

The chart is orientated for  
 Nov. 1 at 1 a.m. NZDT  
 Nov. 15 at midnight "  
 Dec. 1 at 11 p.m. "  
 Dec. 15 at 10 p.m. "

### Evening sky in December 2024

To use the chart, hold it up to the sky. Turn the chart so the direction you are looking is at the bottom of the chart. If you are looking to the south then have 'South horizon' at the lower edge. As the earth turns the sky appears to rotate clockwise around the south celestial pole (SCP on the chart). Stars rise in the east and set in the west, just like the sun. The sky also does a small extra clockwise rotation each night as we orbit the sun.

There are two 'evening stars'. Venus, in the west, is the first to appear. It is soon followed by Jupiter in the northeast. Saturn is midway down the northwestern sky. Due east is Sirius, the brightest true star, twinkling like a diamond. Left of it is Orion, with 'The Pot' at its centre. Bright Rigel is above the Pot and reddish Betelgeuse below. Left of Orion, above Jupiter, is orange Aldebaran with a V-shaped cluster making the face of Taurus the Bull. Further left is the Pleiades/Matariki/Seven Sisters star cluster. The Pointers and Crux, the Southern Cross, are low in the south. Right of Canopus, the second brightest star, are the Clouds of Magellan (LMC and SMC on the chart), two small nearby galaxies. The Great Square of Pegasus spans the lower northern sky with the Andromeda Galaxy below and right of it.

## The Evening Sky in December 2024

There are two 'evening stars' this month on opposite sides of the sky. **Venus** is the first to appear, due west soon after sunset. It is soon followed by **Jupiter** in the northeast. Venus sets in the southwest around midnight, a brilliant object in the dark night sky. Jupiter crosses the north sky through the night, setting in the northwest around dawn.

Venus is bright enough to see in daylight if you can get your eyes focused on infinity. On December 5 the Moon will be near Venus. Around 5 pm the pair will be due north of the zenith. Venus will be 3°, six moon widths, below and left of the Moon. Though bright, Venus isn't of much interest in a telescope. It looks like a featureless Moon just after first quarter.

**Saturn** is northwest of the zenith at dusk. It sets due west around midnight. It looks like a medium-bright cream-coloured star. The Moon will be very close to Saturn on the 8<sup>th</sup>. Jupiter and Saturn are good targets for a telescope. Any telescope will show Jupiter's 'Galilean' moons, but not all four every night as they cross in front of and behind Jupiter. A small telescope will show the disk of Saturn. The ring is becoming edge-on so it looks like a spike through the planet.

**Sirius** is the brightest true star, low in the east, twinkling colourfully. **Canopus**, the second brightest, is a bit higher in the southeast. Almost overhead is **Achernar**. Left of Sirius is the constellation of **Orion**. Bluish **Rigel** and orange **Betelgeuse** are Orion's brightest stars. Between them is the line of three stars making the bottom of 'The Pot' in our southern hemisphere view. A faint line of stars above the bright three is the Pot's handle. At its centre is the Orion Nebula, a glowing gas cloud nicely seen in binoculars.

Left of Orion and just above Jupiter is a triangular group making the upside-down face of **Taurus** the bull. Orange **Aldebaran**, at one tip of the V shape, is one eye of Taurus. The stars on and around the V, except for Aldebaran, are the Hyades cluster. Aldebaran is not a member of the cluster but closer and on the line-of-sight. Further left is the **Pleiades/Matariki/Subaru** cluster, a tight grouping of six naked-eye stars. Many more stars are seen in binoculars.

