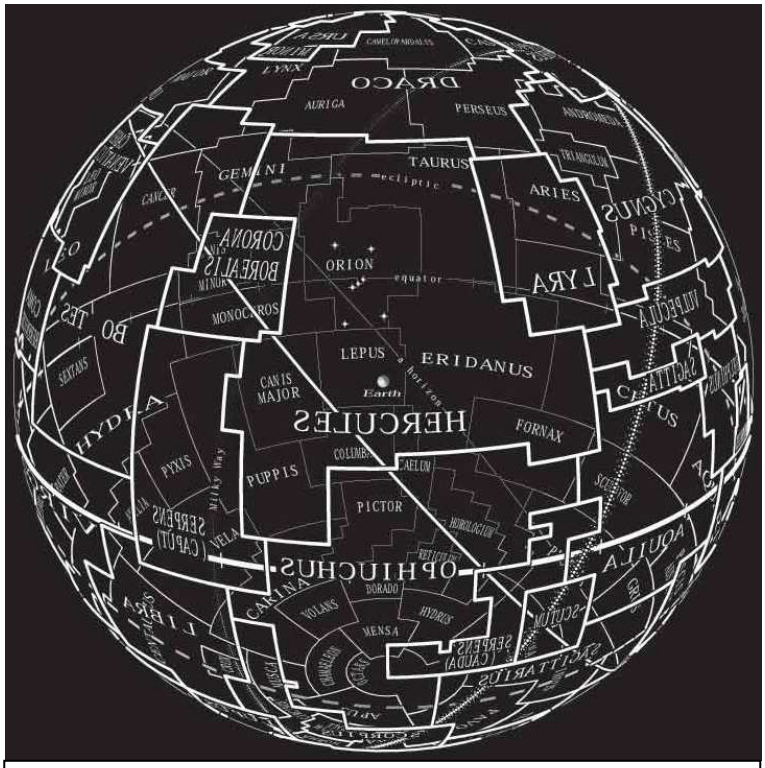
Constellations and Asterisms

Constellations are to astronomers what countries are to planet Earth. Just as named continents, oceans, and countries allow us to conveniently refer to different parts of our home planet, so do constellations help us navigate through the starry reaches of the celestial sphere. Just as we might refer to a certain town in California or a village in Italy, astronomers will talk about a galaxy in Leo or a star in Aquila. Even professional astronomy retains its links with the past: the contents of a journal article such as "*A census of molecular hydrogen outflows and their sources along the Orion A molecular ridge*" may be opaque to non-astronomers, but we can still recognise a multi-millennium-old constellation in the title.

Long before the emergence of civilisations, our remote ancestors must have noticed star patterns that recurred from night to night and marked the slow passage of the seasons. Some patterns bore enough resemblance to familiar objects that they would surely have acquired common names even before there were written languages to record them: the compelling question mark of Scorpius, for example, has been identified as a scorpion by every culture to which scorpions are known, and as a fish hook by every Polynesian culture. Others may have long persisted simply as loose collections of stars, or *asterisms*: groupings of stars distinctive enough to catch the eye, but too small or too dispersed to merit a separate identity.



The 88 modern constellations cover and map the celestial sphere. Source: www.universalworkshop.com/ACOM.htm

The first systematic attempt to record the constellations is usually credited to the Greek Ptolemy c. 150 A.D., building on the work of his predecessor Hipparchus. Ptolemy's *Almagest* lists over 1000 stars arranged in 48 constellations, many of them (including those of the Zodiac) based on Mesopotamian traditions. All but one of these have survived to the present day. From 1592 to 1763, astronomers of the early modern era created nearly 80 new constellations as southern voyagers found new skies unknown to the Greeks, and chart makers sought to fill in some of the gaps between the Ptolemaic constellations. Many of these overlapped, and not until 1930 did the International Astronomical Union finally establish the definitive set of 88 modern constellations, each delimited by lines of celestial latitude and longitude and enclosing all the stars and other telescopic objects within its boundaries.

