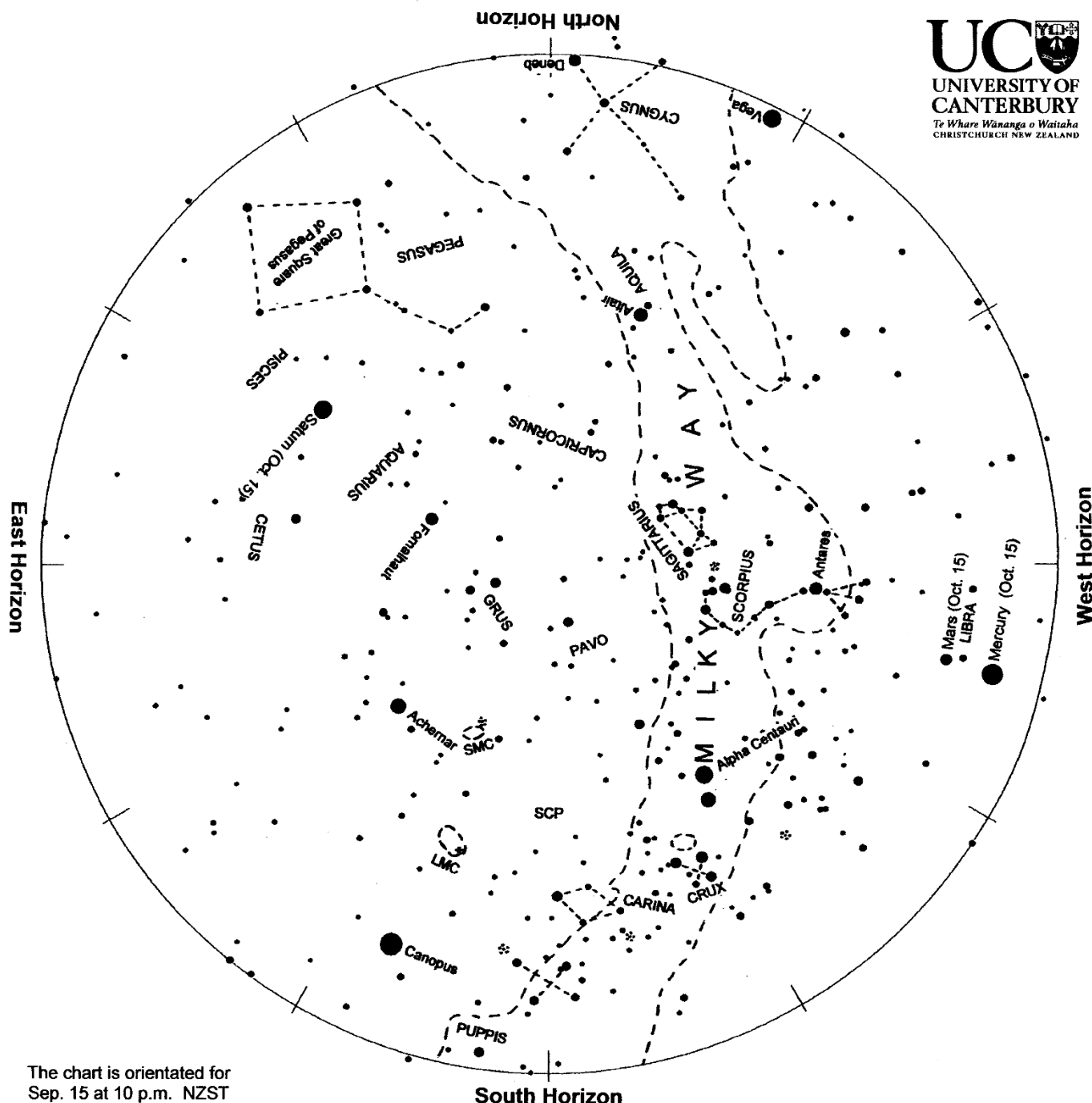




The chart is orientated for
Sep. 15 at 10 p.m. NZST
Oct. 1 at 10 p.m. NZDT
Oct. 15 at 9 p.m. NZST

Evening sky in October 2025

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 makes a small extra clockwise rotation each night as we orbit the sun.

