One-Minute Astronomer

Stargazing 101:

A Whirlwind Tour of The Night Sky

(Northern Hemisphere)

A Guide by One-Minute Astronomer

www.oneminuteastronomer.com

Please email, tweet, blog, and pass this e-book around to your friends, family, students, or astronomy club to help as many people as possible discover and enjoy the night sky.

For email updates on what to see in the night sky, or to learn more about stargazing, visit:

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What You Will Discover in this Guide

"Dwell on the beauty of life. Watch the stars and see yourself running with them." – Marcus Aurelius

Nearly everyone loves to look at the stars. For some, a clear night sky brings a sense of peace. For others it brings a sense wonder about our place in the universe. But when it comes to learning the stars, peace and wonder can change to apprehension or confusion. There are so many stars, how is it possible to tell one from the other? And many would-be stargazers believe stargazing is full of complicated terms and math and physics.

Basic stargazing isn't that hard. If you can follow a map to find your way around a new city, you can find your way around the night sky. As you read through this guide, you will discover how to easily find some of the brightest stars and constellations visible from the northern hemisphere. You will find it tremendously rewarding to point to the sky and show your friends or your children the brilliant blue-white star Vega on a summer night, or the constellation Orion on a crisp winter evening. The basic ideas you discover in this short guide will the stage for a lifetime of discovery of the stars, planets, and thousands of star clusters, nebulae, and galaxies.

To use this guide, first read over the section called "The Layout of the Night Sky". You don't have to understand everything here the first time

through. (I sure didn't when I first learned the night sky). But get a feel for the main features of the sky including the celestial poles and celestial equator, as well as the basic motion of the night sky from day to day and month to month. This will help you understand why the stars appear to move slowly during the night and why they change from season to season.

Then start into the "Short Tours of the Night Sky" which are organized more or less by season: spring, summer, autumn, and winter. Start with your current season and go from there. Each has a one-page circular map you can print and take with you for your stargazing sessions, as well as a few tips about how to read the maps. Then move onto the other seasons of the year as your schedule allows. As you get more acquainted with the stars, you may wish to find more celestial sights using binoculars or a small telescope. The last section lists a few resources to get you started.

Take it slowly as you find your way around the night sky. You only need learn the stars once and they will follow you from season to season and from year to year for the rest of your life.

Wishing you clear skies,

Brian Ventrudo, Ph.D.
Publisher, One-Minute Astronomer
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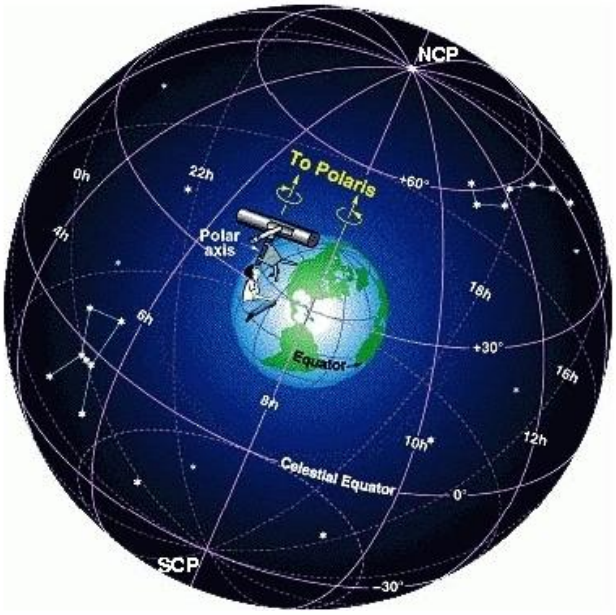
The Layout of the Night Sky

The Celestial Sphere

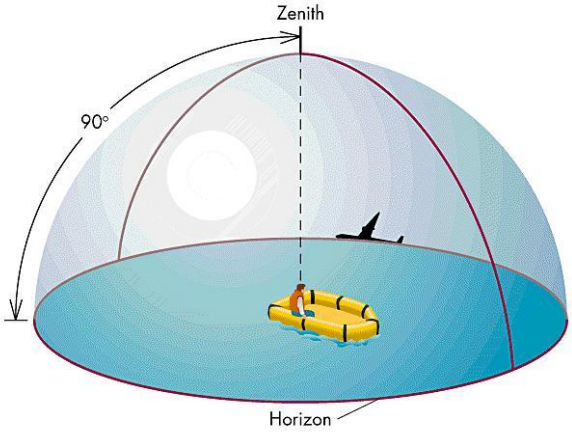
On the next clear night, leave the burdens of the day behind, dress warmly, and wander outside. Find a place with a clear view of most of the sky and, if possible, away from direct light. Look up. You will notice the sky takes on the appearance of a vast hemispherical dome with stars fixed to its inner surface. If the Earth were transparent, you would see the stars on the other half of this starry dome, below your feet, and you'd get the impression you were standing at the center of a velvety-black sphere speckled with stars. Astronomers call this the *celestial sphere*.



The celestial sphere showing the position of the north celestial pole (NCP), south celestial pole (SCP) and celestial equator

While it appears the stars are fixed to this celestial sphere, they are in fact at very different distances, but you cannot directly see this simply by looking into the sky. Ancient stargazers mused the stars may be tens or hundreds of miles away, and thought the stars were holes in the sky to let through the light of heaven. Now we know more. The stars are tens of trillions of miles away, and they are balls of burning gas sustaining themselves from the energy of nuclear reactions in the cores.

But let's get back to the sky. Surrounding you is the full circle at which the earth's surface and the sky appear to meet. This is called the *horizon*. If you're surrounded by structures, trees, and hills, it may be hard to see down to the horizon. If you're on a prairie or desert or the ocean, you should have little trouble seeing the sky down to the horizon.



The horizon, where the sky appears to meet the Earth, and the zenith, directly overhead

The imaginary point on the celestial sphere that is directly overhead, and therefore 90 degrees above the horizon, is called the *zenith*. The point that is 90 degrees below the horizon, which of course you cannot see, is called the *nadir*.

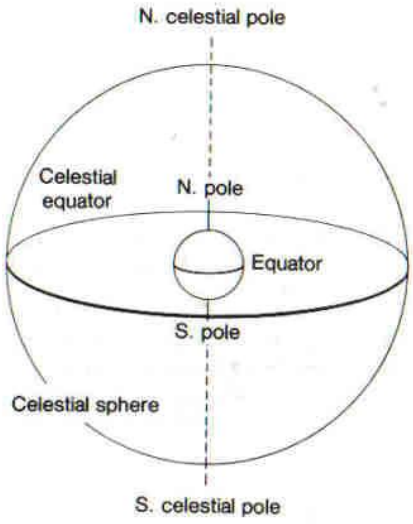
The imaginary points on the horizon which indicate the main directions, north, south, east, and west are known as *cardinal points*. When you can, find out which way lies north. This will come in useful later. Use a compass, a smartphone with GPS, or ask a friend.

