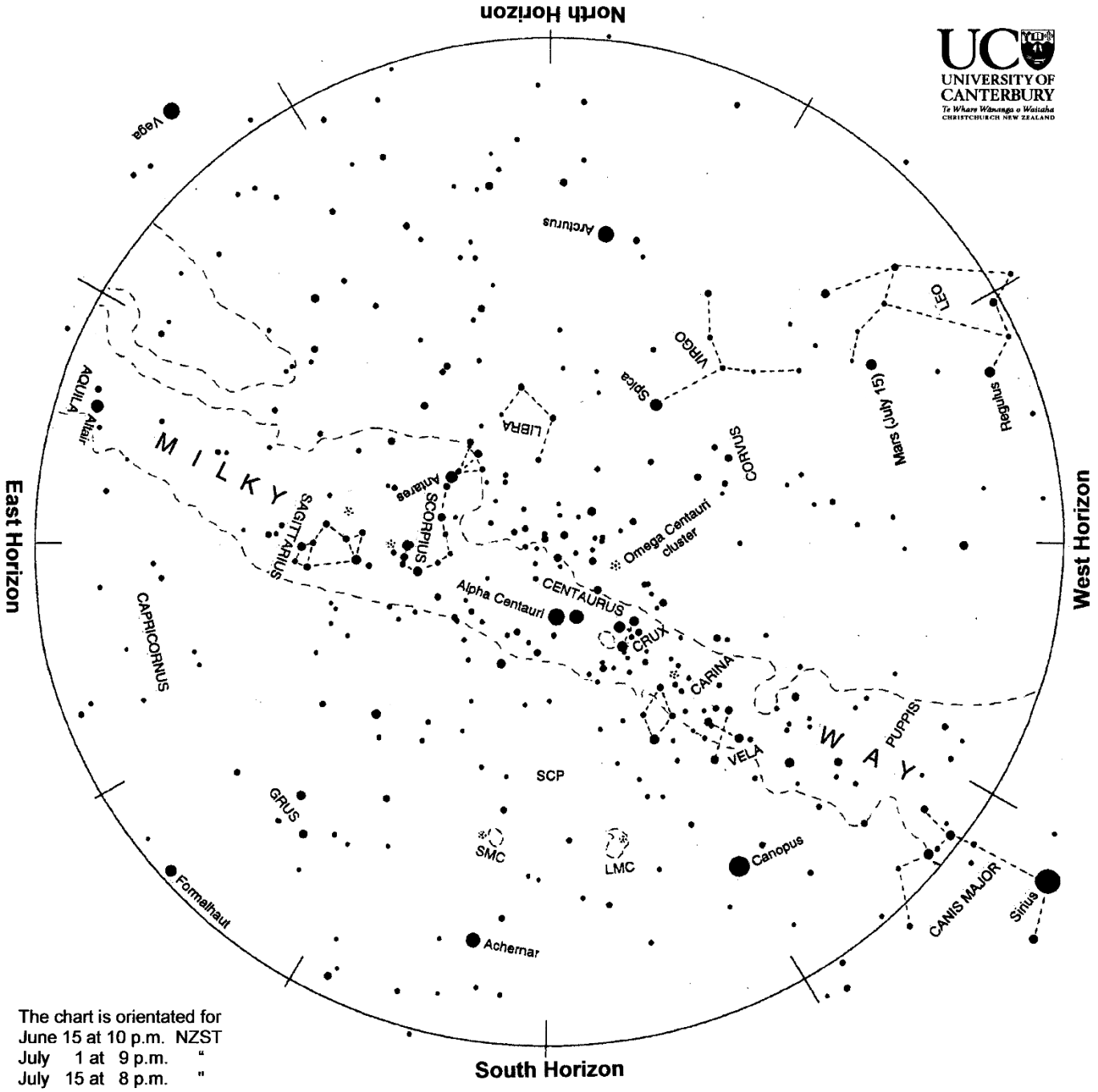

The chart is orientated for
June 15 at 10 p.m. NZST
July 1 at 9 p.m. "
July 15 at 8 p.m. "
Aug. 1 at 7 p.m. "

Evening sky in July 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 is low in the northwest sky in the first half of the month but sets before 8 p.m. so isn't on the chart. Mars is a medium-bright red 'star' low in the northwest, setting before 10 p.m. mid-month. Saturn rises due east before midnight at the beginning of the month and before 10 p.m. at the end (so isn't on the chart, either.) Low in the north is orange Arcturus, often twinkling red and green. The Pointers and Crux, the Southern Cross, are south of the zenith. Sirius, the brightest star, sets in the southwestern twilight, sparkling colourfully. Canopus, the second brightest star, is low in the southwest. It swings down to the southern horizon later. Vega rises on the opposite horizon around 9 pm.

