

The Evening Sky in April 2017

Jupiter is the 'evening star', appearing in the east soon after sunset. It crosses the sky through the night being due north around midnight and setting due west at dawn. **Saturn** rises in the southeast around 11 pm NZDT at the beginning of the month. It looks like a cream-coloured star, the brightest in that region but much fainter than Jupiter. It rises earlier through the month. By the end of April it is up soon after 8 pm NZST.

A small telescope will show the disk of **Jupiter** with its four bright 'Galilean' moons lined up on each side. Binoculars, held steady, will sometimes show one or two moons looking like faint stars close to the planet. Jupiter is 670 million km away mid-month. Jupiter is the biggest planet by far. Its mass is more than all the other planets combined. It rotates quickly, once in 10 hours. This stretches it out at the equator, giving it the oval shape. It circles the sun in 12 years so it shifts roughly one zodiacal constellation eastward each year. The Moon is left of Jupiter on the 10th.

A small telescope shows **Saturn** as an oval, the rings and planet blended. Larger telescopes separate the planet and rings and may show Saturn's moons looking like faint stars close to the planet. Titan, one of the biggest moons in the solar system, orbits about four ring diameters from the planet. Saturn is 1430 million km away mid-month. The moon is left of Saturn on the 16th.

Sirius is the first true star to appear at dusk, midway down the northwest sky. It is soon followed by **Canopus**, southwest of the zenith. Below Sirius are **Rigel** and **Betelgeuse**, the brightest stars in **Orion**. Between them is a line of three stars: Orion's belt. To southern hemisphere star watchers, the line of three makes the bottom of 'The Pot', now tipped on its side. Below and right of Sirius is **Procyon**.

Low in the northern sky is a fuzzy patch of light, the **Praesepe cluster**, marking the shell of **Cancer** the Crab. Praesepe is also called the Beehive cluster, the reason obvious when it is viewed in binoculars. Praesepe is 600 l.y. away. Its stars are 600 million years old. The biggest and brightest stars in the original cluster have long ago burnt out so only the medium-brightness stars remain. This gives the cluster its uniform appearance in contrast to the much younger Pleiades/Matariki/Subaru cluster which still has several prominent stars.

Lower and further left are **Pollux** and **Castor**, the heads of **Gemini** the twins, making a vertical pair. Though related in myth, the Twins are quite different from each other. Pollux is an orange star 31 times brighter than the sun and 34 l.y. from us. Castor is a hot white star about 47 times the sun's brightness and 51 l.y. away.

Crux, the Southern Cross, is high in the southeast. Below it, and brighter, are Beta and **Alpha Centauri**, often called 'The Pointers'. Alpha Centauri is the closest naked-eye star, 4.3 light years (l.y.)^{*} away. Beta Centauri, like most of the stars in Crux, is a blue-giant star hundreds of l.y. away. **Canopus** is also a very luminous distant star; 13 000 times brighter than the sun and 300 l.y. away.

The **Milky Way** is brightest in the southeast above Crux. The Milky Way can be traced to nearly overhead where it fades. It becomes very faint in the northwest, right of Orion. The Milky Way is our edgewise view of the galaxy, the pancake of billions of stars of which the sun is just one.