The Celestial Poles and the Celestial Equator

Recall how a spherical globe of the Earth has a north pole and a south pole. The celestial sphere also has poles. Directly above the Earth's north pole on the celestial sphere lies the north celestial pole (NCP). Directly above the Earth's south pole lies the south celestial pole (SCP).

If you were standing at the Earth's north pole, the north celestial pole would lie at the zenith, the imaginary point directly over your head. The star Polaris would lie almost directly at this point. It's the same story for the south... the *south celestial pole* (SCP) is directly above the Earth's south pole.

In the northern hemisphere, a moderately bright star—the North Star, also called Polaris— lies almost exactly at the position of the *north celestial pole* (NCP). There is, however, no bright star near the SCP, that is, there is no southern counterpart to Polaris.



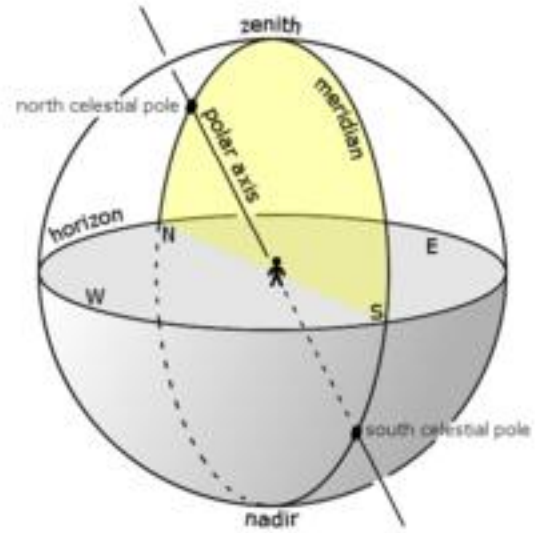
The celestial poles and equator lie above their terrestrial counterparts

As it is with the poles, so it is with the equator. Directly above the Earth's equator lies the *celestial equator*, a circle which goes all the way around the sky and which divides the northern half of the celestial sphere from the southern half (see image above).

If you were standing at the north pole, the celestial equator would coincide with the horizon. And if you were standing on the Earth's equator, the celestial equator would stretch from the south to the north directly overhead. As seen from the equator, the north and south celestial poles would lie on the northern and southern horizon, respectively.

But how about if you're standing at some intermediate latitude, between the north pole and the equator?

In that case, the north celestial pole (NCP) and the north star would lie at some angle above the northern horizon. This angle is equal to your latitude. If you are at the equator, for example, which is 0 degrees latitude, then the NCP (and Polaris) would lie zero degrees above the horizon, that is, on the horizon. At 10 degrees latitude, Polaris would lie 10 degrees above the horizon. And in London, England, which has latitude of 51 degrees, Polaris would lie 51 degrees above the horizon. This is how navigators have determined their latitude for thousands of years... by measuring the angle of Polaris above the horizon.

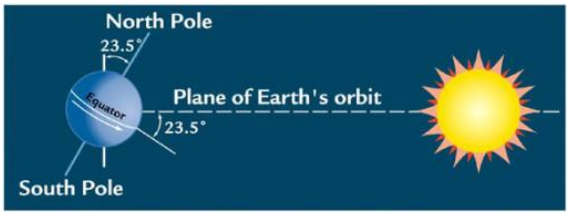


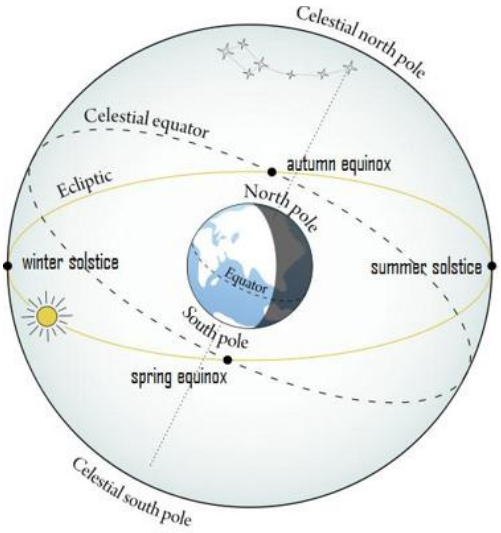
The horizon, meridian, and cardinal points

One more circle… the imaginary great circle that runs from the northern horizon, up through Polaris, through the zenith, then down to the southern horizon is called the *meridian* (again, see image above).

The Ecliptic

The celestial equator goes all the way around the celestial sphere above the Earth's equator. There is another circle that goes all the way around the sky. It is called the *ecliptic*, and it is tilted with respect to the equator by 23.5 degrees.





The tilt of the Earth's axis, showing the plane of the ecliptic inclined to the celestial equator and the position of the equinoxes and solstices.

The ecliptic is the imaginary circle on the sky that marks the annual path of the Sun. It's tilted because the Earth itself is tilted relative to its orbit around the Sun by 23.5 degrees (see above). If the Earth was not tilted in its orbit around the Sun, the celestial equator and ecliptic would be the same circle.

Because of Earth's tilt, the Sun appears highest in the sky relative to the celestial equator when the Earth is at one position in its orbit. This happens on or about June 21, and we call this the *summer solstice* (in the northern hemisphere). When the Earth is at the opposition side of its orbit in December the Sun is at its lowest point in the sky relative to the celestial equator. This is the *winter solstice*. Between the two, the Sun is right on the celestial equator. These are *spring and autumnal equinoxes* when spring and autumn begin. The equinoxes and solstices are four points on the ecliptic.

What's more, since all the planets lie near the same flat plane around the Sun, the ecliptic also marks the path of the planets around the sky as they revolve around the Sun. So every planet, the Sun, and even the Moon, are always found on or very close to the ecliptic during the year.

As it turns out, the great circle of the ecliptic passes through 12 formal groups of stars called *constellations*. This group of constellations is called the *zodiac*, and it includes Aries, Taurus, Gemini, Cancer, Leo, Virgo, Libra, Scorpius, Sagittarius, Capricornus, Aquarius, and Pisces. (The ecliptic actually passes through a 13th constellation, Ophiuchus, but it is not includ-

ed in the zodiac because ancient astrologers regarded the number 13 as unlucky).

You've covered a lot here. Who would have thought the sky has so many points and great circles? It may all seem a little confusing at first. But don't worry. You just need to review this material, think about it on your own, and find these points and circles in the heavens as you examine the sky in the coming weeks and months.

