

superlight.fr

Binocular Skies

75 objects to track down, with their charts and star paths

Legend



-1 0 1 2 3 4 5 6 7 8

Star magnitudes

 Double star

 Variable star (max. and min.)

 Constellation figure

 Galaxy

 Open cluster

 Globular cluster

 Nebula

 Dark nebula

 Planetary nebula

 Ecliptic

 Field of a 7×50 or a 10×50 (7°) and of a 15×70 (4.4°), around the object

 Star path, with the length of each step

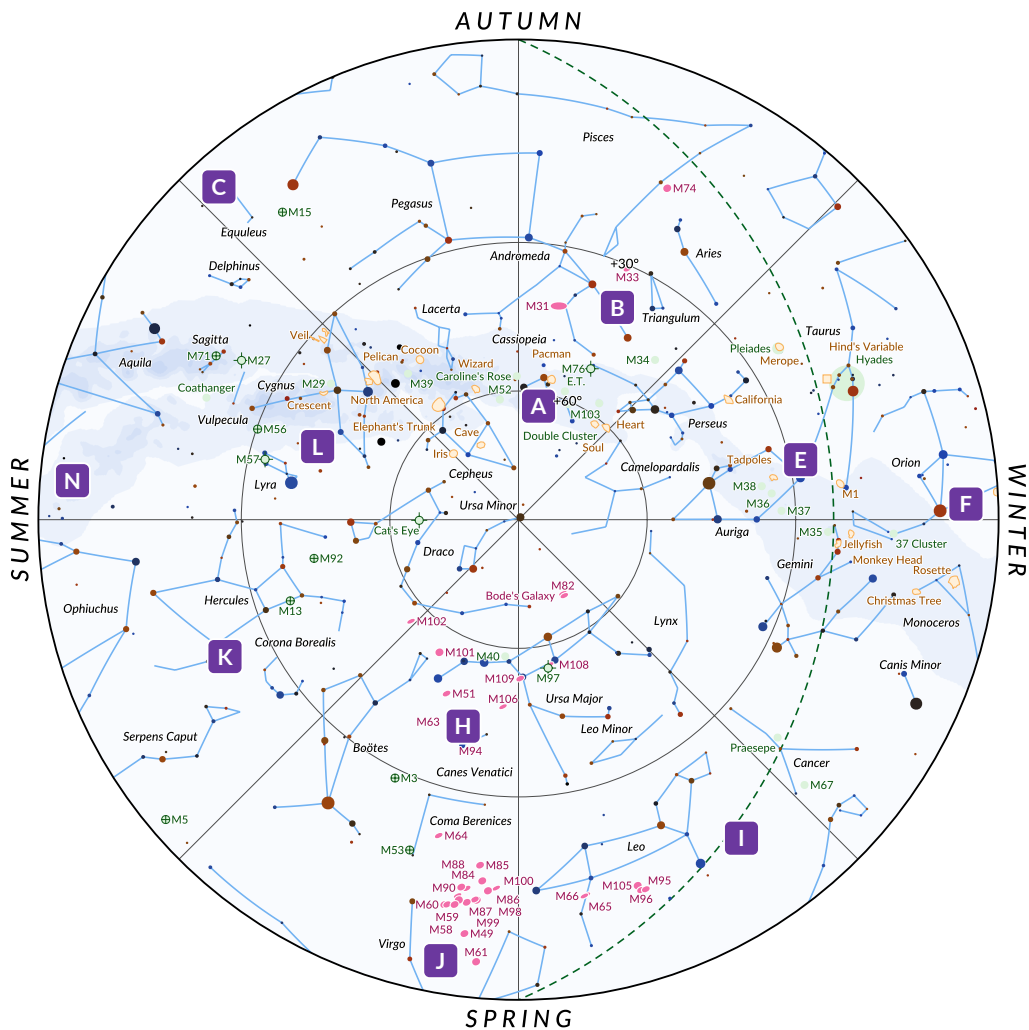
 Another object of the guide, circled, with its number

 Letter of a regional map

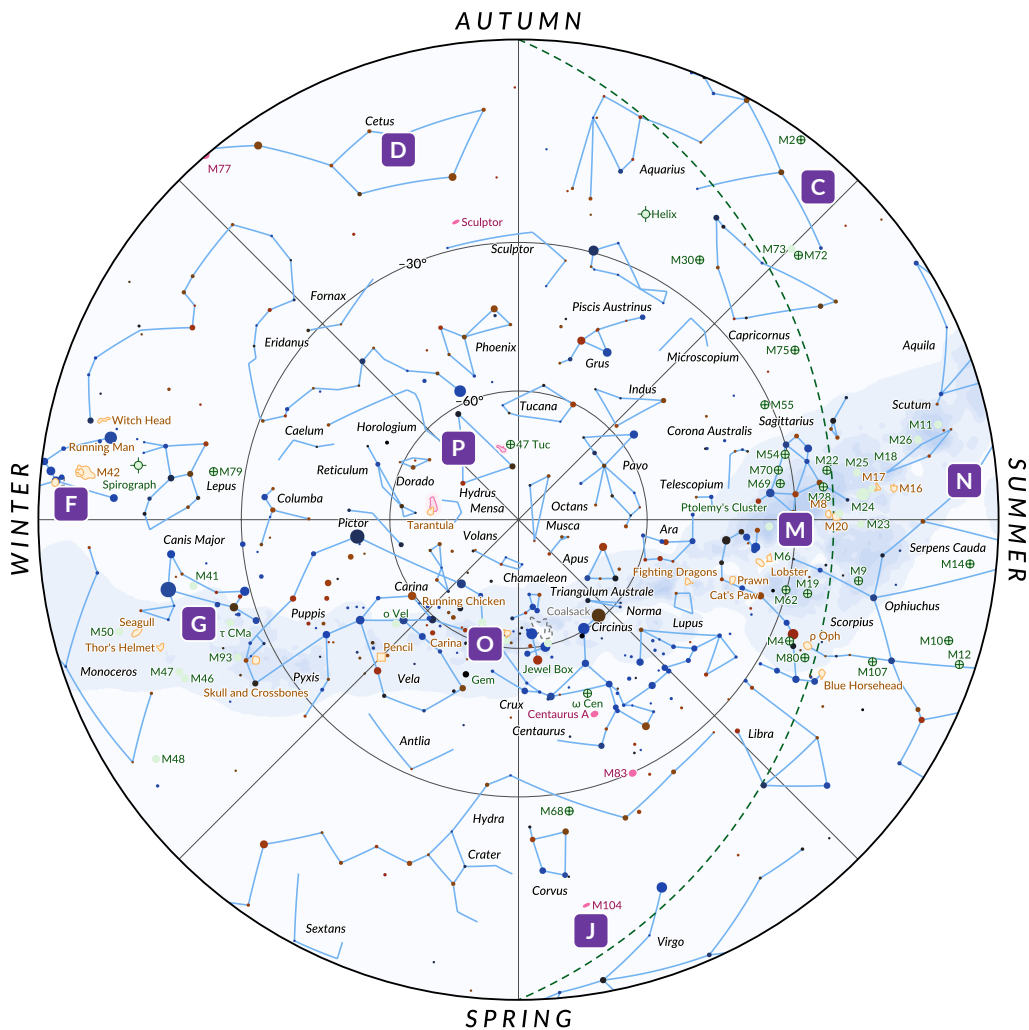
 Greek letters: Bayer designations (δ Cas = delta Cassiopeiae)

North up, east to the left, as in binoculars

Northern celestial hemisphere



Southern celestial hemisphere



Autumn

A Cassiopeia, Cepheus and Camelopardalis

- 1 The Double Cluster
- 2 NGC 457, the E.T. Cluster
- 3 M103 and NGC 663
- 4 M52 and NGC 7789
- 5 Kemble's Cascade and NGC 1502
- 6 The Garnet Star and δ Cephei

B Perseus, Andromeda and Triangulum

- 7 The α Persei Cluster
- 8 M34
- 9 Algol, the Demon Star
- 10 The Andromeda Galaxy
- 11 NGC 752
- 12 The Triangulum Galaxy

C Pegasus, Aquarius and Capricornus

- 13 M15
- 14 M2
- 15 The Helix Nebula
- 16 Algedi and Dabih

D Cetus and Sculptor

- 17 Mira, the Wonderful
- 18 The Sculptor Galaxy

Winter

E Taurus, Auriga and Gemini

- 19 The Pleiades
- 20 The Hyades and Aldebaran
- 21 The three clusters of Auriga
- 22 M35
- 23 The Crab Nebula

F Orion and Monoceros

- 24 The Orion Nebula
- 25 Orion's Belt and Collinder 70
- 26 Collinder 69, the λ Orionis Cluster
- 27 M78
- 28 The Rosette and its cluster NGC 2244
- 29 The Christmas Tree Cluster

G Canis Major and Puppis

- 30 M41
- 31 M46 and M47
- 32 M93
- 33 M50

Spring

H Ursa Major, Canes Venatici and Coma Berenices

- 34 Mizar and Alcor
- 35 M81 and M82
- 36 M51 and M101
- 37 M3
- 38 La Superba, the garnet star of Canes Venatici
- 39 The Coma Star Cluster

I Cancer, Hydra and Leo

- 40 The Beehive, M44
- 41 M67
- 42 M48
- 43 The Leo Triplet

J Virgo and Corvus

- 44 The Sombrero Galaxy
- 45 M49 and M87, in heart of Virgo Cluster

Summer

K Hercules, Corona Borealis and Serpens Caput

- 46 The Great Hercules Cluster, M13
- 47 M92
- 48 M5

L Lyra, Cygnus and Draco's head

- 49 Vega's neighbours: ϵ , ζ and δ Lyrae
- 50 ν Draconis, the Dragon's eyes
- 51 Albireo
- 52 The Coathanger, Brocchi's Cluster
- 53 The Dumbbell Nebula, M27
- 54 North America Nebula and Cygnus Milky Way
- 55 M39

M Scorpius and Sagittarius

- 56 M4 and Antares
- 57 M6 and M7, the clusters of the Scorpion's tail
- 58 The Lagoon and the Trifid
- 59 M22 and M28
- 60 The Small Sagittarius Star Cloud, M24
- 61 The Swan and the Eagle: M17 and M16
- 62 NGC 6231 and the False Comet

N Ophiuchus, Scutum and Aquila

- 63 M10 and M12
- 64 IC 4665
- 65 NGC 6633 and IC 4756
- 66 Wild Duck Cluster, M11, and Scutum Star Cloud
- 67 Barnard's E

The far south

O Carina, Crux and Centaurus

- 68 The Carina Nebula
- 69 The Southern Pleiades, IC 2602
- 70 NGC 3532, the Wishing Well Cluster
- 71 The Jewel Box and the Coalsack
- 72 ω Centauri and Centaurus A
- 73 NGC 2516, the Southern Beehive

P The Magellanic Clouds, Tucana and Dorado

- 74 Large Magellanic Cloud and the Tarantula
- 75 The Small Magellanic Cloud and 47 Tucanae

Autumn

September to November

In autumn the nights lengthen and the summer Milky Way swings west: overhead it runs through Cassiopeia and Perseus, two constellations packed with open clusters within reach of the humblest binoculars. To the south, the Great Square of Pegasus opens onto an emptier sky, that of Aquarius and Cetus, where you hunt globular clusters and a giant but shy nebula, the Helix. Eastward, Andromeda holds the most distant galaxy visible to the naked eye, and Triangulum its fainter neighbour. It is also the season of variables: Algol blinks every three days, Mira goes from plain sight to invisibility within a year. Evenings are still mild in September and damp in November: bring something to wipe the lenses with.

A Cassiopeia, Cepheus and Camelopardalis

- 1 The Double Cluster
- 2 NGC 457, the E.T. Cluster
- 3 M103 and NGC 663
- 4 M52 and NGC 7789
- 5 Kemble's Cascade and NGC 1502
- 6 The Garnet Star and δ Cephei

B Perseus, Andromeda and Triangulum

- 7 The α Persei Cluster
- 8 M34
- 9 Algol, the Demon Star
- 10 The Andromeda Galaxy
- 11 NGC 752
- 12 The Triangulum Galaxy

C Pegasus, Aquarius and Capricornus

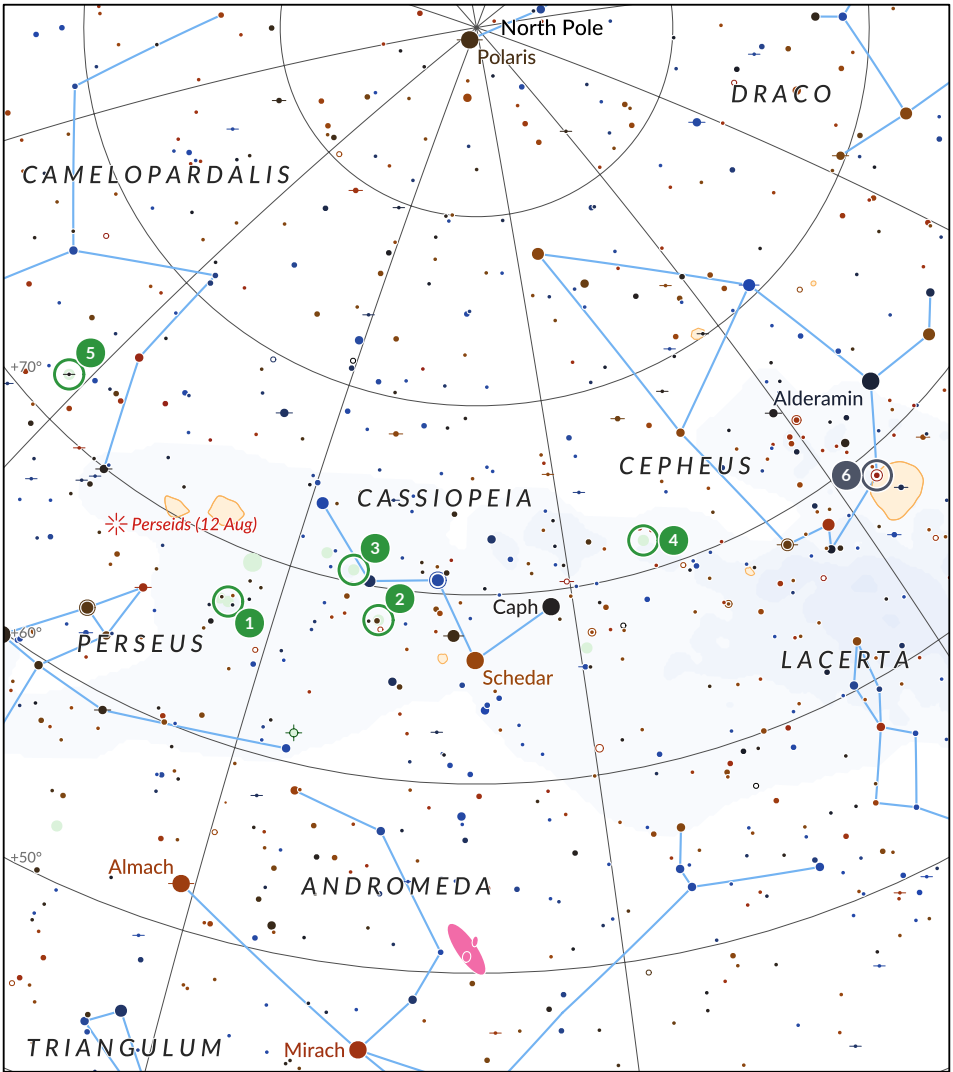
- 13 M15
- 14 M2
- 15 The Helix Nebula
- 16 Algedi and Dabih

D Cetus and Sculptor

- 17 Mira, the Wonderful
- 18 The Sculptor Galaxy

AUTUMN

A Cassiopeia, Cepheus and Camelopardalis

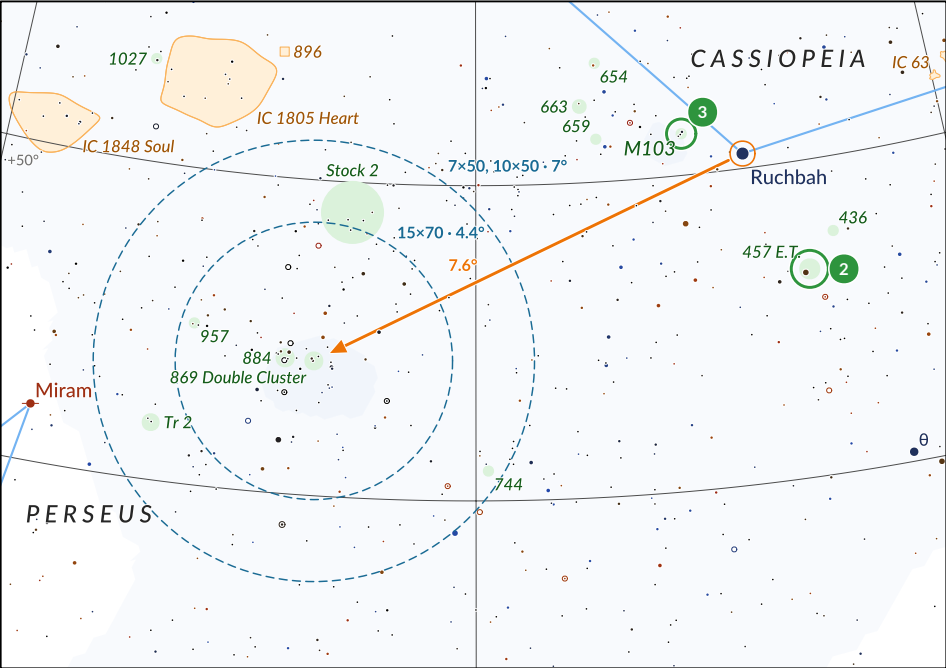


Objects on this map

- 1 The Double Cluster
- 2 NGC 457, the E.T. Cluster
- 3 M103 and NGC 663
- 4 M52 and NGC 7789
- 5 Kemble's Cascade and NGC 1502
- 6 The Garnet Star and δ Cephei

1 The Double Cluster

Open cluster • Perseus A



MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
3.7	18'	7,500 ly	Oct - Dec	●○○ Easy	chart 2

What you will see

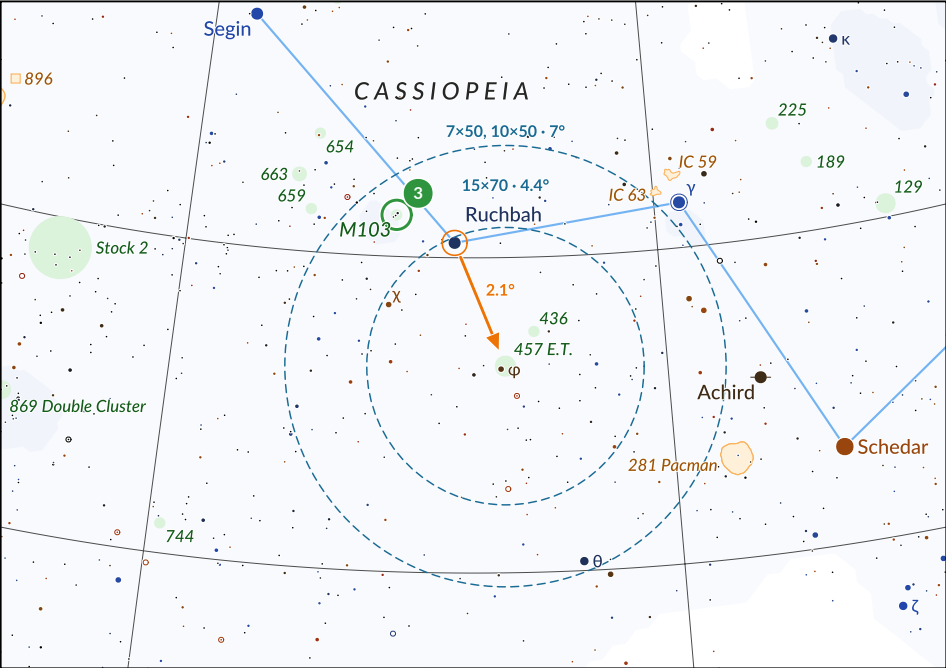
Two clusters side by side, each as wide as the full Moon, in the same field of view: a hazy patch of the Milky Way to the naked eye, in binoculars a handful of stars sprinkled over a grainy background, tighter in NGC 869, the western one. A 10x50 resolves a good thirty of them; the brightest are of magnitude 6 and 7, and a few, in NGC 884, lean towards orange. Two degrees north, Stock 2 spreads its magnitude-8 stars over a degree: a loose cluster, easy in binoculars, invisible in a telescope.

How to find it

Start from Ruchbah (δ Cas), the star at the bottom of Cassiopeia's W on the Perseus side. Slide 7.5° east-south-east, a field and a half, towards Mirfak: the patch of the Double Cluster appears halfway, on the edge of the Milky Way. Under a country sky it shows to the naked eye between the two constellations.

2 NGC 457, the E.T. Cluster

Open cluster • Cassiopeia **A**



MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
6.4	20'	7,900 ly	Oct - Dec	●○ Medium	chart 3

What you will see

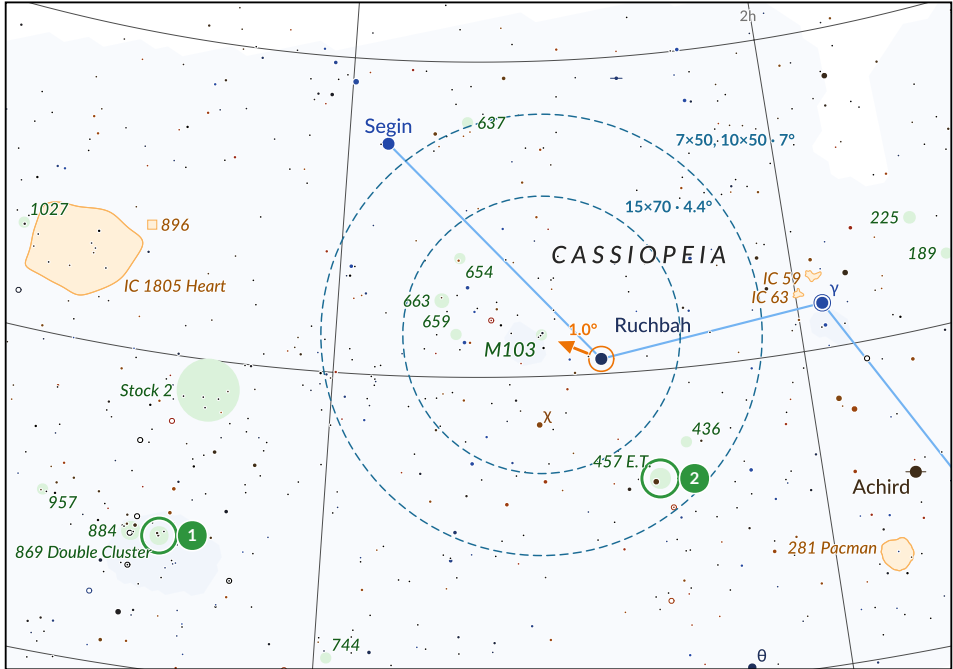
The cluster hangs from ϕ Cas, a magnitude-5 star that probably does not belong to it but acts as its beacon: in binoculars you see this star first, then a small milky cloud stretching away from it to the north-west over a quarter of a degree. A steadily held 10×50 picks out five or six points; the two 'eyes' of the alien, ϕ Cas and its magnitude-7 neighbour, are plain, but the figure with outstretched arms needs a telescope. Hard? No: easy to find, but modest.

How to find it

Aim at Ruchbah (δ Cas), at the bottom of the W. The cluster lies 2° to the south-west, that is below and a little to the right when Cassiopeia is high in the sky: both sit comfortably in one field. Look for the bright point of ϕ Cas; the cluster is glued to it.

3 M103 and NGC 663

Clusters • Cassiopeia **A**



MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
7.4	5.0'	8,500 ly	Oct - Dec	●●○ Medium	chart 1

What you will see

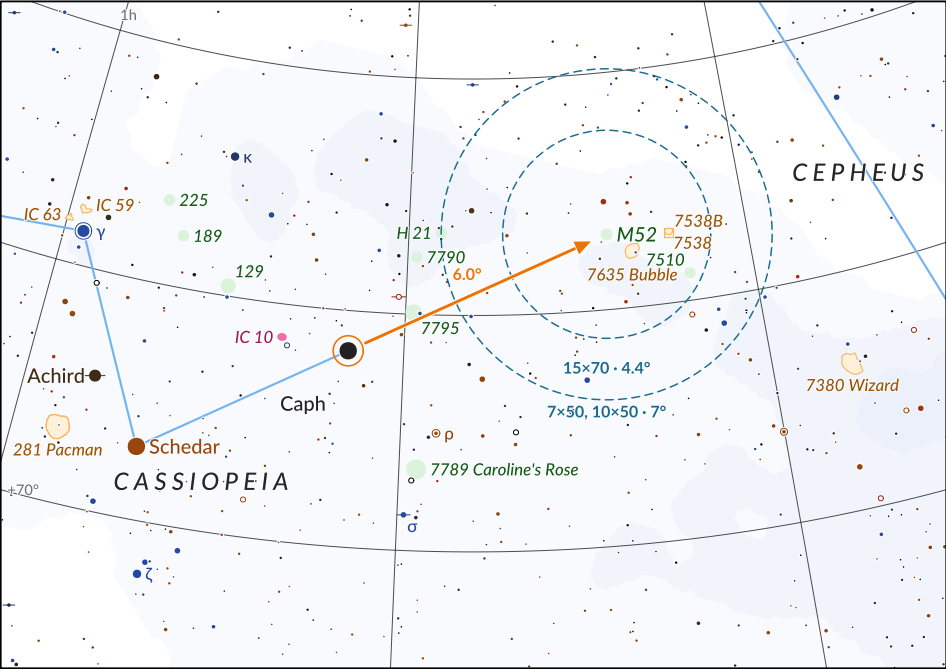
M103 is a small triangular patch a quarter of a degree across, with a magnitude-7 star at one tip: in binoculars it is a slightly fuzzy star that stretches out; a 10×50 guesses three or four points in it. The real show is 1.5° further east: NGC 663, twice as wide and distinctly richer, shows a grainy ball from which a 10×50 picks out some ten stars of magnitude 8 and 9. Between the two, the Milky Way is sown with small clusters the atlas names; in binoculars they are mere thickenings.

How to find them

Put Ruchbah (δ Cas) in the field: M103 is 1° to the north-east, very close, towards Segin (ε Cas), the end of the W. Carry on 1.5° the same way, and a little north, for NGC 663; all three fit in a single field.

4 M52 and NGC 7789

Clusters • Cassiopeia **A**



MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
7.3	15'	4,600 ly	Sep – Nov	●●○ Medium	chart 71

What you will see

M52 is a small bright knot, a sixth of a degree, set on the edge of a streak of Milky Way: in binoculars a fuzzy star with an orange magnitude-8 point on its rim; a 10×50 shows it grainy without quite resolving it. NGC 7789, Caroline's Rose, is the opposite: as wide as the Moon, with no bright star, a round pale glow that a town sky wipes out. Under a dark sky, with averted vision, it swarms. Caroline Herschel found it in 1783 with a small refractor.

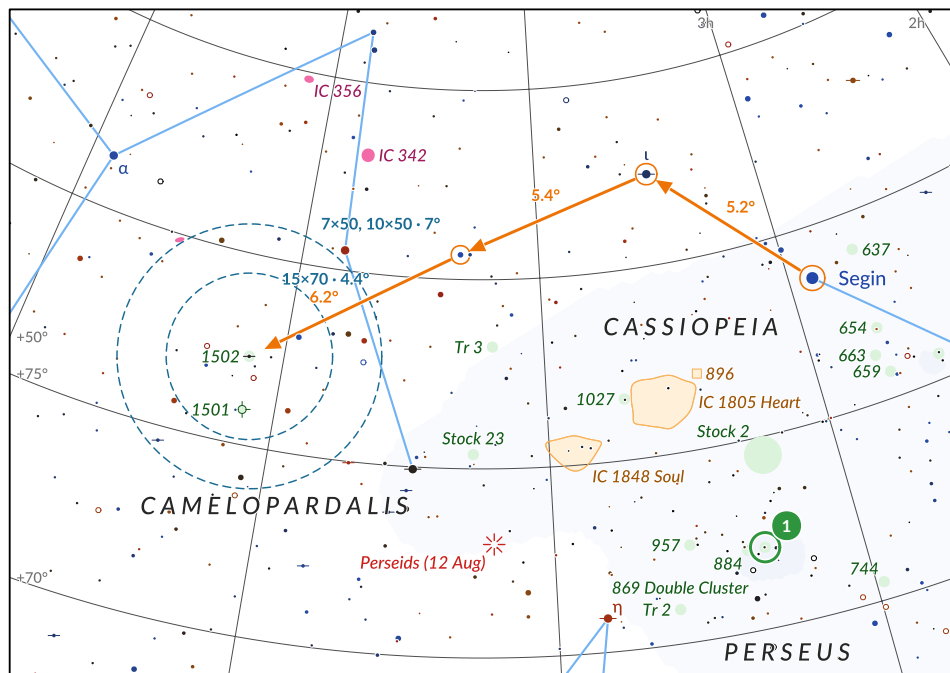
How to find them

Extend the line Schedar–Caph (α then β Cas) by a little more than its length, 6° to the north-west: M52 is at the end, one field from Caph. For NGC 7789, go back to Caph and drop 3° to the south-west, between Caph and ρ Cas, a magnitude-4.5 star.

5 Kemble's Cascade and NGC 1502

Asterism • Camelopardalis

A



MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
6.9	8.0'	2,700 ly	Nov – Jan	●●○ Medium	chart 11

What you will see

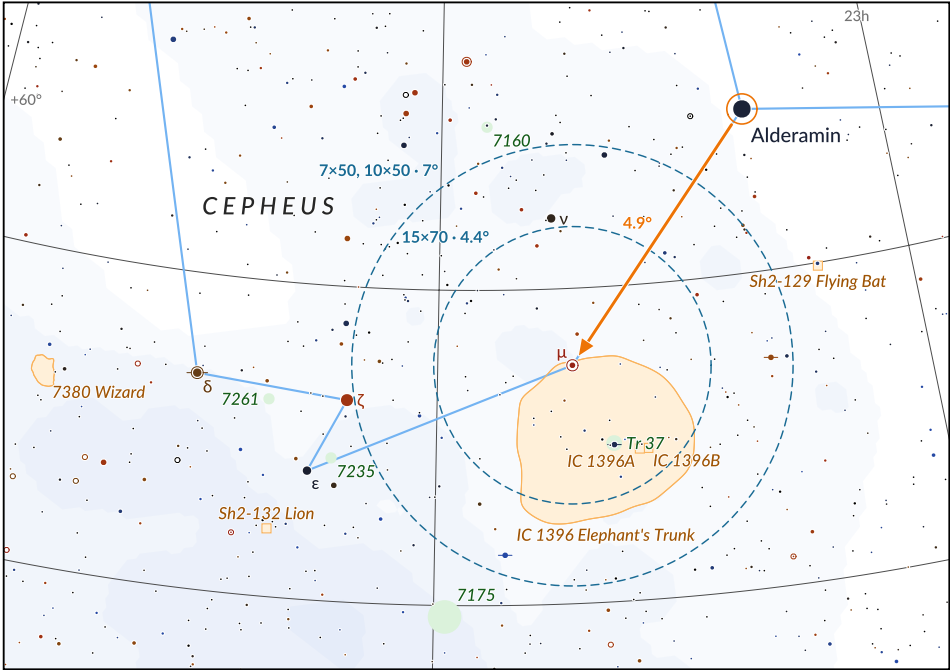
A file of some twenty stars of magnitude 7 to 9, dead straight, 2.5° long, with a magnitude-5 star in the middle: the Cascade is an object made for binoculars, too wide for a telescope, invisible to the naked eye. It flows from north-west to south-east and ends in NGC 1502, a small tight cluster of magnitude 7 that a 10×50 shows as a patch with a pair of twin stars at its centre. It is no cluster: a chance alignment, noticed by Father Lucian Kemble in 1980 and named by Sky & Telescope.

How to find it

Camelopardalis has no bright star: start from Segin (ε Cas), the end of the W. One field north-east, ι Cas (magnitude 4.5); one field east, a magnitude-4.8 star; one field south-east, NGC 1502, with the Cascade climbing from it to the north-west. Roughly halfway between Segin and Capella.

6 The Garnet Star and δ Cephei

Variable star • Cepheus **A**



MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
3.4–5.1	—	2,800 ly	Aug – Oct	●○○ Easy	chart 73

What you will see

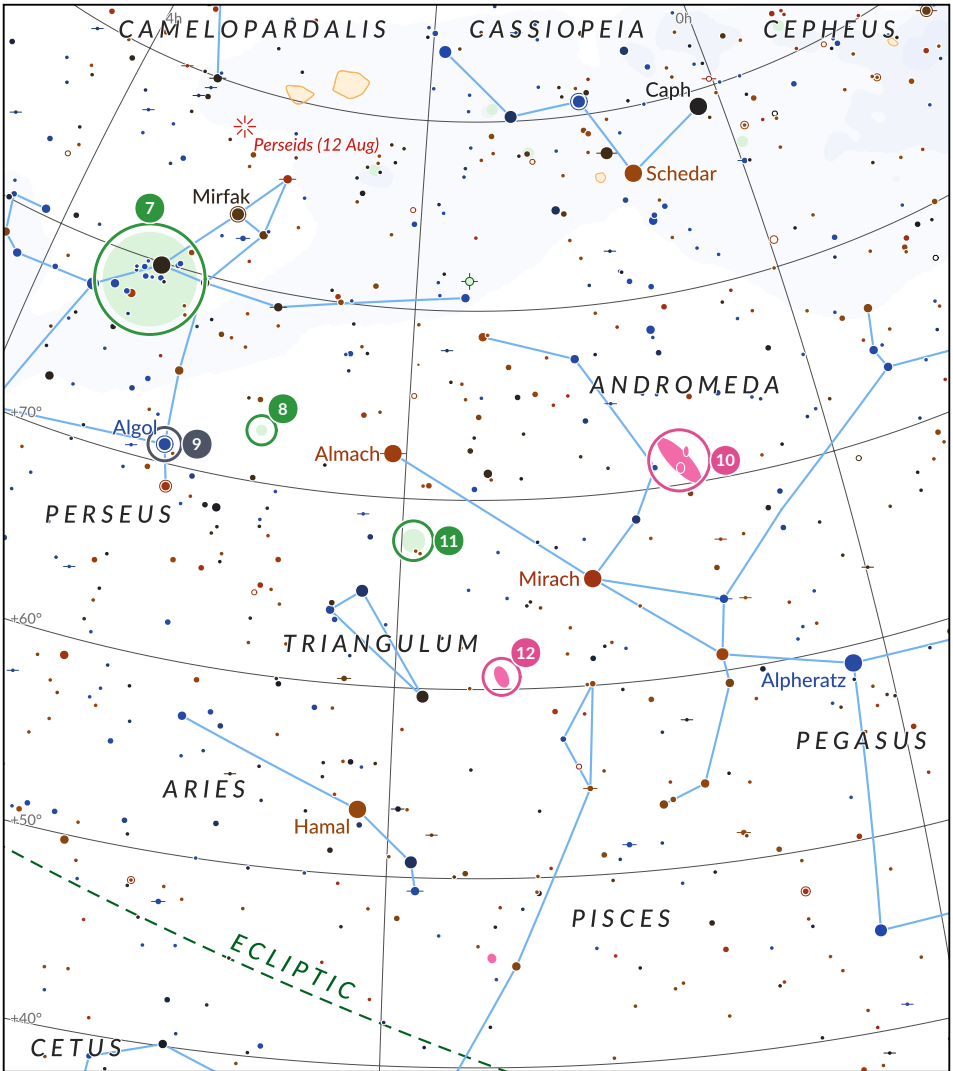
μ Cep is the reddest star binoculars show: a point of deep orange, almost garnet, that William Herschel likened to an ember. It is a supergiant among the largest known; it drifts slowly between magnitudes 3.4 and 5.1. Two fields east, δ Cep, the star the Cepheids are named after, goes from 3.5 to 4.4 in 5.37 days: compare it each evening with its neighbours ζ Cep (3.4) and ε Cep (4.2). A steady 10×50 also splits its bluish companion of magnitude 6.3, 41" away. Around μ Cep the atlas draws the big nebula IC 1396: binoculars only show the cluster Tr 37 at its centre.