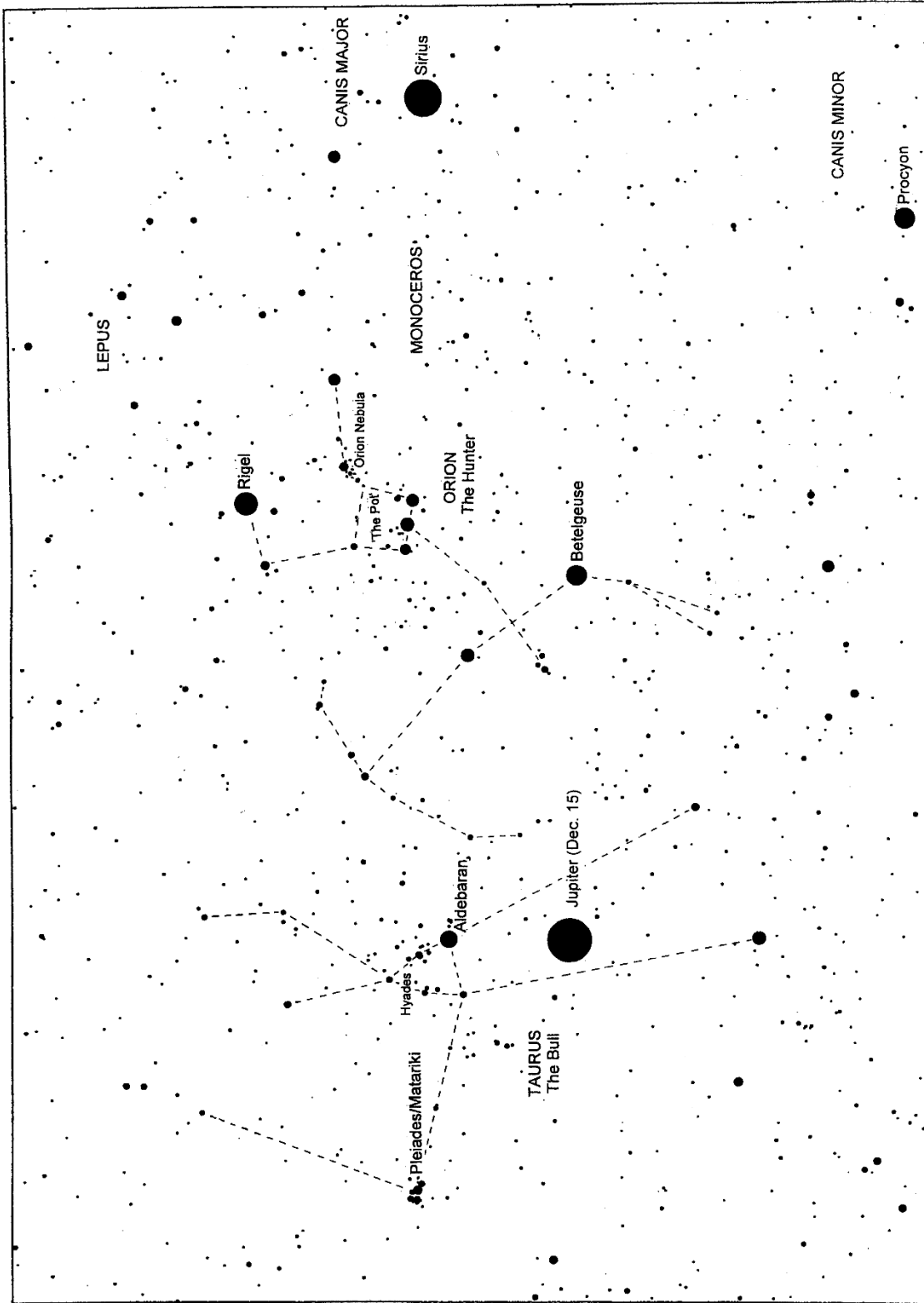
Low in the south are the Pointers, Beta and **Alpha Centauri**, and **Crux** the Southern Cross, upside down at this time of the year. The **Milky Way** is wrapped around the horizon. The broadest part is in Sagittarius, low in the southwest. It narrows toward Crux in the south and becomes faint in the east below Orion.

The Clouds of Magellan, **LMC** and **SMC**, high in the southern sky, are two small galaxies about 160 000 and 200 000 light-years\* away, respectively. They are easily seen by eye on a dark moonless night as misty patches of light.

Mars (not on the chart) rises in the northeast around 1 a.m. at the beginning of the month and 11 p.m. at the end. It is a bright orange red 'star'. We pass Mars next month, so it is nearly at its closest, just under 100 million km away. It is small in a telescope. The Moon will be close to Mars on the morning of the 19<sup>th</sup>. Mercury (not on the chart) appears in the southeast dawn sky mid-month when it is rising an hour before the Sun. It rises 80 minutes before the Sun at the end of the month. It is the brightest 'star' in that part of the sky.

Very low in the north is the **Andromeda Galaxy**. In binoculars in a dark sky it looks like a spindle of light. It is a bit bigger than our Milky Way Galaxy and nearly three million light-years away.