A constellation is defined solely by its boundaries. Star charts often depict constellations as join-the-dots style stick figures, but these representations – although sometimes useful to help identify the main stars – have no official status and vary from source to source. By contrast, an asterism has no boundaries, and is defined solely by its stick figure. Some asterisms are widely recognised and have acquired common names: Orion's belt is probably the best known example. Anyone can coin their own asterisms, and in fact building your own personal collection is one of the keys to learning your way around the sky. An asterism may be as large as a constellation (like the great square of Pegasus) or small enough to fit comfortably within the view field of a high powered eyepiece, but as long as it helps to define a small part of the sky it serves a useful purpose. Southern hemisphere observers often rely on a small but distinctive asterism of five faint stars evenly spaced in a curved V shape to locate the south celestial pole, and the constellation of Aquarius is one of many which lacks shape but can be located easily by the presence of several prominent asterisms.

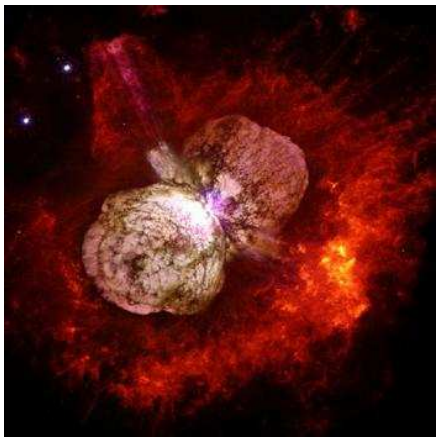
Constellation of the Month: Carina (the Keel)

Origin and History: Carina is a modern take on an ancient theme. It was originally part of the large and sprawling constellation Argo, the mythological vessel sailed by Jason and his crew of heroes (including Hercules, Castor, and Pollux) in their quest for the Golden Fleece. On the final leg of their journey they had to sail through the Symplegades, huge cliffs that came together to crush anything that ventured between them. Acting on advice from the prophet Phineus, Jason released a dove as they approached, and – when the dove made it through minus only a few tail feathers – his crew rowed with all their might. They too passed with only minor damage to the stern of their ship, from which time on the rocks were forever anchored to the islands and allowed free passage to all. It is something of a historical curiosity that the nearby constellation of Columba (the Dove) was named for the dove sent by Noah in search of dry land, rather than the valiant scout of the Argonauts.

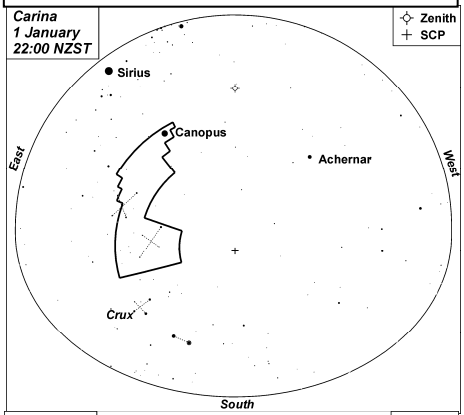
Argo was recognised by the Greeks and was described by Ptolemy in his *Almagest*. Carina gained its own identity in 1879 when the unwieldy Argo was broken up into three pieces of more tractable size for stellar cartography: Puppis (the Poop), Vela (the Sails), and Carina. A fourth fragment, Pyxis (the Compass) was also resurrected then after previously falling into disuse, despite the fact that the original Argo would not have had such a device.

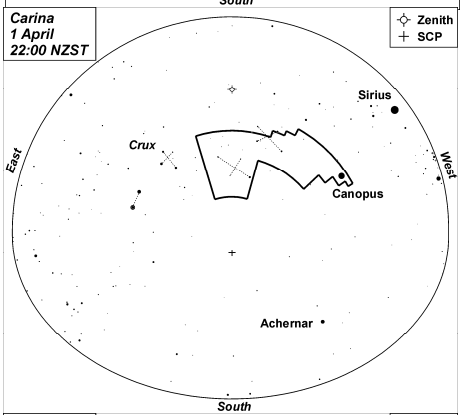
Description: The western extremity of Carina is easily recognised by the magnitude -0.65 Canopus, by far the second brightest star in the sky after Sirius. East of Canopus are the well known asterisms of the False Cross, which straddles the northern border with Vela, and the longer but narrower Diamond Cross, the southern ends of which are marked by the brilliant red Avior (mag. 1.9) and Miaplacidus (mag. 1.7), respectively. The Southern Cross and the two Pointers follow close behind, forming a bright and distinctive series of groupings which is one of the most prominent features of the southern sky.

