Same low power field as NGC 1404, about 10’ away.
NGC 1404	Elliptical galaxy in Eridanus, mag 10, dimensions 5’ x 4.5’. SB 13.1. Dist 63 Mly.



DORADO [Return to Index](#)

HJ 3683 (h3683)	Binary, mags 6.5/7.5, separation 3.8”. G3/G3. Period 326 years. Dist 101 ly.
RMK 4	Almost twin pair, mags 6.8/7.2, separation 5.3”. G4/G5. Distance 90 ly. Midway between Alpha (α) Doradus and Epsilon (ε) Reticuli. Not quite in-line.
LMC	**Large Magellanic Cloud**. Nearby satellite galaxy of the Milky Way. Fourth largest galaxy in the Local Group (Andromeda, Milky Way and Triangulum Galaxies being number 1, 2, 3). 160,000 light years distance. Magnitude 0.3. Dimensions about 11 x 9 degrees.
NGC 1549	Elliptical galaxy, mag 9.8, dimensions 5’ x 4’. SB 12.8. Distance 54 Mly.
NGC 1553	Lenticular galaxy, mag 9.4, dimensions 6’ x 4.3’. SB 12.7. Distance 49 Mly. NGC 1549 and 1553 are in the same field, centers 12’ apart.
NGC 1566	**Spanish Dancer**. Spiral galaxy, mag 9.6, size 7’ x 5’. SB 13.2. Dist 32 Mly. About 2 degrees from Alpha (α) Doradus. One degree from NGC 1553.
NGC 1672	Spiral galaxy, mag 9.7, dimensions 6’ x 5.5’. High SB bar. Distance 39 Mly. Asymmetric with a prominent spiral arm brighter than the one on the other side. About 30’ from Kappa (κ) Doradus and 13’ from a 7th mag star.
NGC 2070	**Tarantula Nebula** (30 Doradus) in the Large Magellanic Cloud. Magnitude 8, size 40’ x 25’. One of the largest H II regions in the Local Group.

RETICULUM

Zeta 2,1 ($\zeta_{2,1}$)	Twin pair, mags 5/5.5, separation 309”. G1/G2.5. Distance 39 ly. Both main sequence yellow dwarfs similar to our Sun.
Theta (θ)	Magnitudes 6/7.7, separation 4.1”. B9/B? Pair at 470 ly.
NGC 1313	**Topsy-Turvy Galaxy**. Barred spiral galaxy, mag 9.2, size 9’ x 7’. SB 13.4 Ragged appearance may be due to a merger with another smaller galaxy. Dist 14 Mly. About 3 degs from β Reticuli. 26’ from the mag 6 star HR 1014.

Double Star Abbreviations

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BSO	Brisbane Observatory
DUN	Dunlop, James
H	Herschel, William
h or HJ	Herschel, John
PZ	Piazzi, Giuseppe
RMK	Rumker, Charles
S	South, James
SHJ	South and Herschel
STF	Struve, F.G.W

Greek Alphabet

alpha	α	nu	ν
beta	β	xi	ξ
gamma	γ	omicron	ο
delta	δ	pi	π
epsilon	ε	rho	ρ
zeta	ζ	sigma	σ
eta	η	tau	τ
theta	θ	upsilon	υ
iota	ι	phi	φ
kappa	κ	chi	χ
lambda	λ	psi	ψ
mu	μ	omega	ω