How to find it

Alderamin (α Cep), the brightest star of Cepheus, marks the corner of the house on the Cassiopeia side. Drop 5° south-east: μ Cep is the red, lonely star on the southern edge of the constellation. Carry on 6° east, past ζ Cep, to δ Cep, in a small triangle with ζ and ε Cep.

AUTUMN

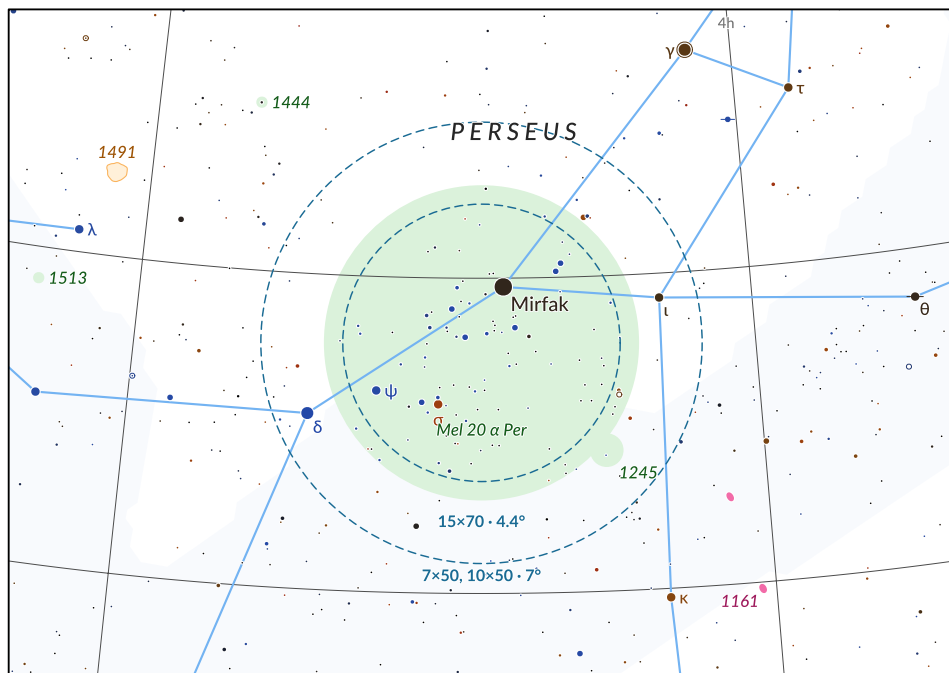
B Perseus, Andromeda and Triangulum



7 The α Persei Cluster

Open cluster • Perseus

B



MAGNITUDE

1.2

SIZE

5.0°

DISTANCE

560 ly

EVENINGS

Nov – Jan

DIFFICULTY

●○○ Easy

ATLAS

chart 13

What you will see

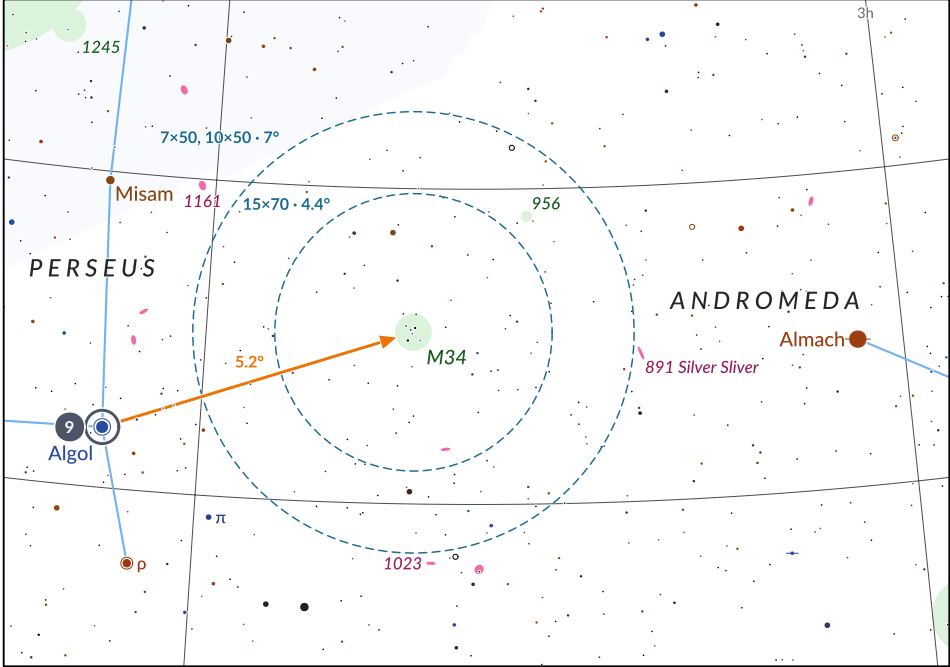
One of the finest binocular fields in the sky, and one of the few clusters that needs only your eyes: around Mirfak, a trail of stars of magnitude 3 to 7, 3° long, stretching towards δ Per to the south-east. A 7×50 takes it all in and counts some fifty stars, mostly white and blue, with yellow Mirfak at the top. Too vast for a telescope, this young cluster is as old as the Pleiades and barely farther away. Wander along the trail: it joins the Milky Way.

How to find it

Mirfak (α Per) is the brightest star of Perseus, halfway between Capella and Cassiopeia's W. The cluster surrounds Mirfak and runs down towards δ Per: point at the star and you are there.

8 M34

Open cluster · Perseus **B**



MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
5.2	35'	1,500 ly	Nov – Jan	●○○ Easy	chart 2

What you will see

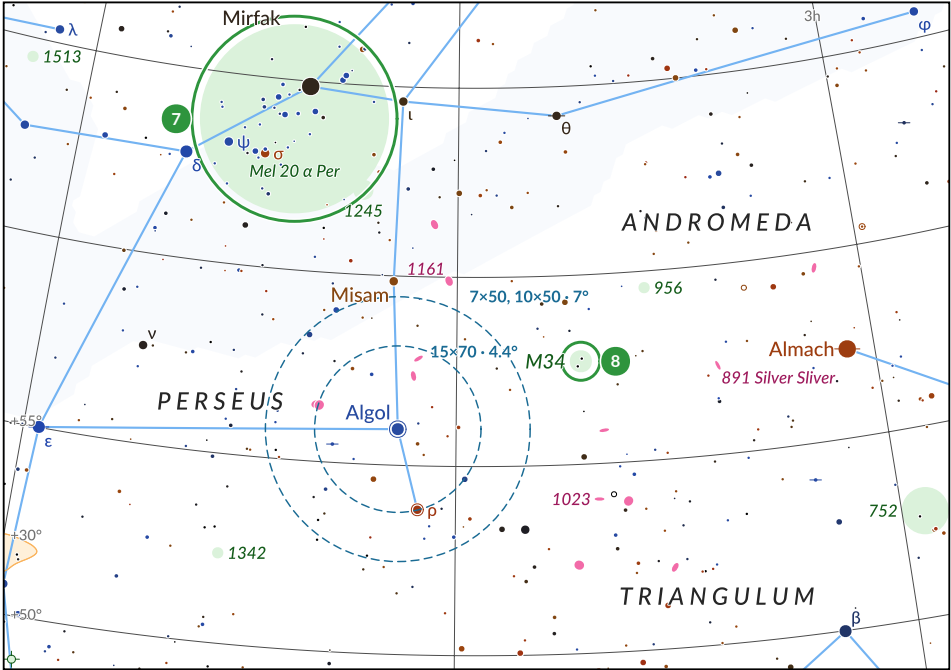
A bright patch as wide as half the Moon, in which a 7×50 already picks out five or six stars of magnitude 7 and 8; a 10×50 shows a dozen, including two close pairs, over a background that stays milky. The cluster is loose and young, two hundred million years, and it fits in the same field as Algol. Under a country sky it shows to the naked eye as a fuzzy star.

How to find it

From Algol (β Per), head west, that is towards Almach (γ And): M34 is 5° along, a little under halfway, slightly north of the line. In a 7×50, Algol is still at the edge of the field when the cluster reaches the centre.

9 Algol, the Demon Star

Variable star · Perseus **B**



MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
2.1–3.4	—	90 ly	Nov – Jan	●○○ Easy	chart 13

What you will see

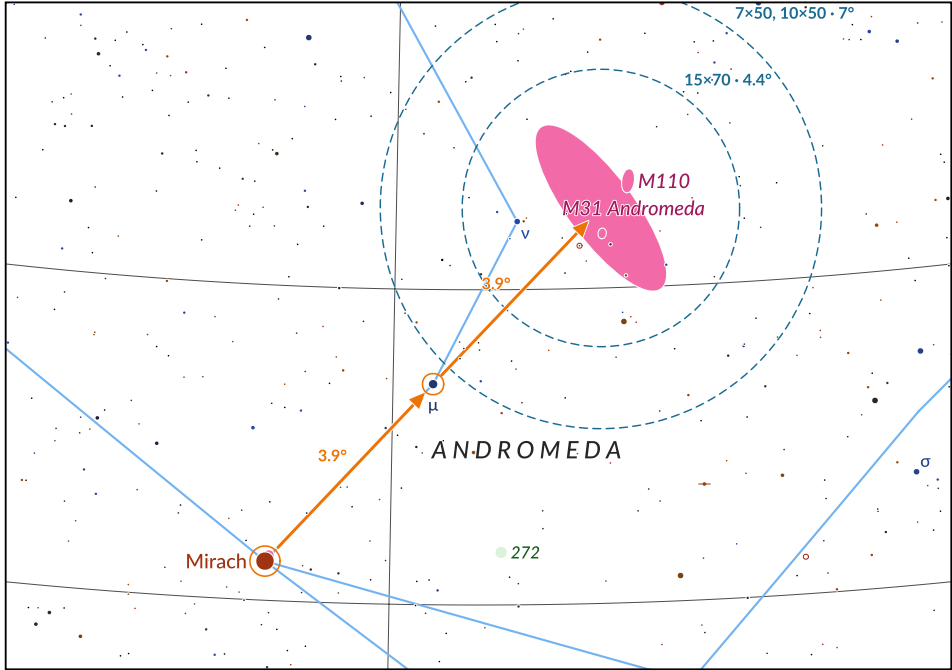
Nothing to see, everything to measure: Algol is an ordinary star of magnitude 2.1 which, every 2 days and 21 hours, drops to 3.4 for some ten hours, while a dimmer companion passes in front of it. The bottom of the eclipse lasts two hours. Binoculars are for comparing: at maximum Algol matches Almach (2.1); at minimum it falls below ε and ζ Per (2.9) and joins ρ Per (3.3), its orange neighbour. The dates of the minima are in the almanacs; on an evening of descent or recovery, the eye sees the change from hour to hour.

How to find it

Algol is the second star of Perseus, 9° south of Mirfak, towards the Pleiades. To the naked eye it forms a triangle with Mirfak and Almach (γ And). The wider map shows the comparison stars: Almach to the west, ε and ζ Per to the east, ρ Per just south.

10 The Andromeda Galaxy

Galaxy • Andromeda **B**



MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
3.4	$3.2 \times 1.0^\circ$	2.5 million ly	Oct – Dec	●○○ Easy	chart 3

What you will see

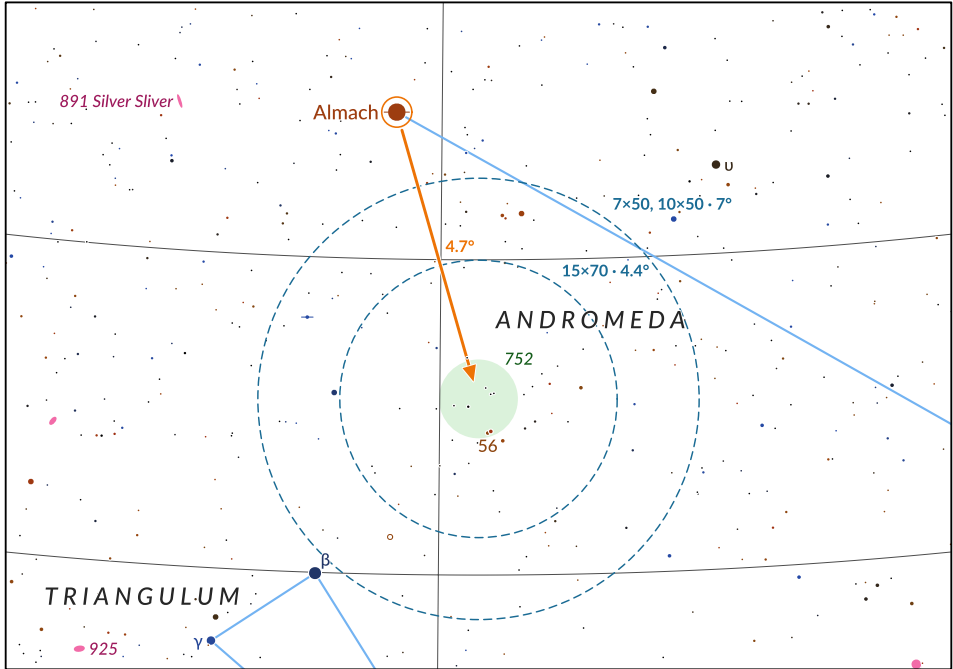
The most distant thing the naked eye can see: an elongated smudge, and in binoculars a milky spindle with a bright core and edges that fade away. Under a dark sky a 10×50 stretches it over 3° , half the field, and shows its dust lane as a sharp cut along the north-western edge. Just south of the nucleus, M32 is an easy fuzzy point; M110, to the north-west, wider and paler, needs a moonless sky, or a 15×70 on a tripod, which makes it easy. Its light left 2.5 million years ago.

How to find it

Mirach (β And) is the middle star of Andromeda's chain, which starts at the corner of the Square of Pegasus. From Mirach, climb 4° north-west to μ And (magnitude 3.9), then another 4° the same way: the galaxy is there, just right of ν And. The three steps fit in two fields.

11 NGC 752

Open cluster • Andromeda **B**



MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
5.7	75'	1,300 ly	Oct - Dec	●○○ Easy	chart 2

What you will see

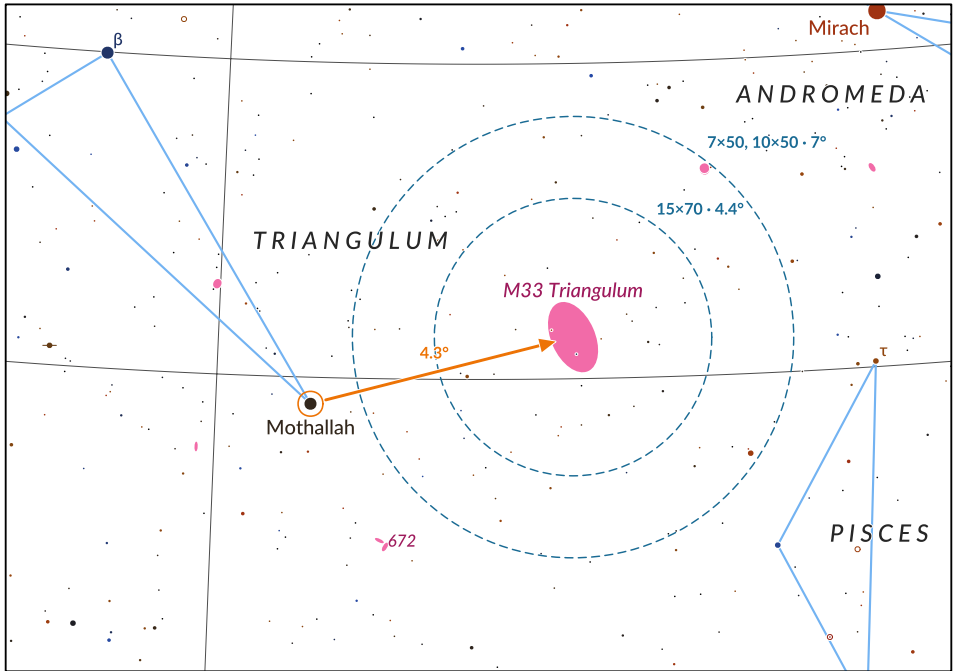
A big loose cluster, two Moons wide, that binoculars show better than any telescope: a 7×50 sees a cloud of points over a hazy background, a 10×50 counts some twenty stars of magnitude 8 and 9, with no concentration at the centre. On its southern edge, two orange magnitude-6 stars, one of them 56 And, make a conspicuous pair that serves as a landmark. The cluster is old for an open cluster, a billion years, and its stars are drifting apart.

How to find it

Almach (γ And), at the end of Andromeda's chain, is the only bright star around. Drop 4.5° due south, less than one field: the cluster lies between Almach and β Tri, a little nearer Almach, with the orange pair on its lower edge.

12 The Triangulum Galaxy

Galaxy · Triangulum **B**



MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
5.7	71 × 42'	2.7 million ly	Oct – Dec	●●○ Medium	chart 2

What you will see

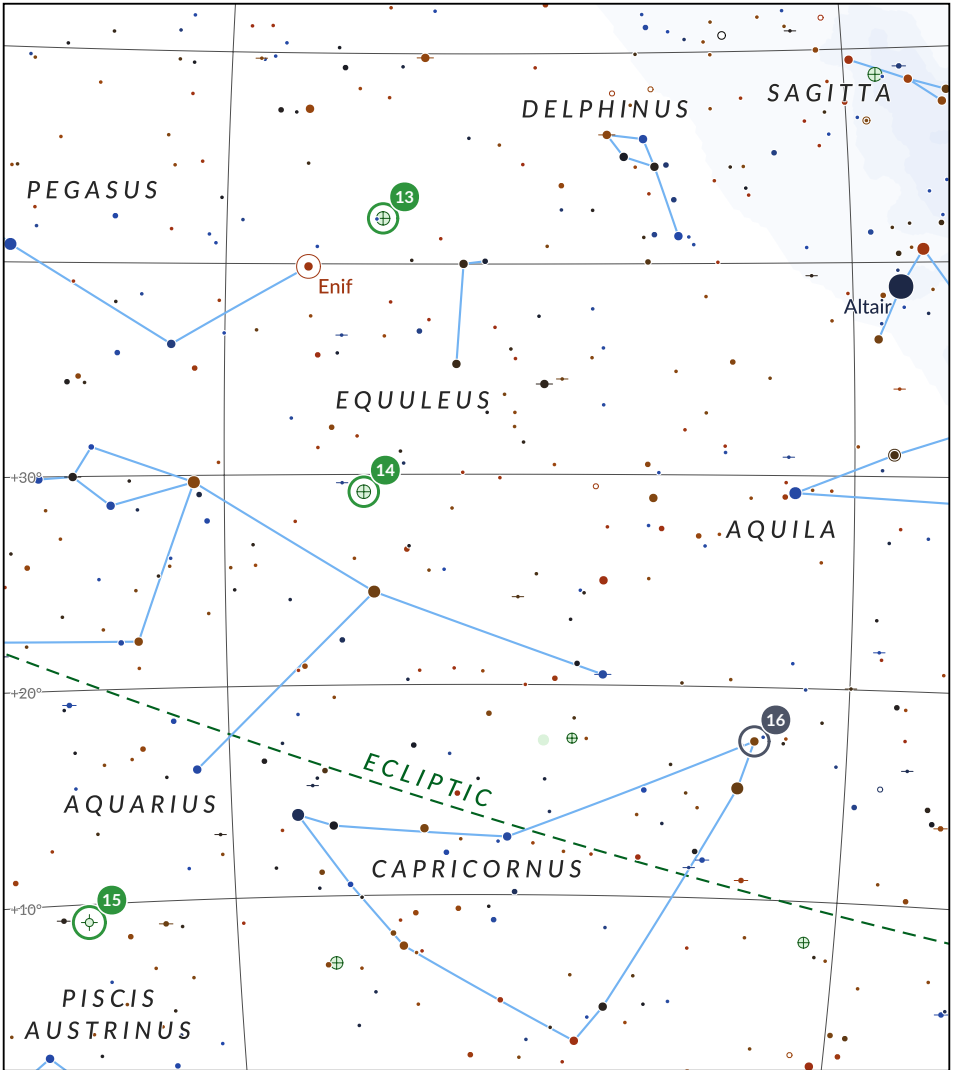
A galaxy seen face-on, as large as the Moon but spread out: its magnitude of 5.8 is scattered over so much area that a suburban sky wipes it out entirely. Under a dark sky a 10×50 shows a pale oval glow with no edges, easier with averted vision than by staring; look for neither a nucleus nor spiral arms. A 15×70 on a tripod, with its darker background, lifts it out clearly, with a slightly brighter heart. It is one of the most distant objects visible to the naked eye, under a perfect sky. Do not mistake it for M31's far more obvious smudge, 15° to the north.

How to find it

Mothallah (α Tri) is the apex of the Triangle, the star nearest Andromeda. Head west from it, towards Mirach: M33 lies 4° along, less than one field, slightly nearer Mothallah than the midpoint. Another route: from Mirach, 7° south-east, opposite M31.

AUTUMN

C Pegasus, Aquarius and Capricornus

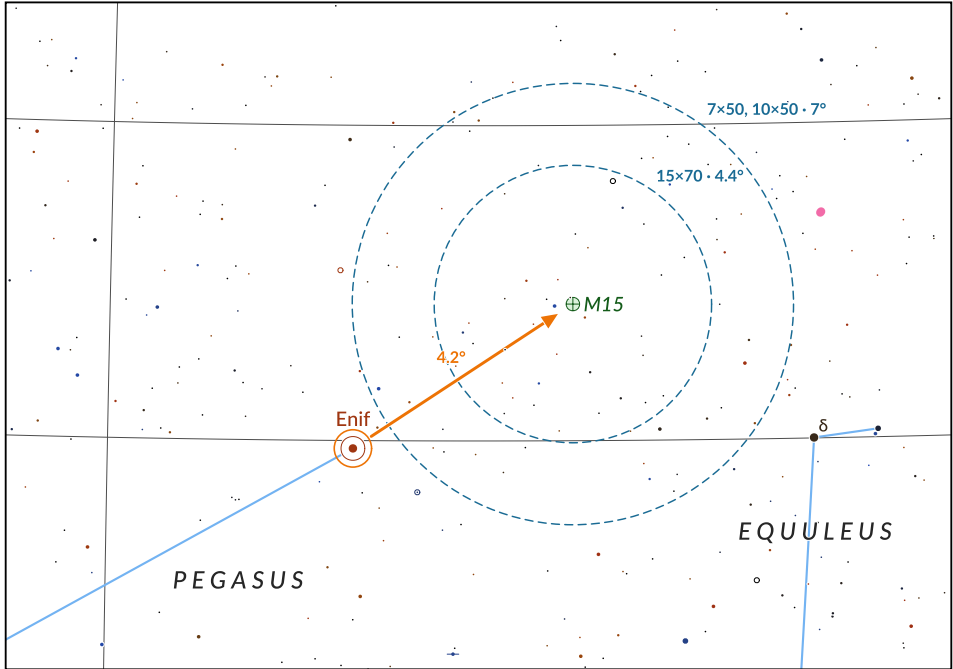


Objects on this map

- | | |
|---------------|----------------------------|
| 13 M15 | 15 The Helix Nebula |
| 14 M2 | 16 Algedi and Dabih |

13 M15

Globular cluster • Pegasus



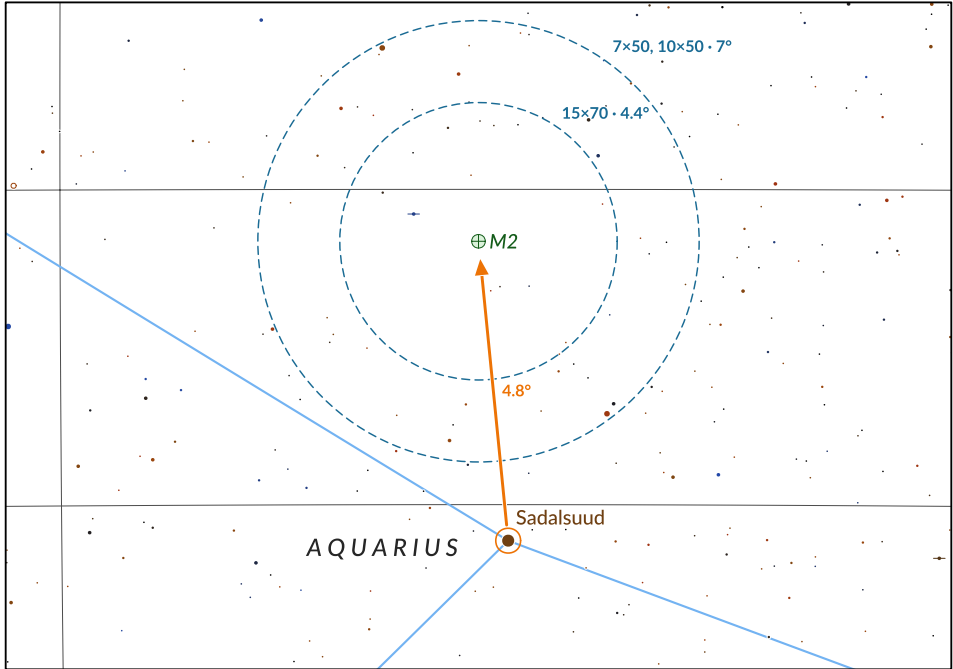
MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
6.4	12'	33,000 ly	Aug – Oct	●○○ Easy	chart 75

What you will see

In binoculars a globular cluster is a star that refuses to come into focus: M15 is one of the brightest of the autumn sky, a small milky ball of magnitude 6 with a very condensed centre, beside a magnitude-7 star that serves for comparison. A 10×50 shows it round and a little wider than the star, a 15×70 on a tripod clearly wider, with a halo, but without resolving it: its hundred thousand stars are thirty thousand light-years away. It is one of the densest clusters known, its core perhaps collapsed onto a black hole.

How to find it

Enif (ε Peg), the nose of Pegasus, is the lonely orange star south-west of the Great Square. Extend the line from Biham (θ Peg) to Enif by half its length, 4° to the north-west: M15 is at the end, in the same field as Enif.



MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
6.2	13'	37,000 ly	Aug – Oct	●○○ Easy	chart 77

What you will see

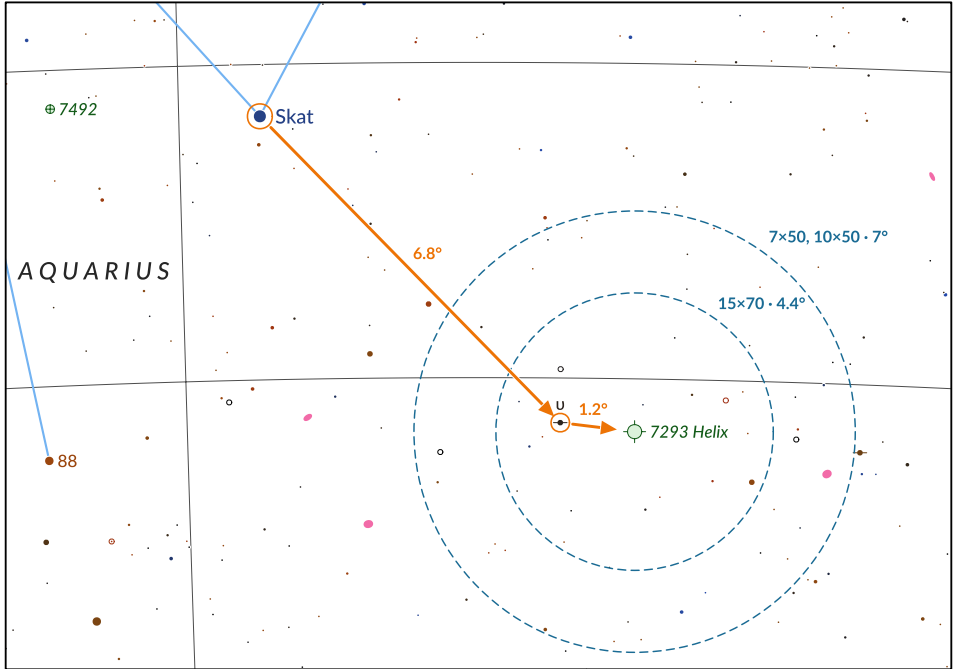
M15's twin, 13° further south: same magnitude, same size, same fuzzy-star look in binoculars, but in an emptier field, which makes it easier to identify. A 10×50 shows it as a slightly oval milky disc, brighter at the centre, a little wider than any star point will ever be; no star stands out from it. A 7×50 puts it in the same field as Sadalsuud. It is farther than M15 and just as old: thirteen billion years.

How to find it

Sadalsuud (β Aqr) is the brightest star of Aquarius, 20° south-east of Altair, at about the same height as Sadalmelik (α Aqr), 10° further east. From Sadalsuud, climb 5° due north, one field: M2 is at the end, almost exactly on the celestial equator.

15 The Helix Nebula

Planetary nebula · Aquarius



MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
7.2	13'	650 ly	Aug – Oct ↓	●●● Hard	chart 77

↓ low in the south

What you will see

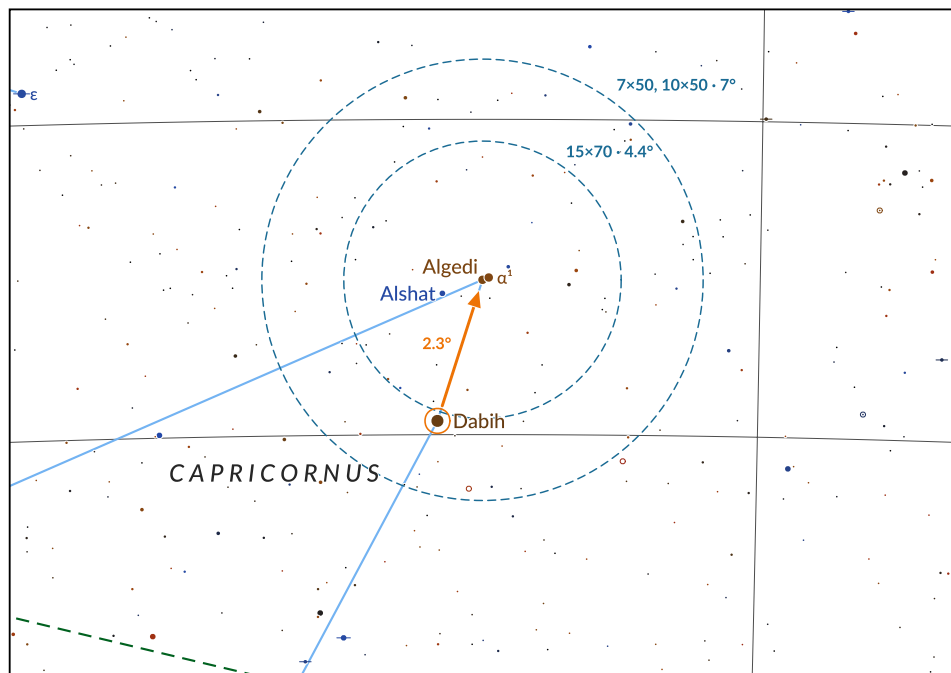
The nearest planetary nebula, and the largest: half the Moon across. But its light is spread over the whole of that disc, and it stays low in the sky from mid-northern latitudes: you need a moonless night, far from towns, and patience. A 10×50 then shows a round, grey, ghostly disc that appears best when you look slightly to one side and fades as soon as you stare. No ring, no colour: those are for photographs. A 7×50 often gives only a suspicion of it; a 15×70 on a tripod shows it for certain.

How to find it

Skat (δ Aqr), magnitude 3.3, is the bottom star of Aquarius, 11° north-east of Fomalhaut. Drop 7° south-west, one field, to υ Aqr, magnitude 5.2; the Helix lies 1.2° west of that star, in the same field, towards Fomalhaut.

16 Algedi and Dabih

Double star · Capricornus



MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
3.6	—	100 ly	Jul – Sep	●○○ Easy	chart 66

What you will see

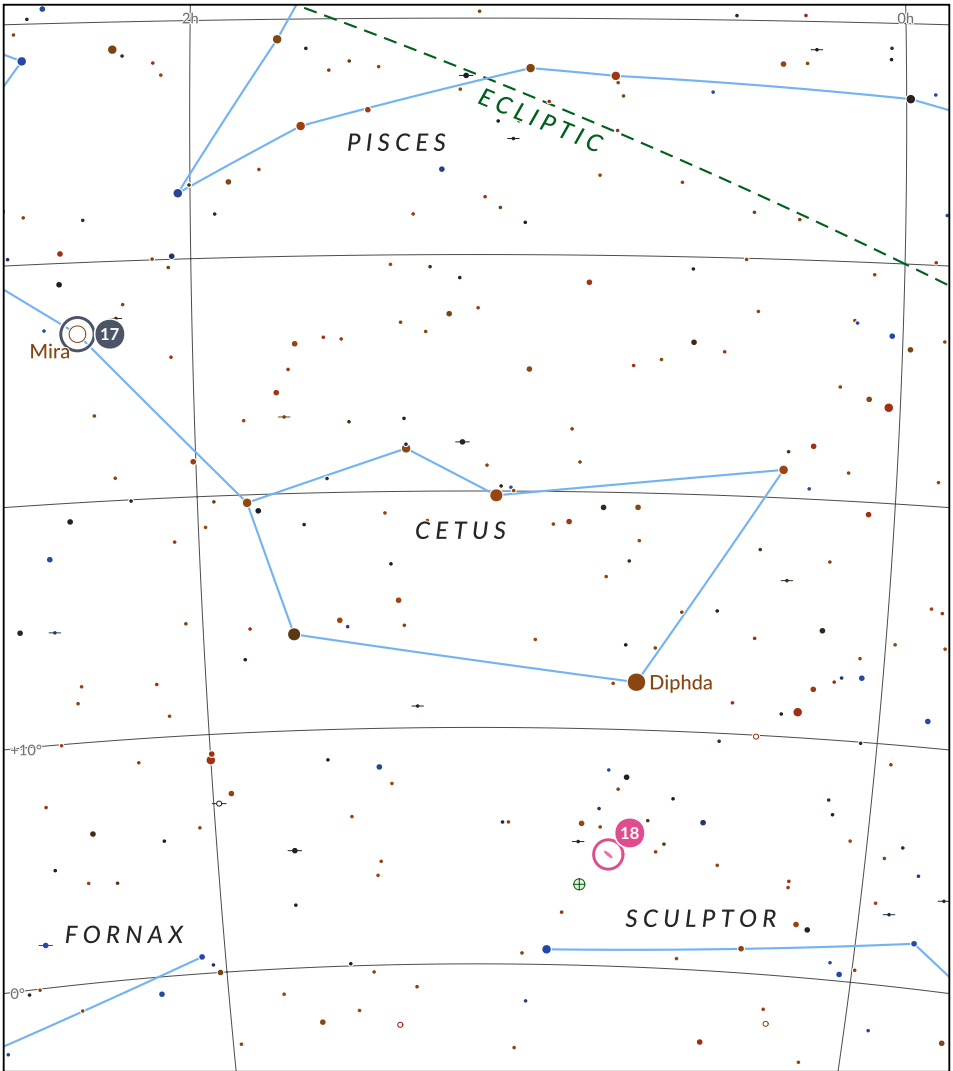
Two doubles to start with, at the head of Capricornus. Algedi (α Cap) already splits to the naked eye, for good eyesight: two yellow stars of magnitude 3.6 and 4.3, 6' apart, neighbours only in appearance, one 100 light-years away, the other nearly 900. Dabih (β Cap), 2° further south, is a true pair that binoculars split without effort: an orange star of magnitude 3.1 and a bluish companion of 6.1, 3' or 205" away. Both couples fit in one 7×50 field.

How to find them

Extend the Vega–Altair line beyond Altair by about two thirds of its length, to the south-east: you reach the head of Capricornus, a small triangle of magnitude-3 and 4 stars, 22° from Altair. Dabih is the brightest; Algedi, 2° above it, is the pair.