How the Sky Moves

The North Star, Polaris, lies very near the rotation axis of the celestial sphere, right above the Earth's north pole. Since it's almost right on the north celestial pole, Polaris appears to stay nearly fixed in the sky all night and all year, just as the Earth's north pole stays fixed as the rest of the Earth's surface moves around it. Any other star on the celestial sphere south of Polaris rotates in circles of increasing diameter about the rotation axis. It's the same with the south celestial pole. Stars above the Earth's equator trace out the largest circles around the sky during their daily motion across the celestial sphere as the Earth turns. And south of the equator, stars trace out circles with smaller apparent diameters as they lie closer to the south celestial pole. The image below gives you a better idea of how the stars appear to rotate during the day.

Star trails caused by the apparent rotation of the celestial sphere around a celestial pole

Like the stars and planets, the Sun also appears to move on the celestial sphere. If you measure the time when the sun is highest in the sky, you will find it takes exactly 24 hours for the sun to move all the way around the celestial sphere and return to its highest point. In fact, that's how we define a "day", or what astronomers formally call a *solar day*.

How about the stars? If you go out at night and select a star to observe, and measure its position on the celestial sphere, you will find it takes 24 hours to move all the way around the sky and get back to the same spot.

Well, almost 24 hours.

If you measure accurately, you'll find it takes only 23 hours and 56 minutes for a star to get back to the same position in the sky as it was the night before. That's because, during the day, the Earth revolved around the sun by 1/365 of its orbit. So each day, you look in a slightly different direction in space, and this causes every star to appear to rise 4 minutes earlier each night. In two weeks, the star rises about an hour earlier; in one month the star rises 2 hours earlier, and in 12 months, it appears to move all the way around the sky back to the position at which you first saw it the previous year.

This apparent motion where the stars rise a little earlier each night, which is caused by the Earth's revolution around the Sun, explains why the stars you see in the night sky in each season are different than the stars you saw during the last season.

Now that you have some idea of the layout of the sky and how it appears to move each day and during the year, let's have a look at what you can actually see in the night sky each season.

As mentioned in the introduction to this guide, your first pass through this section may not be completely clear. It takes time and a little thought and experience to figure this out. Be patient. As you learn the sky, these concepts will become clearer to you.

Short Tours of the Night Sky

How to Read a Star Chart

Learning the sky is really no different than learning the streets of a new city or town. A simple map is the best way to get oriented. Of course, as you start out finding your way around town, you don't need a detailed map with elevations and minute detail of every house and tree down to the square meter. You just need a basic map showing the major streets and landmarks, and how to get from place to place.

So it is with star charts. Many advanced amateur astronomers use highly detailed star atlases that have thousand of stars and deep-sky objects, along with markings of celestial coordinates down to the degree. When you're just starting out, you don't need that. You just need a good, basic star chart that shows you where to find the bright stars and main constellations at a particular time and place.

In this guide, that's what you'll get… four star charts, one for each season, to show you the highlights of the sky.

But first, a word about how to read these charts…

The four charts below show you what you can see from the northern hemisphere at 40 degrees north latitude at 9 p.m. on May 15, August 15, November 15, and February 15.

As mentioned above, because of the revolution of the Earth around the Sun, the stars appear to change slowly each week and month. It turns out the **stars rise about an hour earlier every two weeks**. So these star maps are just as valid if you use them at 8 p.m. two weeks later on June 1, September 1, December 1, and March 1. Or at 10 p.m. two weeks earlier on May 1, August 1, November 1, and February 1, and so on.

As another example, the star chart for August 15 at 9 p.m. will also give you the correct star positions for May 15 at 3 a.m. Or at midnight on April 1, the stars you see will be the same as shown in the chart for May 15 at 9 p.m. because the stars rise 3 hours earlier on May 15 than on April 1. So for most nights of the year, you can use one of these maps early in the evening, and another map a few hours after midnight to get a fairly accurate representation of the sky. This takes a little thought and may be confusing at first, but it will all become clear to you as you gain experience observing.

The charts below try to represent a hemispherical sky on a flat surface. The edge of the chart represents the horizon, and the center of the chart is supposed to represent the zenith (the point directly overhead) at 40 degrees north. East and west are reversed compared to a map of the Earth, but they will point in the right directions when you raise the map over your head. Remember… we are looking at the celestial sphere from the inside, whereas maps of the Earth are drawn as if we look at its surface from above.

If you live south of 40 degrees north latitude, the stars over the southern horizon will appear slightly higher and the stars over the northern horizon will appear slightly lower than shown on the maps. The opposite is true if you live north of 40 degrees north latitude, and some stars over the southern horizon in these maps may not be visible because they are below the horizon.

Print each of the four circular maps and take them outside with you. To read these circular star charts, here's what to do…

• Find a location that's isolated from street and house lights. Stray light will make it harder for you to see fainter stars. Also, for the same reason, try to avoid nights with a full moon or too much haze when you go star-gazing.

• Once you go outside, give your eyes at least 5 or 10 minutes to become adapted to the dark. To best see the star charts, use a red flashlight or a white flashlight covered with red plastic. The red light will preserve the sensitivity of your eye for night viewing.

• Pick a direction to face, say, south, and rotate the chart so south is at the bottom. Now raise the chart overhead. The directions on the chart will now correspond to the directions in the sky.

• Don't try to take in the whole sky at once. Choose a quarter of the map, preferably one with several bright stars or a large well-known constella-tions like Orion or Ursa Major (of which the Big Dipper is a part). Now,

look up at the quarter of the sky that corresponds to the quarter of the map. Make a connection with what you see in the sky with what you see on the map. Take your time… it's a little strange and overwhelming at first.

• Learn a few more stars at a time… don't rush. Once you've identified a few bright stars and constellations, move from what you know to what you don't know. Once you've learned most of a quarter of the sky, move to another quarter.

• Remember… while the charts are set for 9 p.m. local time, they are still useful for an hour or two on either side. The stars will appear in about the same position, except for the stars near the horizons. After 3 hours, the stars will have turned 1/8 of the way around the sky. And after 6 hours, they will have turned 1/4 of the way around the sky. The stars in the west will have set; new stars in the east will have risen.

• If you see an out-of-place star near the ecliptic (and in one of the constellations of the zodiac), it's almost certainly a planet. Since the planets move around in the sky from month to month, you will need to consult an almanac or website to figure out which planet you are seeing. *Sky and Telescope* is an especially good place to check. The positions of the planets are also reviewed each month at *One-Minute Astronomer*.

That's all there is to it. Well, that and a whole lot of practice. Be patient, and savor your personal discovery of each new star and constellation.