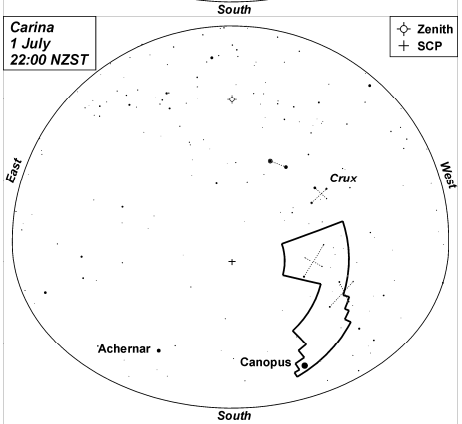
The northeast regions of Carina include a portion of the Milky Way and contain many open clusters, making this area a rich hunting ground for binoculars and small telescopes. However, its greatest claim to fame is the star η (eta) Carinae, which lies in the centre of a large region of diffuse nebulosity within which lie many embedded clusters. Eta Car is currently only magnitude 6.5 but has been much brighter in recent historical times, reaching -0.8 during an outburst which peaked in 1843. Even today it is over 500 000 times more luminous and 100 times more massive than our Sun. Hubble space telescope images show two huge lobes of superheated gases thrown out by the 1843 outburst

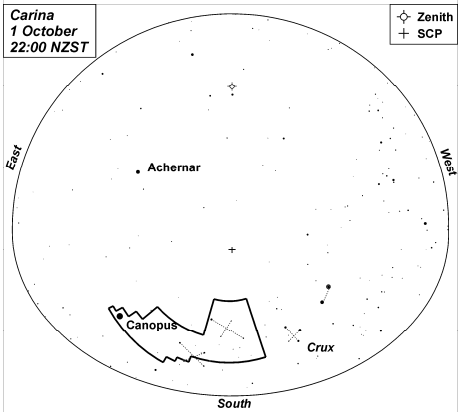


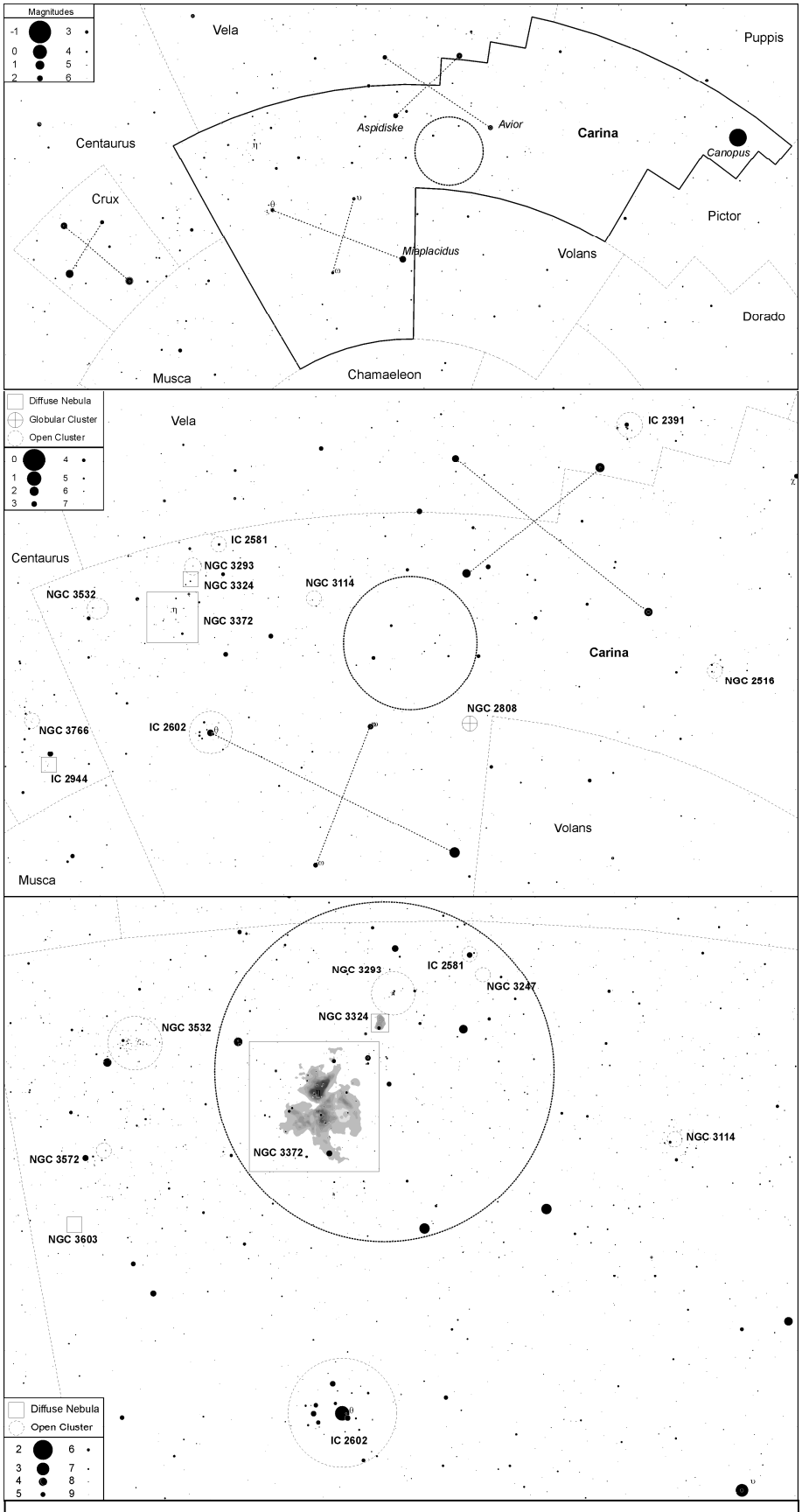
From the latitude of Christchurch Carina is circumpolar, remaining visible throughout the year as it circles the South Celestial Pole. For evening observers it is most prominent in late summer and early autumn, when it reaches its highest point about two hours after sunset. The charts below show Carina as it appears facing due south, at 10:00 pm NZST on 1 January, 1 April, 1 July, and 1 October.











Three views of Carina, zooming in on the region around eta Car. The circle near the centre of each chart represents a 5º field of view, equivalent to the view through a standard set of binoculars.

expanding rapidly on opposite sides of the star. It is widely regarded as a supernova in the making and could erupt at any time in the next 50 000 years – the flap of a bee's wing, astronomically speaking.

Objects of Interest in Carina

NGC 2516 (Southern Beehive): This large open cluster lies just over 3º southwest of ε Car (Avior in the False Cross), within the same binocular field and an easy naked eye target. Its common name recalls the Beehive Cluster, a large open cluster in the northern constellation of Cancer.