AUTUMN

D Cetus and Sculptor



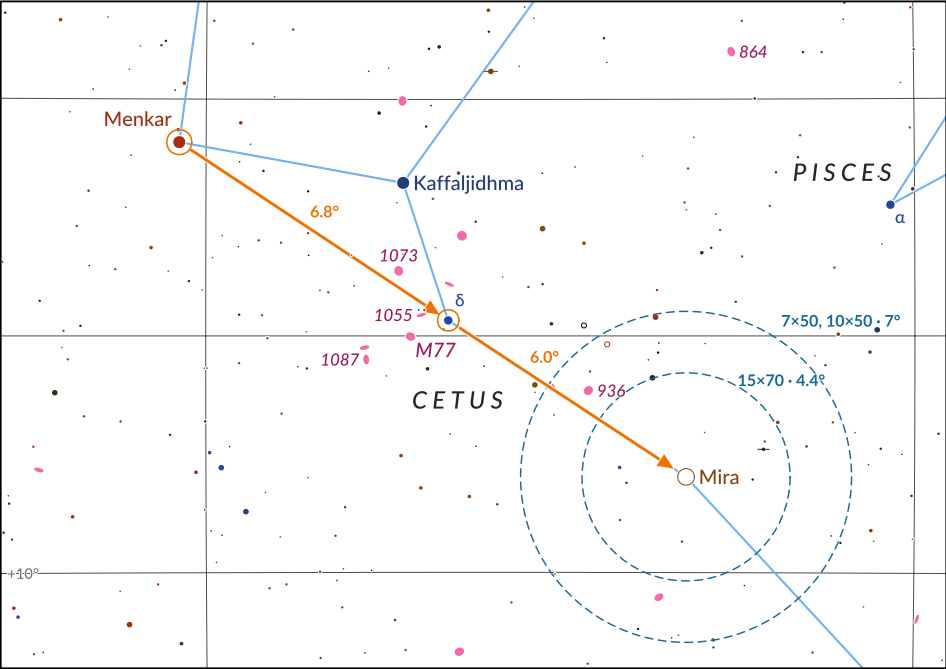
Objects on this map

17 Mira, the Wonderful

18 The Sculptor Galaxy

17 Mira, the Wonderful

Variable star • Cetus **D**



MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
2-10	—	300 ly	Oct - Dec	●●○ Medium	chart 6

What you will see

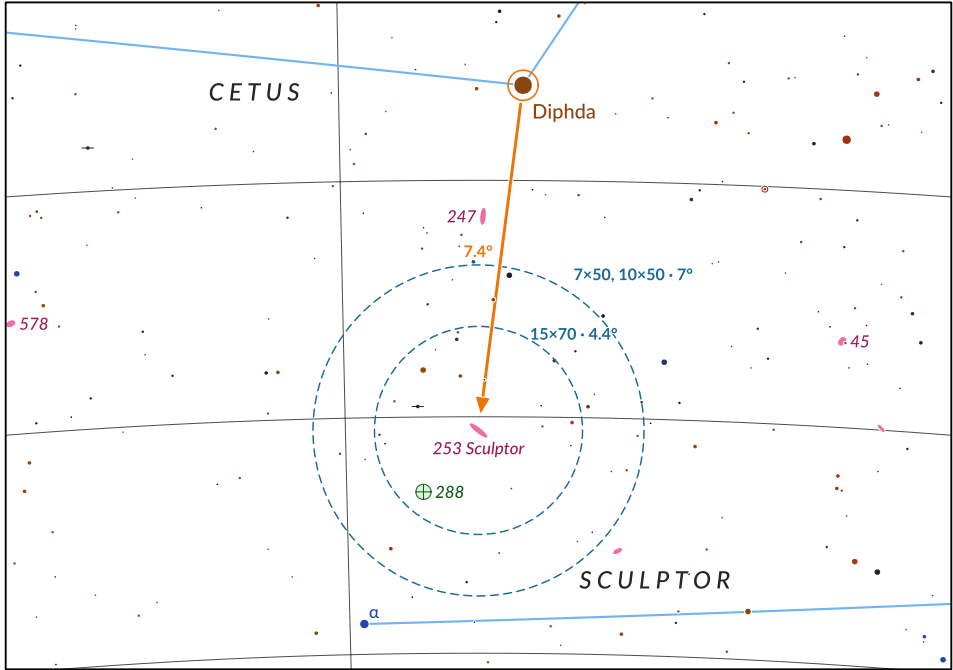
A star that is not always there. About every eleven months Mira climbs to magnitude 2 or 3, orange-red and plain to the naked eye, then fades over a few months to magnitude 9 or 10, beyond the reach of binoculars. A bloated red giant that pulsates; its first change was recorded in 1596. Compare it with δ Cet (4.1) and ζ Cet (3.7): if you find nothing in its place, it is at the bottom of its cycle. The charts draw it at maximum, with a ring to mark it as variable.

How to find it

Menkar (α Cet), orange, is the head of Cetus, 25° south of the Pleiades. Drop 7° south-west, one field, to δ Cet (magnitude 4.1), then another 6° the same way: Mira is on the neck of the whale, halfway between the head and Diphda.

18 The Sculptor Galaxy

Galaxy • Sculptor **D**



MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
7.2	28 × 7'	11 million ly	Oct – Dec ↓	●●○ Medium	chart 7

↓ low in the south

What you will see

After Andromeda, the easiest galaxy in binoculars from mid-northern latitudes, provided the southern horizon is clear: it only rises to 20°. Under a dark sky a 10×50 shows a pale spindle, three to four times longer than wide, half a degree long, tilted north-east to south-west; the centre is barely brighter. A 7×50 catches it with averted vision; a 15×70 on a tripod gives it a slightly mottled look. 1.8° to the south-east, NGC 288 is a small globular cluster of magnitude 8, a fuzzy ball in the same field. The south galactic pole is a degree away: nothing blocks the view.

How to find it

Diphda (β Cet), magnitude 2, is the lonely bright star 30° south of the Square of Pegasus, halfway between Fomalhaut and Menkar. Drop 7.5° due south, a field and a bit more: the galaxy is there, with NGC 288 a little lower to the left.

CHAPTER 2

Winter

December to February

Winter brings the brightest sky of the year: seven of the twenty most luminous stars gather around Orion, from Sirius to Capella, and the Milky Way, fainter than in summer, runs down from Auriga through Canis Major to Puppis. It is the season of open clusters: the Pleiades and the Hyades in Taurus, the three clusters of Auriga, M35 in Gemini, M41 below Sirius, then M46, M47 and M93 in Puppis. In the middle, Orion's Sword carries the finest nebula in the sky, visible in any binoculars. The nights are long and often very transparent once a cold front has passed, but the cold numbs the fingers and dew settles quickly on the eyepieces: dress more warmly than you think you need, keep the binoculars under your coat between looks, and never breathe on the lenses.

E Taurus, Auriga and Gemini

- 19 The Pleiades
- 20 The Hyades and Aldebaran
- 21 The three clusters of Auriga
- 22 M35
- 23 The Crab Nebula

F Orion and Monoceros

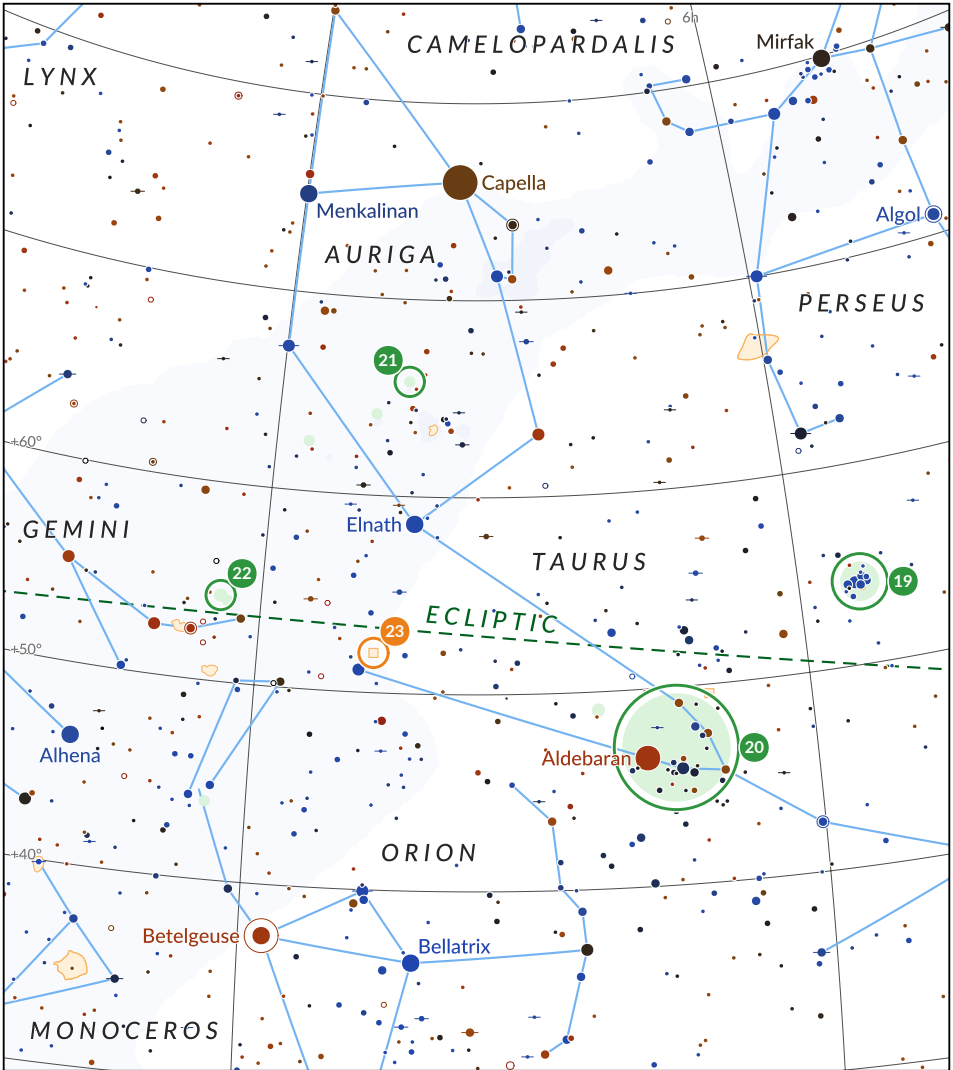
- 24 The Orion Nebula
- 25 Orion's Belt and Collinder 70
- 26 Collinder 69, the λ Orionis Cluster
- 27 M78
- 28 The Rosette and its cluster NGC 2244
- 29 The Christmas Tree Cluster

G Canis Major and Puppis

- 30 M41
- 31 M46 and M47
- 32 M93
- 33 M50

WINTER

E Taurus, Auriga and Gemini



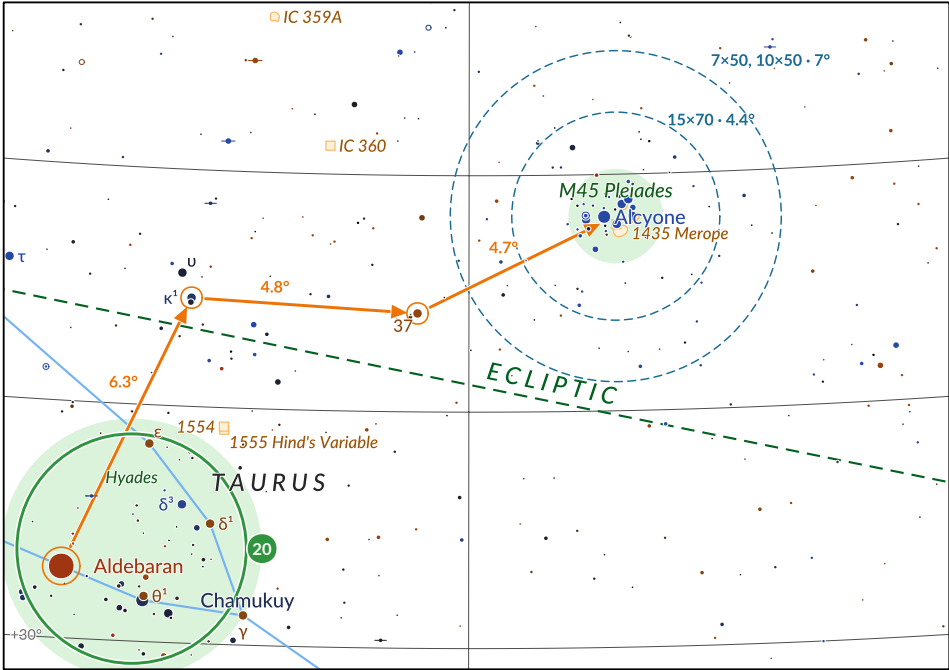
Objects on this map

- 19 The Pleiades
- 20 The Hyades and Aldebaran
- 21 The three clusters of Auriga

- 22 M35
- 23 The Crab Nebula

19 The Pleiades

Open cluster · Taurus **E**



MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
1.6	2.0°	440 ly	Nov – Jan	●○○ Easy	chart 15

What you will see

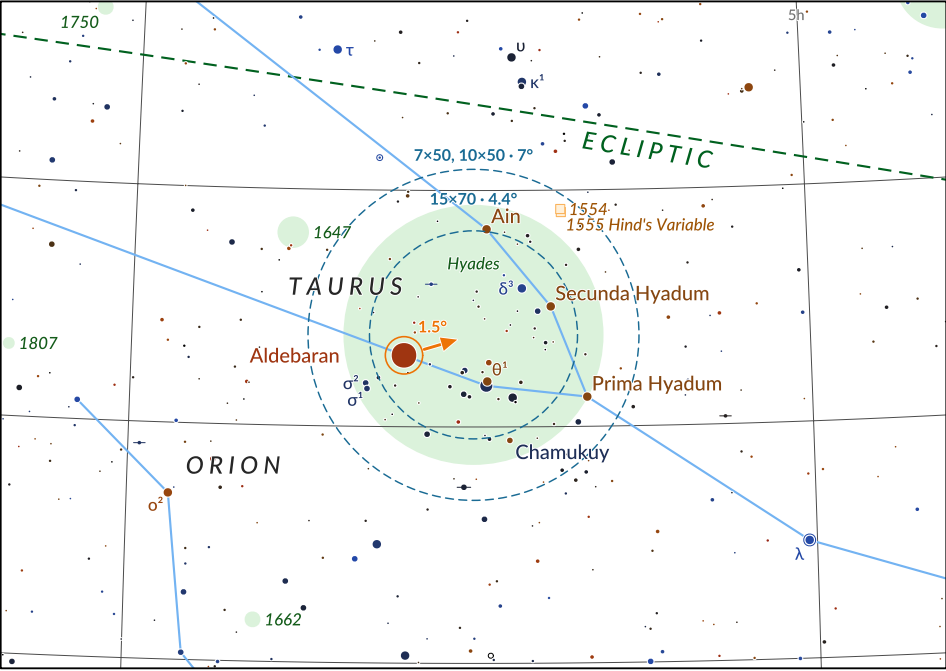
The finest cluster in the sky for binoculars, and the one object that is better not magnified: at 7× or 10×, the seven or eight naked-eye stars become some fifty, bluish, laid out as a small dipper that fills a third of the field. Alcyone shines at the centre, Atlas and Pleione mark the handle, Electra, Maia, Merope and Taygeta trace the rim. The veil of nebulosity around Merope seen in photographs stays invisible even under a dark sky; what is sometimes taken for it is dew forming on the eyepiece. The cluster is young, barely a hundred million years old, and lies 440 light-years away.

How to find it

The Pleiades are a naked-eye object, a small milky patch on the Bull's shoulder, and they are often what you use to find everything else. Starting from Aldebaran, climb north-west along the Bull's back: κ¹ Tau at 6°, then 37 Tau 5° farther, and the cluster 4° beyond, two 7×50 fields in all. You cannot miss it: nothing else in the area looks like this tight bunch of stars.

20 The Hyades and Aldebaran

Open cluster • Taurus **E**



MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
0.5	5.5°	150 ly	Nov – Jan	●○○ Easy	chart 15

What you will see

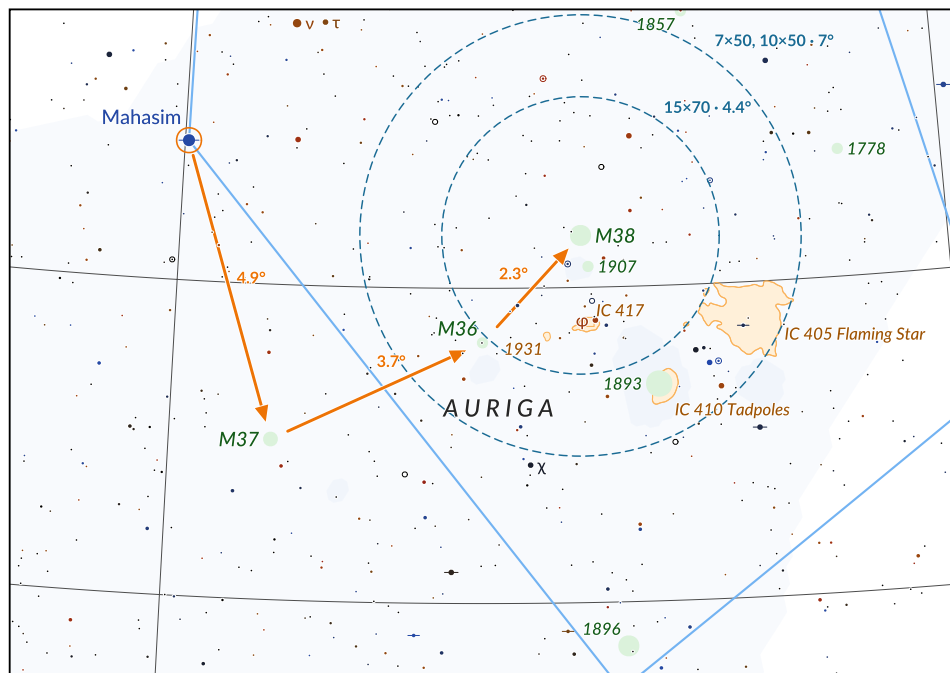
The V of the Hyades spans 5°, nearly the whole field of a 10×50, too much for a 15×70: it is the nearest cluster, and the only one that really looks better in binoculars than to the naked eye or in a telescope. Orange Aldebaran is not a member: it lies twice as close, in the foreground. Binoculars show a good hundred stars and several wide pairs: θ^1 and θ^2 Tau, white and yellow, 6' apart, and σ^1 and σ^2 Tau east of Aldebaran. The two stars of the northern branch, γ and δ , are the “Hyadum”. 3.5° north-east of Aldebaran, NGC 1647 adds a 25' patch of magnitude-8 and 9 stars, four times farther away than the Hyades.

How to find it

No path is needed: Aldebaran, the Bull's red eye, is one of the brightest stars of winter, halfway along the line from Orion's Belt to the Pleiades. Centre it and nudge a little west: the whole V fits in the field. NGC 1647 lies half a field north-east of Aldebaran, towards the Bull's southern horn.

21 The three clusters of Auriga

Clusters · Auriga **E**



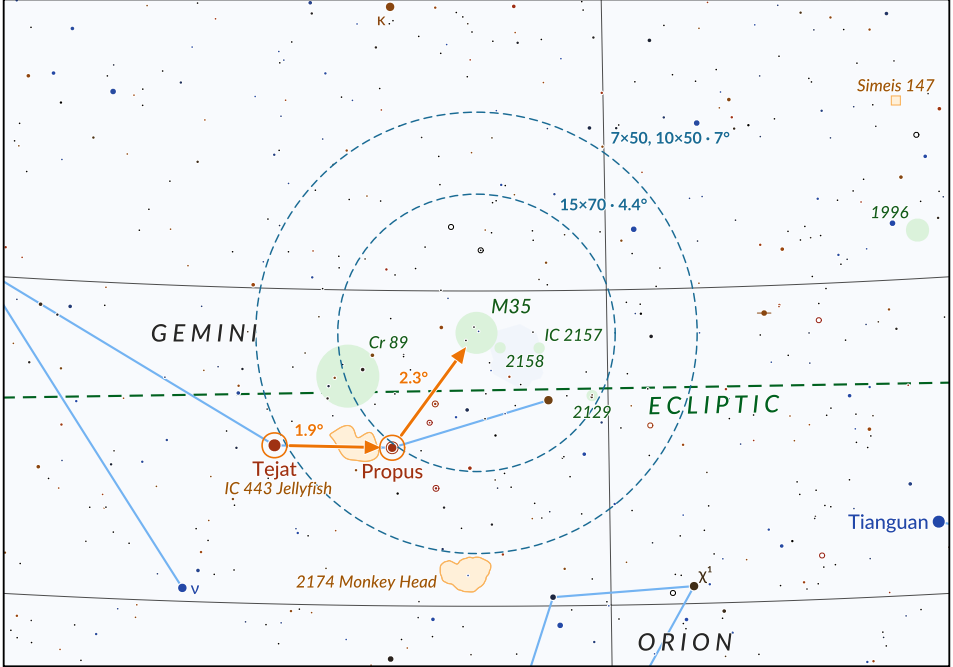
MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
6.4	20'	4,300 ly	Dec – Feb	●○○ Easy	chart 12

What you will see

Three clusters in a row in the Milky Way, 2° and 4° apart, that you tour without leaving the binoculars. M37, the richest, is a soft round patch that a 10×50 just begins to turn grainy; M36, smaller and looser, shows a dozen stars; M38, the widest, is a paler patch sprinkled with a few points. All three lie at about the same distance, 4,000 to 4,500 light-years, but M37 holds five hundred stars and M36 sixty. The whole field, with ϕ Aur and the Milky Way background, is worth the trip in itself.

How to find them

Start from Mahasim (θ Aur), the star at the south-east corner of Auriga's pentagon, opposite Capella. Drop 5° south: M37 is the round patch just east of the line from Mahasim to Elnath. From there, 4° north-west brings M36, then 2° more in the same direction, M38. In a 7×50, M36 and M38 share the same field.



MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
5.1	40'	2,800 ly	Dec – Feb	●○○ Easy	chart 25

What you will see

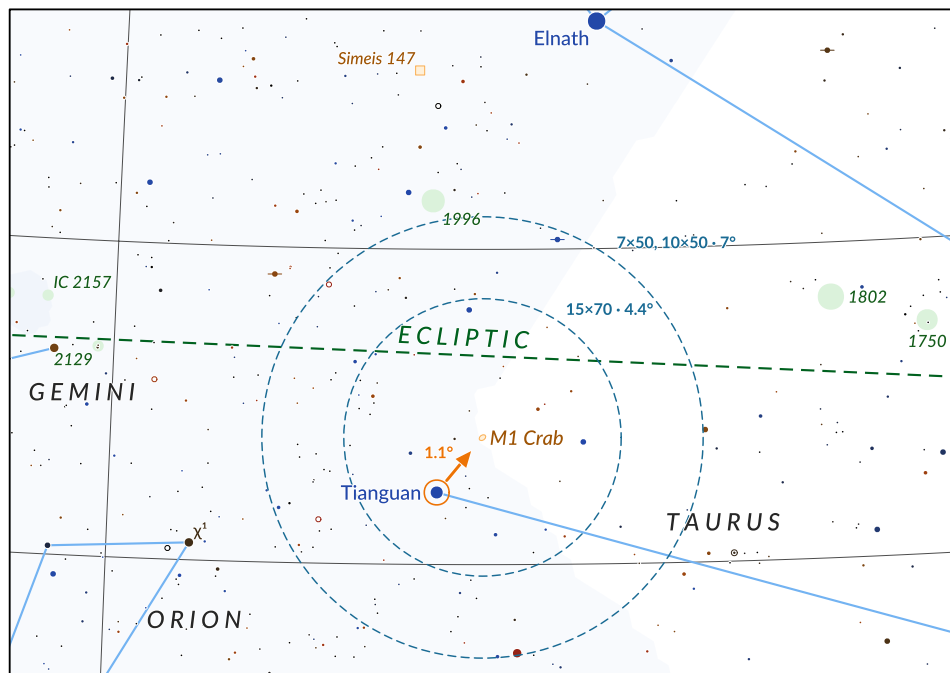
M35 is as wide as the full Moon and very bright: to the naked eye a patch is suspected at the feet of Gemini, and binoculars turn it into a swarm of magnitude-8 and 9 stars on a grainy background; a 10×50 picks out some twenty of them, many more under a dark sky. The cluster is 150 million years old and 2,800 light-years away. On its south-west edge, half a degree out, NGC 2158 forms a small hazy spot of magnitude 8.6: a cluster four times farther away and ten times older, which a 10×50 barely shows and a 7×50 not at all.

How to find it

Find Castor's foot: Tejat (μ Gem) and, 2° to its west, Propus (η Gem), the two stars that end the line of Gemini towards Orion. Put Propus on the eastern edge of the field: M35 is 2° to the north-west, plainly visible as a round patch. It lies on the way from Propus to Elnath, the tip of the Bull's northern horn, 13° farther on.

23 The Crab Nebula

Nebula • Taurus **E**



MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
8.4	7 × 5'	6,500 ly	Dec – Feb	● ● ● Hard	chart 14

What you will see

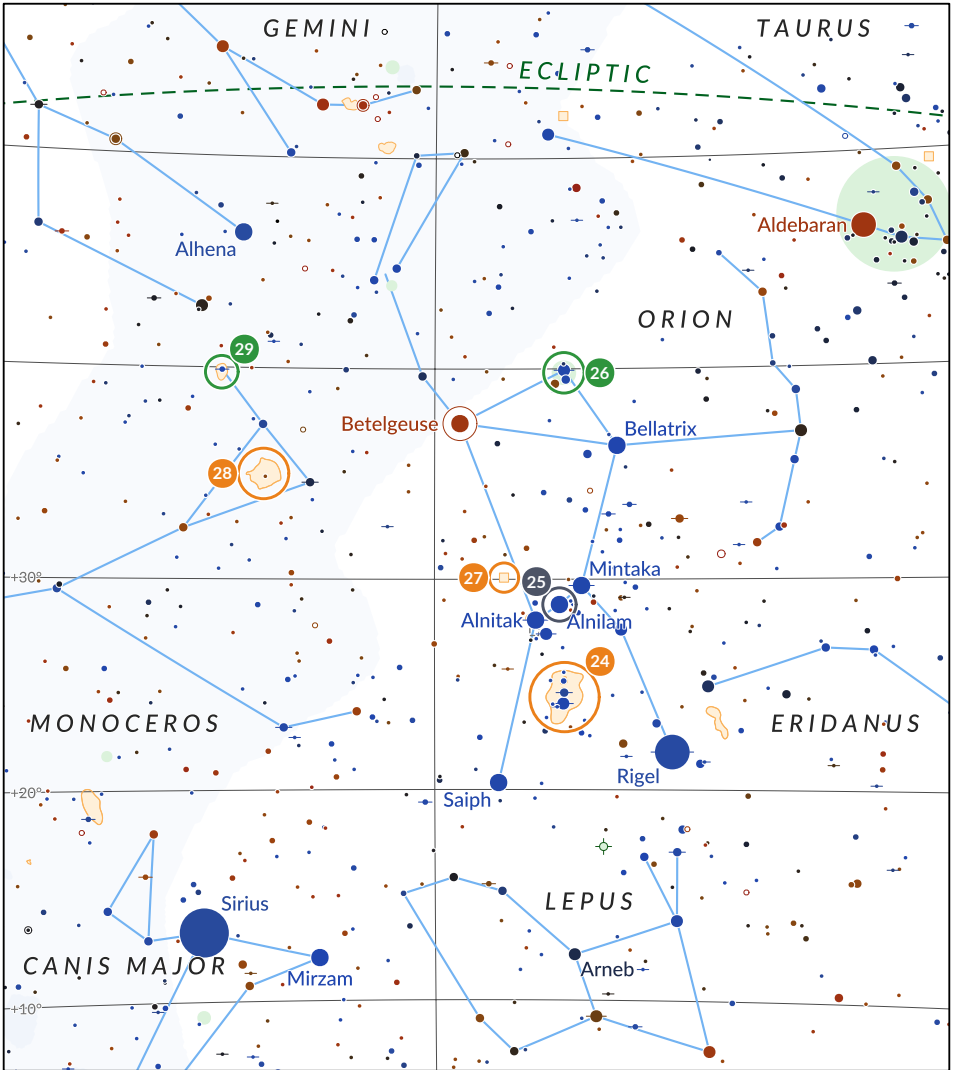
The remnant of the supernova of 1054, visible in daylight for three weeks at the time, is now a patch of magnitude 8.4 and 6': in binoculars, a hard object. In a 10×50, under a dark moonless sky, look for a very pale oval glow, barely larger than a defocused star, a degree from Tianguan; averted vision helps a lot. A 7×50 only rarely shows it. Do not look for the filaments or the crab shape: they need a large telescope. The cloud is still expanding at 1,500 km/s and, at its centre, a pulsar spins thirty times a second.

How to find it

Start from Aldebaran and follow the Bull's southern horn 15° north-east to its tip, Tianguan (ζ Tau), magnitude 3: it is the lower of the two horns, Elnath being the upper one. With Tianguan at the centre of the field, M1 lies 1.1° to the north-west, barely more than two Moon diameters, on the Elnath side. If you see nothing, wait until your eyes are fully adapted and sweep slowly.

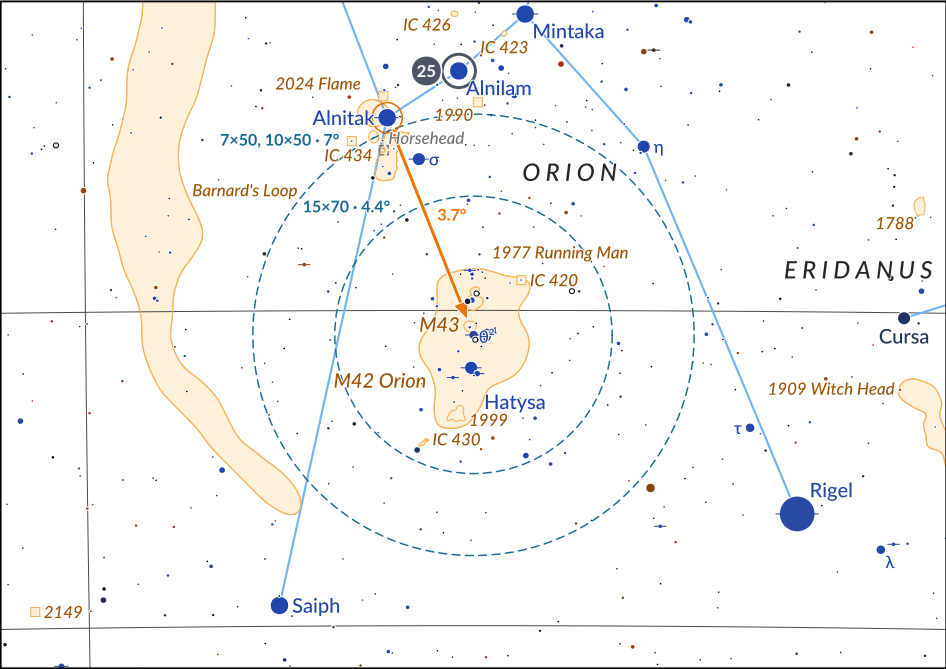
WINTER

F Orion and Monoceros



Objects on this map

- 24 The Orion Nebula
- 25 Orion's Belt and Collinder 70
- 26 Collinder 69, the λ Orionis Cluster
- 27 M78
- 28 The Rosette and its cluster NGC 2244
- 29 The Christmas Tree Cluster



MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
4.0	85 × 60'	1,350 ly	Dec – Feb	●○○ Easy	chart 16

What you will see

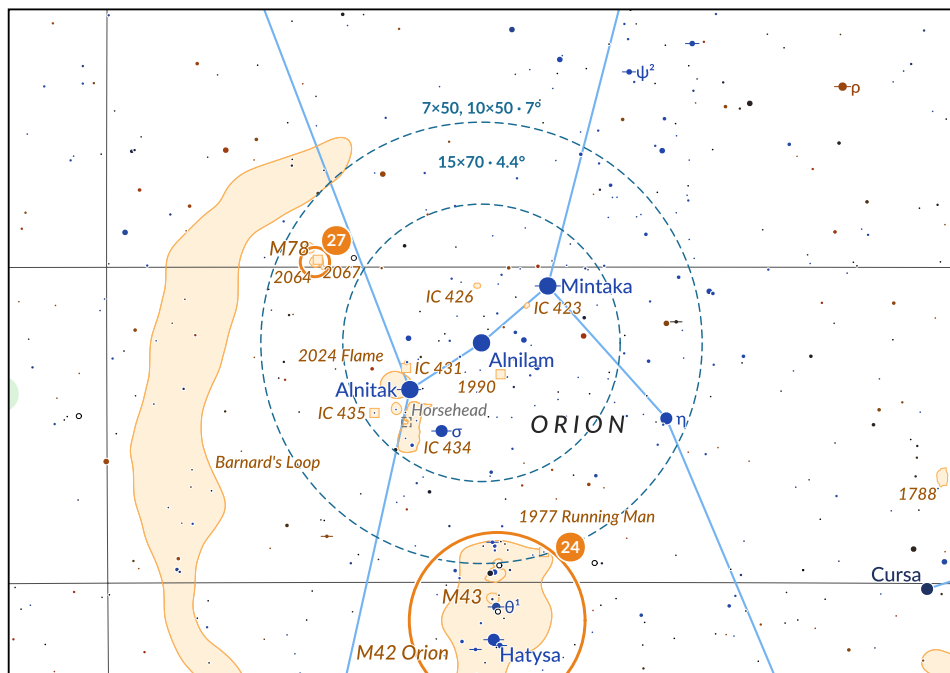
The one nebula that any binoculars show without effort: in the middle of Orion's Sword, a greenish patch, far brighter than a defocused star, with a luminous core and two wings that curl back southwards in a 10×50; under a dark sky the western wing stretches over half a degree. At the centre shines the Trapezium, θ¹ Ori, which binoculars show as a single star; θ² Ori, right beside it, is a wide pair. To the north, cut off by a dark lane, M43 is a small round patch; higher up, the cluster NGC 1981 lines up a handful of bright stars, and between the two the glow of the Running Man, NGC 1777, is barely suspected.

How to find it

Below the Belt hangs the Sword, three “stars” in a north–south line 2.5° long that the naked eye picks out easily. Put Alnitak, the eastern star of the Belt, on the northern edge of the field and drop 4° due south: the middle star of the Sword is the nebula itself, fuzzy instead of sharp. Hatysa (ι Ori), at the foot of the Sword, confirms it.