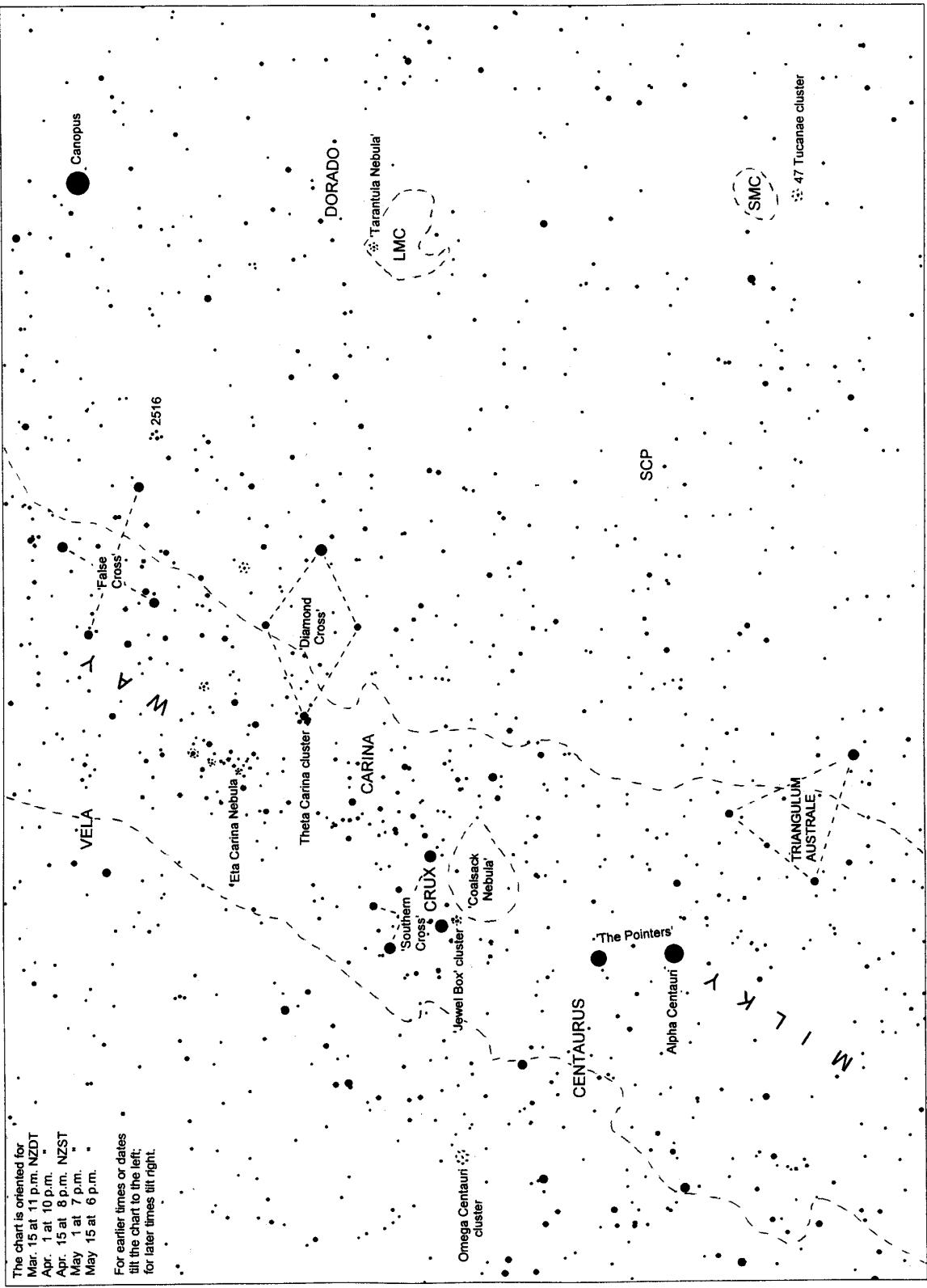
The Clouds of Magellan, **LMC** and **SMC** are midway down the southwest sky, easily seen by eye on a dark moonless night. They are two small galaxies about 160 000 and 200 000 light years away.

The brilliant planet **Venus**, not shown, moves quickly up the dawn sky after passing between Earth and Sun. It rises 70 minutes before the Sun on the 1st and three hours before the Sun by the 30th. It looks like a small crescent moon in a telescope. Venus is 52 million km away mid-month. At the end of the month **Mercury** begins a dawn sky appearance, below and right of Venus but much fainter.

*A **light year** (l.y.) is the distance that light travels in one year: nearly 10 million million km or 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 four years to reach the nearest star, Alpha Centauri.

The chart is oriented for
Mar. 15 at 11 p.m. NZDT
Apr. 1 at 10 p.m.
Apr. 15 at 8 p.m. NZST
May 1 at 7 p.m.
May 15 at 6 p.m.

For earlier times or dates
tilt the chart to the left,
for later times tilt right.



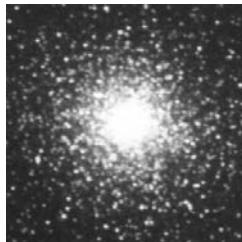
Southern Evening Sky in April-May
The chart shows the area midway up the southern sky. Interesting star clusters and nebulae are indicated with asterisks. They are described on the other side of this page.