The Spring Sky

The sky at 9 p.m. on May 15 from 40^{o}N latitude

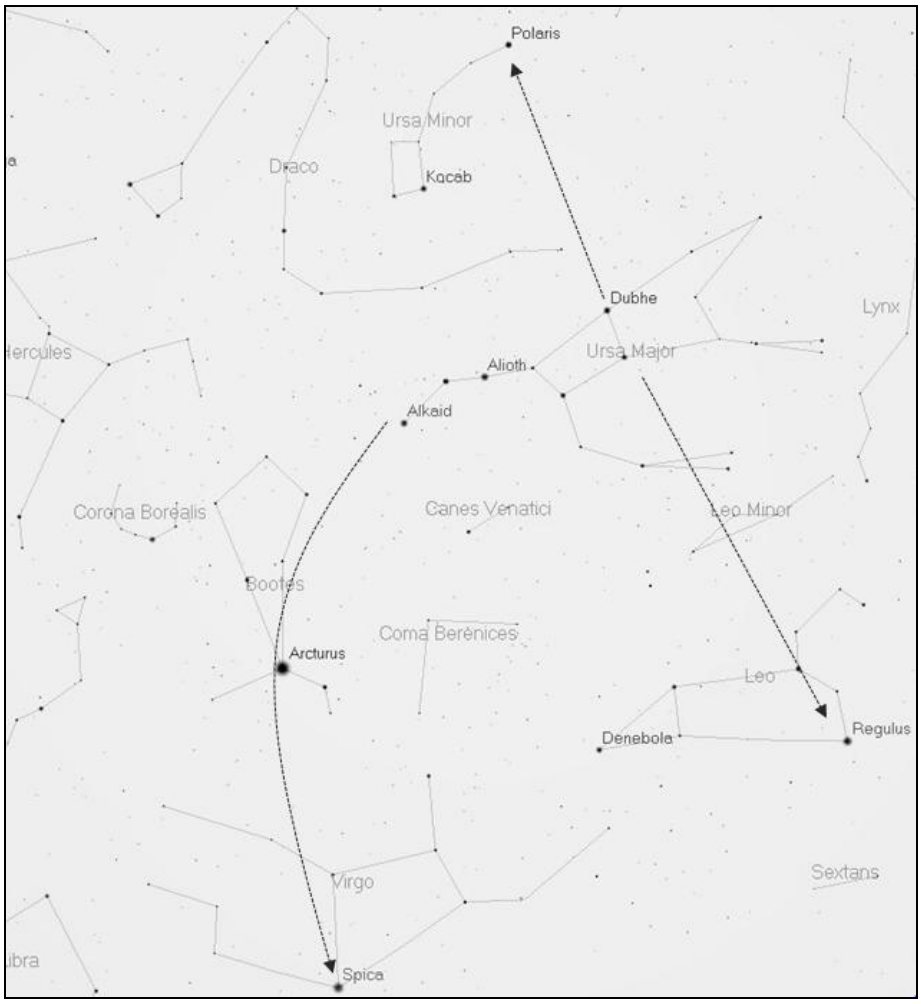
The Sky from April to June

In April through mid-May, a few bright stars from winter constellations linger in the western sky about half an hour after sunset. The bright yellow-white star Capella low in the northwestern sky is especially striking, as is the pair of stars Castor and Pollux just above the western horizon. Have a quick look for these bright stars, but don't spend too much time. You will meet them again in mid winter.

The stars of the "Big Dipper" are the easiest to find this time of year, and they will help you find many other spring constellations. To find the Dipper, just look up in the hours of early evening as darkness falls, and there it is, spanning as much sky as your outstretched hand held at arm's length. The Dipper itself is not a constellation, but is rather part of the larger constellation Ursa Major, the Great Bear.

The two front stars of the bowl of the Dipper are known as the "Pointers" because they point northward to the North Star, Polaris (see image below). This star is less than a degree from the north celestial pole, so when you face Polaris, you are facing north. Polaris is the tip of the tail of the constellation Ursa Minor (also known as the Little Dipper). Follow the "Pointers" in the other direction to find the bright white star Regulus in the constellation Leo, the Lion. The mane and head of this large constellation look like a large "reverse question mark" about as large as your fist held at arm's length. The body and legs of the Lion lie east of the head.

Stay with the Dipper and follow the arc of its curved handle away from the "bowl" to the brilliant yellow-orange star Arcturus. Remember it this way: "Follow the arc to Arcturus". This star is the brightest in the kite-shaped constellation Bootes, the Herdsman. Look just northeast of Arcturus to find the unmistakable semi-circle of Corona Borealis, the Northern Crown.



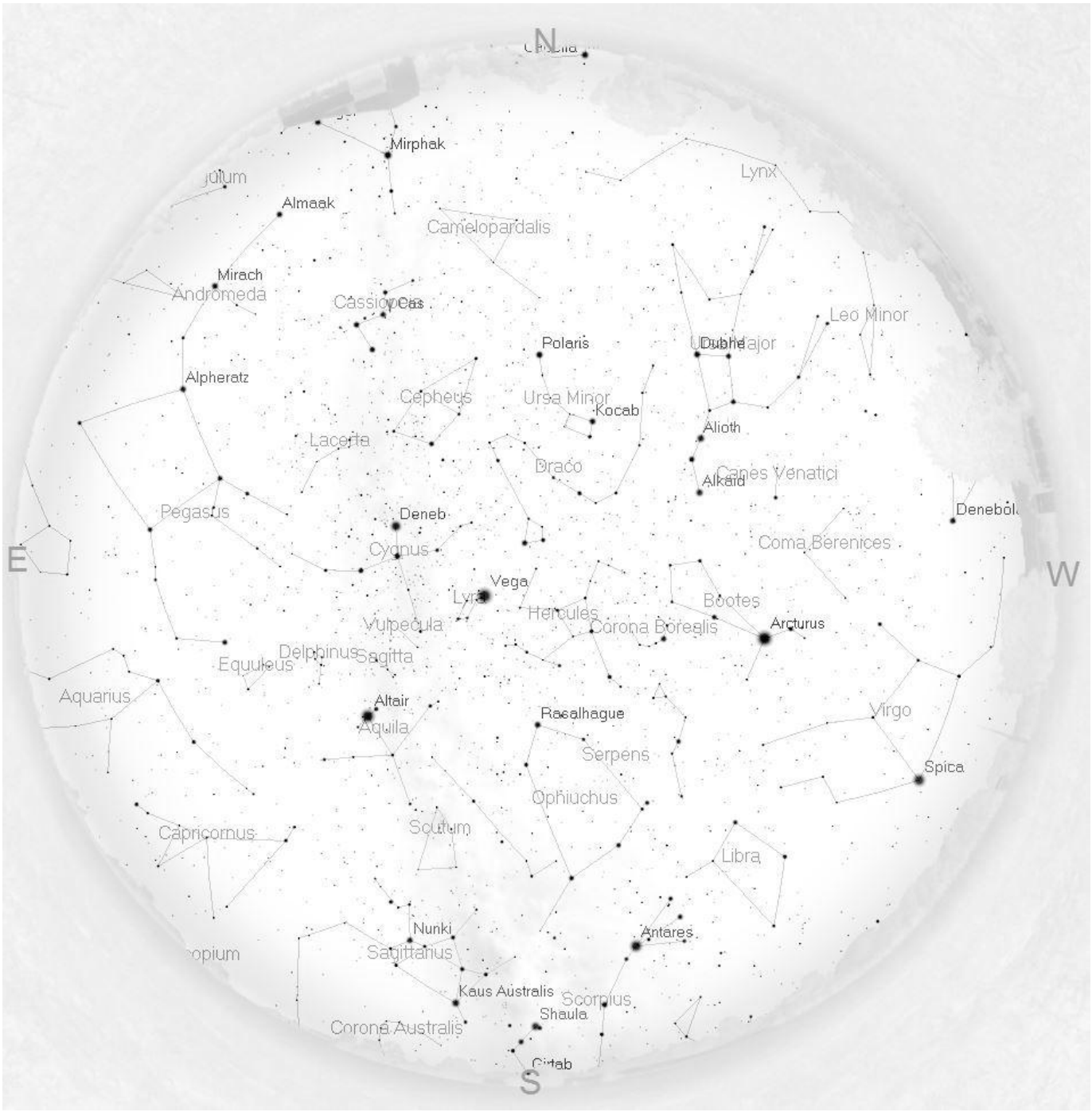
The Big Dipper points the way to the north star Polaris, the bright star Regulus in the constellation Leo, and the bright stars Arcturus and Spica