25 Orion's Belt and Collinder 70

Star field • Orion **F**



MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
1.7	3°	1,300 – 2,000 ly	Dec – Feb	●○○ Easy	chart 16

What you will see

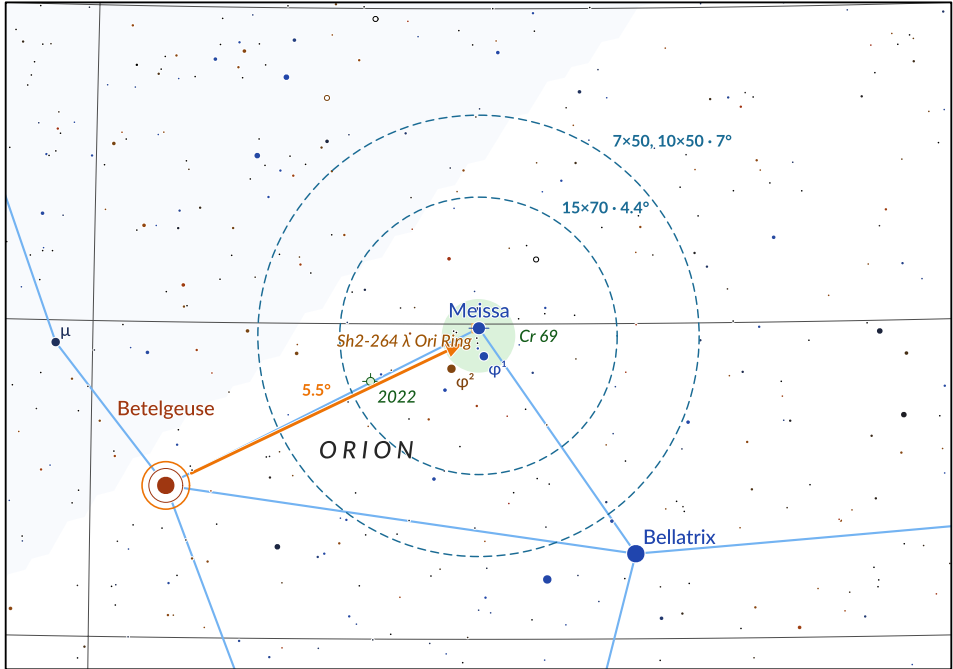
The three Belt stars, 1.4° apart, fit in any field and sit in Collinder 70, a loose cluster of a hundred stars of magnitude 5 to 8 spread over 3° : a 7×50 turns it into a swarm like no other, with a chain of stars snaking between Alnilam and Mintaka. South of Alnitak, σ Ori is a multiple star whose widest companion, $42''$ out, a 10×50 separates, and perhaps the one at $13''$ on a steady night. The Flame Nebula, against Alnitak, is barely suspected under a very dark sky; the Horsehead is out of reach. The three blue giants lie 1,300 to 2,000 light-years away.

How to find it

No path: Orion's Belt is the most recognisable line in the winter sky, three second-magnitude stars evenly spaced in the middle of the great rectangle of Betelgeuse, Bellatrix, Rigel and Saiph. Centre Alnilam, the middle one, and let your eyes settle: the stars of Collinder 70 rise out of the background one by one. σ Ori lies 1.5° to the south-east, just below Alnitak.

26 Collinder 69, the λ Orionis Cluster

Open cluster • Orion **F**



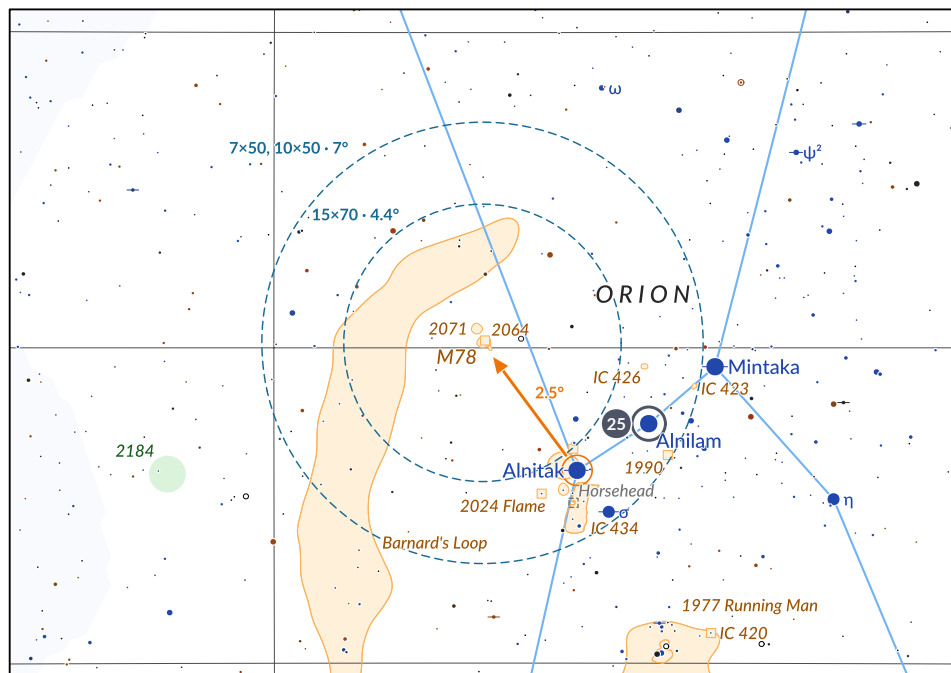
MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
2.8	70'	1,300 ly	Dec - Feb	●○○ Easy	chart 14

What you will see

Orion's head is a cluster: around Meissa (λ Ori), some twenty stars of magnitude 4 to 8 form a 1° group that a 7×50 frames perfectly, with ϕ^1 and ϕ^2 Ori to the south like two eyes. Meissa itself is double, but its companion $4''$ away is out of reach. The whole is young, a few million years, 1,300 light-years away; the great ring of gas Sh2-264, 6° across, that the map draws around it shows only in long-exposure photographs. This is a cluster you look at for the pleasure of a rich field, not for a particular object.

How to find it

Betelgeuse marks Orion's eastern shoulder, Bellatrix the western one; the head is the small triangle of Meissa, ϕ^1 and ϕ^2 Ori, 5.5° north-west of Betelgeuse, visible to the naked eye under an average sky. Put Betelgeuse on the south-east edge of the field and move up one field: Meissa is the brightest star of the group. The cluster is what surrounds it, not a separate object.



MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
8.0	14'	1,600 ly	Dec – Feb	●●● Hard	chart 14

What you will see

The brightest reflection nebula in the sky is still a shy object in binoculars: a small round patch of magnitude 8, rather like a distant comet, with two magnitude-10 stars buried in it that a 10×50 does not separate. It takes a dark sky, no Moon and averted vision; a 7×50 shows it only exceptionally. What you see is the dust of the Orion cloud lit by those two hot stars, 1,600 light-years away, in the same region as Barnard's Loop, invisible here.

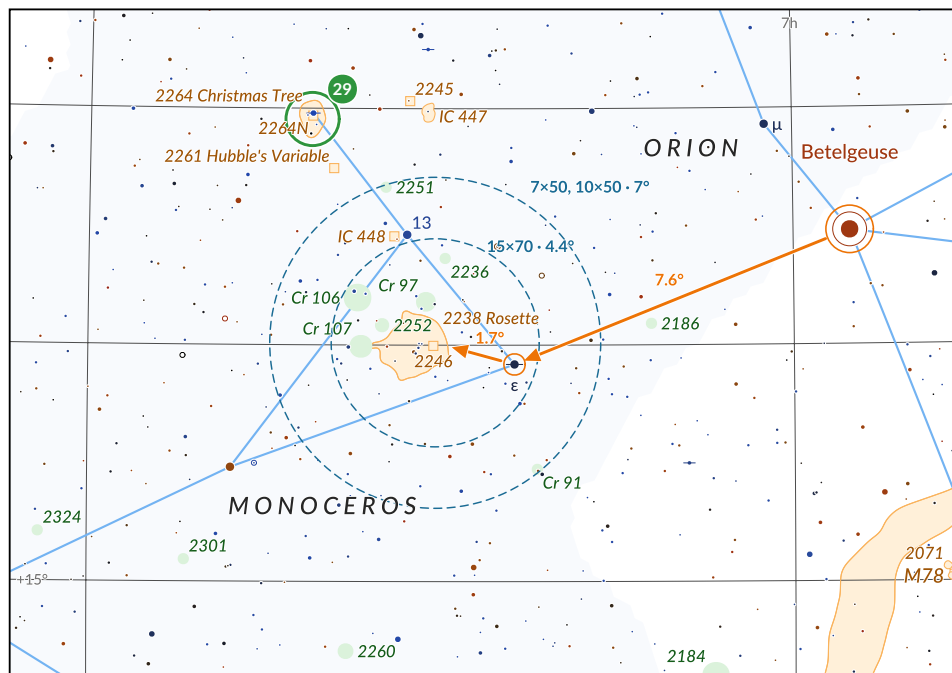
How to find it

Centre Alnitak, the eastern star of the Belt, and move 2.5° north-east, half a field, towards Betelgeuse: M78 lies just east of the line from Alnitak to Betelgeuse, a quarter of the way along. Under a dark sky the glow of the Flame Nebula, hugging Alnitak, marks the start. If a fuzzy star appears where the map shows none, that is it.

28 The Rosette and its cluster NGC 2244

Clusters and nebulae · Monoceros

F



MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
—	80'	5,200 ly	Dec – Feb	●●○ Medium	chart 25

What you will see

The cluster first: NGC 2244 is a small rectangle of six stars of magnitude 6 to 8, 20' long, easy in any binoculars; the yellow star 12 Mon, magnitude 5.9, which seems to belong to it, actually lies in front. The Rosette, a ring of gas more than a degree across around it, is another matter: under a very dark sky a 10×50 shows a pale halo that makes the background a little less dark around the rectangle, mostly with averted vision; from town, nothing. The whole lies 5,200 light-years away, and it is the wind of the cluster's stars that hollowed out the central hole.

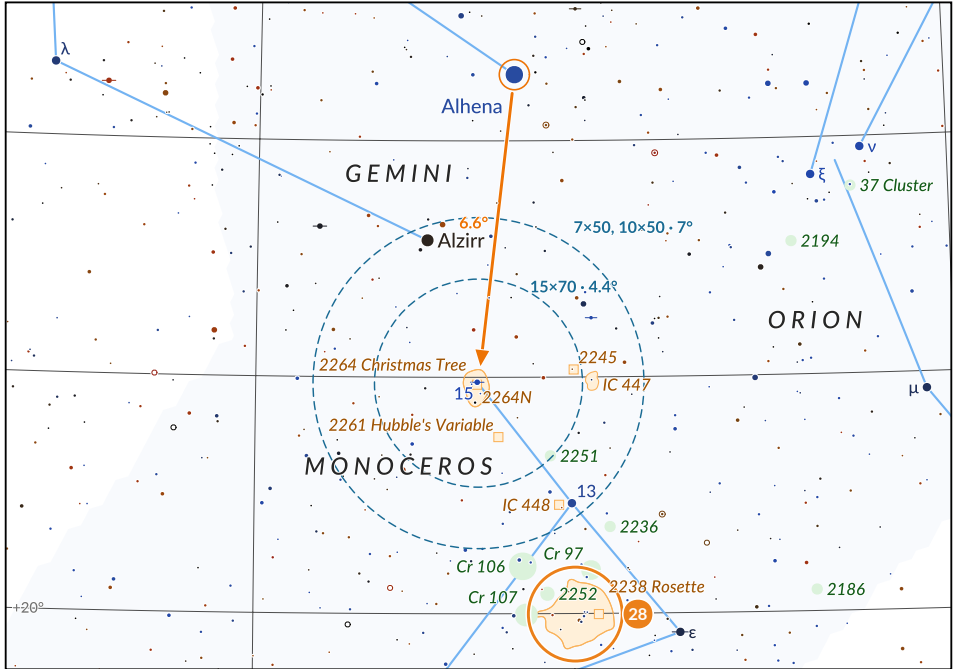
How to find them

From Betelgeuse, go 7.5° east, a little more than a 7×50 field: ε Mon, magnitude 4.3, is the brightest star of this empty corner of Monoceros. From there, 2° farther east: the small rectangle of stars of NGC 2244 sits at the centre of the Rosette. 13 Mon, 3.5° north-east of ε Mon, confirms that you are in the right place.

29 The Christmas Tree Cluster

Open cluster • Monoceros

F



MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
3.9	20'	2,500 ly	Jan – Mar	●○○ Easy	chart 25

What you will see

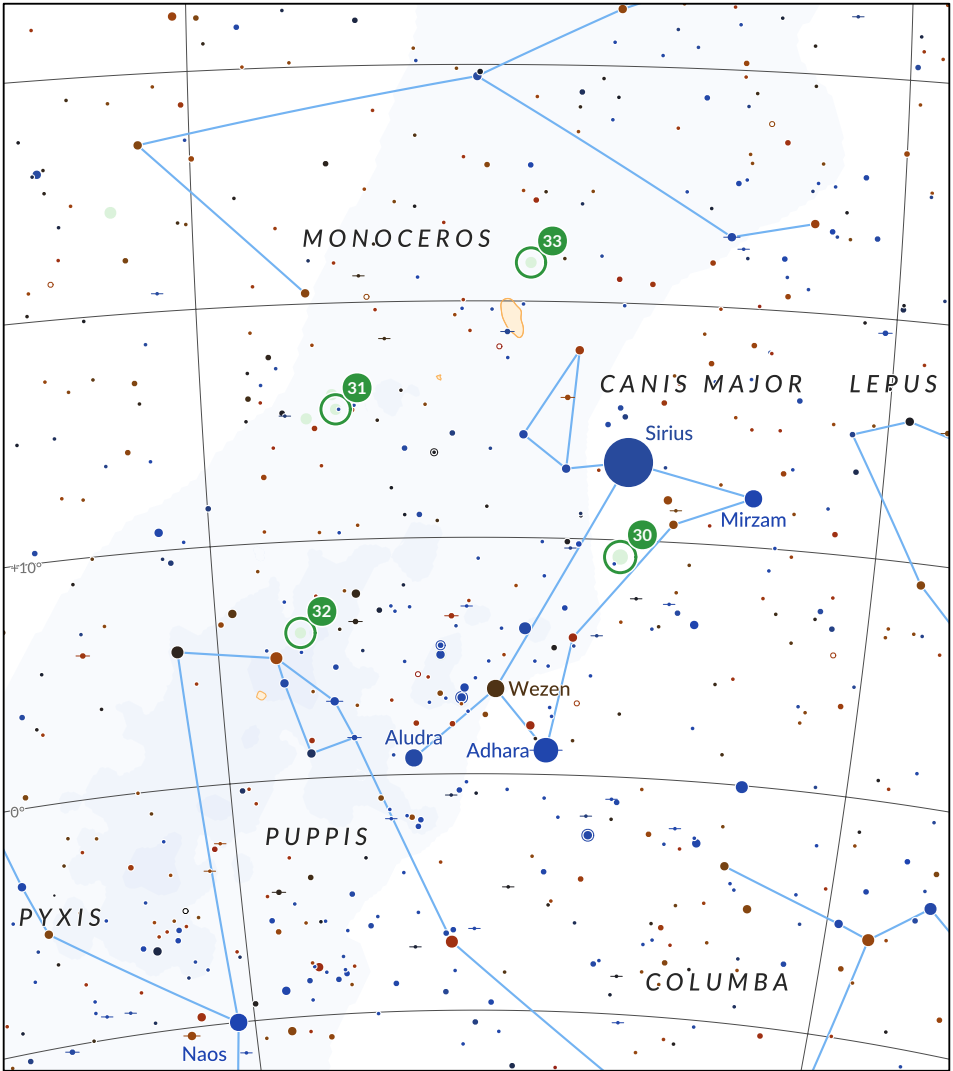
A fir tree upside down: S Mon, magnitude 4.7, at the foot of the tree, which is to the north, and some twenty stars of magnitude 7 to 9 that draw the triangle over 25' southwards, tip down. A 7×50 shows the triangle, a 10×50 fills it with stars. S Mon is a variable and double star, blue-white, whose companion 3" away is out of reach. The Cone Nebula, at the tip, and the nebulosity that wraps the cluster in photographs stay invisible. The cluster is very young, a few million years, 2,500 light-years away.

How to find it

Alhena (γ Gem), Pollux's foot, magnitude 1.9, shines north of the line from Betelgeuse to Procyon. Centre it and drop 6.5° due south, one field: S Mon, the brightest star of this sparse field, sits at the top of the cluster. Another landmark: NGC 2264 lies a little west of the midpoint of the Betelgeuse – Procyon line, 3.5° north of it.

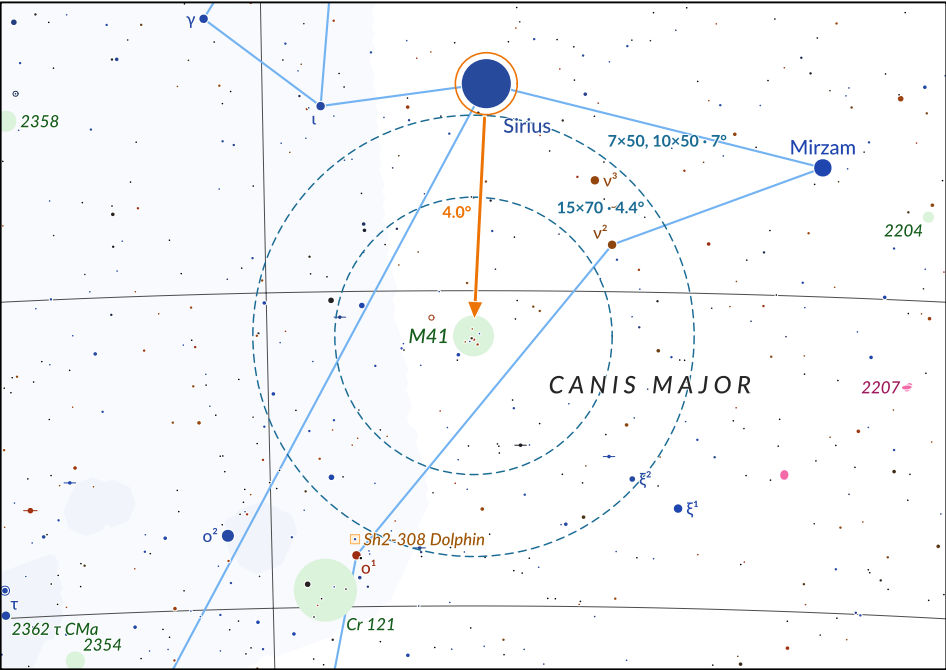
WINTER

G Canis Major and Puppis



Objects on this map

- | | |
|----------------|--------|
| 30 M41 | 32 M93 |
| 31 M46 and M47 | 33 M50 |



MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
4.5	39'	2,300 ly	Jan – Mar	●○○ Easy	chart 27

What you will see

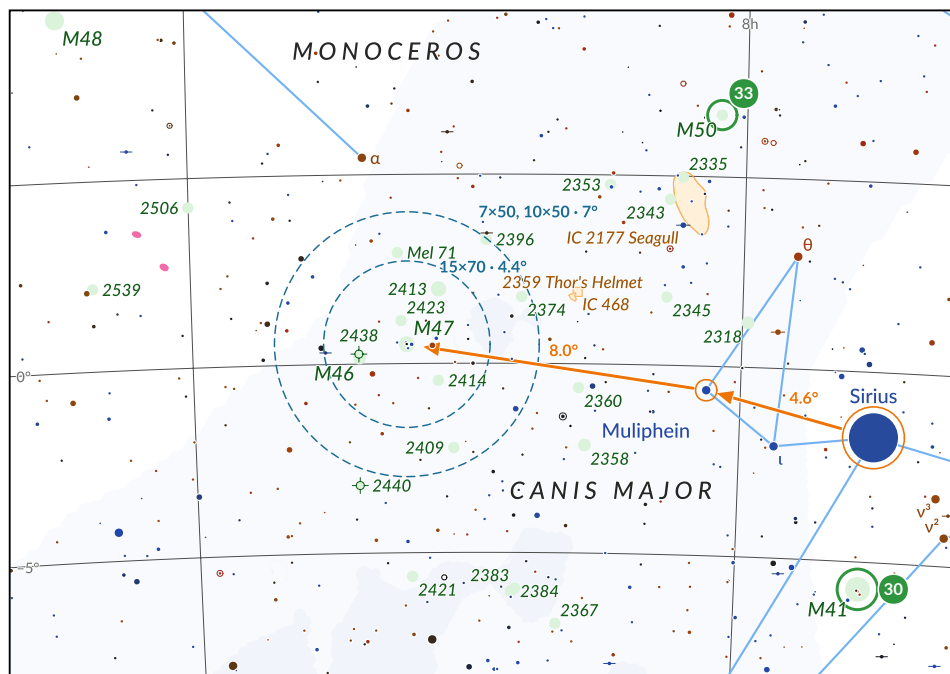
A cluster as wide as the full Moon, which Aristotle may already have noted as a naked-eye patch: in binoculars, some thirty stars of magnitude 7 to 9 on a luminous background, loose enough for a 10×50 to separate nearly all of them, with an orange star, a giant, near the centre. It lies 2,300 light-years away and is about 200 million years old. Its ease makes it a good test of the sky: if it shows to the naked eye below Sirius, the night is a good one.

How to find it

Sirius, the brightest star in the sky, is the simplest starting point in this guide. Put it on the northern edge of the field: M41 lies 4° due south, in the same field, a round patch towards the bottom, in the direction of Wezen and Adhara, the stars of the Dog's hindquarters.

31 M46 and M47

Clusters · Puppis **G**



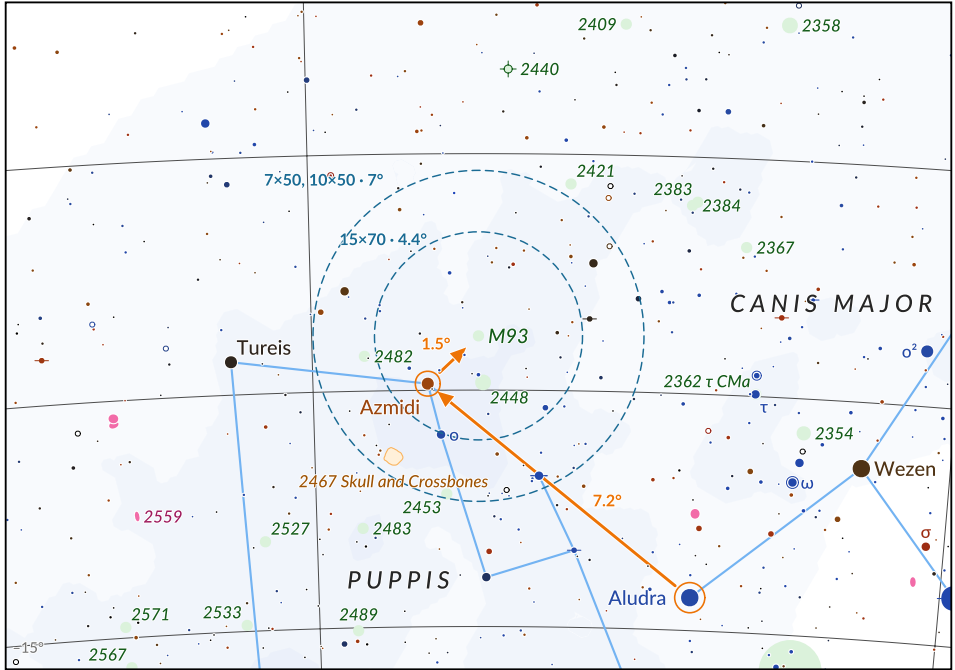
MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
4.4	25'	1,600 ly	Jan – Mar	●○○ Easy	chart 26

What you will see

Two clusters 1.3° apart, in the same field, and as different as can be. M47, to the west, is bright and coarse: some twenty stars of magnitude 6 to 9 that a 7×50 already separates, 1,600 light-years away. M46, to the east, is a ball of soft, even light: five hundred stars of magnitude 10 to 13, 5,000 light-years away, which a 10×50 just begins to turn grainy under a dark sky. The planetary nebula NGC 2438, sitting on M46, is out of reach. Half a degree north of M47, NGC 2423 adds a small pale patch. The trio is one of the finest fields in Puppis.

How to find them

From Sirius, go 4.5° east to Muliphein (γ CMA), magnitude 4.1; then carry on 8° in the same direction, a little more than a 7×50 field: M47 appears as a handful of bright stars, M46 just east of it as a round cloud. In all, the two clusters lie 13° due east of Sirius, two binocular fields.



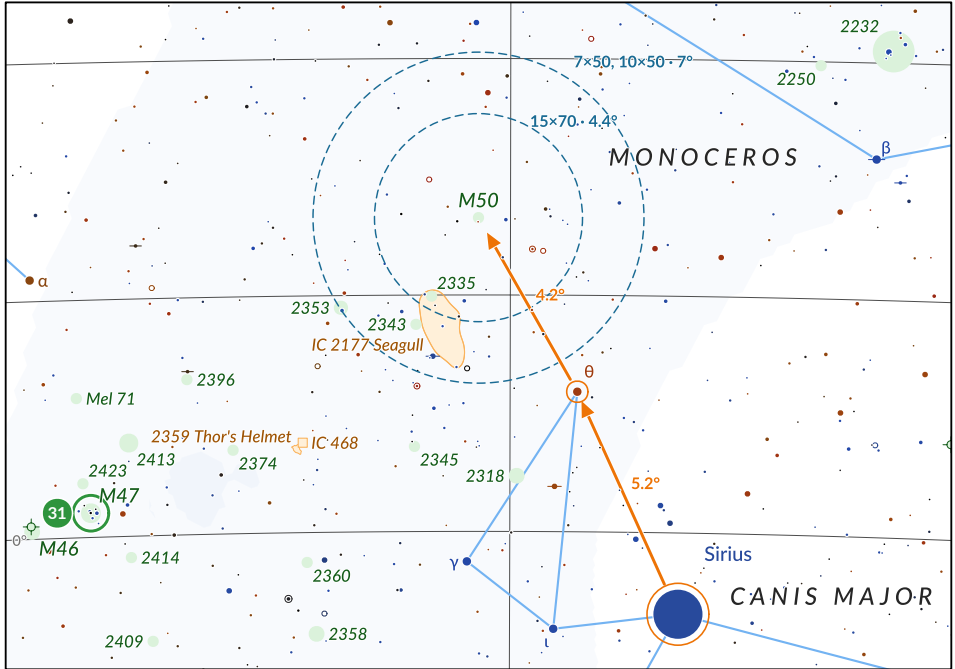
MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
6.2	10'	3,600 ly	Jan – Mar	●●○ Medium	chart 26

What you will see

A small compact cluster of 10', shaped like a wedge or an arrowhead, with two orange magnitude-8 stars at the brightest corner: a 7×50 shows an elongated patch, a 10×50 picks out a dozen stars on a grainy background. It is low from mid-northern latitudes, 25° above the horizon at best, which dims it; look for it when it crosses the meridian, around 10 pm in February. The cluster is 100 million years old and lies 3,600 light-years away, in a stretch of the Milky Way rich in small clusters that binoculars only brush.

How to find it

Start from the Dog's tail: Aludra (η CMa), the last bright star to the south-east. Climb 7° north-east, one 7×50 field: Azmidi (ξ Pup), magnitude 3.3, is the brightest star of this corner of Puppis. M93 lies 1.5° north-west of it, in the same field, a small elongated hazy patch.



MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
5.9	14'	3,000 ly	Jan – Mar	●○○ Easy	chart 27

What you will see

A medium-sized cluster, 15', heart- or diamond-shaped, which stands out well against a sparse background: a plainly visible hazy patch in a 7×50, a dozen stars of magnitude 8 and 9 in a 10×50, one of them red on the southern edge. It lies 3,000 light-years away, in a part of Monoceros where the winter Milky Way stays faint. Not a showpiece, but an easy stop on the way from Sirius to the Rosette and Procyon, through a region nobody looks at.

How to find it

From Sirius, go 5° north-east to θ CMa, magnitude 4.1, the star at the top of the Dog's head; from there, 4° more to the north-east, in the same direction: M50 is the round patch at the centre of a field with no bright star. In all, 9° from Sirius, a field and a quarter, a third of the way along the line from Sirius to Procyon.

CHAPTER 3

Spring

March to May

In spring the Big Dipper rides overhead and the Milky Way lies along the horizon: we look out of our Galaxy, towards Leo, Virgo and Canes Venatici, where the galaxies crowd. For binoculars this is the most demanding season. Only the brightest show, as small hazy smudges, and they need a truly dark sky: far from towns, no Moon, after twenty minutes in the dark. But spring has its easy objects too: the Beehive and M67 in Cancer, still high early in the evening, the Coma star cluster, M3 halfway between Arcturus and Cor Caroli, and Mizar, the most famous of doubles. In May the nights shorten and twilight lingers; the first summer clusters, M13 and M5, are already rising in the east after midnight. Start early, in the west, before Cancer sets.

H Ursa Major, Canes Venatici and Coma Berenices

- 34 Mizar and Alcor
- 35 M81 and M82
- 36 M51 and M101
- 37 M3
- 38 La Superba, garnet star of Canes Venatici
- 39 The Coma Star Cluster

I Cancer, Hydra and Leo

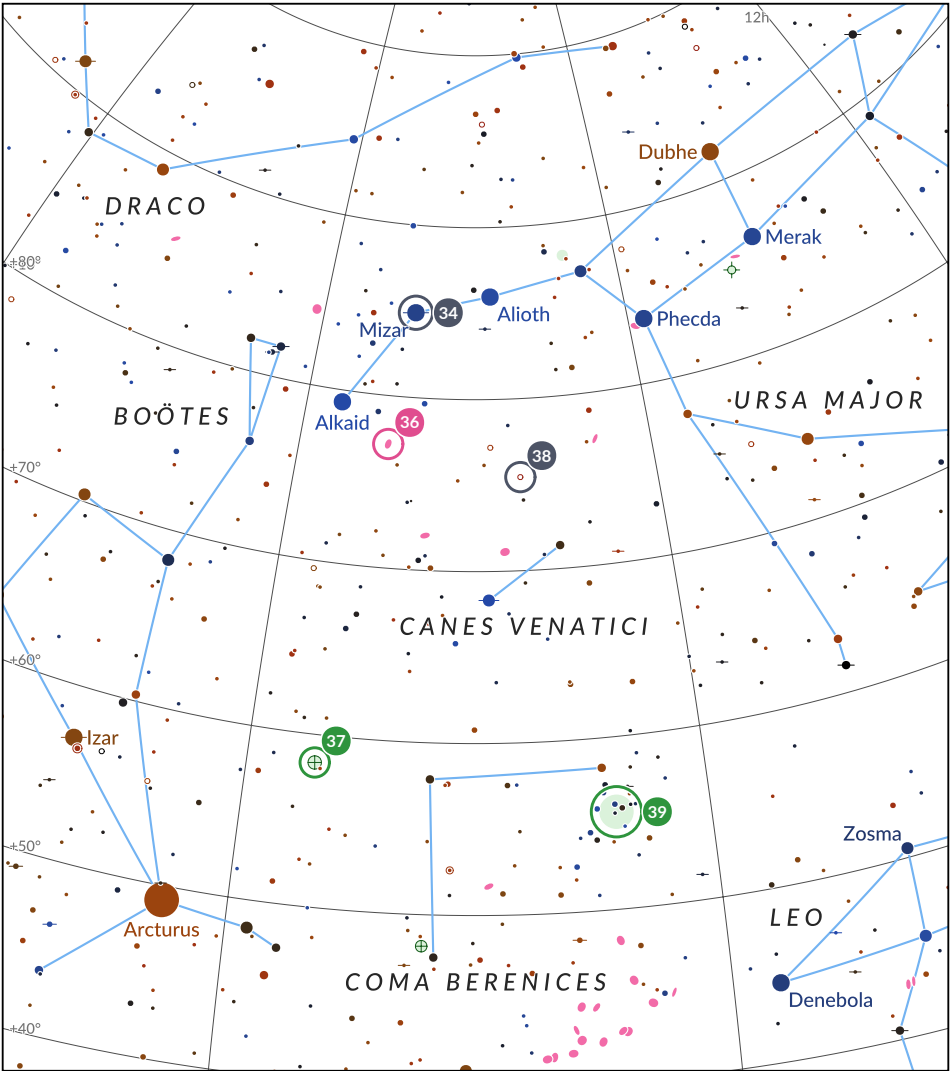
- 40 The Beehive, M44
- 41 M67
- 42 M48
- 43 The Leo Triplet

J Virgo and Corvus

- 44 The Sombrero Galaxy
- 45 M49 and M87, in heart of Virgo Cluster

SPRING

Ursa Major, Canes Venatici and Coma Berenices



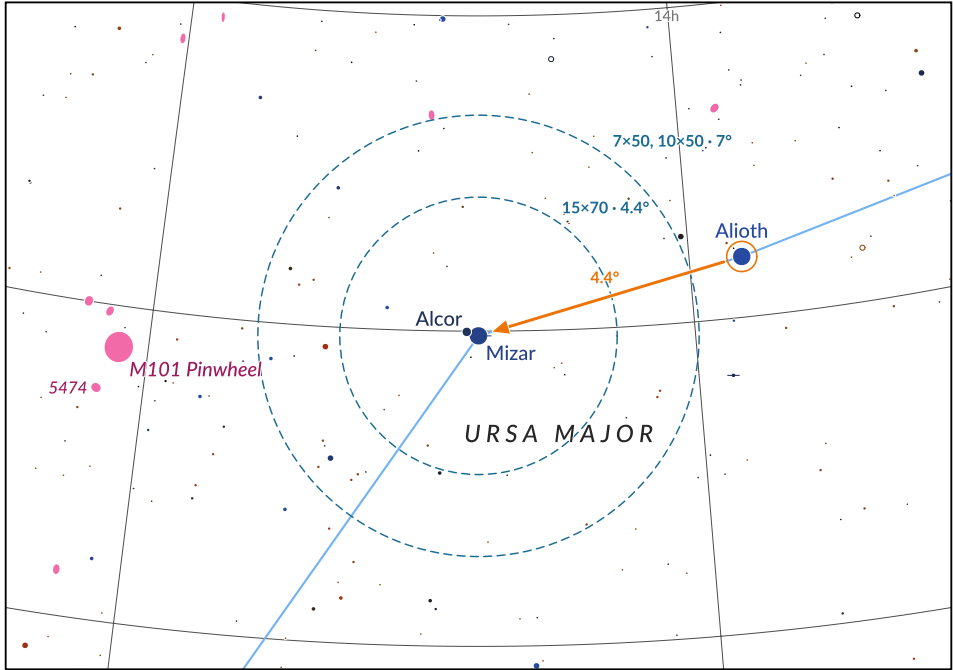
Objects on this map

- 34 Mizar and Alcor
- 35 M81 and M82
- 36 M51 and M101
- 37 M3
- 38 La Superba, the garnet star of Canes Venatici
- 39 The Coma Star Cluster

34 Mizar and Alcor

Double star • Ursa Major

H



MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
2.2 and 4.0	12' apart	85 ly	Apr – Jun	●○○ Easy	chart 43

What you will see

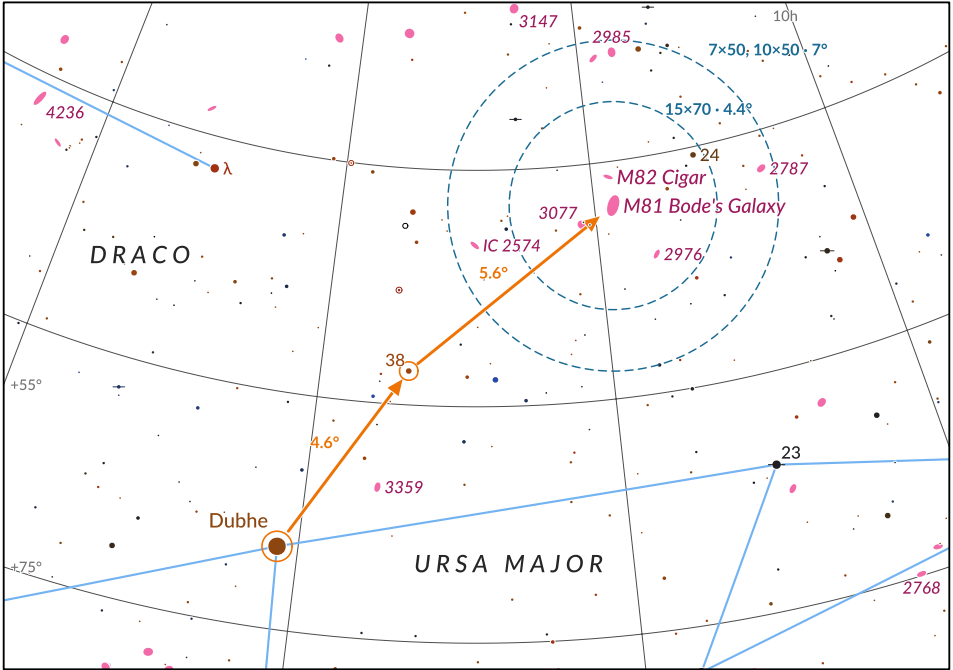
Mizar, at the bend of the Big Dipper's handle, and Alcor, its small companion 12' away: splitting them with the naked eye was the eyesight test of the ancients. In binoculars the pair leaps out, white and crisp, with between them a magnitude-8 star once named Sidus Ludoviciana. Mizar's true companion, only 14" away, needs a telescope. Alcor and Mizar are genuinely bound, 85 light-years away, and each is itself a multiple star for the spectroscopist: six stars in all in this small patch of sky.