Mercury appears low in the west, below reddish Mars till the 20th. Orange Antares is midway down the western sky, above the two planets. Saturn, cream-coloured, is midway up the northeast sky. Canopus is low in the southeast, twinkling colourfully. Crux, the Southern Cross, and the Pointers, Alpha and Beta Centauri, are in the south-west. Vega sets on the northwest horizon. The Milky Way spans the sky from north through west and into the south. The Magellanic Clouds, nearby galaxies marked as LMC and SMC on the chart, are misty glows above Canopus.

The Evening Sky in October 2025

Mercury moves up the western sky through the month, the brightest 'star' in that region. It will be alongside **Mars** around the 20th. Mars is reddish and much fainter than Mercury. By the end of October, Mercury is setting around 10 p.m. NZDT. Both planets are tiny in a telescope. Mars is on the far side of the Sun from us, 360 million km away. Mercury is swinging around from the far side of the Sun and catching us up. It is 170 million km away mid-month. The Moon appears near them on the 23rd.

Saturn appears midway up the northeast sky in the evening and is due north by midnight. It looks like a lone, medium-bright star with a cream tint. In low-powered telescopes Saturn appears as a ball with a spike through it. The ring is nearly edge-on so appears as a broad line. Larger telescopes show the ring and Saturn's biggest moon, Titan, looking like a star near the planet. Titan and the smaller moons of Saturn appear in line with the edge-on ring. Saturn is 1290 million km away mid-month. The moon will be near Saturn on the 5th and 6th.

The brightest true stars are low in the north and south. **Canopus** is low in the southeast at dusk, often twinkling colourfully. It swings up into the eastern sky during the night. On the north skyline is **Vega**, setting in the early evening. Places in the north of Aotearoa NZ will see **Deneb** near the north skyline in the middle of the Milky Way. Deneb is the brightest star in the cross-shaped constellation of **Cygnus** the swan. It is one of the most distant stars visible to the naked eye, around 2600 light-years* away. Its brightness is uncertain because of the distance uncertainty but it could be 200 000 times the Sun's luminosity.

Orange **Antares** is midway down the western sky. It marks the body of the Scorpion. The Scorpion's tail loops up the sky, making a back-to-front question mark with Antares being the dot. The curved tail is the 'fish-hook of Maui' in some Māori star lore. Above and right of the Scorpion's tail is 'the teapot' made by the brightest stars of **Sagittarius**. It is upside down in our southern hemisphere view.

In the southwest are 'The Pointers', Beta and **Alpha Centauri**, making a vertical pair. They point down to **Crux** the Southern Cross. Alpha Centauri, the top Pointer, is the closest naked eye star at 4.3 light-years away. Beta Centauri is a blue-giant star, very hot and very luminous, hundreds of light-years away.