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

The Night Sky in July 2025

Mercury makes its best evening sky appearance of the year. At the beginning of the month it appears as a bright star toward the northwest, setting two hours after the Sun. It holds that position till mid-month, slowly fading as more of its sunlit side is turned away from us. It then sinks into the twilight in the third week as it begins to pass between us and the Sun. (Because it sets before 8 p.m. it isn't on the chart.)

Mars is the only other planet in the evening sky. It looks like a medium-bright red star, setting in the west around 9:40. It is 300 million km away, mid-month, so tiny in a telescope. The Moon will be below Mars on the 28th and above it on the 29th.

Saturn is up in the late evening. It rises around 11:50 at the beginning of the month and before 9:50 at the end (so isn't on the chart.) It looks like a medium-bright cream-coloured star, due east, all on its own. By dawn Saturn is mid-way up the sky a bit west (left) of due north. The Moon will be near Saturn on the night of the 16th-17th. Saturn is 1370 million km away mid-month. It is worth a look in any telescope. The ring is nearly edge-on to us, so appears as a thin line. Its shadow makes a dark line across the planet. Saturn's larger moons orbit in the same plane as the ring so their shadows are also crossing Saturn. On the night of the 2nd-3rd the shadow of Titan, the largest moon, will be on Saturn when it rises around 11:40. It looks like a small black spot. The shadow moves off the planet around 1 a.m. This repeats on the 18th when Saturn rises around 10:40 and Titan's shadow moves off just after midnight.

Sirius, the brightest true star, sets in the southwest as twilight ends, twinkling like a diamond. **Canopus**, the second brightest star, is also in the southwest at dusk. It swings down to the southern skyline before midnight where it also twinkles colourfully. It then moves up into the southeast sky in the morning hours. It is a 'circumpolar star'. Seen from Aotearoa it never sets, except in the most northern places. Canopus is a truly bright star: 13 000 times the sun's brightness and 300 light-years* away.

South of the zenith are 'The Pointers', Beta and **Alpha Centauri**. They point to **Crux**, the Southern Cross, on their right. Alpha Centauri is the third brightest star in the sky. It is also the closest of the naked eye stars, 4.3 light-years away. Beta Centauri, like most of the stars in Crux, is a hot blue-giant star hundreds of light-years away. Crux and the Pointers are also circumpolar. They are always somewhere in our southern sky. In summer they are upside down and low in the south.

Midway down the north sky is orange **Arcturus**. It sets in the northwest around midnight, twinkling red and green as it goes. It is the fourth brightest star and the brightest in the northern hemisphere sky. It is 120 times the sun's brightness and 37 light-years away. It has an orange colour because it is cooler than the Sun; around 4000°C. Above Arcturus is a lone bright star, **Spica**, the brightest star in Virgo. The Moon will be close to Spica on the 31st. **Vega** rises in the northeast around 9 pm. It is on the opposite side of the sky to Canopus: low in the north when Canopus is low in the south. Vega is the fifth-brightest star in the sky and the second-brightest northern hemisphere star. It is 52 times brighter than the Sun and 25 light-years away.

The **Milky Way** is brightest and broadest in the east toward **Scorpius** and **Sagittarius**. In a dark sky it can be traced up past the Pointers and Crux, fading toward Sirius. 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, 30 000 light-years away, is in Sagittarius. The actual centre is hidden by dust clouds in space. A scan along the Milky Way with binoculars shows many clusters of stars and some glowing gas clouds.

Venus rises in the northeast around 4:20 a.m. at the beginning of the month and 5 a.m. at the end, a brilliant object in the dark sky. Golden Jupiter begins a morning sky appearance in July. It rises an hour before the Sun mid-month and at 6 a.m. at the end.

*A **light-year** (**l.y**.) is the distance that light travels in one year: nearly 10 million million 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.