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the Road Less Traveled*
CHRISTCHURCH NEW ZEALAND

Chart produced by Guide 8 software; www.projectpluto.com. Labels 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

Interesting Objects in the Autumn Southern Sky

Large & Small Clouds of Magellan (LMC & SMC) appear as two luminous patches below Canopus on autumn evenings, 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 just below 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 near the SMC it is one-tenth the distance, 15 000 light years away, and is 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**, above and left of the Pointers, is similar but larger than 47 Tucanae, around 17 000 light years away.



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. Both nebulae are places where vast clouds of dust and gas have recently condensed into clusters of stars.

Canopus is the second brightest star after Sirius. It is 14 000 times brighter than the sun and 300 light years away. The planets Venus and Jupiter, and sometimes Mars, are brighter.

Alpha Centauri, the brighter and lower Pointer, is the closest naked-eye star: 4.3 light-years away. Alpha Cen is a binary star: two stars about the same size as the sun orbiting around each other in 80 years. A telescope magnifying 30x will split 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 Alpha.)

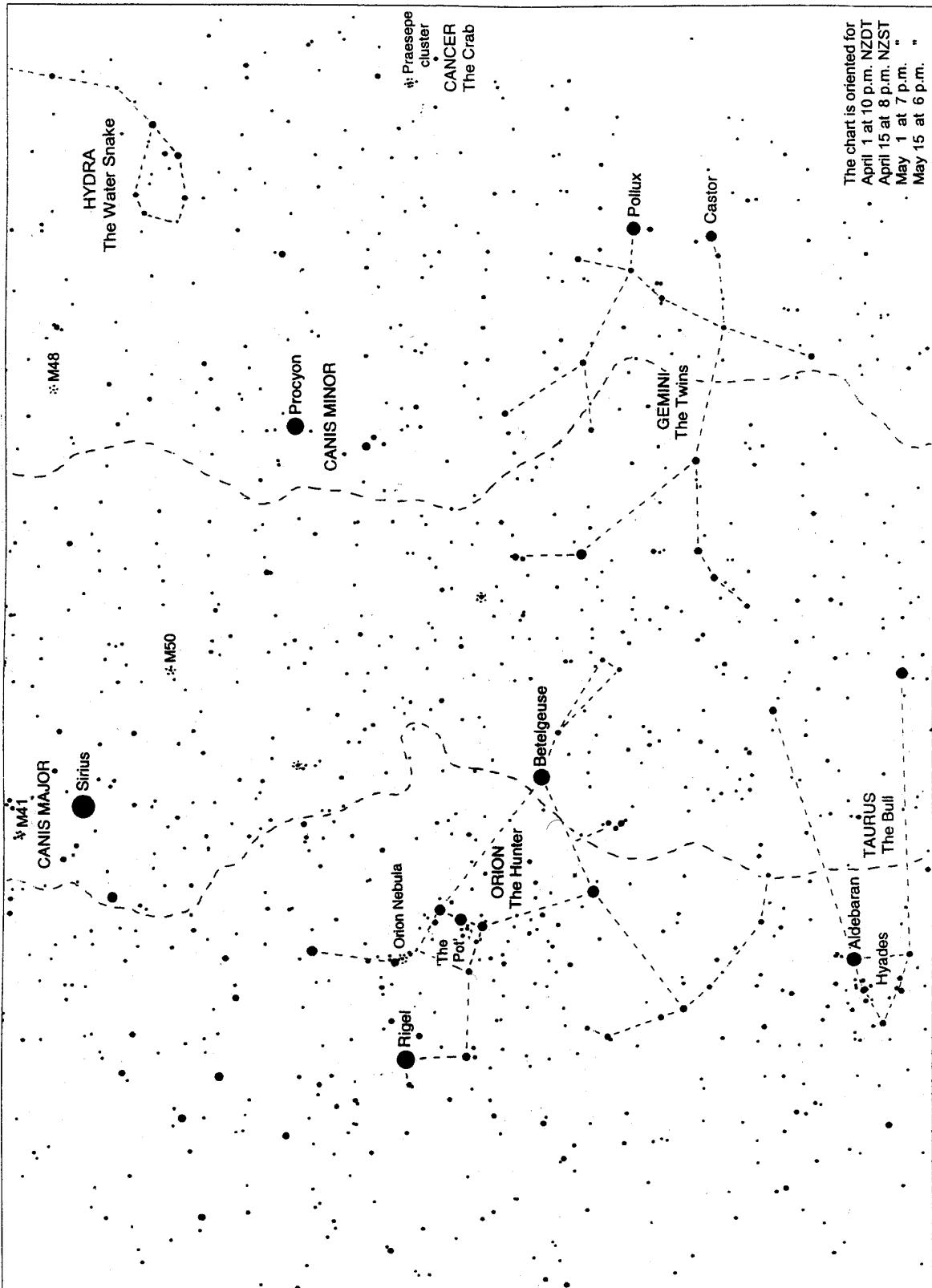
Coalsack nebula is a cloud of dust and gas about 300 light years away, dimming the more distant stars in the Milky Way. Many similar 'dark nebulae' can be seen, appearing as slots and holes in the Milky Way. These clouds of dust and gas eventually coalesce into clusters of stars.