Now keep following the arc from the handle of the Big Dipper through Arcturus to a bright icy-white star well above the southern horizon in mid-evening in spring. This is the star Spica ("SPEE-ka") in the constellation Virgo.

In the northern spring sky at this time of year you are looking out of the plane of the Milky Way galaxy into the dark, starless space between galaxies. You only see a few bright foreground stars in this part of the sky. With a telescope (and some practice), you can see hundreds of distant galaxies in this region of the sky, especially the galaxies of the Virgo galaxy cluster, which lies just southeast of the star Denebola in Leo, and under the handle of the Dipper in Canes Venatici.

Key Sights in April-June: The Big Dipper; Polaris, the North Star; Regulus and the constellation Leo; the bright stars Arcturus and Spica; Corona Borealis, the Northern Crown. Above the western horizon after sunset lie the bright yellow-white star Capella and the stars Castor and Pollux in the constellation Gemini

The Summer Sky



The sky at 9 p.m. on August 15 from 40^{o}N latitude

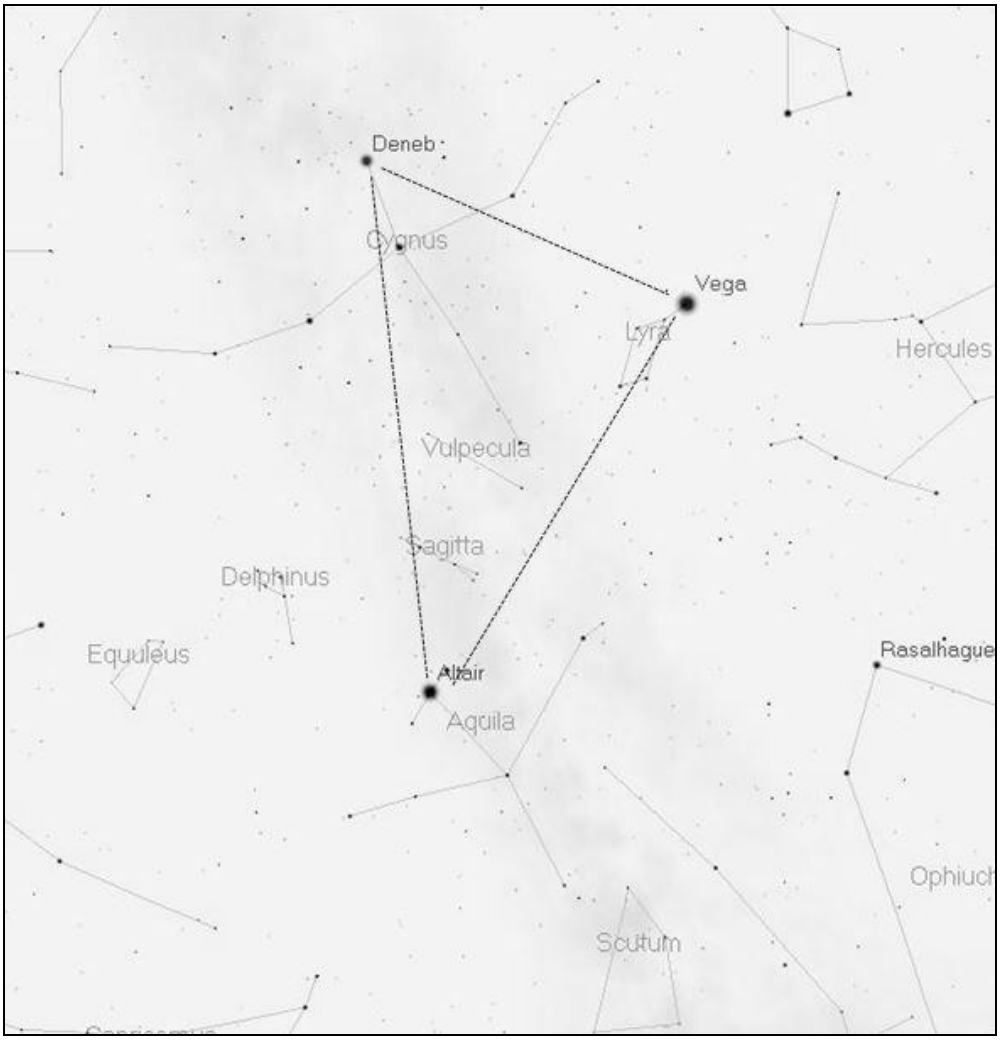
The Sky from July to September

By 9 p.m. on August 15, the stars have moved westward by 90 degrees since mid-month in May. Leo, which was just past overhead in the spring sky, has now set in the west. The Big and Little Dippers have also made a quarter turn around Polaris relative to their position at the same time on May 15. In between the Big Dipper and Little Dipper lies the long, winding, and dim constellation Draco, the Dragon.