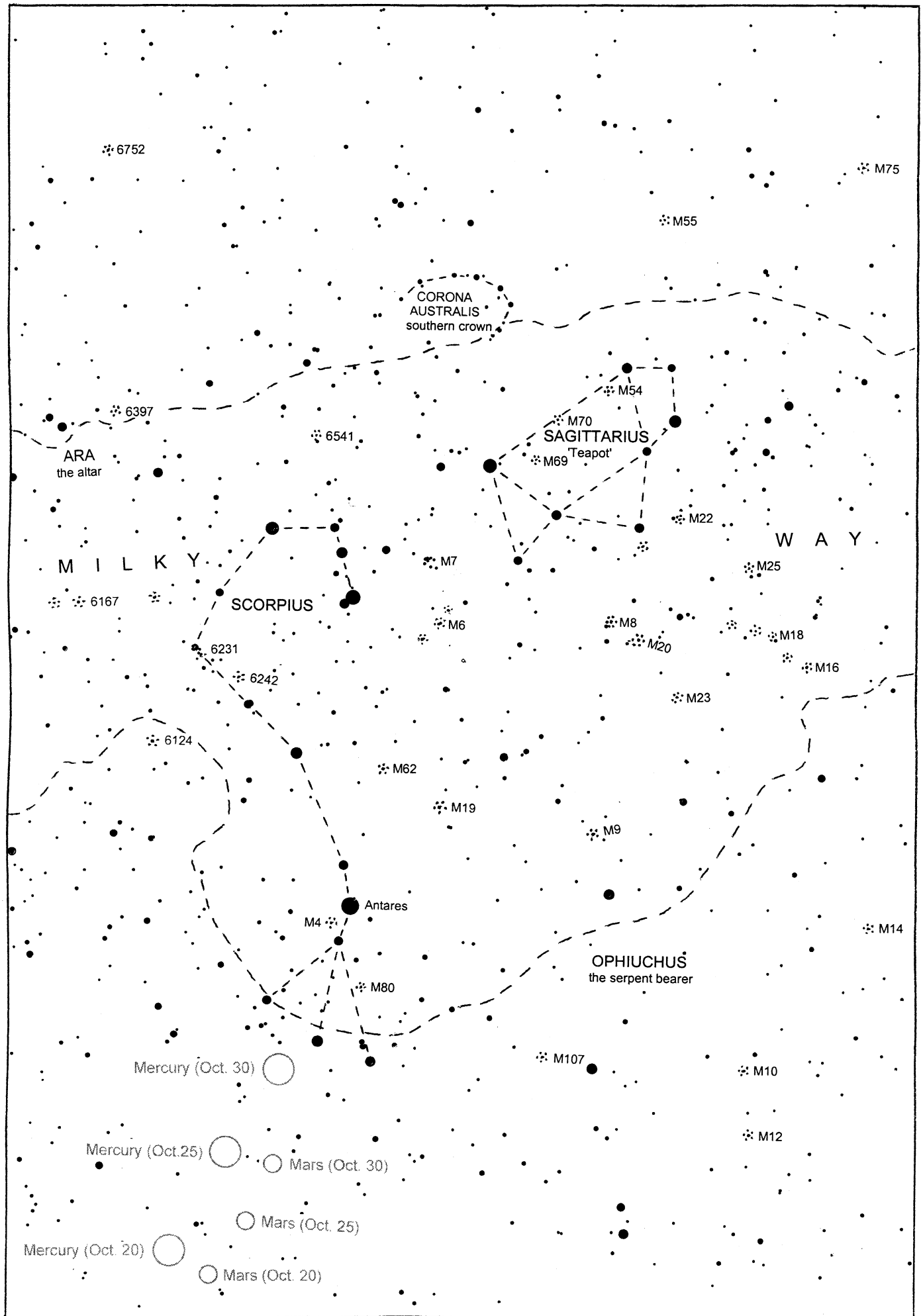
The **Milky Way** is brightest and broadest in Scorpius and Sagittarius. In a dark sky it can be traced down to the south. In the north it meets the skyline right of **Vega**. The Milky Way is our edgewise view of the galaxy, the pancake of billions of stars of which the Sun is just one. The thick hub of the galaxy, 27 000 light-years away, is in Sagittarius. The actual centre, with a black hole four million times the sun's mass, is hidden by dust clouds in space. Its direction is a little outside the Teapot's spout. The dust clouds appear as gaps and slots in the Milky Way. A scan along the Milky Way with binoculars shows many clusters of stars and some glowing clouds of left-over gas. There are many in Scorpius and Sagittarius and in the Carina region below Crux.

The Large and Small Clouds of Magellan, **LMC** and **SMC**, look like two misty patches of light in the southeast sky above Canopus. They are easily seen by eye on a dark moonless night. They are galaxies like our Milky Way but much smaller. The LMC is around 160 000 l.y. away; the SMC around 200 000 l.y. away.

On moonless evenings in a dark rural sky the Zodiacal Light is visible in the west. It looks like late twilight: a faint broad column of light enclosing Mercury and Mars and reaching up toward Antares, fading out at the Milky Way. It is sunlight reflecting off meteoric dust in the plane of the solar system.

Jupiter is the brightest 'star' in the morning hours. It rises in the northeast around 3:30 a.m. at the beginning of the month and 1:40 at the end. It shines with a steady golden light. The Moon will be near Jupiter on the 14th. From places with a low eastern skyline, brilliant Venus might be seen rising in the dawn twilight around 6 a.m. at the beginning of the month and 5:30 at the end. Venus is on the far side of the Sun from us; 235 million km away mid-month. A very thin crescent Moon will be near Venus on the 20th.