The Jewel Box is a compact cluster of young luminous stars about 7000 light years away. The cluster formed less than 10 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 estimated to be to be 60 times heavier than the sun and a million times brighter but is dimmed by dust clouds around it. It 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 Carinae cluster** of stars is at one point of the 'Diamond Cross'. It is also called the 'Five of Diamonds' cluster, the reason obvious when viewed in a telescope. The cluster is about 500 light years away and is around 10 million years old. **NGC 2516** is right of the False Cross. To the eye it looks like a faint comet. It is a nice sight in binoculars. The cluster is about 1200 light years away.



Northwest Evening Sky in April-May

The chart shows our northwest sky in the evening. The chart may need to be tilted to the left or right to match the sky, depending on the time of night. Interesting objects are described on the other side of this page.

Chart produced by Guide 8 software, 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

Interesting Objects in the Autumn Northwest Sky at Dusk

Orion the Hunter is prominent in the western evening sky, below **Sirius** the brightest star. Sirius marks the head of one of the two dogs following the hunter down the sky. **Procyon** marks the lesser dog. Well to the right of Orion the pair of stars making **Gemini** the Twins. Above and right of them is the **Praesepe** star cluster making the shell of **Cancer** the Crab.

Sirius is the brightest star, though star-like Venus and Jupiter, and sometimes Mars, are brighter. Sirius appears bright because it is both brighter than the sun -- 23 times brighter -- and relatively close at 8.6 light years (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. Canis Major is heading down the western sky; the dog's hindquarters are marked by four bright stars above Sirius. Sirius often twinkles like a diamond when it is low in the sky, as the air breaks its light into separate colours.

Orion the Hunter, or warrior, is now upside down into the west in our southern hemisphere view. The line of three stars makes Orion's Belt. The line of faint stars above and left of the belt form Orion's Sword in the northern view, hanging from his belt. To most southern hemisphere sky watchers the belt and sword form **The Pot** or The Saucepan, now tilted on its side. In early June Orion can be seen both in the west at dusk and in the east at dawn.



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. 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 -- wider than earth's orbit! -- but only around 20 times heavier. It is mostly very thin gas around a dense hot core. It is around 9 000 times brighter than the sun, about 400 l.y. away, and has a surface temperature around 3000°C. The sun is 5500°C.

The Milky Way is our edge-on view of the disk of stars that is our galaxy. It is faint in this region because we are looking toward the nearby edge of the disk. Several star clusters visible in binoculars or small telescopes are marked with asterisks. The numbers beside them are from a catalogue compiled by Charles Messier an 18th Century French comet searcher. **M41**, 2400 l.y. away, and **M50**, 3000 l.y. away, are faint in binoculars and best seen in a telescope. Messier also listed the Orion Nebula (M42) and the Praesepe cluster (M44).

Pollux and **Castor** mark the heads of the Gemini, the twins. Though paired in myths, the two stars are not related at all. Castor is a hot white star like Sirius but 52 light years away. Golden Pollux is bigger and brighter but cooler than Sirius and 34 light years away.

The **Praesepe cluster** marks the shell of **Cancer** the crab. To the eye, in a dark sky, it is a spot of light bigger than a full moon. The cluster is also called the Beehive and binoculars show why. The cluster is some 500 light years from us. It formed in a gas cloud about 700 million years ago.

*A **light year (l.y.)** is the distance light travels in one year: about 10 million million km (10^{13} km) or 6 million million miles. Light from the sun reaches us in 8 minutes. Light from the moon gets here in 1 second. Sunlight takes 4 hours to reach Neptune, the outermost significant planet, and 4 years to reach Alpha Centauri, the nearest star.