How to find them

Impossible to miss: it is the second star of the Big Dipper's handle counting from the end, Alkaid. Aim at Alioth, the handle star nearest the bowl, and slide a small field, 4°, east, that is to the left with north up. Alcor stands out just north-east of Mizar, less than half a Moon's width away.

35 M81 and M82

Galaxies · Ursa Major **H**



MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
6.9	27 × 14'	12 million ly	Feb – Apr	●●○ Medium	chart 31

What you will see

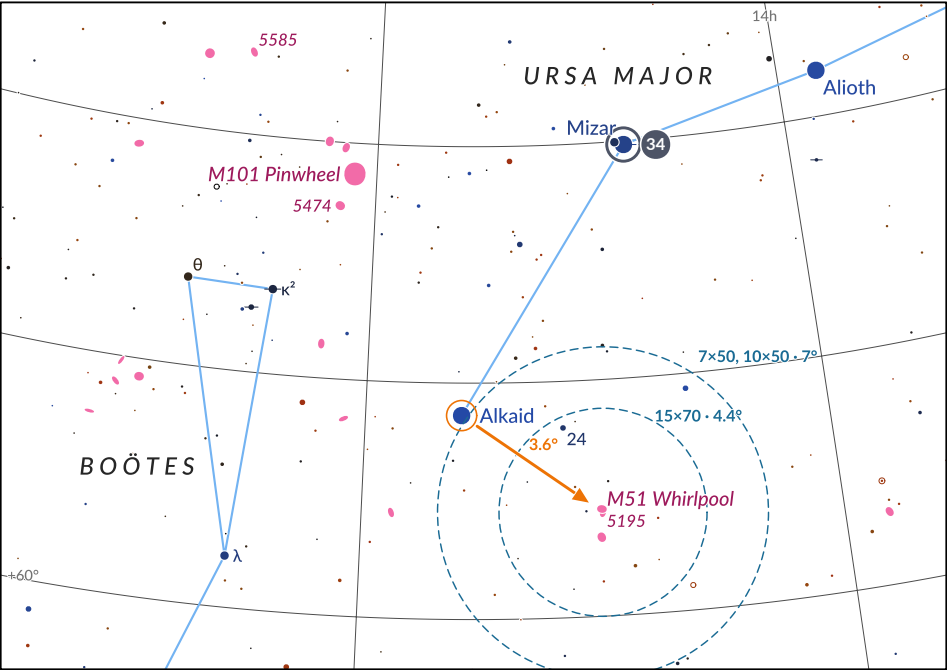
In one field, two galaxies half a degree apart, 12 million light-years away: M81, a milky oval with a brighter heart, and M82 to the north, a thin, fainter spindle like a pencil stroke. A 10×50 shows both as soon as the sky is dark; a 7×50 just hints at them; a 15×70 on a tripod makes them obvious, M82 a crisp spindle. They are the most accessible galaxies for binoculars after Andromeda and Triangulum, and the pair is circumpolar: visible all year, best in spring, when the Big Dipper is overhead.

How to find them

Extend the bowl's diagonal from Phecda through Dubhe by the same length, 10°, a field and a half to the north-west. On the way, one field past Dubhe, pass 38 UMa, a magnitude-5 star; M81 is another 6° on, 2° east of 24 UMa, the brightest star nearby. Look for the small oval patch, then the streak of M82 just above it.

36 M51 and M101

Galaxies • Canes Venatici **H**



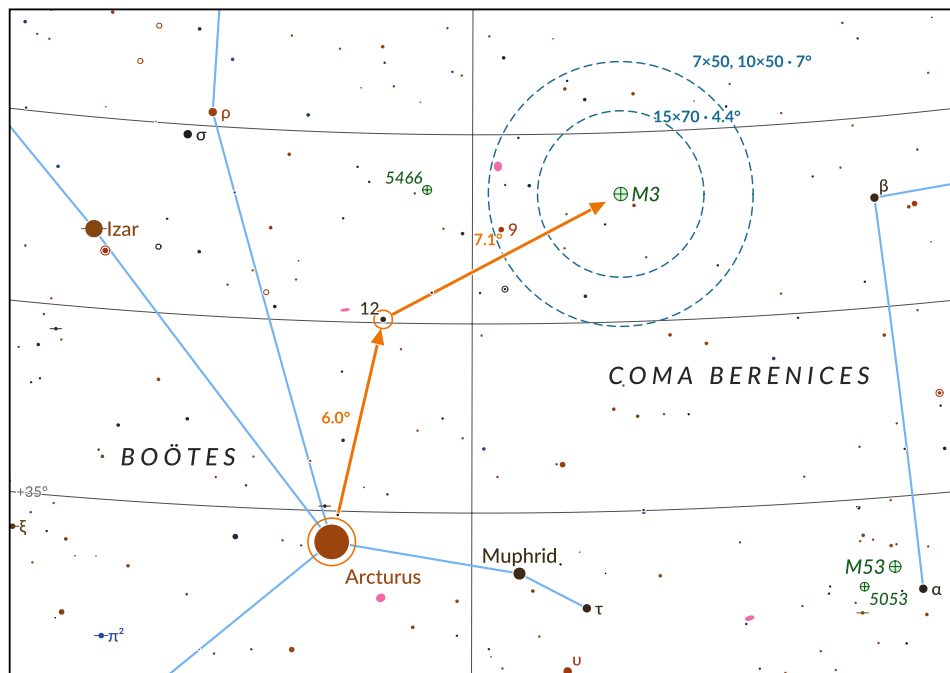
MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
8.4	11 × 7'	25 million ly	Apr – Jun	●●● Hard	chart 43

What you will see

Two face-on spirals, and two challenges. M51, the Whirlpool, is the easier: under a dark sky a 10×50 shows a small round hazy spot, barely brighter at the centre; its companion NGC 5195, touching it on the north, only shows in a 15×70 on a tripod, as a bump. M101, the Pinwheel, is wider than the full Moon but its light is thinly spread: it takes a mountain sky, a well adapted eye and averted vision to catch its pale halo. Expect no spiral arms: in binoculars these are ghost galaxies, and seeing them at all is a victory.

How to find them

For M51, start from Alkaid at the tip of the Big Dipper's handle and drop 3.6° south-west, half a field, to the hazy spot. For M101, go back to Mizar and slide 6° east, a full field: the galaxy makes a near-equilateral triangle with Mizar and Alkaid, on the eastern side.



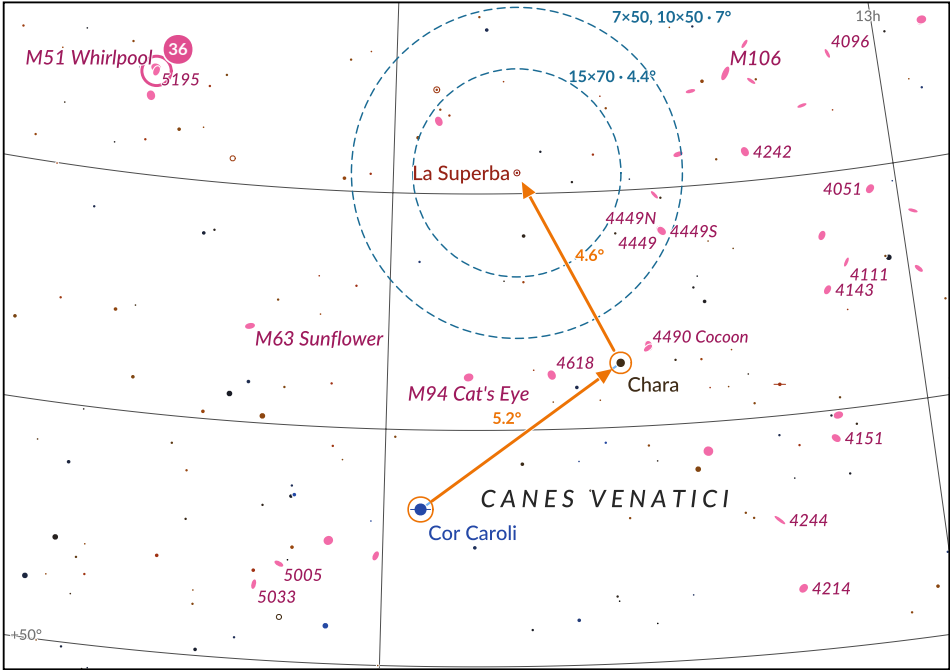
MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
6.4	16'	34,000 ly	Apr – Jun	●●○ Medium	chart 44

What you will see

Half a million stars packed into a ball, 34,000 light-years away: in binoculars M3 is a fuzzy star of magnitude 6 that refuses to come into focus. A 10×50 shows a small milky disc about 5' across, clearly brighter at the centre, with an edge that fades away; no star is resolved. It is one of the three great globular clusters of the spring and summer sky, with M13 and M5, and to many the finest of the three in a telescope.

How to find it

M3 lies halfway between Arcturus and Cor Caroli, slightly north of the line. Start from Arcturus, climb 6° north, one field, to 12 Boo, a magnitude-5 star; keep on 7° north-west: the small fuzzy star sits alone in a sparse field, and gives itself away by never coming to focus.



MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
4.8–6.3	—	700 to 1,000 ly	Apr – Jun	●○○ Easy	chart 43

What you will see

One of the reddest stars in the sky, christened 'La Superba' by Father Secchi, who marvelled at its spectrum. It is a dying carbon giant whose sooty atmosphere soaks up the blue: in binoculars its deep orange, almost ruby colour strikes all the more when compared with the white stars nearby. A variable, it swings between magnitudes 4.8 and 6.3 in about 160 days, so it always stays within reach of a 7×50. Look at it slightly aside, then straight on: the colour changes with the way you look.

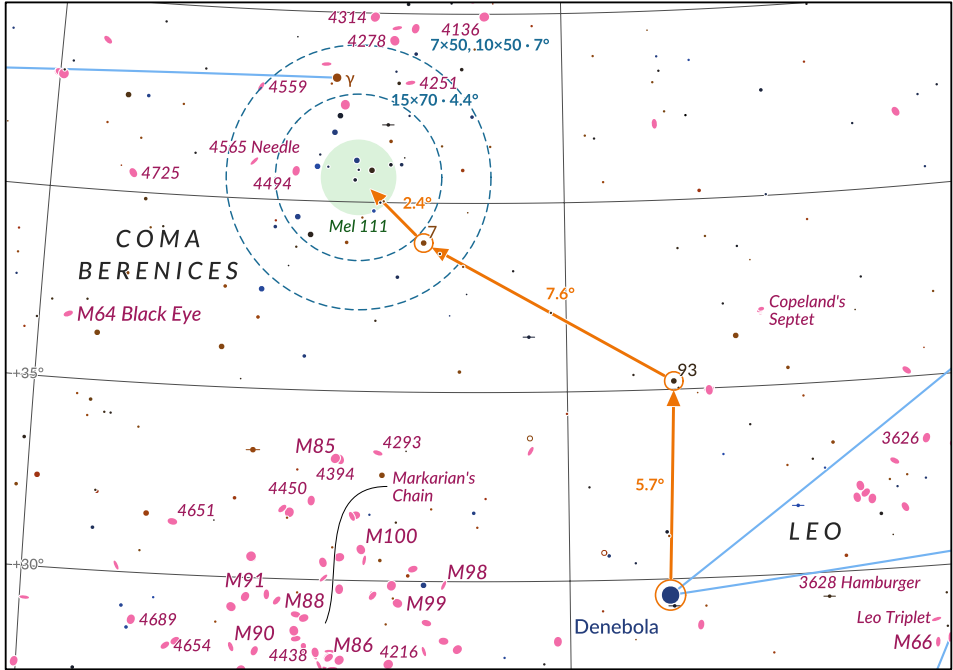
How to find it

Start from Cor Caroli, the main star of Canes Venatici, below the Big Dipper's handle. One field west, 5°, brings you to Chara, its magnitude-4 neighbour; from there climb 4.5° north-east. La Superba is the distinctly red star of the field, somewhat isolated, with nothing bright around it.

39 The Coma Star Cluster

Open cluster • Coma Berenices

H



MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
1.8	2.0°	280 ly	Mar – May	●○○ Easy	chart 45

What you will see

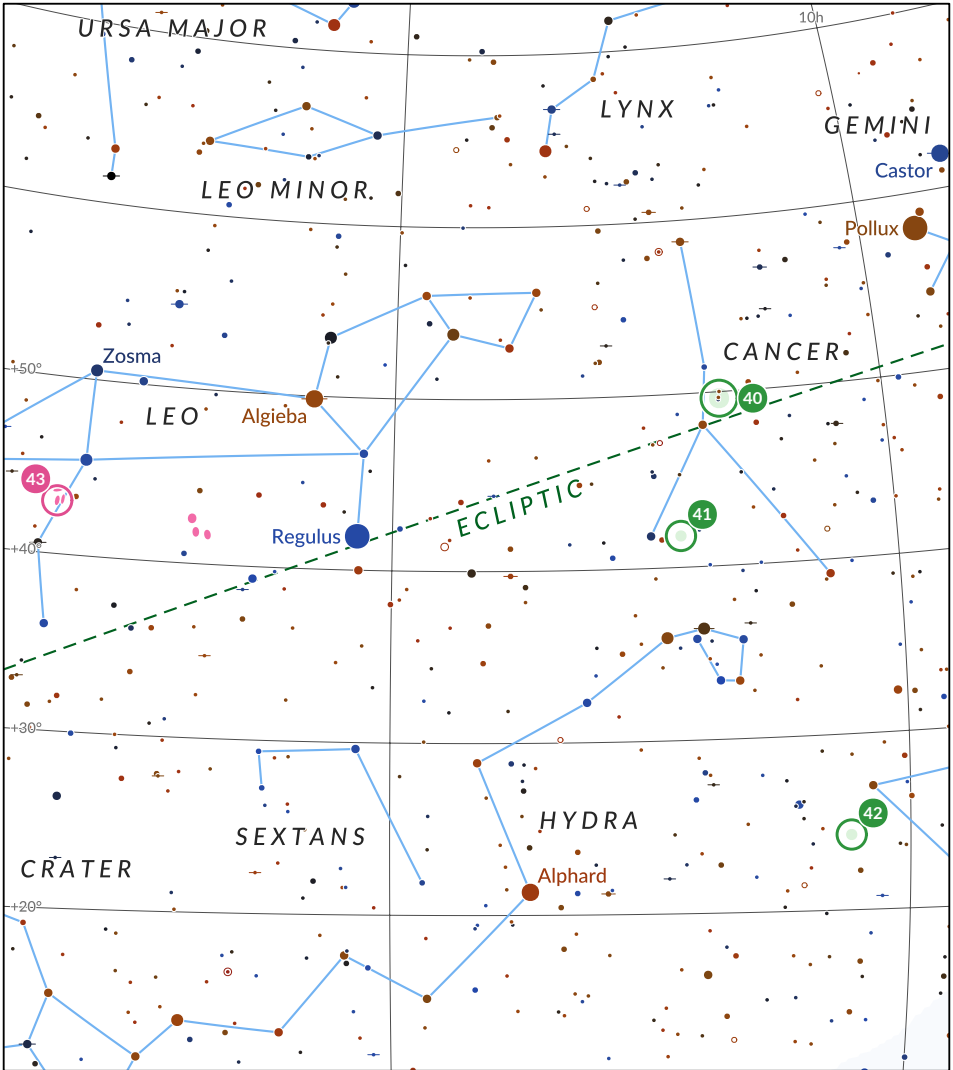
A swarm of some thirty stars of magnitude 5 to 7, spread over 5°, tracing an open V: to the naked eye a diffuse glow below the Big Dipper's handle, the 'hair' that Queen Berenice is said to have sacrificed. The cluster is so wide that it nearly fills the field of a 7×50 or a 10×50, the only instruments that show it whole; a 15×70 frames only part of it. In a telescope it vanishes. It is one of the nearest clusters, 280 light-years away, twice as far as the Hyades.

How to find it

Start from Denebola, the Lion's tail. Climb 5.5° north to 93 Leo, a magnitude-4.5 star, then one field, 7.5°, north-east to 7 Com; the swarm begins there and spreads 5° north-east around the star γ Com. Under a country sky you can see it directly with the naked eye, halfway between Denebola and Cor Caroli.

SPRING

I Cancer, Hydra and Leo



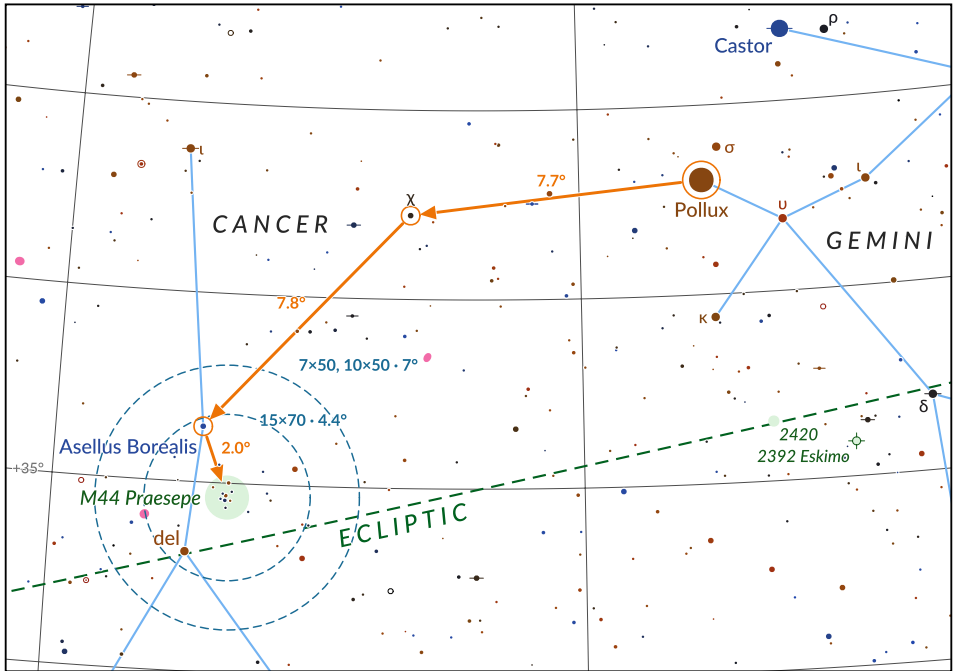
Objects on this map

- 40 The Beehive, M44
- 41 M67

- 42 M48
- 43 The Leo Triplet

40 The Beehive, M44

Open cluster • Cancer



MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
3.1	70'	600 ly	Feb – Apr	●○○ Easy	chart 24

What you will see

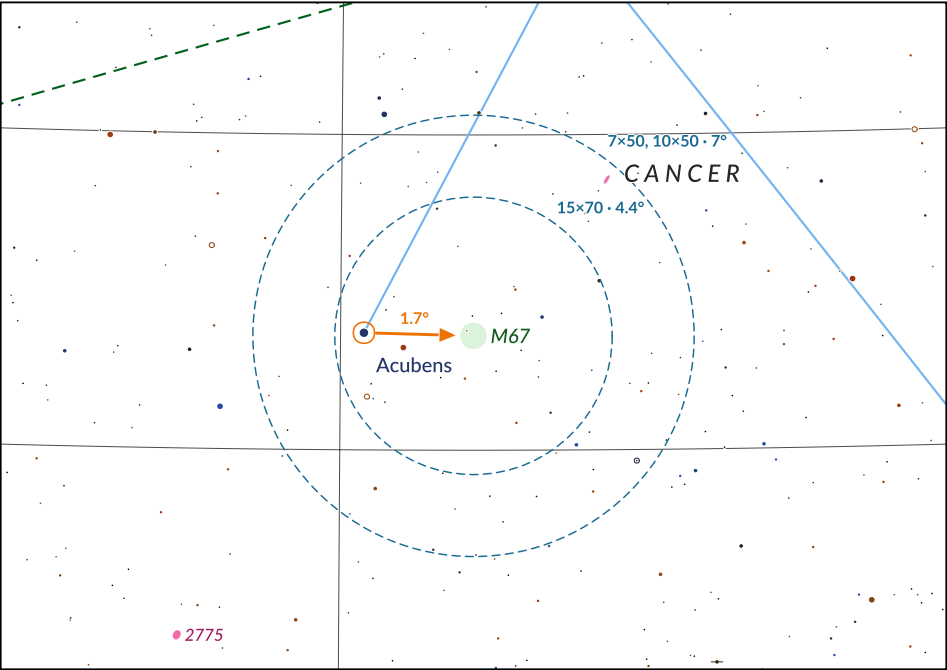
To the ancients it was a cloud, the 'Manger' where two donkeys feed, the stars Asellus Borealis and Australis; Galileo counted forty stars in it. In binoculars the cloud resolves at once into some forty stars of magnitude 6 to 9 over more than a degree, with a small V at the centre and several tight pairs. It fits easily in the field of a 7×50 or a 10×50, with space around it; a 15×70 on a tripod frames it tighter and adds dozens of stars. At 600 light-years it is close, and 600 million years old, the same age and motion as the Hyades: the two clusters may have been born together.

How to find it

The Beehive sits in the middle of Cancer, halfway from Pollux to Regulus; under a moonless sky the naked eye sees it as a pale patch. In binoculars, start from Pollux: a good field, 7.5°, east to χ Cnc, a magnitude-5 star; another 8° south-east to Asellus Borealis, then 2° south: the cluster is there, between the two Donkeys.

41 M67

Open cluster • Cancer I



MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
7.2	25'	2,700 ly	Feb – Apr	●●○ Medium	chart 24

What you will see

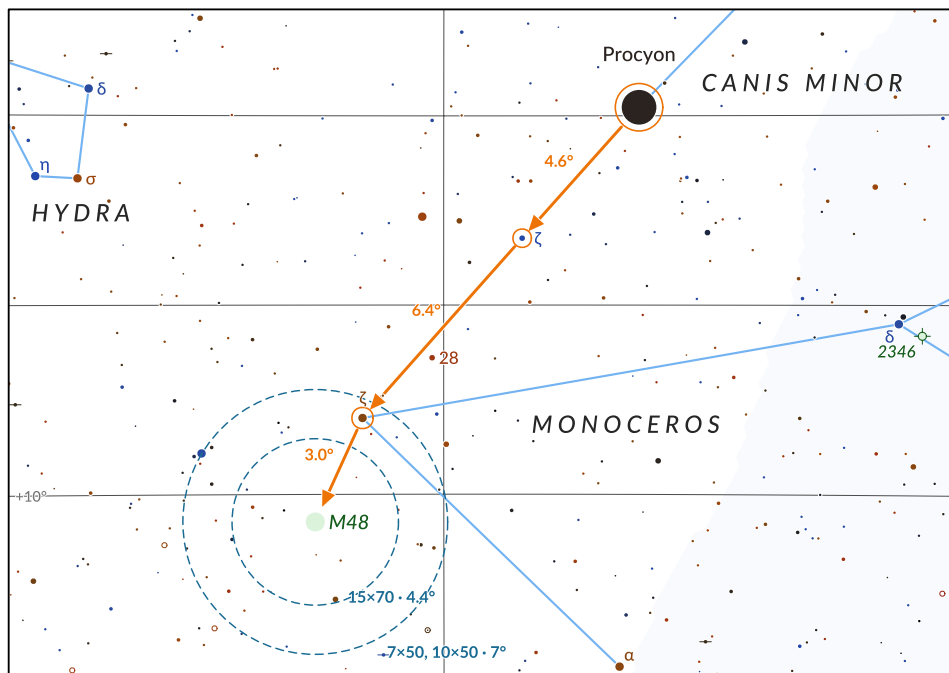
A modest but remarkable open cluster: one of the oldest known, close to 4 billion years, the age of the Sun, while most clusters scatter after a few hundred million years. In binoculars it is a round hazy patch of magnitude 7, half the width of the Moon, which a 10×50 begins to grain without really resolving; its brightest stars are of magnitude 10. It looks like a small globular cluster, but it is an open one, 2,700 light-years away, with 500 stars much like the Sun.

How to find it

Start from Acubens, α Cnc, the magnitude-4 star that marks the Crab's southern claw, south-east of the Beehive. M67 lies 1.7° west, a quarter of a field, in the same view: a small round patch you cannot mistake for anything else. If Acubens is hard to spot, drop 8° south from the Beehive.

42 M48

Open cluster · Hydra



MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
5.8	30'	2,500 ly	Jan – Mar	●○○ Easy	chart 26

What you will see

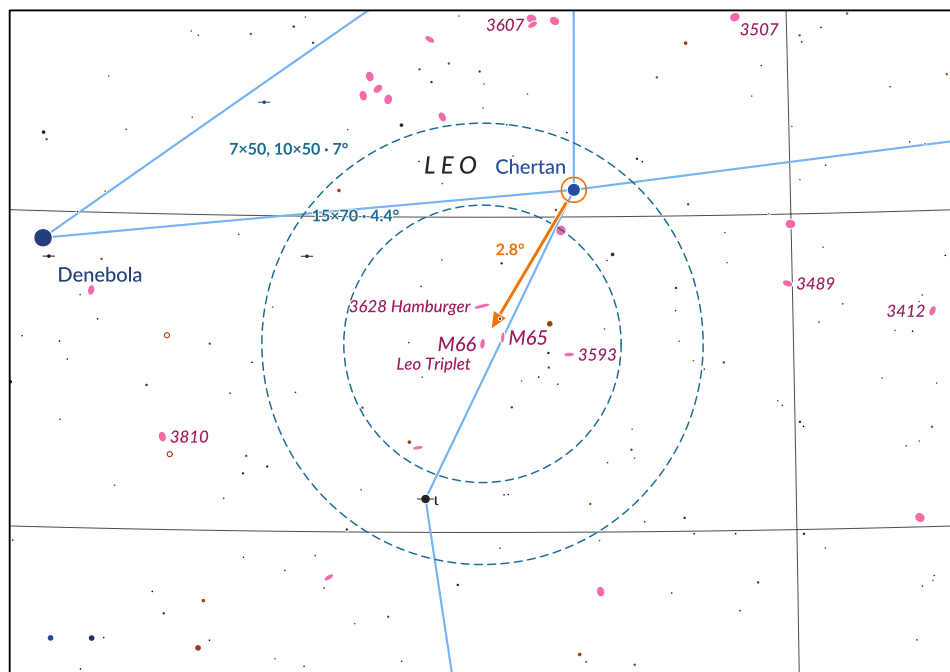
A large loose cluster of magnitude 6, as wide as the full Moon, which Messier recorded at a wrong position: it was thought lost for two centuries. In binoculars it is easy enough: an extended patch, pricked with ten or so stars of magnitude 8 and 9 in a 10×50, with a chain of stars running across it, in an empty corner of sky between Procyon and Hydra. A 7×50 shows mostly the patch. Some 300 million years old, it lies 2,500 light-years away.

How to find it

M48 lies 14° south-east of Procyon, in a star-poor corner. Start from Procyon and drop 4.5° south-east to ζ CMi, magnitude 5; carry on one field, 6.5°, in the same direction to ζ Mon, magnitude 4.4; the cluster is 3° farther south-east, and gives itself away as a slightly hazy patch.

43 The Leo Triplet

Galaxies • Leo **I**



MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
8.9	9 × 4'	35 million ly	Mar – May	●●● Hard	chart 34

What you will see

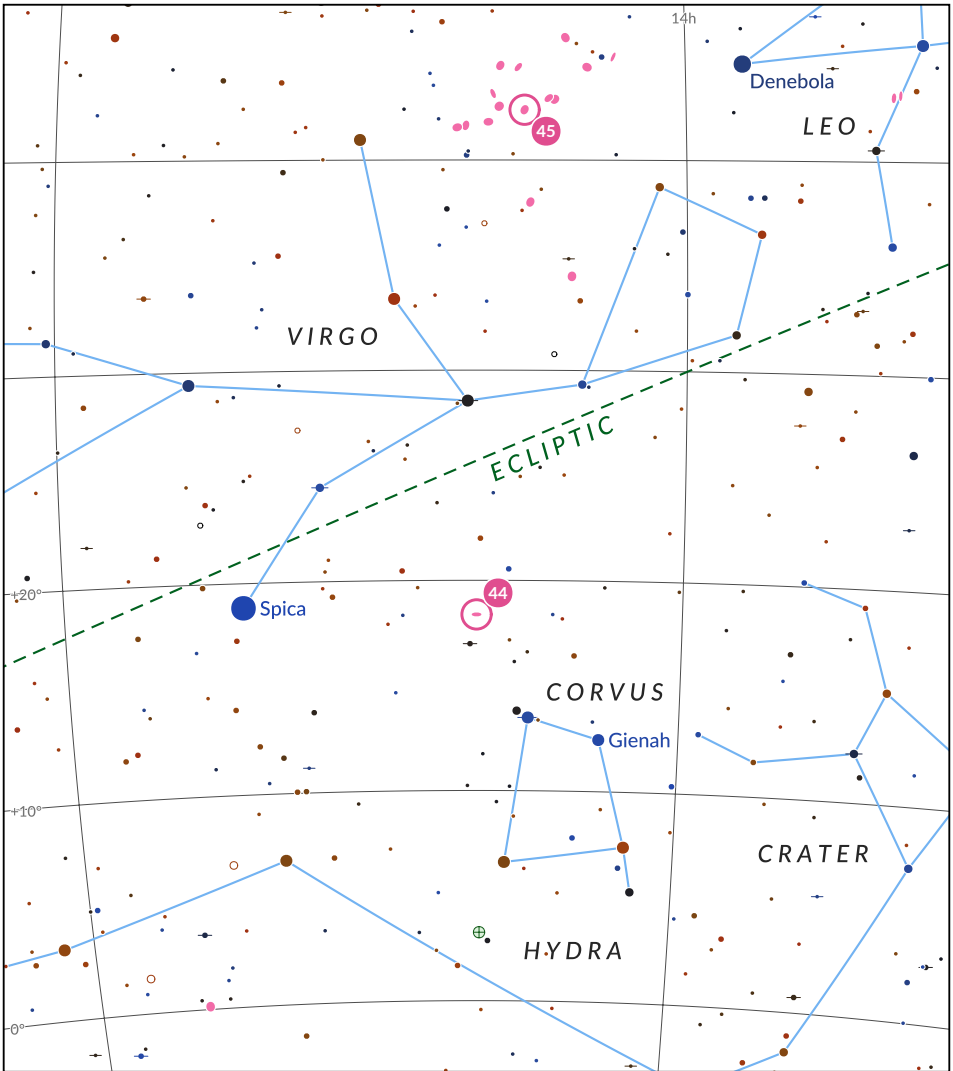
Three spiral galaxies within a 1° field, 35 million light-years away: M65, M66 and NGC 3628. In binoculars this is an exercise in averted vision under a very dark sky. A 10×50 shows M66 as a small, faint oval patch and M65 right beside it, a third of a degree west, fainter still; NGC 3628, seen edge-on, is almost invisible, except in a 15×70 on a tripod. A 7×50 shows little more than M66. Wait until Leo is high, shield the lights, and sweep slowly: the patches appear from the corner of the eye and vanish when you stare.

How to find them

Start from Chertan, θ Leo, the magnitude-3.3 star at the Lion's rear hip, west of Denebola. Drop 2.8° south-east, half a field, halfway to ι Leo: the two patches are there, less than a degree apart on an east–west line.

SPRING

J Virgo and Corvus



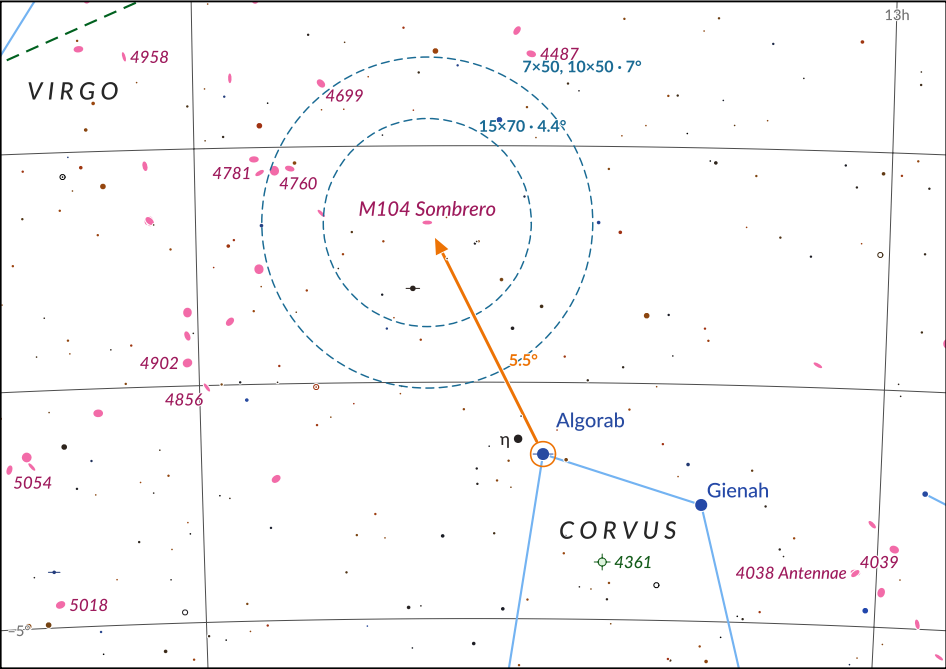
Objects on this map

44 The Sombrero Galaxy

45 M49 and M87, in the heart of the Virgo Cluster

44 The Sombrero Galaxy

Galaxy · Virgo **J**



MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
8.0	9 × 4'	30 million ly	Apr – Jun	●●● Hard	chart 47

What you will see

The Sombrero is small, 8' by 3', but bright for its size, and its lens shape seen edge-on makes it one of the most recognisable galaxies. In binoculars little remains but a small elongated patch of magnitude 8, which a 10×50 shows under a dark sky as a pale streak, slightly wider at the middle; the dust lane that gives it its name is for telescopes. At 30 million light-years it is one of the most massive galaxies around, with a black hole of a billion solar masses at its centre.

How to find it

Start from Corvus, the small quadrilateral south-west of Spica, and Algorab, δ Crv, its north-east corner. Aim towards Porrima, γ Vir, 15° farther north: the galaxy lies on that line, a third of the way, 5.5° from Algorab, one field. It is recognised by its east–west elongation, in a field without a bright star.



Between Denebola and Vindemiatrix lies the Virgo Cluster, two thousand galaxies 55 million light-years away, the heart of our supercluster. In binoculars almost all of it stays invisible; but under a very dark sky, a 10×50 and a patient eye will find the two giant ellipticals, M87 and M49, of magnitude 8.6 and 8.4: two tiny, round, hazy spots glimpsed with averted vision. M84 and M86, 1.5° west of M87, call for a 15×70 on a tripod. What you see is the light of trillions of stars, which set out when the first primates appeared.

Start from Vindemiatrix, ϵ Vir, the magnitude-2.8 star east of the cluster. Slide 5° west to ρ Vir, magnitude 4.9, then 3.5° north-west: M87 is there, in a nearly empty field. M49 lies 4.5° south of M87, or 3.7° south-west of ρ Vir; M84 and M86 are 1.5° west of M87, in the same field.

Summer

June to August

Summer darkness comes late and does not last, but it brings the richest sky of the year for binoculars. Three bright stars, Vega, Deneb and Altair, draw the Summer Triangle overhead; between them flows the Milky Way, from Cygnus down to Sagittarius low in the south. There, towards the centre of the Galaxy, it is at its densest: star clouds, clusters by the dozen, nebulae showing as pale patches, and great dark rifts, the Cygnus Rift first of all. Higher up, Hercules and Ophiuchus hold the finest globular clusters of the northern sky, small cottony balls in a 10×50. Observe once the sky is truly dark, often after 11 pm, and look for a clear southern horizon: the treasures of Scorpius and Sagittarius never climb high from mid-northern latitudes.