*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 sunlight four years to reach the nearest star, Alpha Centauri.



Interesting Objects in the Western Sky in October 2025

Antares is the brightest star in the region till the second half of October when Mercury appears. Antares is orange coloured; being a 'red giant' star. (The 'red' of red giants is usually more an orange tint.) It is around 600 light years (ly) away, 19 000 times brighter than the sun, and three times bigger than Earth's orbit. Its mass or weight is about 12 times that of the sun, so most of the star is very thin gas spread around a hot dense core. Red giants are the last stage in the evolution of stars. The dense core of the star has shrunk and heated. The outer regions of the star have expanded to a very spread-out gas. The core is wringing the last of the thermo-nuclear energy out of elements like helium, carbon, oxygen and neon. Relatively soon the core of Antares will run out of energy and collapse, triggering a spectacular supernova explosion. (The sun will become a red giant in about seven billion years' time but it ends up as a white dwarf star, not a supernova.)



At the right-angle bend in the Scorpion's tail is a large and bright cluster of stars, **NGC 6231**, looking like a small comet. It is around 6000 ly away. Its brightest stars are 60 000 times brighter than the sun. The cluster is about 8 light years across, similar in size to the Pleiades/Matariki cluster in our summer sky. Were it as close as the Pleiades/Matariki cluster (440 ly) then its brightest stars would be as bright as Sirius.

To the right of the Scorpion's sting is **M7**, a cluster obvious to the eye and nicely seen in binoculars. M7 is about 800 ly away and around 260 million years old. Below M7 and fainter is **M6**, the 'butterfly cluster'. M6 is around 1300 ly away and is half the age of M7. Other clusters worth a look in binoculars are M21, M23, NGC 6167, and NGC 6193. The 'M' objects were listed by the 18th Century French astronomer Charles Messier. He hunted comets, so made a catalogue of fuzzy objects that could be mistaken for comets. The NGC (New General Catalogue) objects shown are bright enough to have been seen by Messier but are too far south to be seen from Paris.