But new constellations have risen in the east, bringing into to view the bright stars of the summer sky. High overhead you will see the dazzling blue-white star Vega in the small constellation Lyra, the Lyre. The constellation looks like a little parallelogram formed by four blue-white stars that are fainter than Vega. This star group is about as large as three fingers held side-by-side at arm's length.

The larger constellation Cygnus and its bright star Deneb lie northeast of Vega. Cygnus is supposed to represent a flying swan, but its most easily recognized as its informal name, the "Northern Cross". Further to the southeast you will see the bright star Altair in the eye of the constellation Aquila, the eagle. The stars Vega, Deneb, and Altair form what's known as the "Summer Triangle". You can follow the triangle on its slow path westward each night well into late autumn. Next to Vega, almost directly overhead, you'll see a "keystone"-shaped group of four stars which marks the body of the constellation Hercules. The Keystone is a little larger on each edge than the parallelogram of Lyra is long.

Look also for the tiny constellations Delphinus and Sagitta. They look very much like the dolphin and arrow after which they are named.



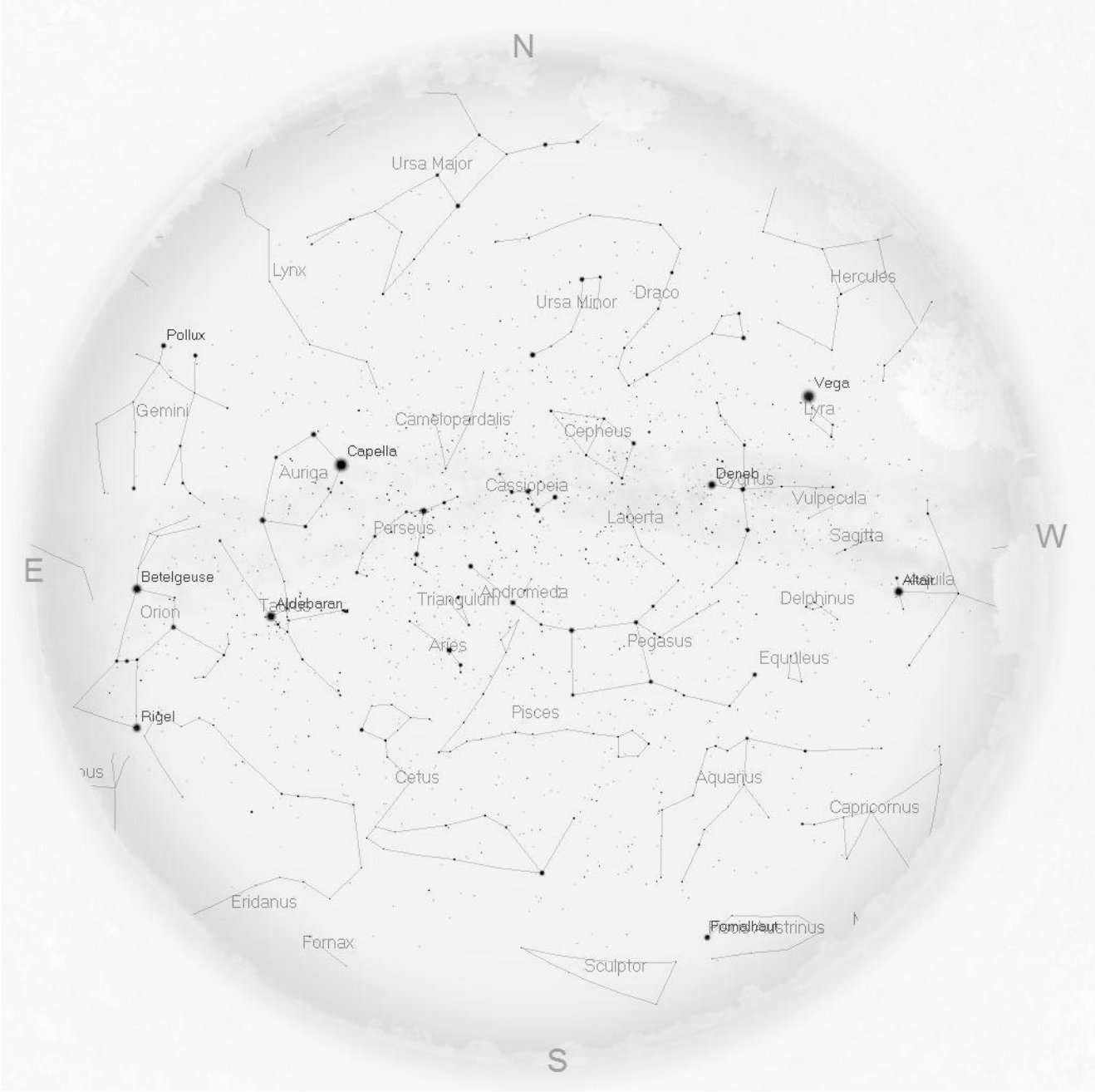
The "Summer Triangle" lies nearly overhead in late summer evenings as seen from the mid-northern hemisphere

Perhaps the finest celestial sights of the northern-summer sky lie above the southern horizon. That's where you'll find the long band of star clouds of the Milky Way in the constellations Scorpius and Sagittarius. Scorpius represents a celestial scorpion, and it does so convincingly, with its claws pointing northward and its curved stinger dipping southward. Antares is the very bright red star at the heart of the Scorpion in the south-southwest. The Milky Way grows thickest in the southeast in the teapot-shaped constellation Sagittarius. This constellation is thick with star clusters and nebulae where new stars are forming. If you have dark sky, you will see some of these clusters and nebula with your unaided eye as faint misty patches of silver-white. These are dazzling sights in binoculars or a small telescope.

Towards Sagittarius lies the center of our galaxy, which is why the star clouds of the Milky Way appear so thick in this part of the sky. These star clouds are very difficult to see from urban areas where bright city lights wash them out, but they are very obvious in clear sky far away from city lights.

Key Sights in July-September: The "Summer Triangle"; bright stars Vega, Deneb, and Altair; the constellations Lyra, Cygnus, Scorpius, and Sagittarius. The long band of star clouds of the Milky Way.