\*A **light-year (l.y.)** is the distance that light travels in one year: nearly 10 million million km,  $10^{13}$  km. Sunlight takes eight minutes to get here; moonlight about one second. Sunlight reaches Neptune, the outermost major planet, in four hours. It takes sunlight four years to reach the nearest star, Alpha Centauri.



**Eastern Evening Sky in December 2024**

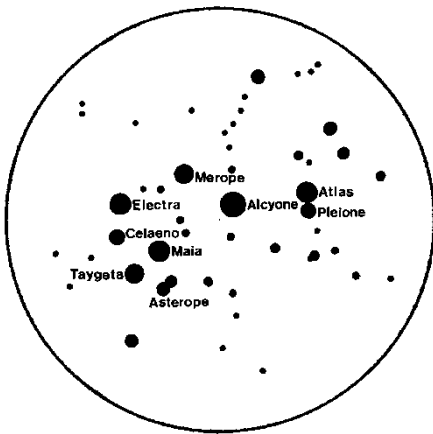
This chart shows the area of sky in the east on spring evenings. Jupiter is a beacon for the region, the second brightest 'evening star' after Venus. During the night these constellations move into the north, tilting leftward as they go. Interesting objects are described on the other side of the page.

Chart produced by Guide 8 software; [www.projectpluto.com](http://www.projectpluto.com). Labels and text added by Alan Gilmore, Mt John Observatory of the University of Canterbury, P.O. Box 56, Lake Tekapo 7945, New Zealand. [www.canterbury.ac.nz](http://www.canterbury.ac.nz)

**Jupiter** is a beacon for the region, appearing low in the northeast soon after sunset. Venus is on the opposite side of the sky at dusk. It is brighter than Jupiter and white. Jupiter has a golden tint. Both planets shine with a steady light.

**Sirius** appears soon after Jupiter, appearing due east and higher than the planet. It often twinkles all colours. It is the brightest true star in the sky but much fainter than Jupiter and Venus. Left of Sirius is **Orion** with its bright stars bluish **Rigel** and orange **Betelgeuse**. Between them is the line of three fainter stars making Orion's belt or, in the southern hemisphere view, the bottom of **The Pot** or Saucepan. Left of Orion is orange **Aldebaran**, one eye of Taurus the Bull. The bull's face is made by the V-shaped cluster of stars called the **Hyades**, upside down in our view. Left again is the **Pleiades/Matariki** cluster.

**Orion**, in the northern hemisphere view, has a shield raised toward Taurus and a club ready for action. The line of faint stars above and left of the belt then form Orion's sword dangling from his belt. In the southern hemisphere it makes the handle of The Pot. A modern variation on this is 'the shopping trolley'. The Pot is the trolley's basket. Betelgeuse and Bellatrix, the star above and left of Betelgeuse, make the wheels. Like most constellation pictures, it requires imagination.



The **Pleiades / Seven Sisters / Matariki / Subaru**, and many other names, is a cluster of stars well known in both hemispheres. Though often called the Seven Sisters, most modern eyes see only six stars. Dozens are visible in binoculars. The cluster is 440 light years away. Its brightest stars are around 200 times brighter than the sun.

One **light-year (l.y.)** is the distance light travels in one year: about 10 million million km or 6 million million miles. Light from the sun reaches us in 8 minutes; from the moon in 1 second. Sunlight takes 4 hours to reach Neptune, the outermost significant planet, and 4 years to reach Alpha Centauri, the nearest star.