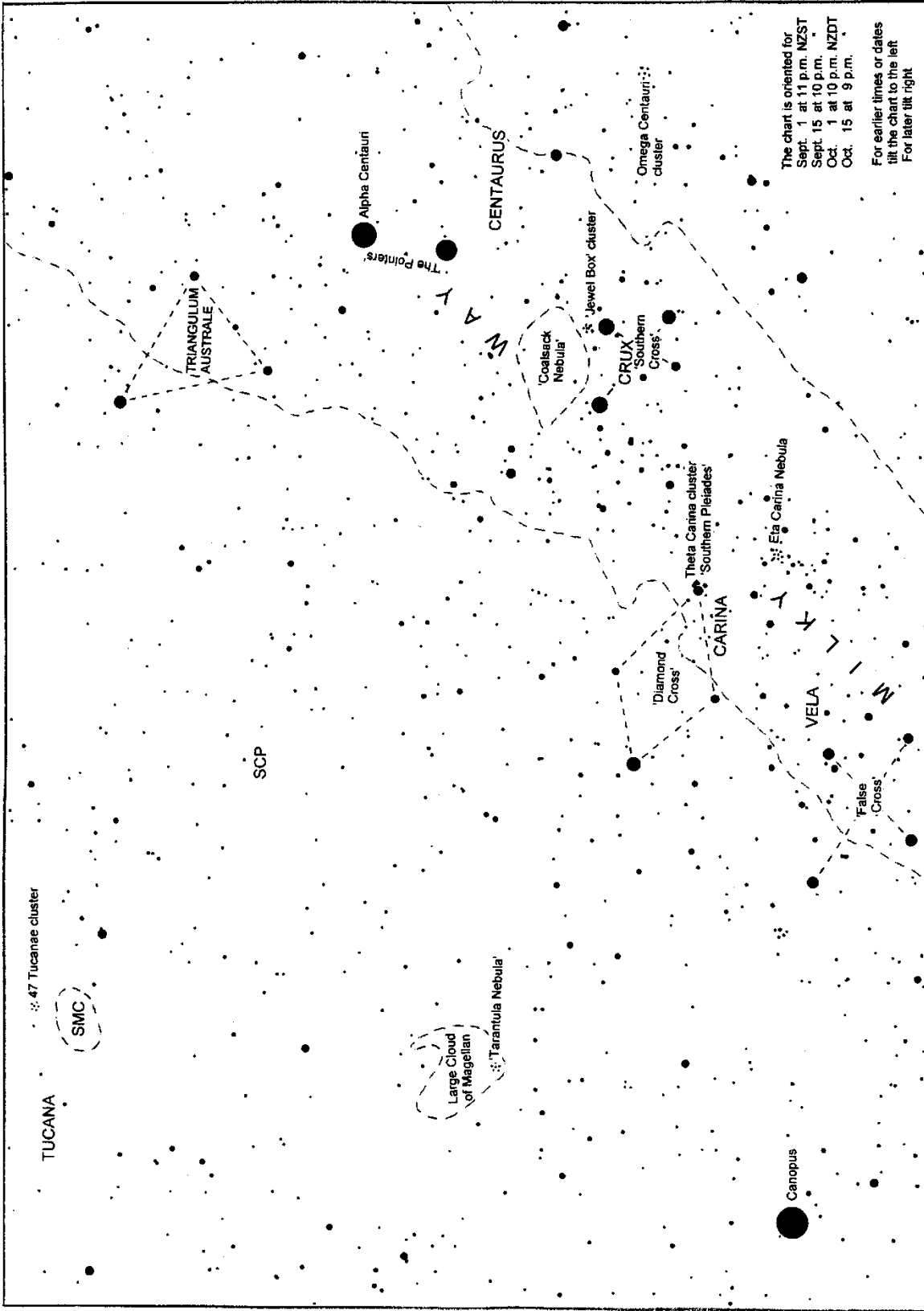
Below the Sagittarius 'Teapot' is the glowing gas cloud **M8, the 'Lagoon Nebula'**. It is a star-forming region where gas and dust have recently gathered into new stars. ('Recently' = the past million years or so.) Ultraviolet (UV) light from one particularly hot star is lighting up the leftover gas, making it glow. On colour photos it appears pink due to hydrogen atoms fluorescing in the UV light. Below M8 is M20, the Trifid Nebula, small glowing patch in binoculars, also a pink hydrogen region in photos. Other nearby nebulae (gas and dust clouds) are M16 and M17.



Globular clusters, spherical clusters of ancient stars, are found throughout the region. The brightest is **M4** by Antares. It is also the closest at 7200 ly away. In binoculars and small telescopes globular clusters appear as round fuzzy spots. Others marked on the chart are M9, M10, M12, M14, M19, M22, M54, M55, M62, M80 and NGC 6541. The concentration of globular clusters in this area was an early clue that the centre of the galaxy lay in this direction.

This part of the Milky Way is broad and bright as we are looking toward the centre of the galaxy. The actual centre, 27 000 light years away, is hidden from our view by intervening dust clouds. The nearer dust clouds make gaps and slots along the Milky Way.

In the second half of the month **Mercury** moves up the western sky. At the same time the stars are moving down, from night to night. This brings both Mercury and **Mars** onto the chart. Mercury is brighter than Antares. Mars is fainter than Antares. In November Mercury will be just below Antares but fading quickly.



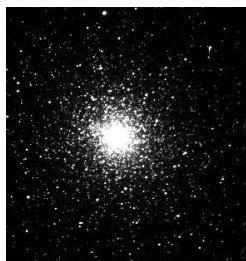
Southern Evening Sky in October

The chart shows the southern and southwest 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. 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 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 ly away, both very close by or 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, 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**, right of the Pointers, 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 in the summer sky) 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, in the eastern dawn sky, is the brightest star in the sky. The planets Venus and Jupiter are brighter.

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 around 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 estimated to be to be 80 times heavier than the Sun and four 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 Carina cluster** or **Southern Pleiades** is a cluster on the west end of the 'Diamond Cross'. It is also called the 'Five of Diamonds' cluster, the reason obvious when viewed in a telescope. It is much fainter and smaller than the real Pleiades in Taurus but a nice sight in binoculars. The cluster is about 500 light years away and is around 30 million years old.