K Hercules, Corona Borealis and Serpens Caput

- 46 The Great Hercules Cluster, M13
- 47 M92
- 48 M5

L Lyra, Cygnus and Draco's head

- 49 Vega's neighbours: ε, ζ and δ Lyrae
- 50 ν Draconis, the Dragon's eyes
- 51 Albireo
- 52 The Coathanger, Brocchi's Cluster
- 53 The Dumbbell Nebula, M27
- 54 North America Nebula and Cygnus Milky Way
- 55 M39

M Scorpius and Sagittarius

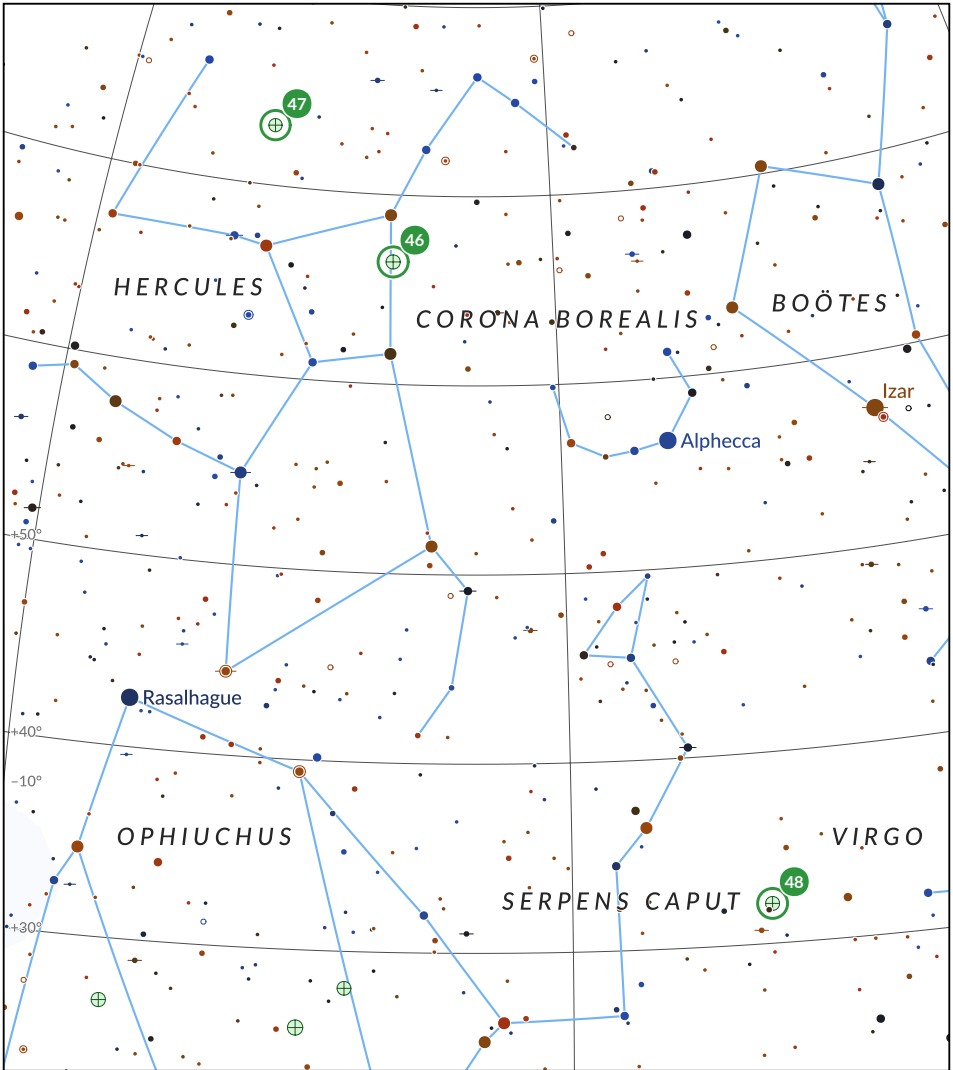
- 56 M4 and Antares
- 57 M6 and M7, clusters of Scorpion's tail
- 58 The Lagoon and the Trifid
- 59 M22 and M28
- 60 The Small Sagittarius Star Cloud, M24
- 61 The Swan and the Eagle: M17 and M16
- 62 NGC 6231 and the False Comet

N Ophiuchus, Scutum and Aquila

- 63 M10 and M12
- 64 IC 4665
- 65 NGC 6633 and IC 4756
- 66 Wild Duck Cluster, M11, and Scutum Star Cloud
- 67 Barnard's E

SUMMER

K Hercules, Corona Borealis and Serpens Caput



Objects on this map

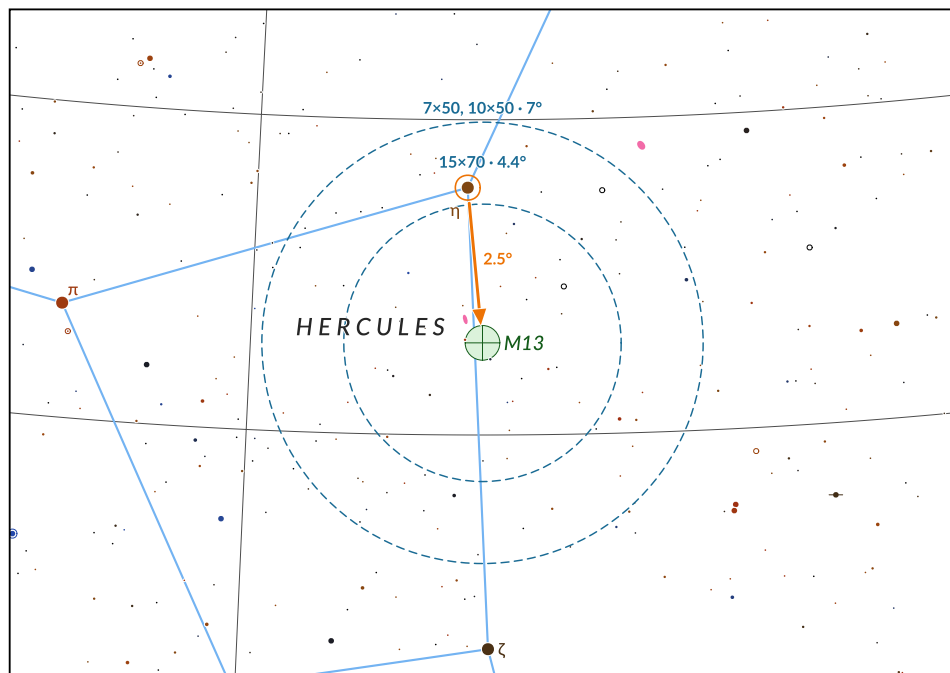
- 46 The Great Hercules Cluster, M13
- 47 M92

- 48 M5

46 The Great Hercules Cluster, M13

Globular cluster • Hercules

K



MAGNITUDE

5.8

SIZE

33'

DISTANCE

25,000 ly

EVENINGS

Jun – Aug

DIFFICULTY

●○○ Easy

ATLAS

chart 52

What you will see

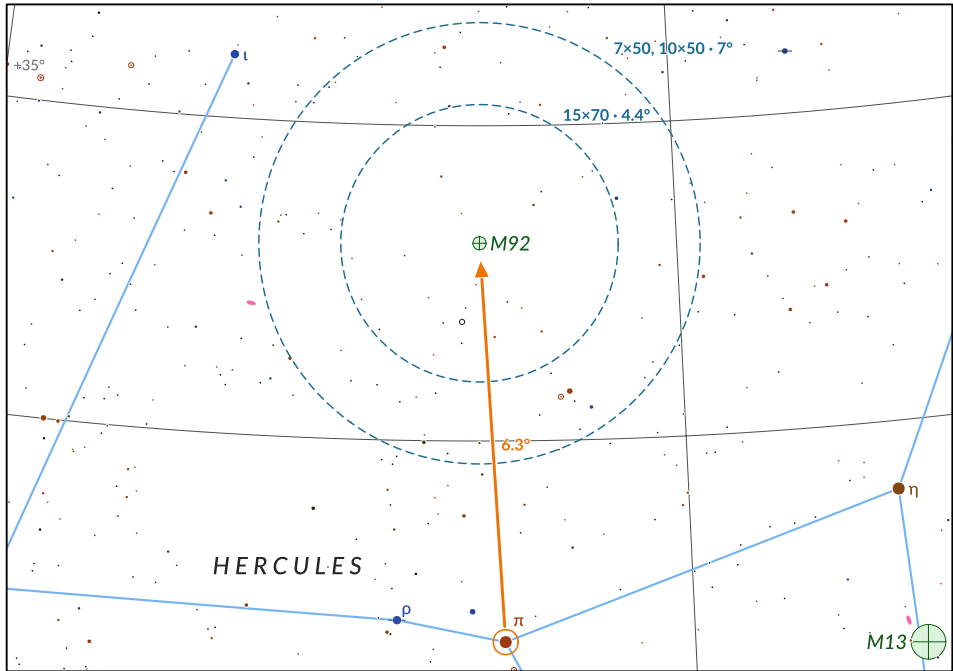
In a 7×50, M13 is a small fuzzy ball of magnitude 5.8, clearly brighter at the centre, sitting on the western side of the Keystone of Hercules. A 10×50 shows it larger and cottony, with a dense core and a halo that fades gently; you can tell it is made of stars without resolving a single one; a 15×70 on a tripod starts to pick out its edge. It holds several hundred thousand of them, 25,000 light-years away. Two magnitude-7 stars flank it, east and west. The small galaxy NGC 6207, right beside it, is beyond the reach of binoculars.

How to find it

Find the Keystone of Hercules, four stars of magnitude 3 to 4 between Vega and Corona Borealis. Aim at η Her, its north-western corner, and move 2.5° south along the western side of the Keystone, less than half a field: M13 lies two thirds of the way to ζ Her, a fuzzy star in the same field as η.

47 M92

Globular cluster · Hercules **K**



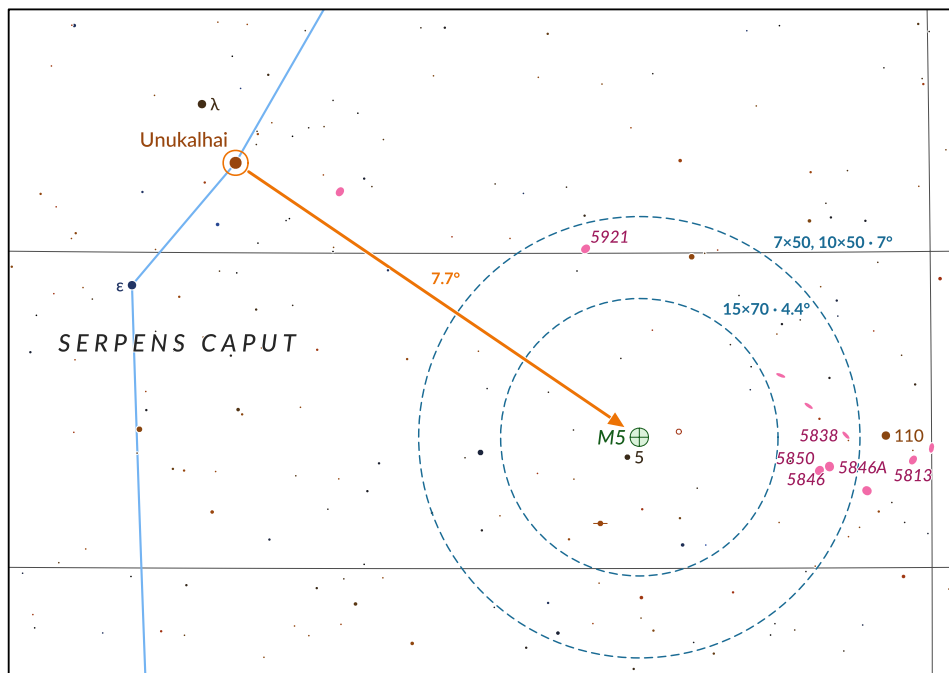
MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
6.5	11'	27,000 ly	Jun – Aug	●●○ Medium	chart 52

What you will see

Smaller and tighter than M13, M92 is still a fine cluster of magnitude 6.5: in a 7×50, a fuzzy point told from the stars by its soft edge; in a 10×50, a small round ball with a sharp centre, a third as wide as the full Moon. It sits alone in a rather empty field north of the Keystone, which helps to recognise it. At 27,000 light-years, it is one of the oldest globular clusters known, formed soon after the Galaxy itself.

How to find it

Start from π Her, the north-eastern corner of the Keystone, and go 6° north, one field: M92 shows as a fuzzy star of magnitude 6.5, about halfway between π Her and ι Her, the star of Hercules' raised arm. If you land on a bigger cluster south-west of the Keystone, that is M13.



MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
6.0	17'	25,000 ly	May – Jul	●○○ Easy	chart 55

What you will see

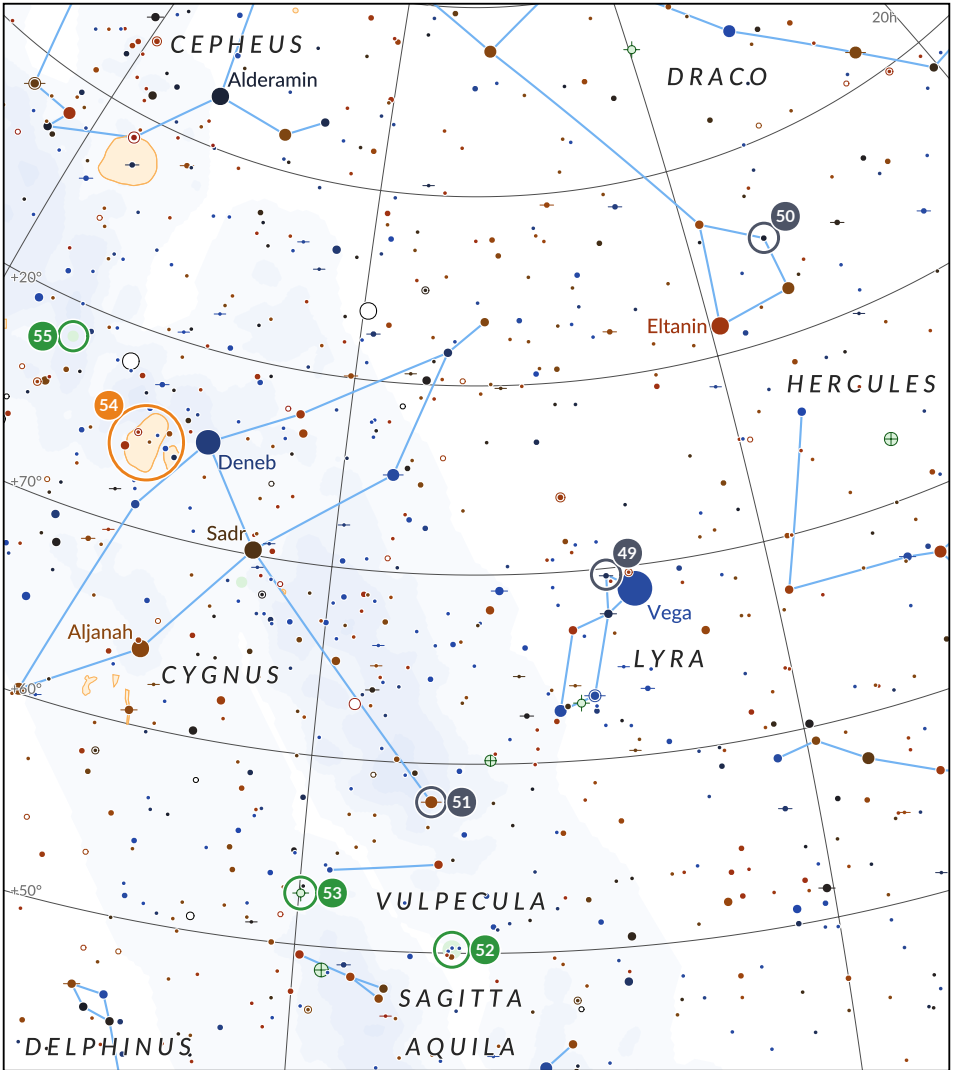
M5 rivals M13: magnitude 6, a cottony ball 15' across with a bright centre, which a 10×50 shows slightly oval, with a halo that widens as the eye settles. In a 7×50, it is a dense fuzzy star just north-west of 5 Ser, a magnitude-5 star in the same field that serves as a marker. At 25,000 light-years, the cluster holds over a hundred thousand stars and a hundred variables; none is within reach of binoculars. A 15×70 on a tripod makes it grainy.

How to find it

Find Unukalhai, α Ser, the brightest star of Serpens Caput, west of Ophiuchus. Slide 7.7° south-west, a little over one field: M5 is the fuzzy patch accompanying the star 5 Ser, 20' south-east of it. The pair is easy to recognise.

SUMMER

L Lyra, Cygnus and Draco's head



Objects on this map

49 Vega's neighbours: ϵ , ζ and δ Lyrae

50 ν Draconis, the Dragon's eyes

51 Albireo

52 The Coathanger, Brocchi's Cluster

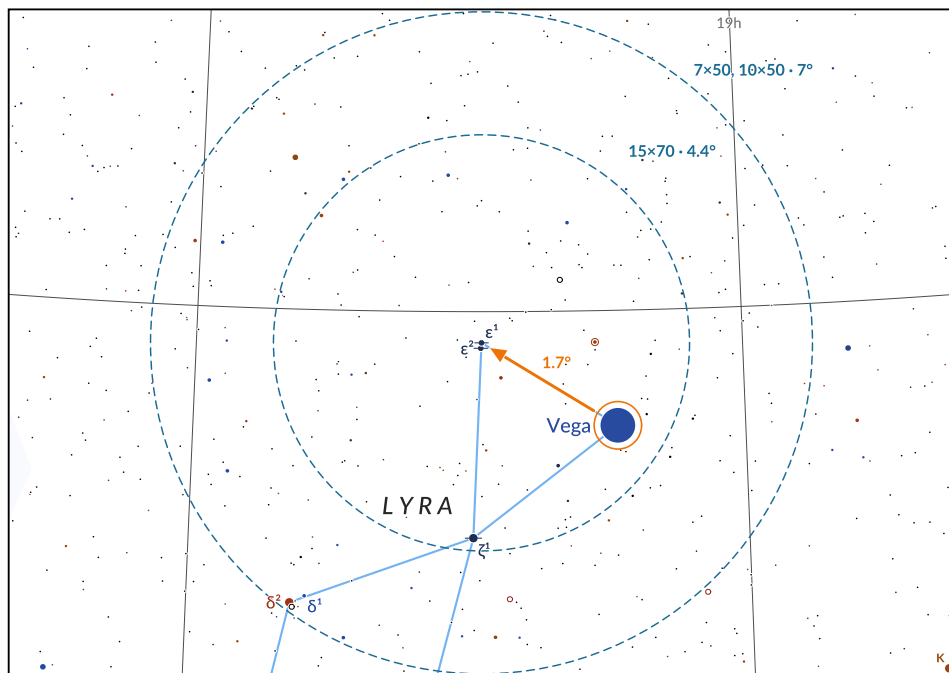
53 The Dumbbell Nebula, M27

54 The North America Nebula and the Cygnus Mi...

55 M39

49 Vega's neighbours: ϵ , ζ and δ Lyrae

Stars • Lyra **L**



MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
4.7	—	160 ly	Jul – Sep	●○○ Easy	chart 63

What you will see

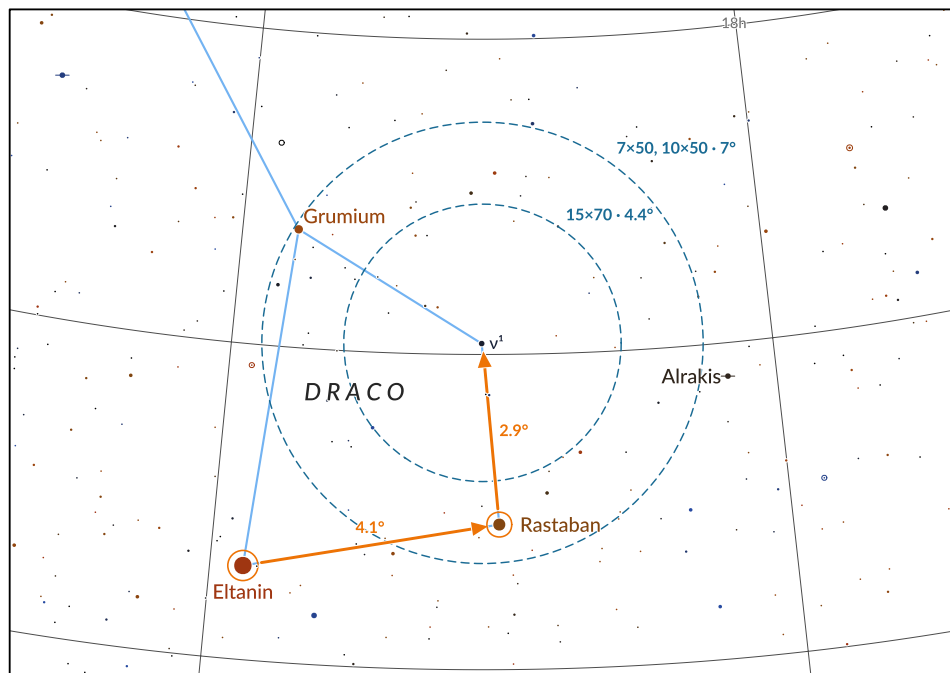
At 1.7° from Vega, ϵ Lyr, the Double-Double: a 7×50 already splits the two stars of magnitude 4.7 and 4.6, $3.5'$ apart, like twin headlights; each is double again, but at only $2''$, a job for a telescope. To the south, ζ Lyr is a tight $44''$ pair (magnitudes 4.3 and 5.7): a steady 10×50 splits it, a 7×50 shows it elongated. Farther south-east, δ Lyr offers a colour contrast: δ^2 orange-red and δ^1 bluish, $10'$ apart, in the middle of a small group of stars, the cluster Stephenson 1.

How to find them

Vega, overhead on summer evenings, is the brightest star of the Summer Triangle. Centre it: ϵ Lyr is 1.7° to the north-east, in the same field, already splitting in two. ζ Lyr lies 2° south-east of Vega, and δ Lyr 4° in the same direction: all three fit in one 7×50 field with Vega.

50 v Draconis, the Dragon's eyes

Double star • Draco



MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
4.9	—	100 ly	Jun – Aug	●○○ Easy	chart 52

What you will see

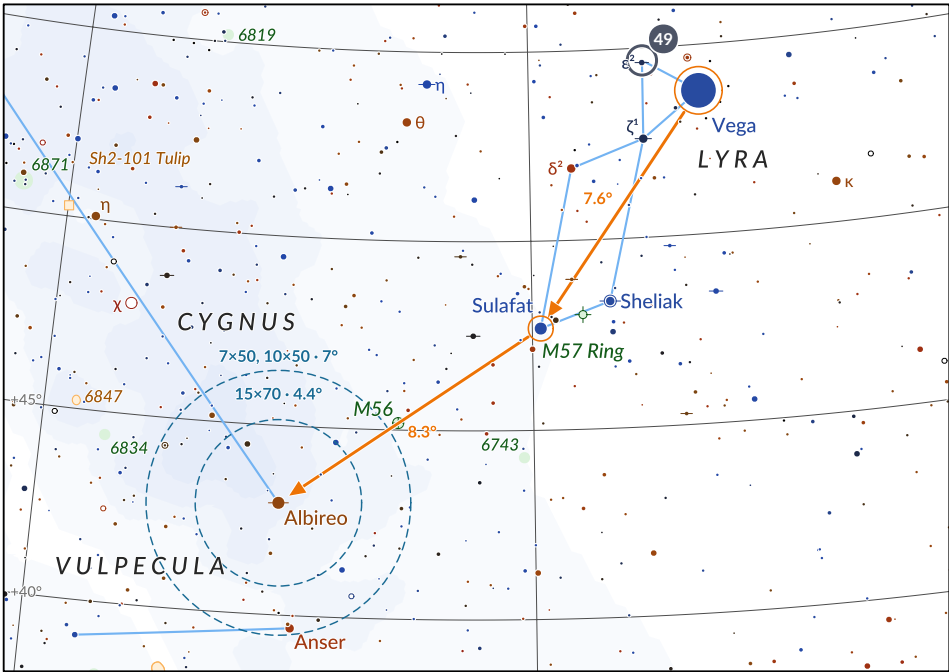
Two twin white stars of magnitude 4.9, 62" apart: in a 7×50, v Dra splits without effort, like two eyes staring back from the Dragon's head; in a 10×50 the gap is comfortable and the equality of the two components is striking. It is probably the finest double star within reach of binoculars in the northern sky. The two stars, 100 light-years away, orbit each other over tens of thousands of years.

How to find it

Draco's head is a lozenge of four stars north of Vega, towards the Little Dipper. Start from Eltanin, γ Dra, the brightest, go 4° west to Rastaban, β Dra, then 3° north: v Dra is the faintest corner of the lozenge, and it splits as soon as you look at it.

51 Albireo

Double star • Cygnus **L**



MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
3.1	—	400 ly	Jul – Sep	●●○ Medium	chart 64

What you will see

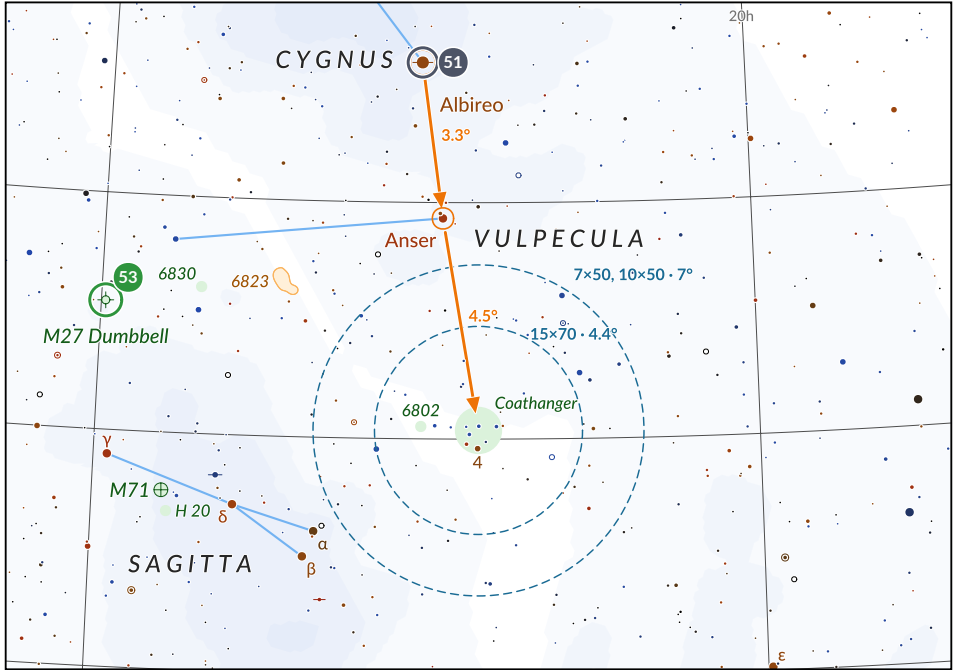
At the foot of the Northern Cross, Albireo is the most famous coloured pair in the sky: a golden star of magnitude 3.1 and a blue companion of 5.1, 34" apart. In a 7×50 you only see one star, slightly elongated or of an oddly mixed colour; a 10×50 rested on a support, or held very firmly, shows the two points side by side, with their colours, especially if the image is slightly defocused. A 15×70 on a tripod splits them with ease. The pair, some 400 light-years away, may be a mere alignment: the two stars do not seem to be bound.

How to find it

Albireo marks the Swan's beak, at the south-western end of the great Cross, halfway between Vega and Altair. From Vega, go 7.5° south-east to Sulafat, γ Lyr, the south-eastern corner of Lyra's small parallelogram, then another 8° in the same direction: Albireo is the lone golden star where the long arm of the Cross ends.

52 The Coathanger, Brocchi's Cluster

Asterism • Vulpecula



MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
3.6	60'	a chance alignment	Jul – Sep	●○○ Easy	chart 65

What you will see

Ten stars of magnitude 5 to 7 draw a coat hanger a degree and a half wide: six in a line for the bar, four for the hook, which hangs south. With north up in binoculars the hanger is upside down, hook below. It fits whole in the field of a 7×50 or a 10×50, which also shows a few faint stars around. It is the finest asterism in the sky for binoculars, and pure chance: its stars lie at very different distances, from 200 to over 1,000 light-years, and form no cluster.

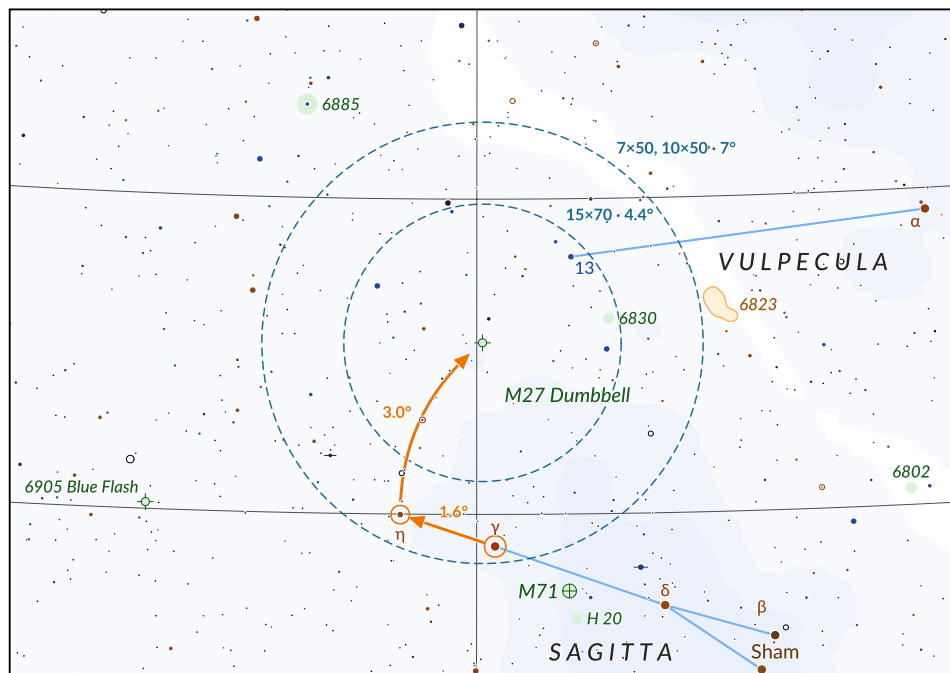
How to find it

Aim at Albireo, at the foot of the Northern Cross, and go 3° south to α Vul, an orange star of magnitude 4.4 with a fainter neighbour. Carry on 4.5° south, a little over one field from Albireo in all: the bar of the Coathanger presents itself, lying across the field.

53 The Dumbbell Nebula, M27

Planetary nebula • Vulpecula

L



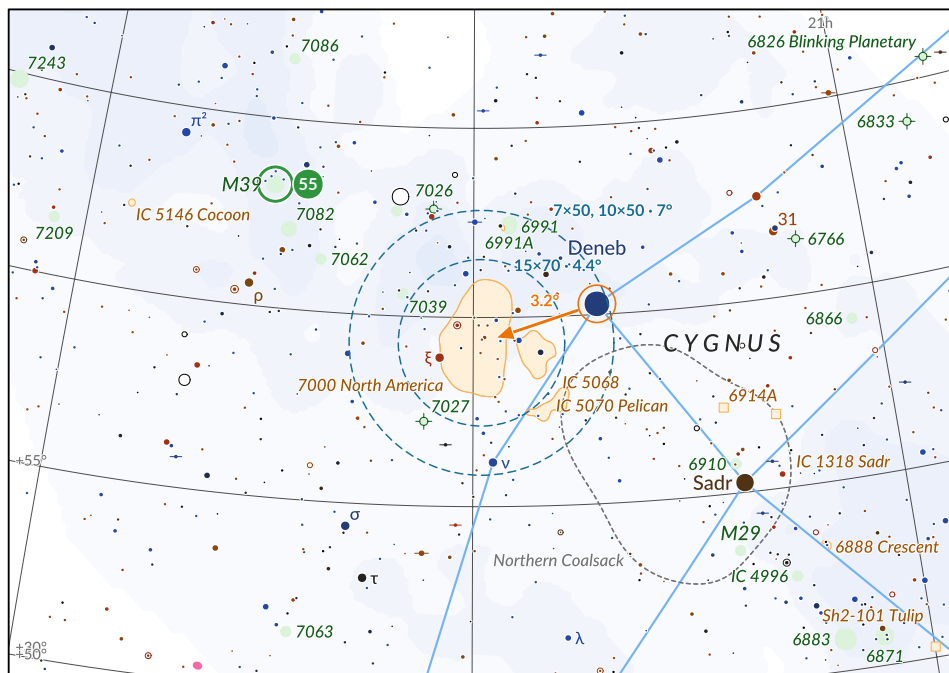
MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
7.4	6.7'	1,300 ly	Jul – Sep	●●○ Medium	chart 64

What you will see

The easiest planetary nebula for binoculars: magnitude 7.4 over 8', a quarter of the full Moon. In a 10×50 under a dark sky it is a small grey oval patch, clearly larger than a star, with soft edges and no colour at all; the dumbbell, or apple-core, shape is a job for a telescope, barely hinted at in a 15×70 on a tripod. In a 7×50 it remains a slightly blurred point to be hunted with averted vision. It is the gas thrown off by a dying star a few thousand years ago, 1,300 light-years away.

How to find it

Look for the Arrow, Sagitta, four stars of magnitude 3.5 to 4.5 in a 5° line between Altair and Albireo. Start from γ Sge, the arrow's tip. Go 1.6° east to η Sge, of magnitude 5, then climb 3° north, drifting a little back west: follow the chain of roughly aligned stars. M27 is the small patch amid a group of faint stars.



MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
4.0	2.0°	≈ 2,000 ly	Aug – Oct	●●● Hard	chart 62

What you will see

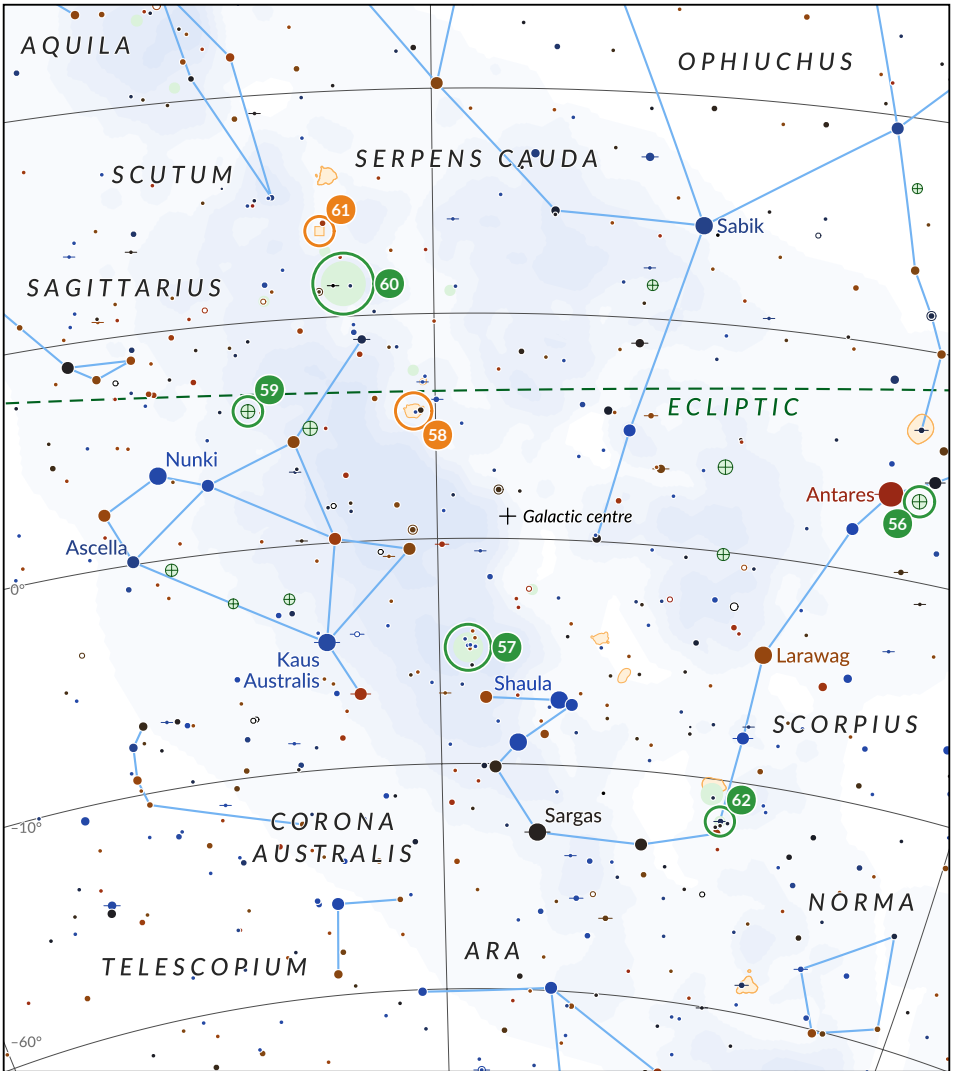
A challenge for moonless nights far from towns: 3° east of Deneb, a 7×50, favoured here by its large exit pupil, shows a vast area barely brighter than the sky, two degrees wide, whose western edge is hollowed into a 'Gulf of Mexico' along a dark band. The shape only appears while sweeping slowly, with averted vision. Around it, the Cygnus Milky Way is superb: the star cloud around Sadr, γ Cyg, and the great dark Rift that splits the Milky Way in two from Deneb down to Aquila. The Pelican, to the west, and the Veil stay invisible.