The Autumn Sky



The sky at 9 p.m. on November 15 from 40°N latitude

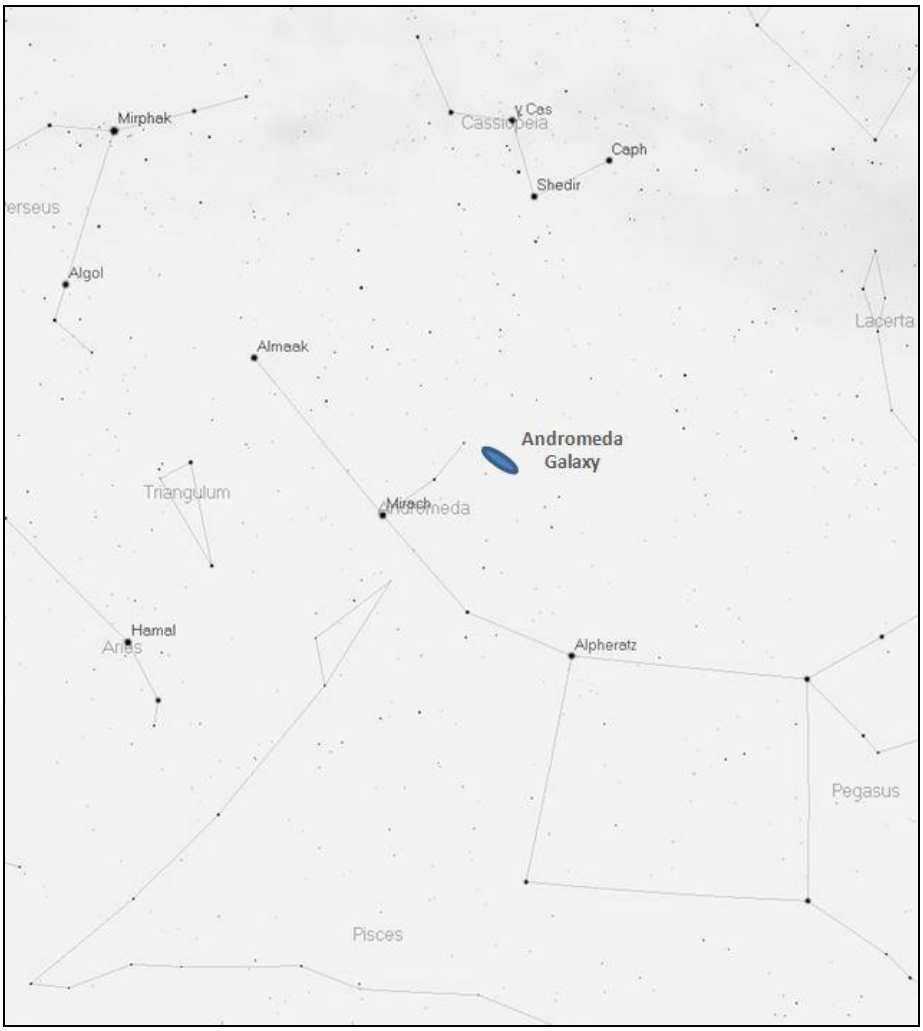
The Sky from October to December

The sky has made another quarter turn in the three months since August as the Earth moves around the Sun. The Summer Triangle has worked its way westward during the northern autumn. The rich band of the Milky Way in the constellation Sagittarius disappears into the southwest. The Big Dipper has turned low in the northeast. If you have an unobstructed view of the southern horizon, you'll see the star Fomalhaut ("FOAM-a-lot") in the constellation Piscis Austrinus, the Southern Fishes. Because it's the only bright star in this part of the sky in the northern hemisphere, Fomalhaut is sometimes called the "Lonely Star of Autumn".

Rising in the northeast sky, look for the large constellation Perseus and above it the W-shaped constellation Cassiopeia. This constellation reveals many fine star clusters to an observer with binoculars or a telescope. Below Perseus, low in the northeast, the brilliant star Capella, which you saw setting in the northwest in the spring, rises again and gets a little higher each night as the autumn wears on.

Perhaps the most conspicuous constellation of a northern autumn is Pegasus, the winged horse of Greek legend. The body of Pegasus comprises the "Great Square", which lies just southeast of the zenith in mid-November and spans as much sky as your closed fist. Attached to Pegasus is the constellation Andromeda, which harbors the nearest major galaxy to our own. The Andromeda Galaxy can be seen easily with the unaided eye in dark sky as a faint, misty, oval patch near the star Mirach in

Andromeda. But don't underestimate this dim fuzzy patch… it's actually a galaxy like our own Milky Way, though somewhat larger, with some 200 billion stars. The light from the Andromeda Galaxy has been traveling through space for 2 million years before it enters your eye.