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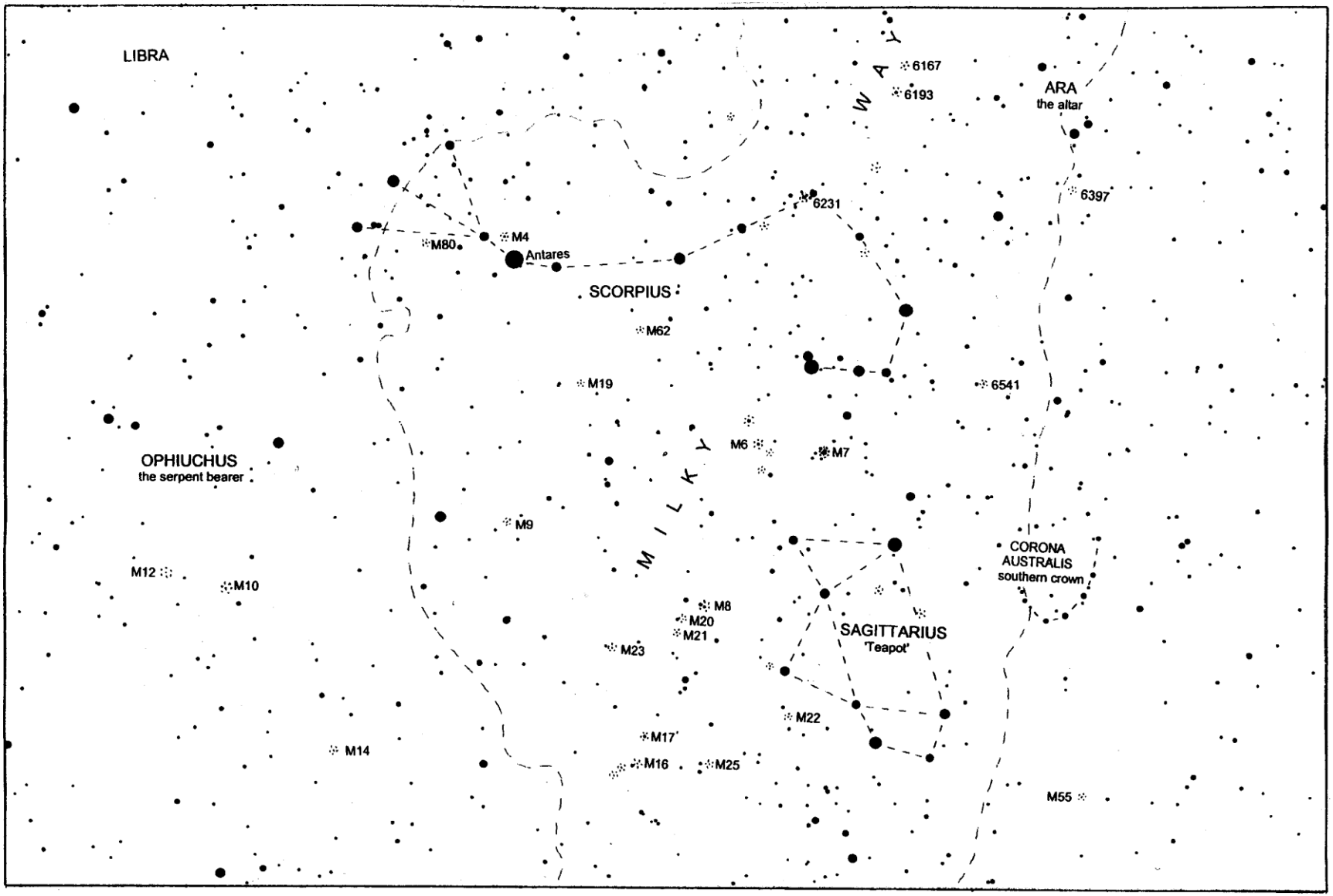

Eastern Evening Sky in July

The chart shows the eastern sky at nightfall. The Milky Way is here bright and broad as we look toward the centre of the galaxy. Many star clusters and a few nebulae are seen, some obvious to the naked eye. Those visible in binoculars or small telescopes are indicated with asterisks. They are described on the other side of this page.

Chart produced by Guide 8 software; www.projectpluto.com. Labels added by Alan Gilmore, University of Canterbury's Mt John Observatory, P.O. Box 56, Lake Tekapo 7945, New Zealand. www.canterbury.ac.nz

Interesting Objects East of Overhead on Winter Evenings

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Antares is the brightest star in the region. It is orange coloured; being a 'red giant' star. (The 'red' of red giants is usually more an orange tint.) It is 600 light years* away, 19 000 times brighter than the sun, and big enough to fill Earth's orbit. Its mass or weight is about 20 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. In about two million years 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.)

Antares marks the heart of Scorpius. In the evening at this time of year the Scorpion is on its back with its tail on the right, curving upward then turning down and curling clockwise. The sting is the horizontal line of bright stars pointing toward Antares. In Maori star lore the tail's hook is the 'fish hook of Maui'.
By midnight the scorpion's tail is directly overhead.