How to find it

Centre Deneb, the Swan's tail and the top of the Cross. Move 3° east, half a field, until ξ Cyg, an orange star of magnitude 3.7, enters the field: the nebula spreads just west of ξ Cyg, between it and Deneb. Let the eye settle for a minute and sweep gently.

SUMMER

M Scorpius and Sagittarius

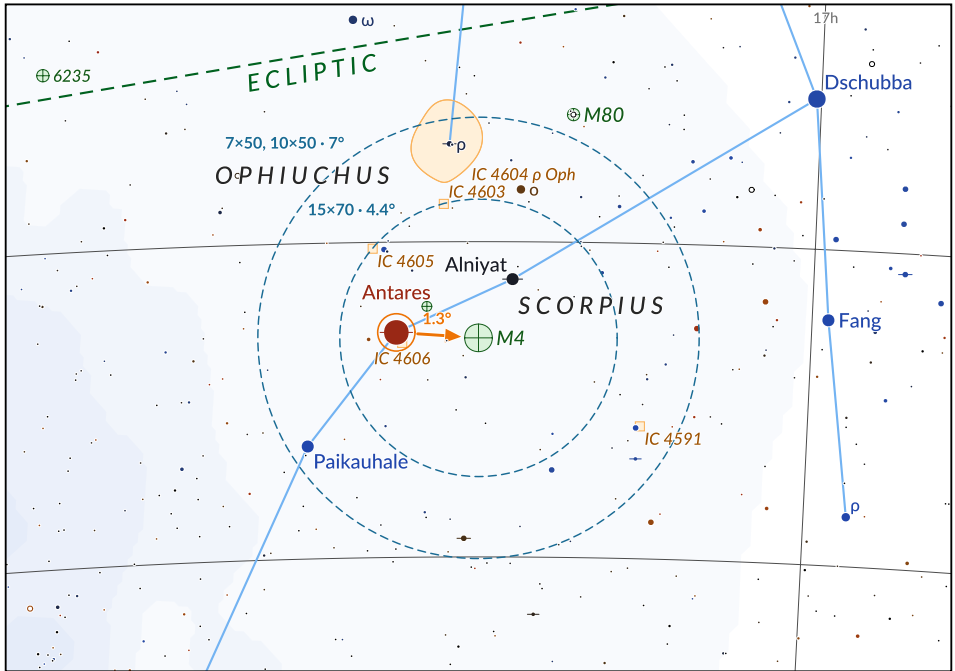


Objects on this map

- 56 M4 and Antares
- 57 M6 and M7, the clusters of the Scorpion's tail
- 58 The Lagoon and the Trifid
- 59 M22 and M28
- 60 The Small Sagittarius Star Cloud, M24
- 61 The Swan and the Eagle: M17 and M16
- 62 NGC 6231 and the False Comet

56 M4 and Antares

Globular cluster · Scorpius **M**



MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
5.6	26'	7,000 ly	May – Jul	●●○ Medium	chart 57

What you will see

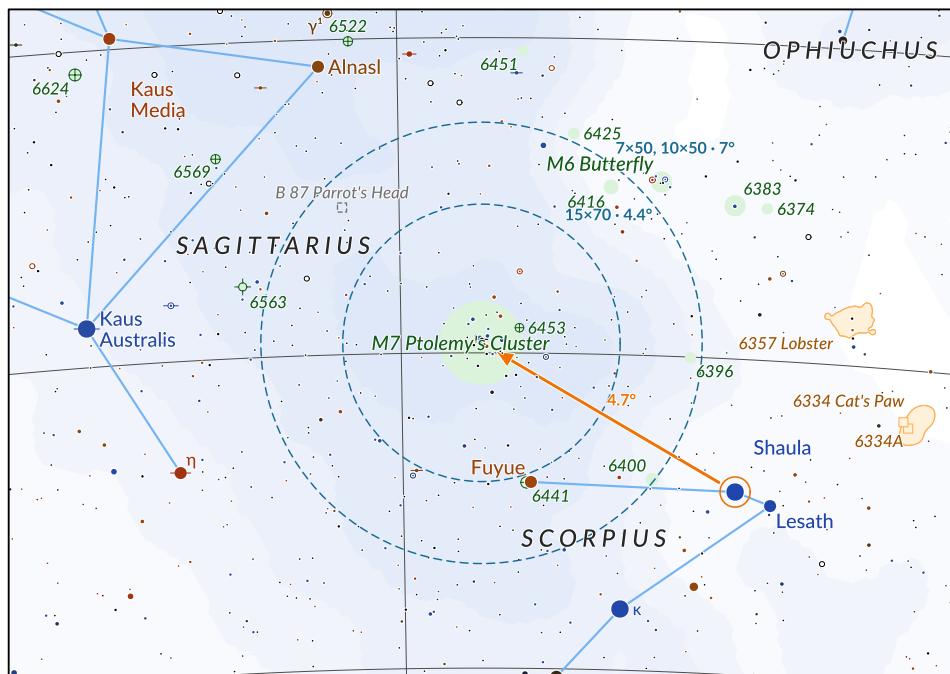
The nearest of the great globular clusters, 7,000 light-years away, and one of the easiest to find: M4 is in the same field as Antares, 1.3° to the west. It is a soft round patch of magnitude 5.4, as wide as the full Moon, without a marked core, which the glare of Antares tends to drown: put the supergiant at the edge of the field. A 10×50 under a dark sky shows it grainy; a 15×70 on a tripod starts to resolve it. From mid-northern latitudes the cluster stays low and dimmed by the atmosphere. North of Antares, the dark lanes rising towards ρ Oph can be guessed as holes in the Milky Way.

How to find it

Antares, the red heart of the Scorpion, is the brightest star in the south on summer evenings. Centre it: M4 is in the field, 1.3° to the west, that is to the right and slightly below. If you cannot see it, push Antares to the eastern edge of the field and let the eye settle. σ Sco, 2° north-west of Antares, helps to get oriented.

57 M6 and M7, the clusters of the Scorpion's tail

Clusters · Scorpion **M**



MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
3.4	80'	980 ly	Jun – Aug ↓	●○○ Easy	chart 58

↓ low in the south

What you will see

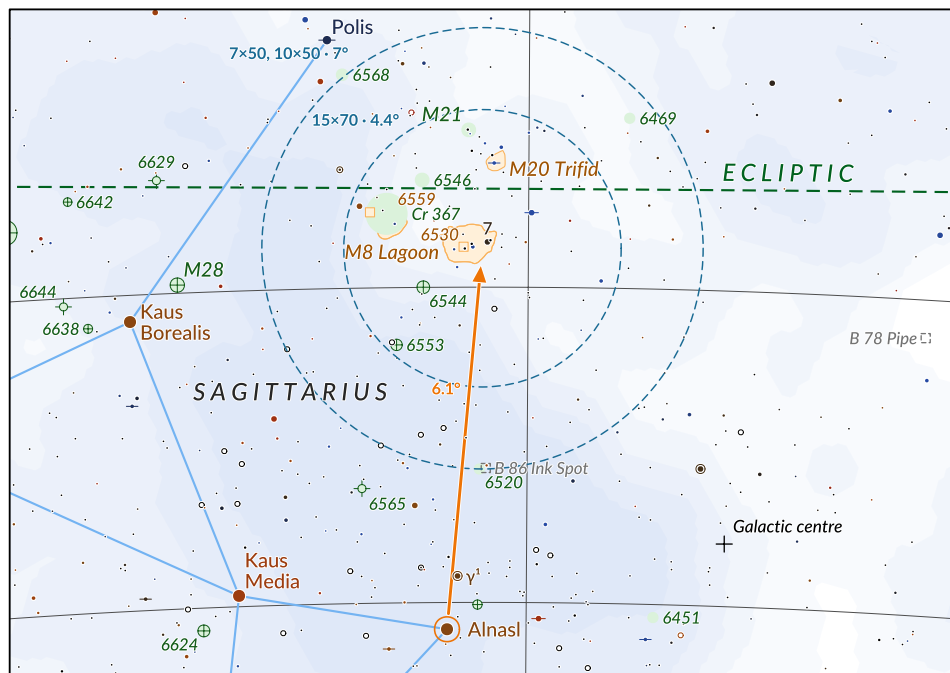
Two large neighbouring clusters, naked-eye objects under a good sky and magnificent in binoculars. M7, Ptolemy's Cluster, is the brightest in the sky after the Pleiades: a 7×50 resolves it completely into some forty stars scattered over more than a degree, against a teeming Milky Way background. M6, the Butterfly, 4° north-west, is smaller and tighter, lozenge-shaped, with an orange star in one wing. From mid-northern latitudes they culminate barely 15° high: wait for their passage in the south, around 11 pm in July, and a clear horizon.

How to find them

Find the Scorpion's sting, Shaula and Lesath, two close stars at the end of the curved tail, very low in the south. From Shaula, go up 4.7° north-east, less than a field: M7 fills the field with its stars. M6 then lies 3.8° to the north-west, a slight nudge away, smaller and denser.

58 The Lagoon and the Trifid

Clusters and nebulae • Sagittarius



MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
6.0	1.5 × 0.7°	4,100 ly	Jun – Aug	●○○ Easy	chart 67

What you will see

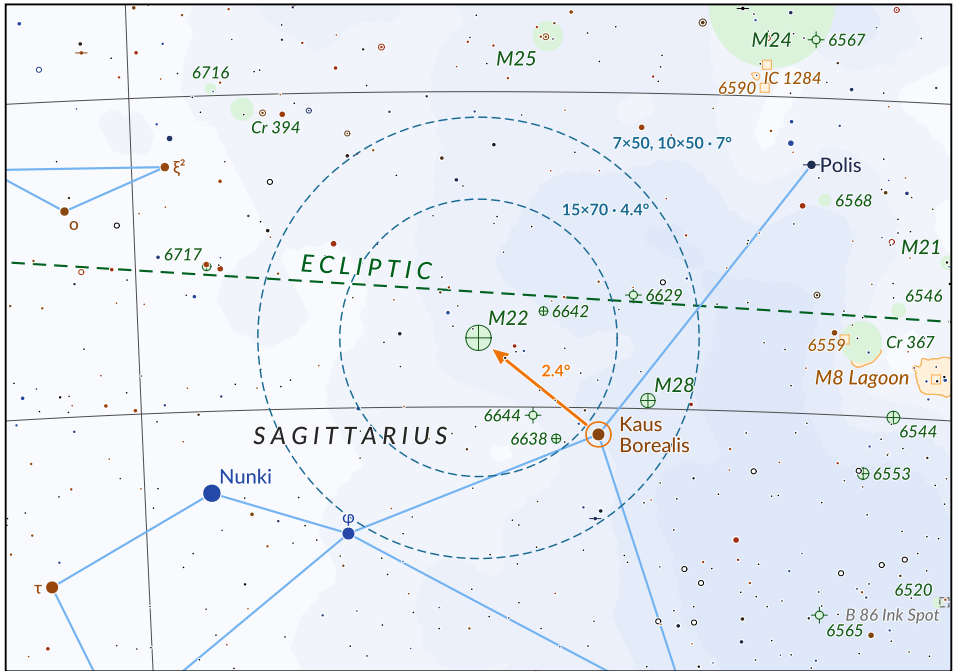
Above the Teapot's spout, the Lagoon is the brightest nebula of summer: a patch over a degree long, visible to the naked eye under a dark sky, which a 7×50 shows as a soft grey glow, cut in two by a dark band that a 10×50 can make out, with the cluster NGC 6530 set in its eastern half, a handful of stars of magnitude 7 to 9. 1.4° to the north, the Trifid, M20, is only a small faint round patch, and M21, 0.6° from it, a small compact cluster. All three fit in one field. The Lagoon lies 4,100 light-years away.

How to find them

The Teapot of Sagittarius is low in the south, left of the Scorpion. Aim at Alnasl, γ Sgr, the tip of its spout, and go 6° due north, one field, as if following the steam from the Teapot: the Lagoon is the bright patch stretched east to west, with a small cluster set in it; the Trifid is just above.

59 M22 and M28

Globular cluster • Sagittarius



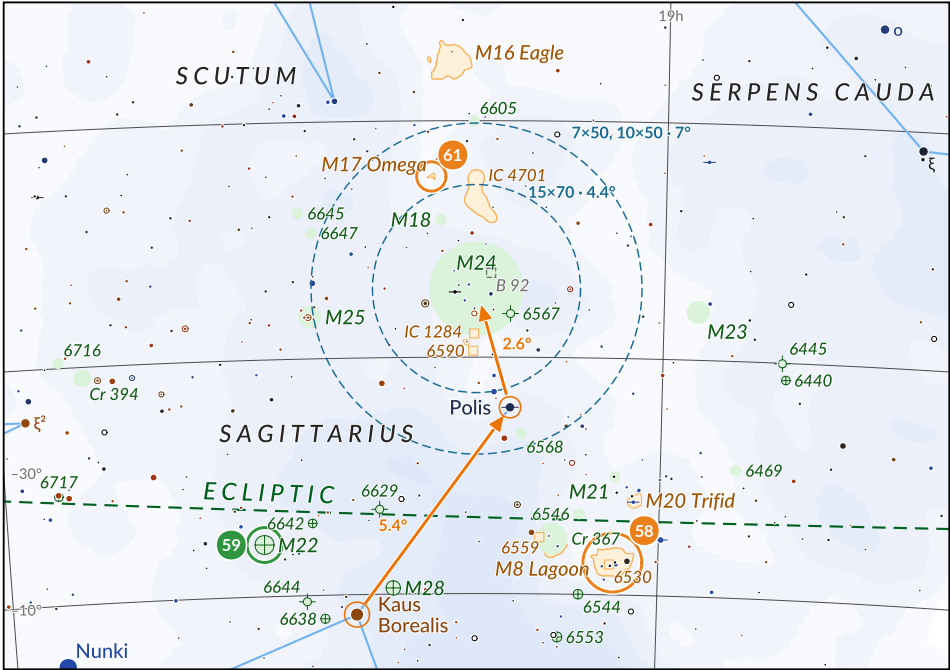
MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
5.1	24'	10,000 ly	Jul – Sep	●○○ Easy	chart 67

What you will see

One of the brightest globular clusters in the sky, nearer and bigger than M13, but low from mid-northern latitudes: in a 7×50 , a round cottony patch, clearly brighter at the centre, a third of the full Moon across; in a 10×50 it turns grainy under a good sky, at the limit of resolution, which a 15×70 on a tripod crosses. In the same field, 1° north-west of Kaus Borealis, M28 is a small fuzzy point, far more modest. M22 lies 10,000 light-years away, just in front of the star clouds of the galactic centre.

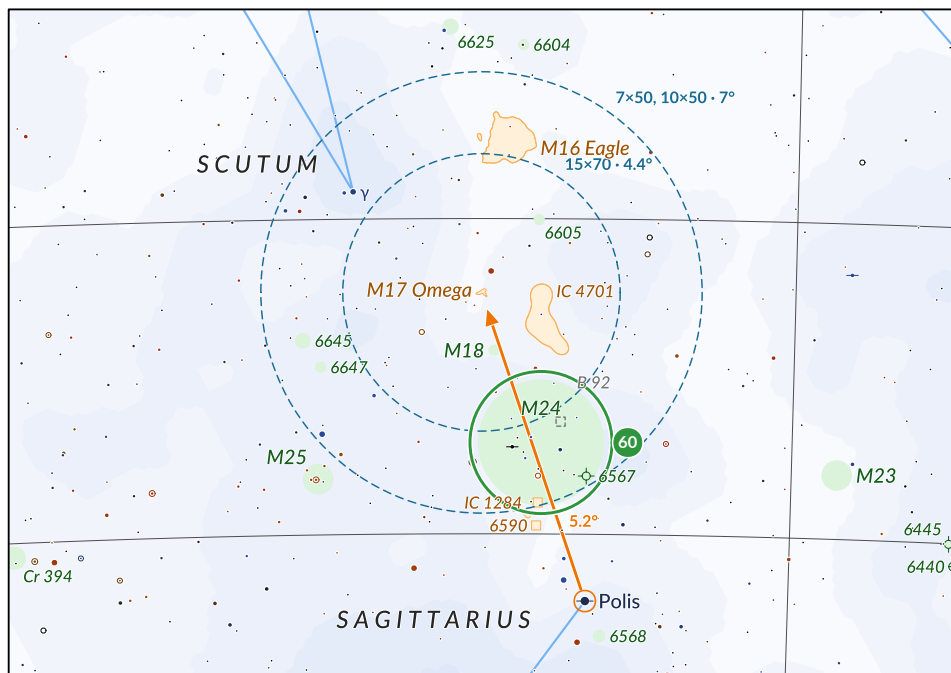
How to find it

Aim at Kaus Borealis, λ Sgr, the top of the Teapot's lid. M22 is in the same field, 2.4° to the north-east, that is upper left: an obvious fuzzy patch. M28 lies 1° north-west of the same star, upper right, smaller: both clusters and λ Sgr fit together in the field.



61 The Swan and the Eagle: M17 and M16

Clusters and nebulae · Sagittarius



MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
6.0	11'	5,500 ly	Jun – Aug	●●○ Medium	chart 67

What you will see

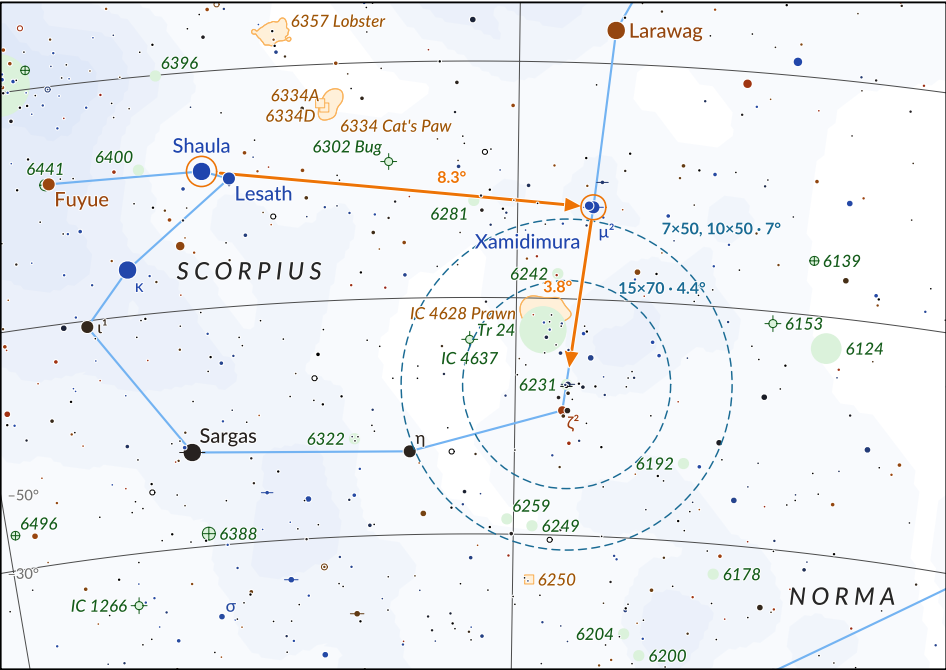
Two nebulae 2.4° apart, in the same field, just north of the cloud M24. M17, the Swan or Omega, is the more obvious: a small bright bar of magnitude 7, stretched east to west, which a 10×50 shows clearly, with one brighter side, like the body of a swan seen from afar; a 7×50 shows it as a fuzzy streak. M16, the Eagle, is first a cluster of some twenty stars of magnitude 8 to 9, wrapped in a faint haze that only a dark night reveals; its 'pillars' are out of reach. They lie 5,500 and 7,000 light-years away.

How to find them

From μ Sgr, the magnitude-3.8 star north of the Teapot's lid, go 5° due north, one field: you cross the cloud M24, then the small cluster M18, and M17 appears as a bright streak. M16 is 2.4° farther north, slightly west, a small hazy cluster in the same field as M1

62 NGC 6231 and the False Comet

Open cluster · Scorpius **M**



MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
2.6	14'	5,500 ly	Jun – Aug ↓	●●○ Medium	chart 58

↓ low in the south

What you will see

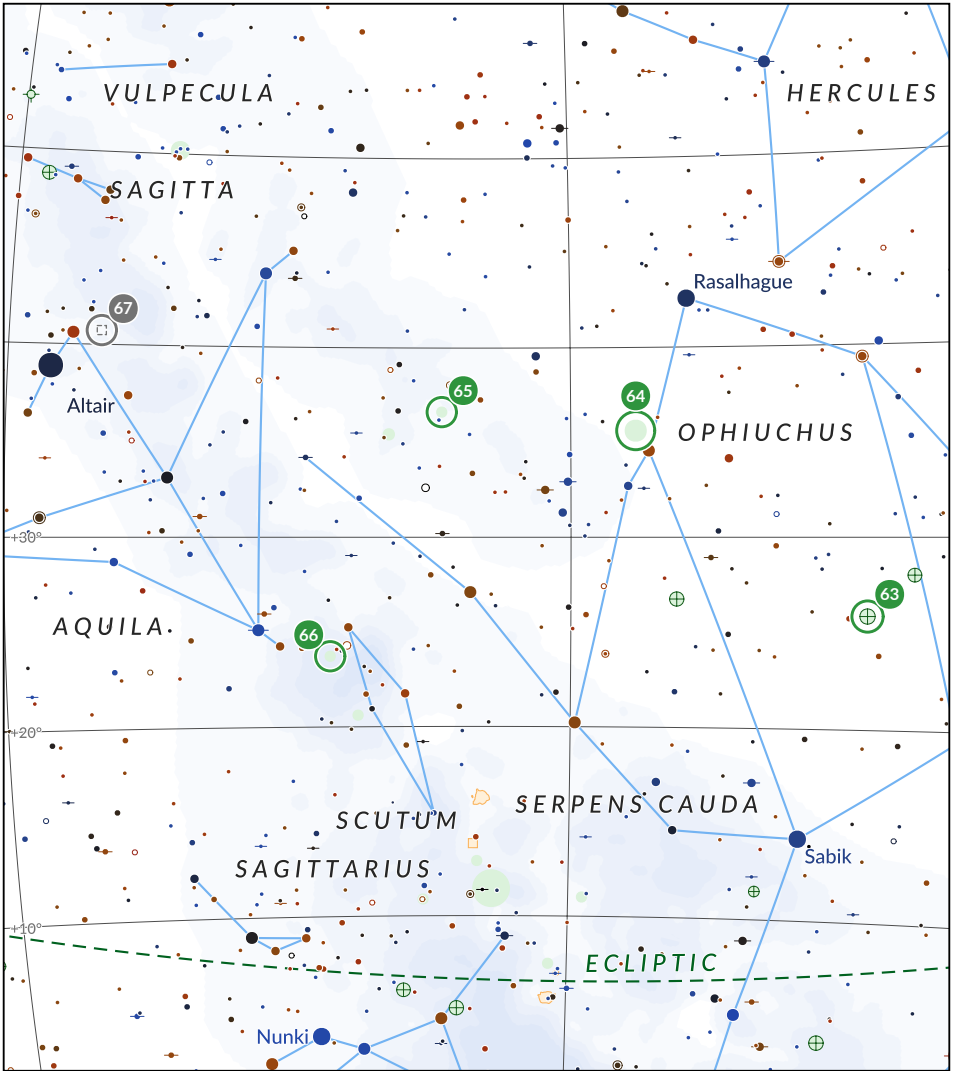
A showpiece of the southern sky: NGC 6231, a cluster of magnitude 2.6, forms the head of a 'false comet' whose tail, the loose cluster Trumpler 24 and the chain of stars beyond it, stretches 2° to the north-east; ζ Sco, 0.5° south, marks its tip. In a 7×50 the whole thing fits in the field and really looks like a comet; a 10×50 resolves a dozen bright blue stars in the head. But the declination of -42° is unforgiving: from latitude 45° north, the cluster culminates only 3 to 5° high. It is an object for travellers south of 40° north, where it becomes a marvel.

How to find it

Follow the Scorpion's tail from the sting: from Shaula, go 8° west to μ¹ Sco, in the bend of the tail, then 3.8° south: the head of the false comet lies 0.5° north of ζ Sco, the brightest star at the bottom of the tail. A perfectly clear southern horizon is a must.

SUMMER

N Ophiuchus, Scutum and Aquila

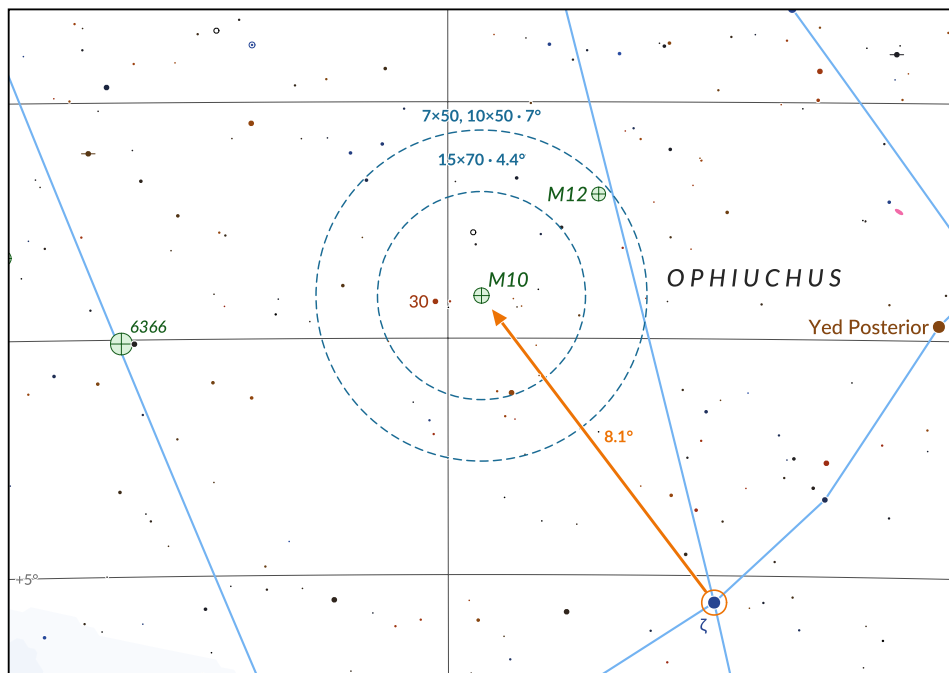


Objects on this map

- 63 M10 and M12
- 64 IC 4665
- 65 NGC 6633 and IC 4756
- 66 The Wild Duck Cluster, M11, and the Scutum...
- 67 Barnard's E

63 M10 and M12

Globular cluster · Ophiuchus 



MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
5.0	15'	14,000 ly	Jun - Aug	●●○ Medium	chart 56

What you will see

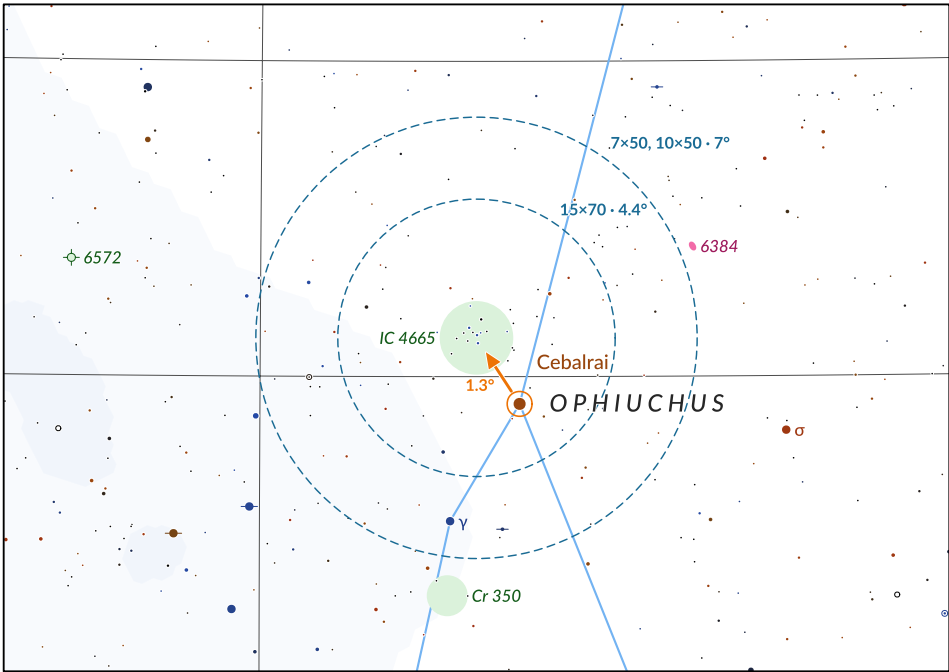
Two globular clusters 3.3' apart, in the same 7×50 field, in the middle of the great emptiness of Ophiuchus. M10, magnitude 5, is the brighter: a crisp fuzzy ball with a marked centre, 1° west of the star 30 Oph (magnitude 4.8) which serves as a marker; M12, a little fainter and more diffuse, to the north-west, spreads wider. Neither truly resolves, even in a 15×70, but the pair makes a pretty duo, easy to compare. They lie 14,000 and 16,000 light-years away, one behind the other.

How to find it

Start from ζ Oph, the magnitude-2.5 star at the bottom of Ophiuchus' big pentagon, above Antares. Go 8° north-east, a little over one field: M10 is the fuzzy patch just west of 30 Oph, a star of magnitude 4.8. M12 lies 3.3° north-west of M10, in the same field.

64 IC 4665

Open cluster • Ophiuchus N



MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
4.2	70'	1,100 ly	Jun – Aug	●○○ Easy	chart 54

What you will see

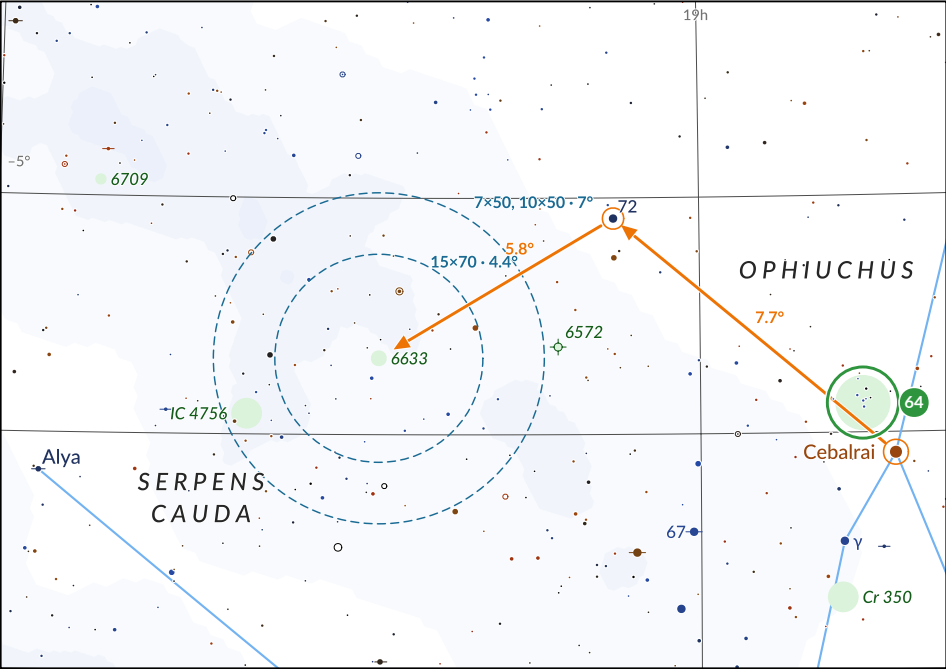
A cluster for binoculars alone: some thirty stars of magnitude 7 to 9 scattered over a degree, too loose for a telescope, too faint for the naked eye. In a 7×50 it forms an airy group just above Cebalrai, at first taken for a mere thickening of the Milky Way; a 10×50 resolves it completely and brings out alignments, including a small loop of stars. It is young, a few tens of millions of years, 1,100 light-years away.

How to find it

Aim at Cebalrai, β Oph, the magnitude-2.8 star marking the eastern shoulder of Ophiuchus, east of Rasalhague. The cluster is in the same field, 1.3° to the north-east: a sprinkling of faint stars, not to be confused with the Milky Way background. Centre it so that it stands out better.

65 NGC 6633 and IC 4756

Clusters · Ophiuchus N



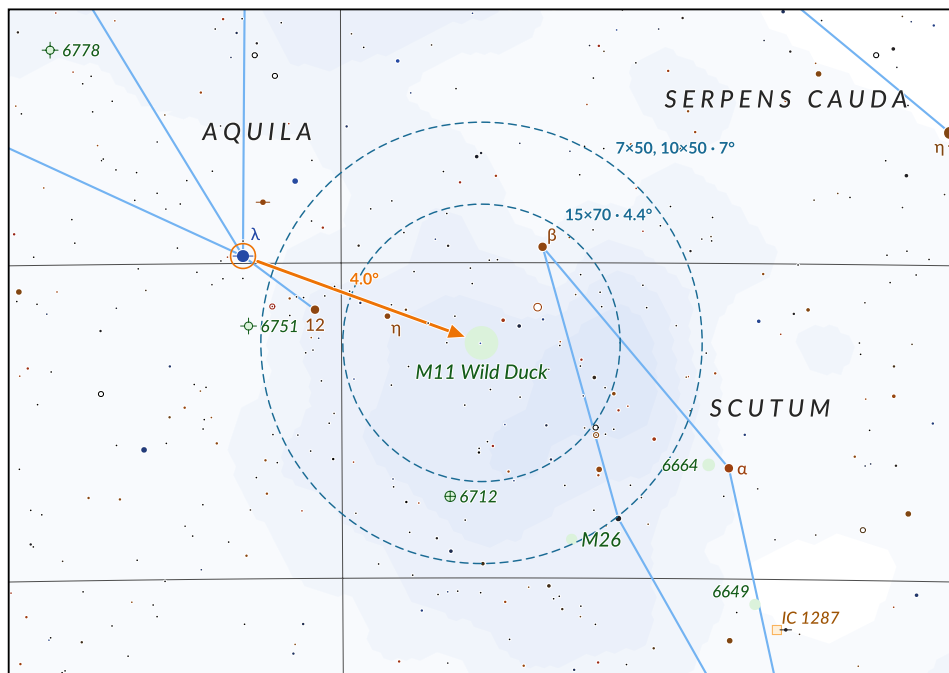
MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
4.6	20'	1,000 ly	Jun – Aug	●○○ Easy	chart 65

What you will see

Two big loose clusters 3° apart, just within one 7×50 field. NGC 6633, magnitude 4.6, is a band of some thirty stars of magnitude 7 to 9 stretched north-east to south-west over half a degree, standing out well. IC 4756, to the east, is even larger, nearly a degree, but more discreet: a sheet of small stars that a 10×50 sets teeming. They lie 1,000 and 1,300 light-years away. Typical 'binocular' objects, too spread out for a telescope.