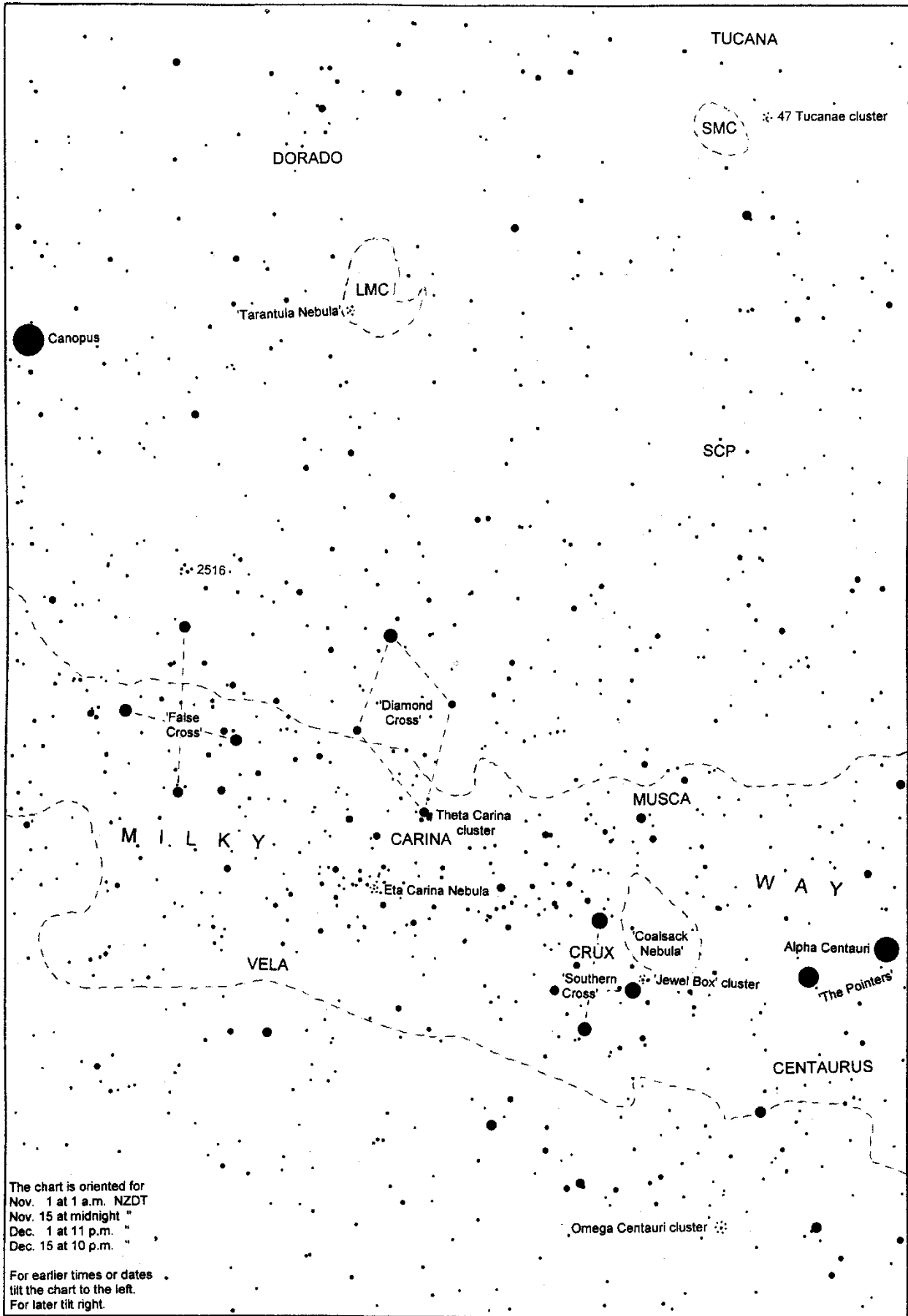
The **Hyades** cluster is 160 light- years away. Its brightest stars (not Aldebaran!) are about 70 times brighter than the sun. The cluster is 630 million years old. **Aldebaran** is not a member of the cluster but simply on the line of sight. It is 65 l.y. away and 150 times brighter than the sun. Its orange colour is due to its temperature, around 3500° C. The sun is 5500° C.



The **Orion Nebula** is visible in binoculars as a misty glow around the middle stars of Orion's sword or the handle of The Pot. It is a vast cloud of dust and gas about 1300 l.y. away and more than 20 l.y. across. Ultra-violet light from a massive, extremely hot star in the cloud causes it to glow. Some stars in this region are only two million years old. The sun, by contrast, is 4.6 billion years old. Stars continue to form in a giant cloud behind the glowing nebula. There are many bright and dark nebulae in this region. The Horsehead nebula, a favourite of astronomy books, is beside the right-hand star of Orion's Belt, but too faint to be seen in small telescopes.

**Rigel** is a blue 'supergiant' star around 40 000 times brighter than the sun and 800 l.y. away. Its surface temperature is around 20 000°C, giving it a bluish colour. **Betelgeuse** is a red giant star 250 times bigger than the sun but only around 20 times heavier, so it is mostly very thin gas. It is around 10 000 times brighter than the sun, about 400 l.y. away, and has a temperature around 3000°C.