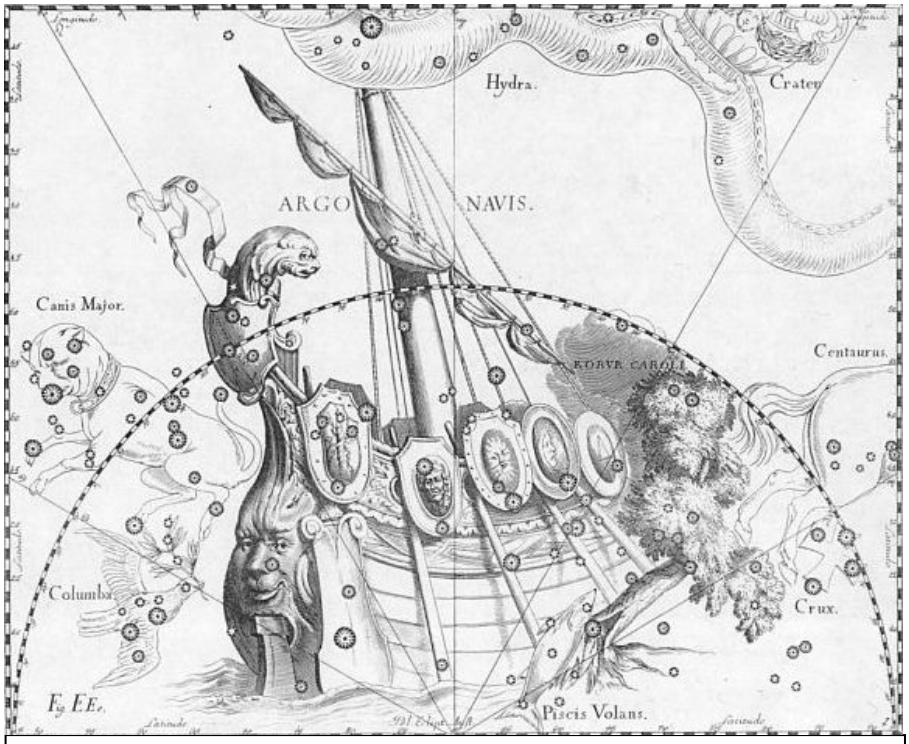
NGC 2808: A small globular cluster midway between ι Car (Aspidiske in the False Cross) and Miaplacidus. Easily visible in binoculars, and a bright hazy spot through a small telescope.

NGC 3114: a large, scattered open cluster needing low magnification and a wide field, well suited to binoculars.

IC 2602 (Southern Pleiades): A splashy open cluster centred around θ Car, easily visible to the naked eye and spectacular through binoculars or a small telescope.

NGC 3293 (Gem Cluster): A compact open cluster 2º northwest of η Car, visible with binoculars and spectacular through even a small telescope. Similar in appearance to the Jewel Box cluster in Crux, with a single bright red star standing out clearly from its blue-white neighbours.

NGC 3372: The η Car nebula is one of the largest and most spectacular objects of its type, being exceeded in size and brightness only by the Great Orion Nebula M42. It is visible to the naked eye and shows up well in binoculars. It has very prominent dark lanes, where layers of cool, intervening dust lie between us and the bright nebulosity, with a distinctive dark notch called the Keyhole. Even a small



The former constellation of Argo Navis as drawn by the great celestial cartographer Johannes Hevelius (1611-1687). Crux is clearly visible at lower right, with the Diamond Cross, the False Cross, and Canopus appearing successively further left . The modern day Carina essentially coincides with the hull of the ship as shown in this representation.

telescope will bring out layers of detail in and around the Keyhole, and a larger instrument will just pick up the lobes around the central star.

NGC 3532 (Wishing Well Cluster): Another splashy cluster 3º east of η Car, easily recognised by a prominent yellow super giant star which appears to form part of the cluster but is actually a background star. Breathtaking on a dark night and a must see for binoculars, NGC3532 is about 1300 light years distant.

Carina: Vital Statistics

Genitive:	Carinae
Abbreviation:	Car
English name:	The Keel
Origin:	de Lacaille, 1763
Constellation family:	Heavenly Waters
Bordered by:	Centaurus, Vela, Puppis, Pictor, Volans, Chamaeleon, Musca
Area:	494.18 square º (34th in size)
Centroid right ascension:	08h 41.70’
Centroid declination:	-63º 13.16’
Culminates at midnight:	30 January
Brightest star:	Canopus (mag -0.62)

Other named stars:

Name	Bayer designation	Magnitude
Miaplacidus	beta Car	1.68
Avior	epsilon Car	1.86
Aspidiske (Turais)	iota Car	2.25

Four of the more spectacular objects in Carina, all easily found with binoculars. From top: Southern Beehive; Southern Pleiades; nebula surrounding eta Carinae; Gem Cluster.

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