How to find them

From Cebalrai, β Oph, go 7.7° north-east, a field and a quarter, to 72 Oph, a lone star of magnitude 3.7, then 5.8° south-east: NGC 6633 is the band of stars that enters the field. IC 4756 lies 3° farther east, in Serpens Cauda.



MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
5.8	32'	6,100 ly	Jul – Sep	●○○ Easy	chart 67

What you will see

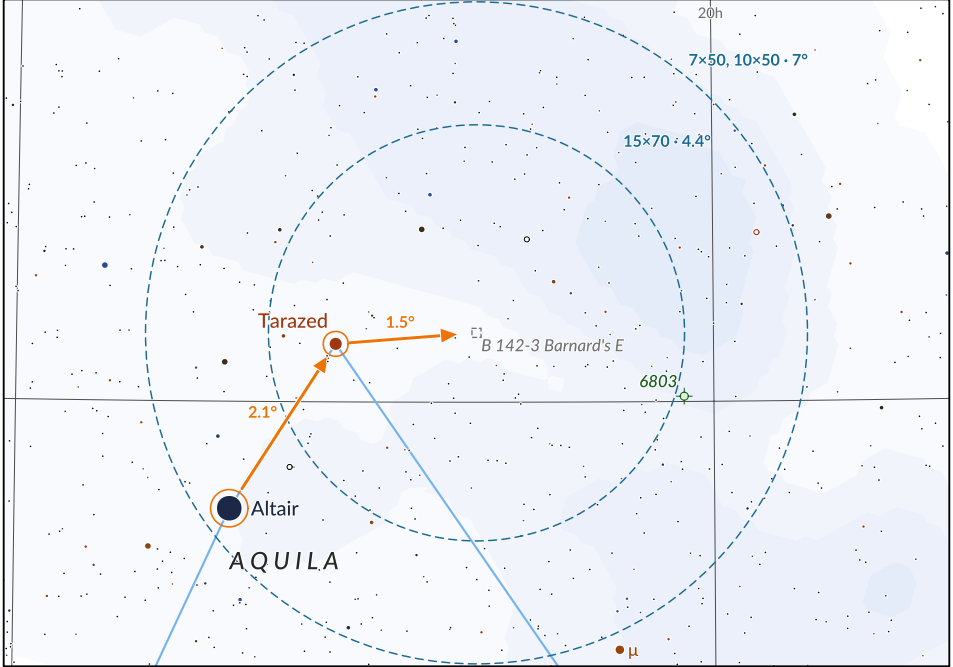
In a 7×50, M11 is a dense bright point of magnitude 5.8, barely fuzzy, set on the edge of the Scutum Star Cloud, one of the finest stretches of summer Milky Way; in a 10×50 it becomes a small compact, almost triangular patch, which feels made of stars without resolving. It is the richest open cluster known, nearly 3,000 stars packed into 14', 6,100 light-years away. The cloud around it teems in any binoculars; a dark nebula borders it to the north.

How to find it

Find λ Aql, the magnitude-3.4 star at the Eagle's tail, south-west of Altair. Go 4° west, less than a field: M11 is the bright compact point on the north-eastern edge of the Scutum Star Cloud, 1.5° west of η Sct and 1.8° south-east of β Sct. The cloud itself shows to the naked eye.

67 Barnard's E

Dark nebula • Aquila **N**



MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
—	40'	≈ 2,000 ly	Jul – Sep	● ● ● Hard	chart 64

What you will see

An object seen by its absence: two dust clouds, B 142 and B 143, draw a dark capital E a degree tall, 1.5° west of Tarazed, against the starry Milky Way. You need a moonless night, far from towns, and a 10×50; then, among the crowded stars of the field, a starless area takes shape, with its three branches. A 7×50 shows it too, less sharply. The cloud lies some 2,000 light-years away, in front of the stars it hides.

How to find it

Centre Altair, then slide 2° north-west to Tarazed, γ Aql, the orange star that accompanies it. The E lies 1.5° west of Tarazed, to the right, in the same field: let the eye settle and look for the hole in the sprinkling of stars rather than for an object.

The far south

From the tropics and the southern hemisphere

There is a sky Europe never sees: everything within 45° of the south celestial pole. That is where the two Magellanic Clouds hide, neighbouring galaxies visible to the naked eye; the Milky Way of Carina, richer still than that of Sagittarius; the Southern Cross and the black hole of the Coalsack; ω Centauri, the largest of the globular clusters. Huge objects, for which binoculars are the ideal instrument: all of them fit in the field, and no telescope shows them whole. This chapter is for the traveller in the tropics as much as for the southern observer. Down there the seasons are reversed, and facing the equator north is at the bottom: the maps, north up, are read upside down; facing the south pole, as for most of these objects, they read as they are. The evenings given on each page are the months when the object crosses the meridian at about 10 pm; they hold everywhere on Earth.

O Carina, Crux and Centaurus

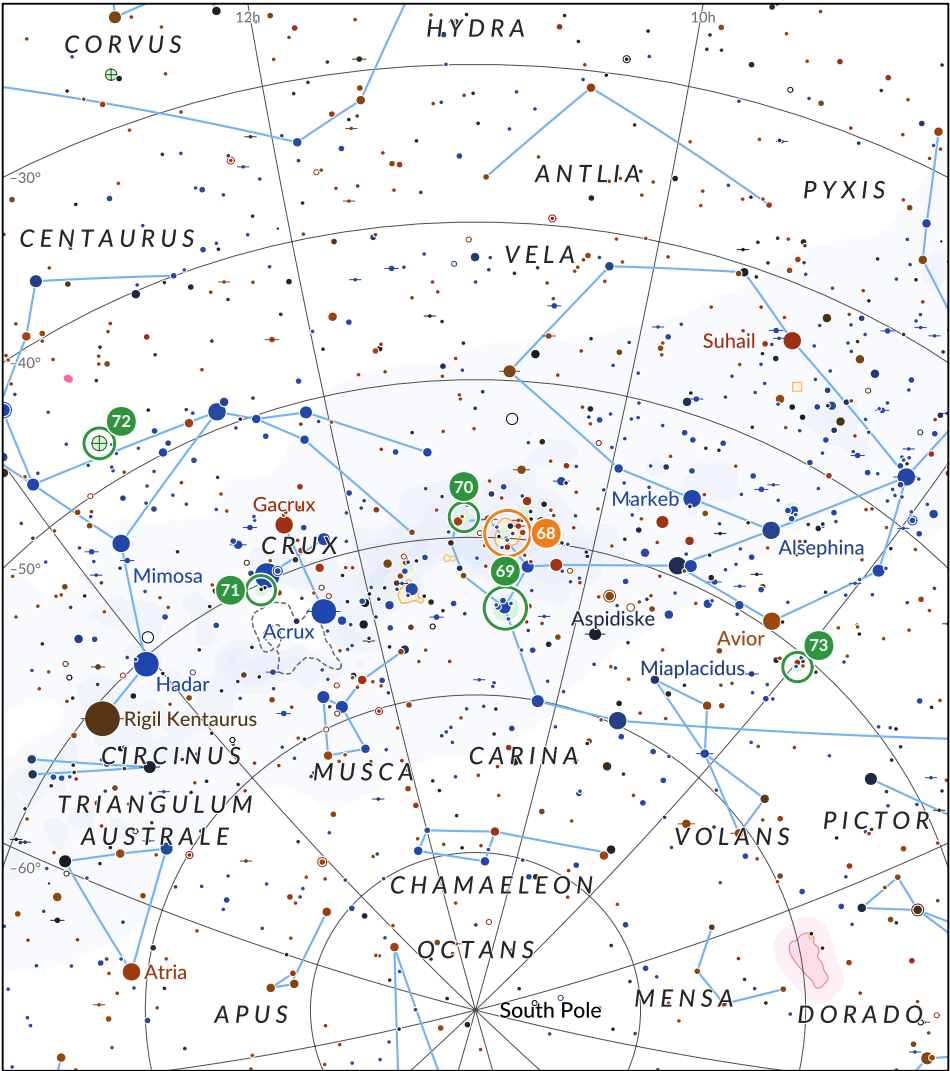
- 68** The Carina Nebula
- 69** The Southern Pleiades, IC 2602
- 70** NGC 3532, the Wishing Well Cluster
- 71** The Jewel Box and the Coalsack
- 72** ω Centauri and Centaurus A
- 73** NGC 2516, the Southern Beehive

P Magellanic Clouds, Tucana and Dorado

- 74** Large Magellanic Cloud and Tarantula
- 75** Small Magellanic Cloud and 47 Tucanae

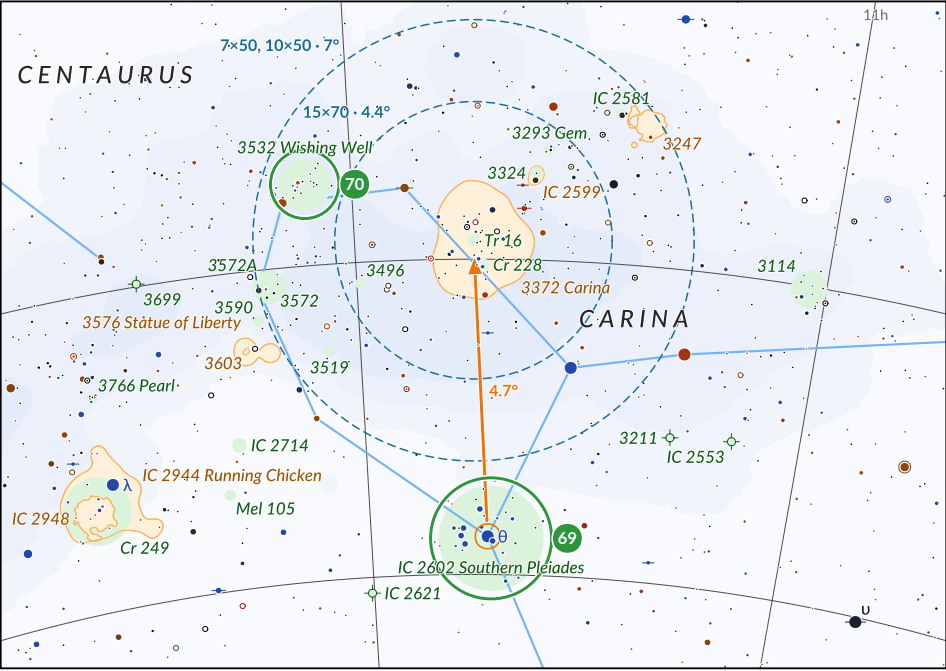
THE FAR SOUTH

Carina, Crux and Centaurus



Objects on this map

- 68 The Carina Nebula
- 69 The Southern Pleiades, IC 2602
- 70 NGC 3532, the Wishing Well Cluster
- 71 The Jewel Box and the Coalsack
- 72 ω Centauri and Centaurus A
- 73 NGC 2516, the Southern Beehive



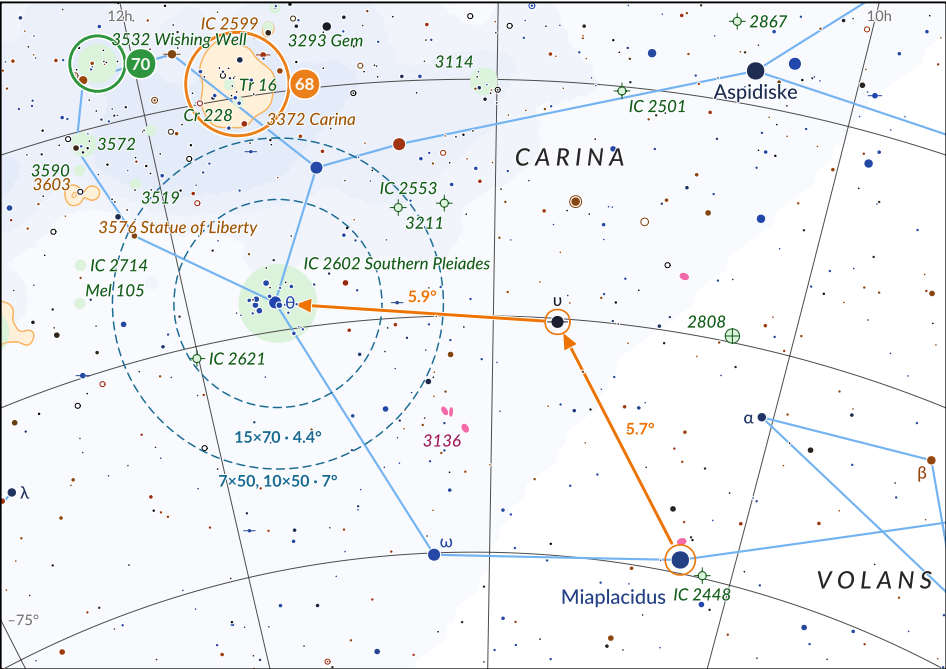
MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
3.0	2.0°	7,500 ly	Mar – May	●○○ Easy	chart 40

What you will see

To the naked eye it is the brightest patch of the southern Milky Way. In binoculars, a bright irregular cloud 2° wide, as big as four full Moons, crossed by dark lanes: the sharpest cuts the nebula in two, on either side of η Carinae, the orange star nestled in its brightest part. Around it, clumps of blue stars (Tr 16, inside the nebula itself) and a grainy background. The famous Keyhole, close to η Car, needs a telescope. In the 1840s η Car was briefly the second-brightest star in the sky; today it hovers around magnitude 4.5.

How to find it

Start from θ Carinae, the magnitude-2.7 star at the heart of the Southern Pleiades, halfway between the Southern Cross and the False Cross. Move 4.5° north, a little less than one field: the nebula fills the centre of the field, impossible to miss. 2° to the north-west lies the compact cluster NGC 3293; 3° to the east, NGC 3532.



MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
1.9	1.7°	480 ly	Mar – May	●○○ Easy	chart 40

What you will see

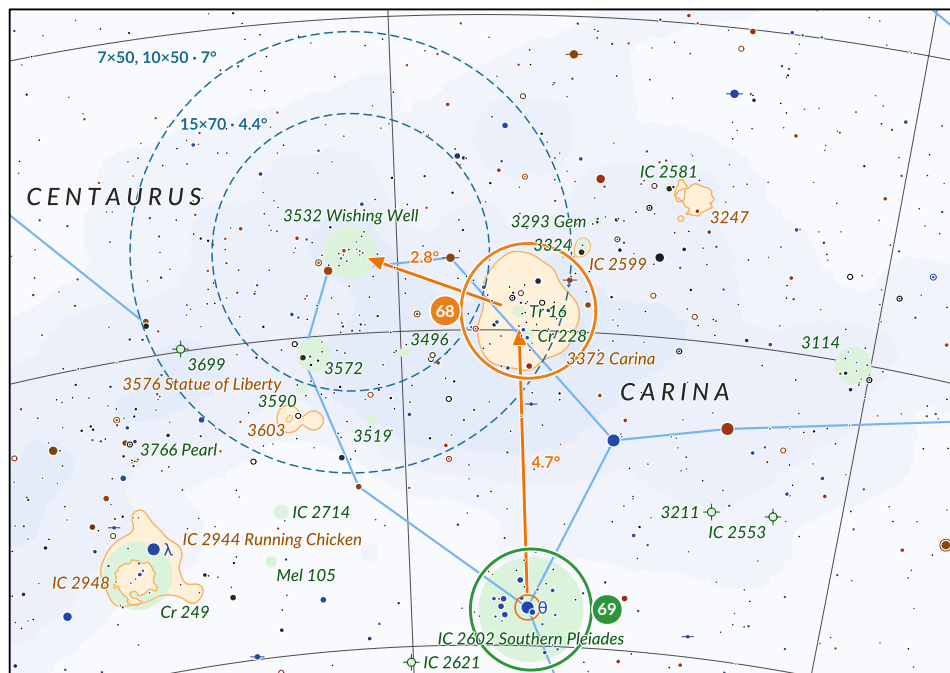
A cluster as wide as the Pleiades, spread over 1° around bright blue θ Carinae: a handful of stars to the naked eye, in binoculars some thirty of magnitude 3 to 8, strung in chains and pairs over a good third of the field. It fits whole in a 7×50 with room to spare, and that is where it looks best: a telescope dilutes it. It is barely farther than the original Pleiades, and nearly as young, about fifty million years.

How to find it

Start from Miaplacidus (β Carinae), the bright star south of the False Cross. Go 5.5° east to ν Carinae (magnitude 2.9), one field, then another 6° east: θ Carinae and its swarm fill the field. Under a dark sky they show to the naked eye between the Southern Cross and the False Cross, just south of the Carina Nebula.

70 NGC 3532, the Wishing Well Cluster

Open cluster • Carina



MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
3.0	50'	1,600 ly	Mar – May	●○○ Easy	chart 38

What you will see

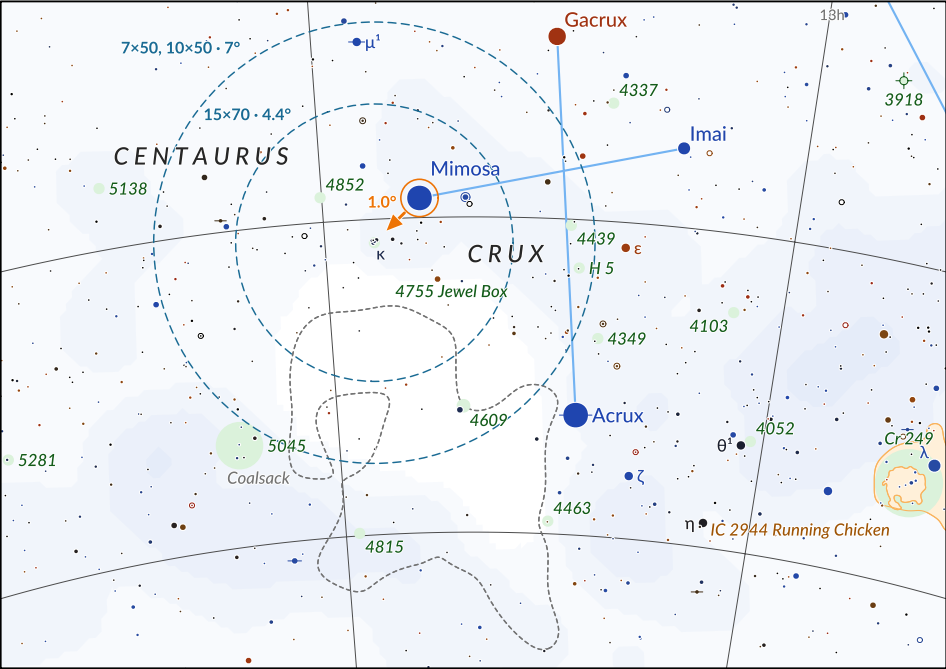
Perhaps the finest open cluster for binoculars: a swarm of more than a hundred stars of magnitude 7 to 10 in an oval nearly 1° across, so dense that a 10×50 sees a glittering dust, with two or three orange stars. It is plainly visible to the naked eye under a dark sky. 4° to the west, on the far side of the Carina Nebula, lies NGC 3293, the Gem Cluster: a compact bright knot 5' wide that binoculars only partly resolve.

How to find it

From θ Carinae, go 4.5° north to the Carina Nebula, then slide 3° east, half a field: the cluster is the sparkling oval just east of the nebula. The three objects, the nebula, NGC 3532 and NGC 3293, fit together in the field of a 7×50.

71 The Jewel Box and the Coalsack

Open cluster • Crux 



MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
4.2	10'	6,400 ly	Apr – Jun	●○○ Easy	chart 50

What you will see

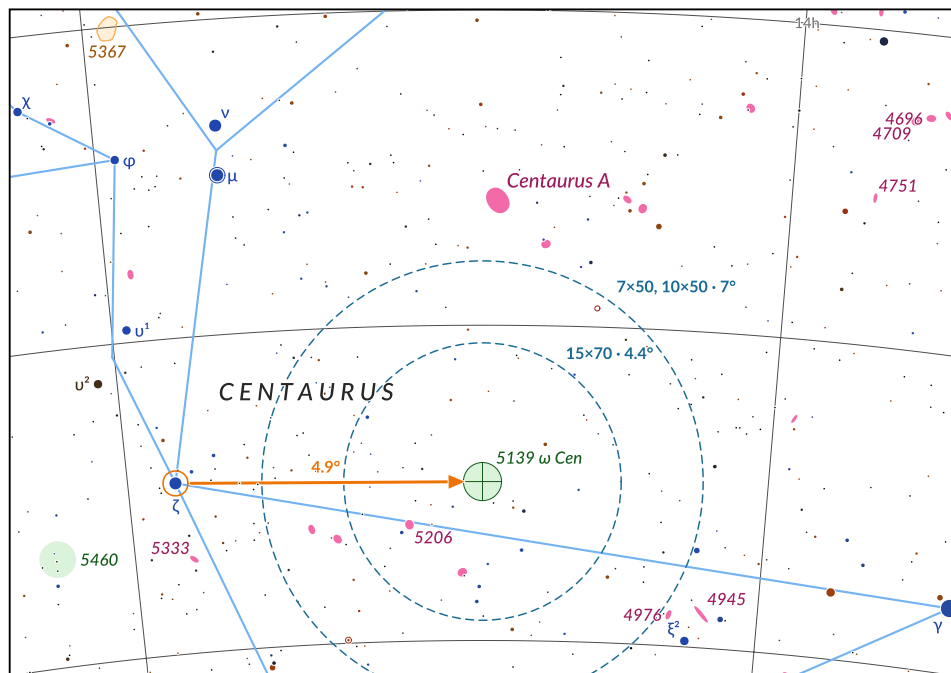
The Jewel Box is a tight knot of stars 1° from Mimosa: in binoculars, a small bright triangle 10' across, in which a steadily held 10×50 picks out three or four stars of magnitude 6 and 7; the blue and red colours that earned its name need a telescope. Close by, the Coalsack: a black hole 7° by 5° in the densest Milky Way of the sky, obvious to the naked eye, where binoculars show the ragged edges and a few scattered foreground stars. It is a cloud of dust 600 light-years away, hiding the stars behind it.

How to find it

Start from Mimosa (β Crucis), the eastern star of the Southern Cross. Shift 1° south-east, a sixth of a field: the Jewel Box is the small bright patch hugging κ Crucis. The Coalsack spreads to the south-west, between Mimosa and Acrux; it is best taken in by sweeping slowly with a 7×50.

72 ω Centauri and Centaurus A

Globular cluster · Centaurus



MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
3.7	36'	17,000 ly	Apr – Jun	●○○ Easy	chart 49

What you will see

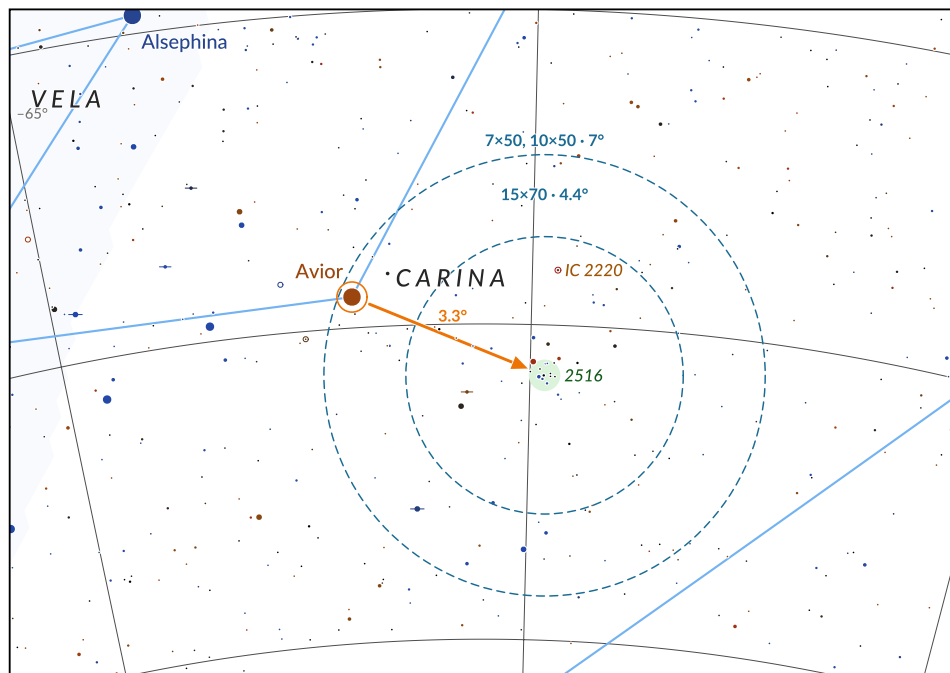
The largest globular cluster in the sky: to the naked eye a fuzzy star of magnitude 3.7, in binoculars a ball of light more than half a degree wide, as big as the Moon, its edge fading gently into the sky. A steadily held 10×50 gives it a grainy texture; a 15×70 on a tripod resolves its edge: it holds ten million of them, 17,000 light-years away. 4.5° to the north, Centaurus A (NGC 5128) is a pale round patch of magnitude 7, a galaxy 12 million light-years away; its dust lane shows only in a telescope.

How to find it

Start from ζ Centauri (magnitude 2.6), halfway between Hadar and Menkent in the middle of the Centaur. Go 5° west, one field: ω Centauri is the big fuzzy ball. Centaurus A lies 4.5° farther north, three quarters of a field; look for it on a moonless night, with averted vision.

73 NGC 2516, the Southern Beehive

Open cluster • Carina



MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
3.8	30'	1,300 ly	Jan – Mar	●○○ Easy	chart 30

What you will see

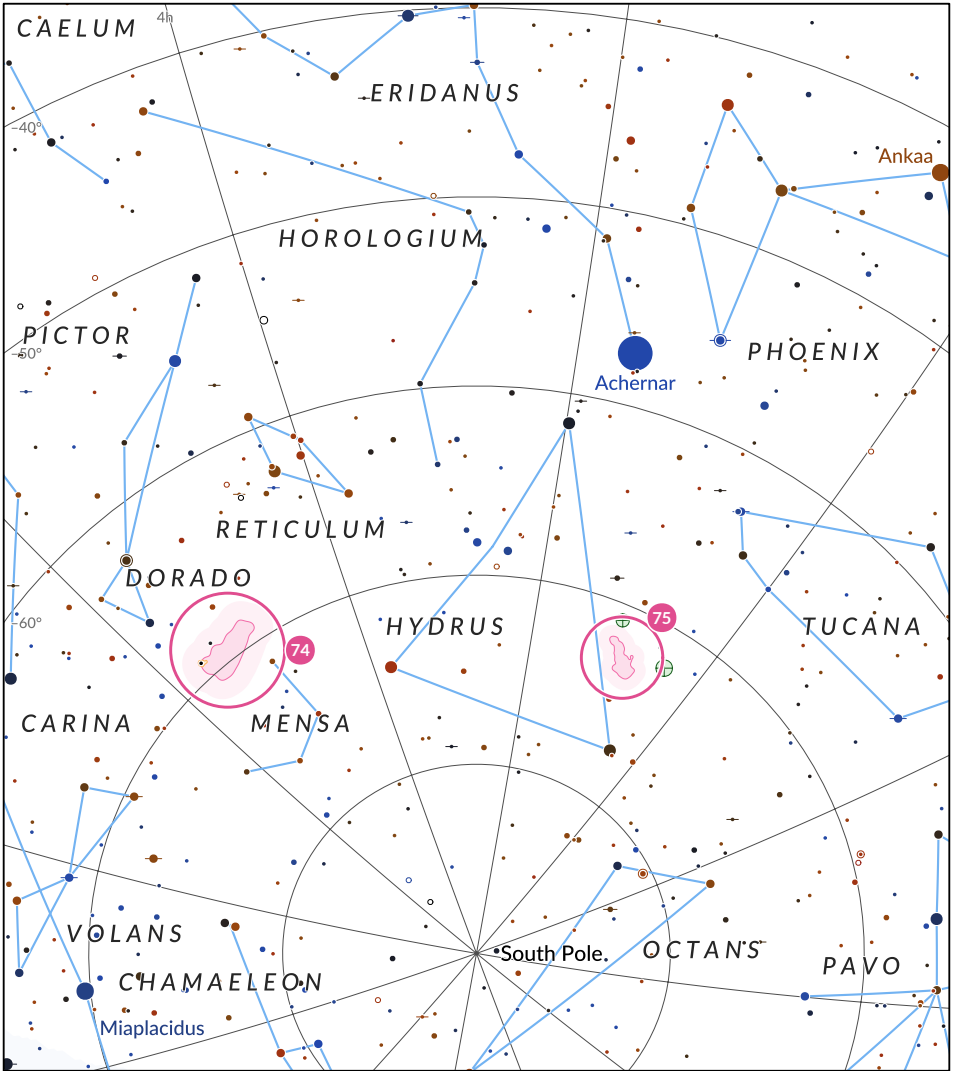
A rich, bright cluster half a degree wide, visible to the naked eye as a hazy patch beside Avior, south of the False Cross. A 7×50 shows it as a grainy cloud of stars; a 10×50 counts a good thirty of them, including a red giant of magnitude 5 at its centre, orange against the white stars. Its nickname, the Southern Beehive, comes from its likeness to M44, which it outdoes in richness.

How to find it

Start from Avior (ε Carinae), the brightest of the four stars of the False Cross. Shift 3° south-west, half a field: the cluster appears at once, a ball of stars that leaps out of an otherwise quiet field.

THE FAR SOUTH

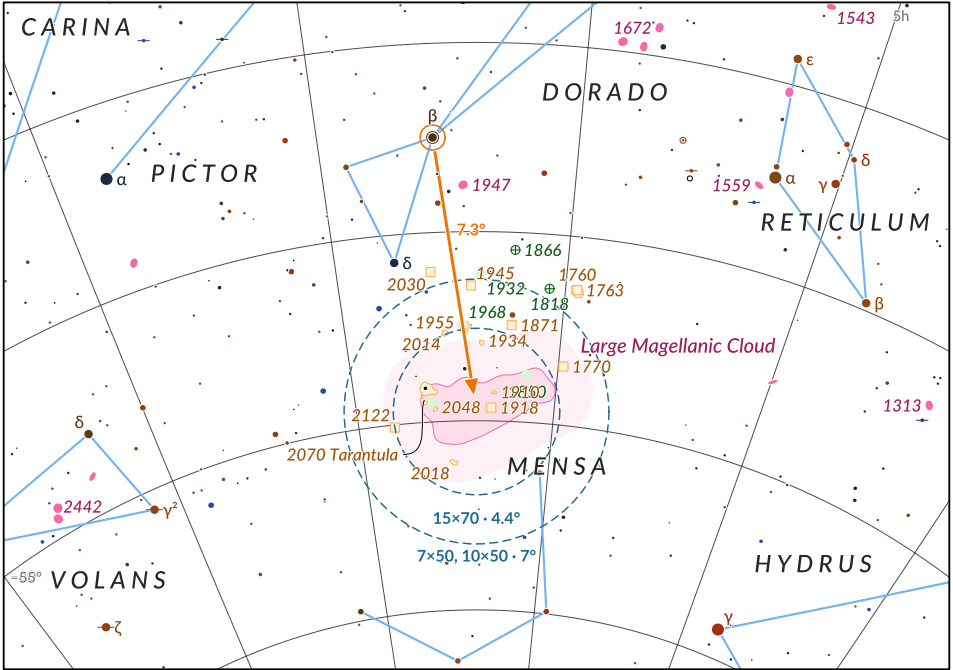
P The Magellanic Clouds, Tucana and Dorado



Objects on this map

74 The Large Magellanic Cloud and the Tarantula

75 The Small Magellanic Cloud and 47 Tucanae



MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
0.4	10.8°	160,000 ly	Dec – Feb	●○○ Easy	chart 20

What you will see

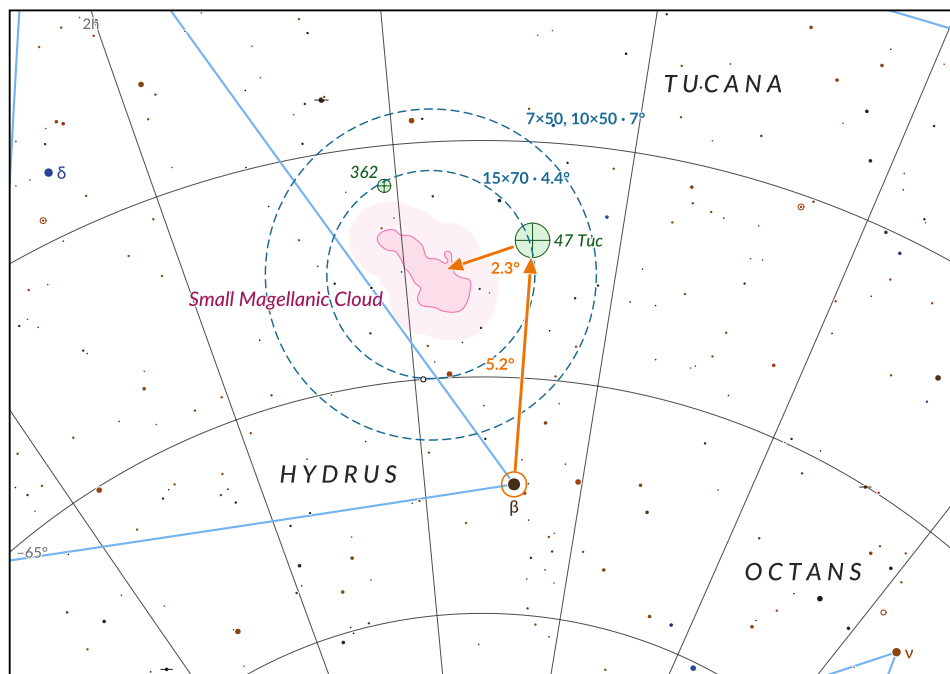
A whole galaxy in the field: the Large Cloud spans 10°, more than a binocular field, like a stray piece of Milky Way. A pale patch to the naked eye, in binoculars an elongated bar of stars running east to west, dotted with dozens of patches and knots: the clusters and nebulae of another galaxy, 160,000 light-years away. The brightest, at the eastern end of the bar, is the Tarantula (NGC 2070): a nebula visible to the naked eye which, placed at the distance of the Orion Nebula, would cover 60° of sky. A 10×50 begins to resolve a few clusters. Sweep slowly: it never gets old.

How to find it

Both Clouds show to the naked eye, like clouds that never move, between Canopus and the south celestial pole. For the Large Cloud, find β Doradus (magnitude 3.5), 12° south-west of Canopus, then drop 7° south, one field: the bar fills the view. The Tarantula is the bright knot at the eastern end of the bar.

75 The Small Magellanic Cloud and 47 Tucanae

Galaxy • Tucana



MAGNITUDE	SIZE	DISTANCE	EVENINGS	DIFFICULTY	ATLAS
2.2	5.3 × 3.1°	200,000 ly	Oct – Dec	●○○ Easy	chart 10

What you will see

The Small Cloud is an elongated patch 3° by 2°, plain to the naked eye, that fits whole in a 7×50: a grainy mist of stars, brighter at its south-western end, with a few knots, the clusters and nebulae of a galaxy 200,000 light-years away. 2.5° to the west, 47 Tucanae (NGC 104) steals the show: a bright, sharp ball of magnitude 4, nearly as wide as the Moon, scarcely less fine than ω Centauri and much closer, a cluster of our own Galaxy in the foreground, 15,000 light-years away. North-east of the Cloud, NGC 362 is a smaller, paler ball of magnitude 6.6.

How to find it

Start from β Hydrus (magnitude 2.8), the bright star nearest the south celestial pole, 21° south of Achernar. Move 5° north, almost a field: 47 Tucanae is the bright ball. The Small Cloud lies 2.5° farther east, in the same field; it shows to the naked eye anyway.