At the right-angle bend in the tail is a large and bright cluster of stars, NGC **6231,** looking like a small comet. It is around 6000 l.y. 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 at the Pleiades (400 l.y.) then its brightest stars would be as bright as Sirius. Below the Scorpion's sting is **M7** a cluster obvious to the eye and nicely seen in binoculars. M7 is about 800 l.y. away and around 260 million years old. (The older a star cluster, the fewer bright stars it has.)

Below M7 and fainter is **M6**, the 'butterfly cluster'. M6 is around 1300 l.y. 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 to enough to have been seen by Messier but are too far south to be seen from Paris.

Left of 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 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. Right alongside it is a blue reflection nebula where starlight is scattered by dust. 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 one of the closest at 10 000 l.y. away. In binoculars and small telescopes 'globs' appear as round fuzzy spots. Others marked on the chart are **M9**, **M10**, **M12**, **M14**, **M19**, **M22**, **M55**, **M54**, **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 to the centre of the galaxy. The actual centre, 27 000 light years away, is hidden from our view by intervening dust clouds. The nearer clouds make gaps and slots along the Milky Way. The hub of the galaxy is a great sphere of stars, called the 'central bulge'. Some of the central bulge is glimpsed in gaps between the dust clouds. At the very centre lies a black hole four million times the sun's mass but only the size of our solar system. Infra-red telescopes, peering through the dust, show stars orbiting the invisible black hole at high speed. By plotting the movements of these stars over the past two decades, astronomers have been able to deduce the mass of the central black hole and its distance. All big galaxies have a massive black hole at their centre.

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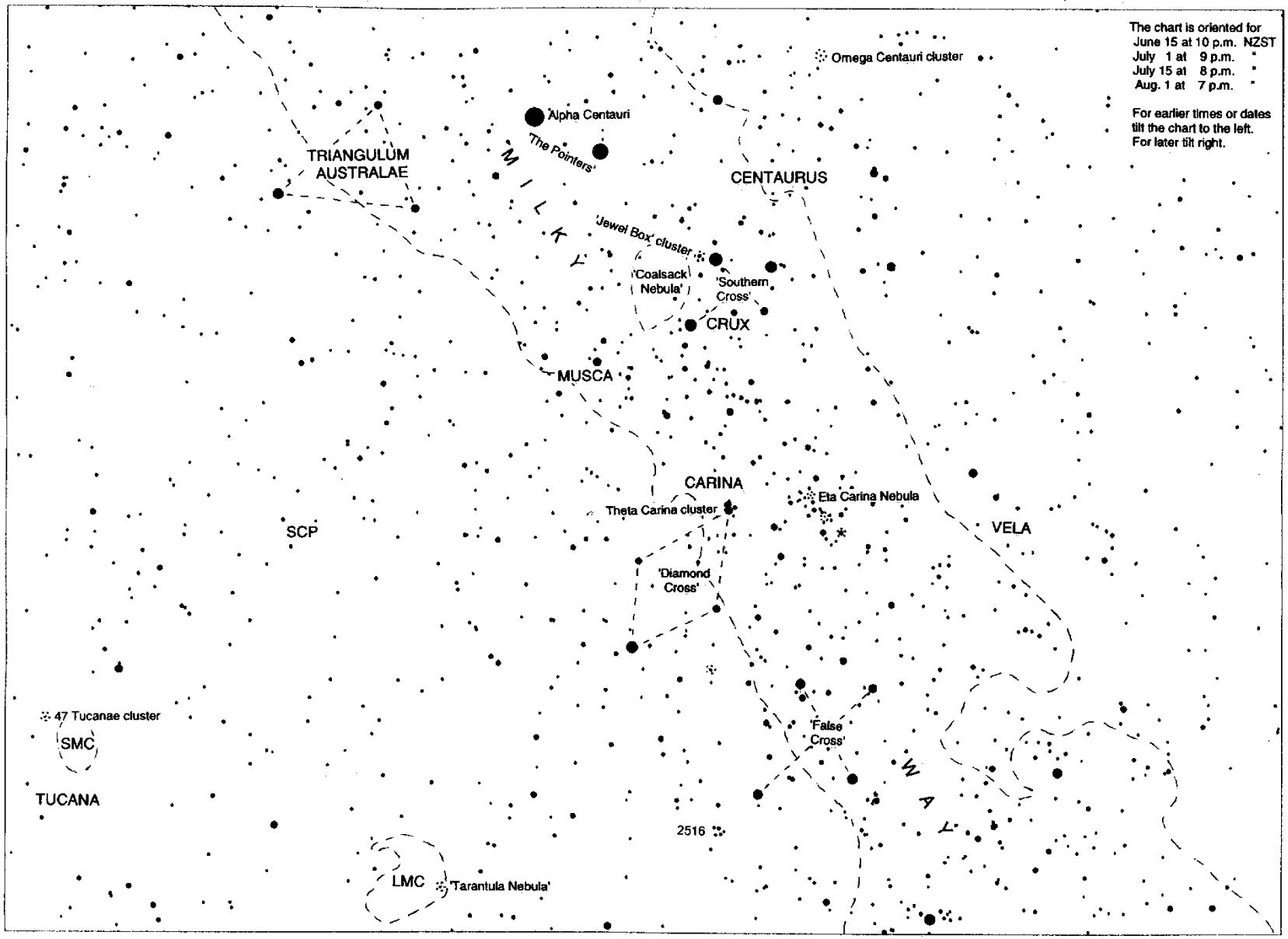