**Sirius** is the brightest star, though the planets Venus and Jupiter, and sometimes Mars, are brighter. Sirius appears bright because it is both 30 times brighter than the sun and relatively close at 8.6 l.y. away. Sirius was often called 'the dog star' being the brightest star in Canis Major, one of the two dogs that follow Orion across the sky.



### Southern Evening Sky in December

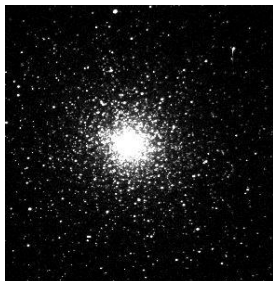
The chart shows the lower southern sky. Interesting star clusters and nebulae are indicated with asterisks. They are described on the other side of this page.

Chart produced by Guide 8 software; [www.projectpluto.com](http://www.projectpluto.com). Labels and text added by Alan Gilmore, Mt John Observatory of the University of Canterbury, P.O. Box 56, Lake Tekapo, 7945, New Zealand. [www.canterbury.ac.nz](http://www.canterbury.ac.nz)



## Interesting Objects in the Southern Sky

**Large & Small Clouds of Magellan (LMC & SMC)** appear as two luminous patches, easily seen by eye in a dark sky. They are two galaxies like the Milky Way but much smaller. Each is made of billions of stars. The Large Cloud contains many clusters of young luminous stars seen as patches of light in binoculars and telescopes. The LMC is about 160 000 light years away and the SMC 200 000 l.y away, both very close by for galaxies. (1 light year is about 10 000 billion km,  $10^{13}$  km.)



**47 Tucanae**, looks like a faint fuzzy star on the edge of the SMC. It is a globular cluster, a ball of millions of stars. A telescope is needed to see a peppering of stars around the edge of the cluster. Though it appears on the edge of the SMC it is one-tenth the distance, 13 000 light years away, and has no connection to the Small Cloud. Globular clusters are mostly very old, 10 billion years or more; at least twice the age of the sun. **Omega Centauri**, very low in the south, is a similar cluster.



**Tarantula nebula** is a glowing gas cloud in the LMC. The gas glows in the ultra-violet light from a cluster of very hot stars at centre of the nebula. The cloud is about 800 light years across. It is easily seen in binoculars and can be seen by eye on moonless nights.

This nebula is one of the brightest known. If it was as close as the Orion nebula (in The Pot's handle) then it would be as bright as the full moon.

**Canopus** is the second brightest star. It is 14 000 times brighter than the sun and 300 light years away. Sirius, low in the east on spring evenings, is the brightest star in the sky.

**Alpha Centauri**, the brighter Pointer, is the closest naked-eye star, 4.3 light-years away. Alpha Centauri is a binary star: two stars about the same size as the sun orbiting around each other in 80 years. A telescope that magnifies 50x splits the pair. (A very faint and slightly closer star, Proxima Centauri, orbits a quarter of a light-year, or 15 000 Sun-earth distances, from the Alpha pair.)

**Coalsack nebula** is a cloud of dust and gas about 600 light years away, dimming the more distant stars in the Milky Way. Many similar 'dark nebulae' can be seen, appearing as slots and holes in the Milky Way. These clouds of dust and gas eventually coalesce into clusters of stars.

**The Jewel Box** is a compact cluster of young luminous stars about 7000 light years away. The cluster formed less than 16 million years ago. To the eye it looks like a faint star.



**Eta Carinae nebula** is a glowing gas cloud about 8000 light years away. The golden star in the cloud, visible in binoculars, is Eta Carinae. (Eta is the Greek 'e'.) It is a binary star: two massive stars orbiting each other in 5.5 years. The bigger star is 80 times heavier than the Sun; the smaller is 60 times the Sun's mass. Together they are about five million times brighter than the Sun but are dimmed by dust clouds around them. The bigger star is expected to explode as a supernova any time in the next few thousand years.

Many star clusters are found in this part of the sky.

The **Theta Carina Cluster** at one point of the 'Diamond Cross'. It is also known as the 'Five of Diamonds' cluster, the reason obvious when it is seen in a telescope. A newish name is 'Southern Pleiades', though this cluster is much fainter and smaller than the real Pleiades in Taurus. The cluster is about 500 light years away and is around 30 million years old.