Southern Evening Sky in July

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.

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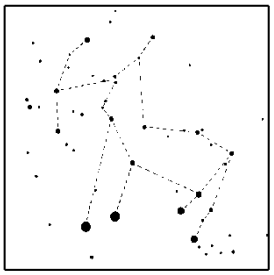
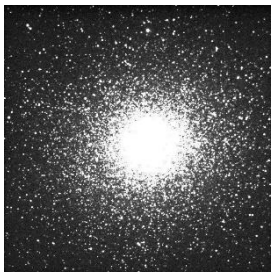
Interesting Objects in the Winter Southern Sky



Centaurus, with the bright 'Pointers'**,** and **Crux**, the Southern Cross are south of overhead, the tightest grouping of bright stars in the whole sky. Originally Crux was the hind legs of the Centaur, the horse-man of Greek mythology. The complete Centaur, with bow, is outlined at left. It was only in the 17th Century that Crux was split off as a separate constellation. The slow wobble of Earth's axis allowed this part of the sky to be seen from more northerly places in ancient times. The fainter Pointer and the three bluish-white stars of the Crux are all super-bright stars hundreds of light years away. Alpha Centauri is just 4.3 light years* away and the reddish top star of Crux is 90 light years from us.



Omega Centauri is a globular cluster, a ball-shaped cluster of millions of stars. Its total mass is six million times the sun's mass. It is 17 000 light years away and 200 light years across. Globular clusters are very ancient, around 10 billion years old, twice the age of the sun. Omega Centauri is the biggest of the hundred-odd globulars randomly orbiting our galaxy. It may originally have been the core of a small galaxy that collided with the Milky Way and was stripped of its outer stars. 47 Tucanae, near the SMC, is a similar but smaller cluster about 16 000 light years away.

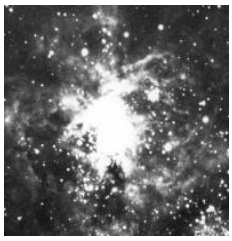
Coalsack nebula, left of Crux, looks like a hole in the Milky Way. It is a cloud of dust and gas 600 light years away, dimming the distant stars in the Milky Way. Many 'dark nebulae' can be seen along the Milky Way, appearing as slots and holes. These clouds eventually form new stars.

The Jewel Box is a compact cluster of young bright stars about 7000 light years away. The cluster formed about 16 million years ago. To the eye it looks like a faint star close to the second-brightest star in Crux. A telescope is needed to see it well.

Eta Carinae nebula, a luminous spot in the Milky Way to the right of Crux and lower, is a glowing gas cloud about 8000 light years from us. The thin gas glows in the ultra-violet light of nearby hot young stars.

The golden star in the cloud, visible in binoculars, is Eta [Greek 'e'] Carinae. It is estimated to be to be 80 times heavier than the sun. It is four million times brighter than the sun but is dimmed by dust clouds around it. It is expected to explode as a supernova in the next few thousand years. Many star clusters are found in this part of the sky.

Large & Small Clouds of Magellan (LMC & SMC) appear as two luminous clouds, easily seen by eye in a dark sky. They are galaxies like the Milky Way but much smaller. Each is made of billions of stars. The LMC contains many clusters of young bright stars seen as spots of light in binoculars. The LMC is 160 000 l.y away; the SMC 200 000 l.y. Both are very close by for galaxies.



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 the 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 then it would be as bright as the full moon.

*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.

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