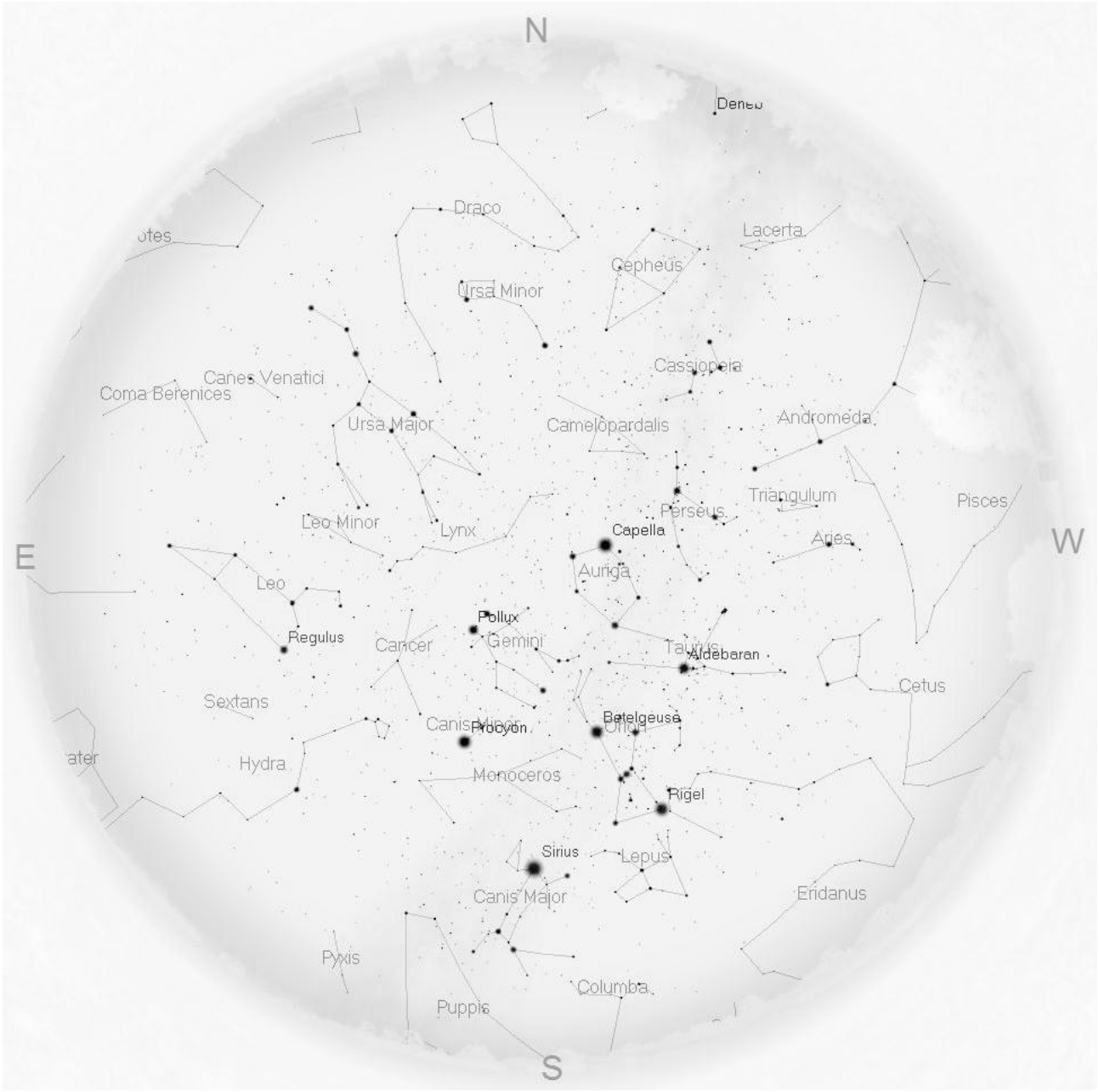


The "Great Square" of Pegasus lies overhead on northern autumn evenings. The position of the Andromeda Galaxy is shown in this map

In November later in the evening look to the east for the rising Pleiades star cluster, which lies within the small V-shaped constellation Taurus, the Bull. The appearance of Taurus with its bright orange star Aldebaran marks the coming of winter in the northern hemisphere. East of Taurus, in late November and December look for the grand constellation Orion, the Hunter, rising above the eastern horizon. The tidy line of three bright stars marks the "belt" of the ancient constellation.

Key Sights in October-December: The lonely star Fomalhaut; the "Great Square" of Pegasus; the constellations Pegasus and Andromeda, Cassiopeia, and Perseus; the Andromeda Galaxy; the Pleiades and the constellation Taurus; a first glimpse of Orion.

The Winter Sky



The sky at 9 p.m. on February 15 from 40^{o}N latitude

The Sky from January to March

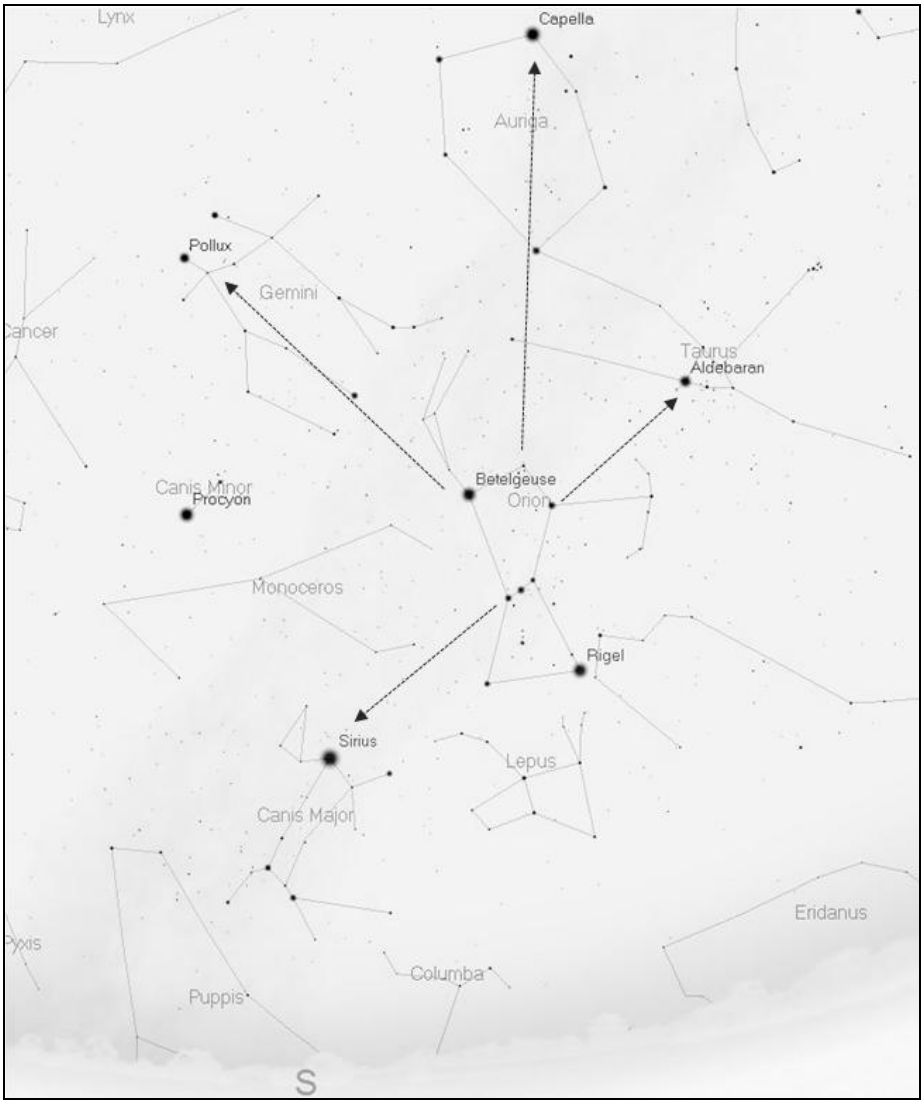
Pegasus and Andromeda sink into the west after December. The Big Dipper lies low in the northeast.

High over the southern horizon in the winter months you see the grand constellations of winter: Orion, Taurus, Auriga, Perseus, Cassiopeia, Gemini, and Canis Major. These constellations are rich with stars and star clusters. Overhead in January and February lies a grand octagonal collection of brilliant stars: Capella, Castor and Pollux, Procyon, Sirius, Rigel, Aldebaran, and Betelgeuse. These stars are a spectacular sight on a dark winter night.

Orion, the Hunter, is the feature constellation this time of year in both hemispheres, and it makes a good base of operations to find other constellations. It takes little imagination to see a hunter outlined in these stars. Above the little line of three stars in the belt are two stars marking his shoulders. His left shoulder is the bright orange-red star Betelgeuse. Below his belt are two feet; the right foot is the bright blue star Rigel. Hanging off his belt are three fainter stars. This is the "Sword of Orion". Look carefully at the middle star in the Sword. You will see it is slightly fuzzy. In fact this middle star is not a star at all. It is a nebula, a misty patch of glowing hydrogen gas where new stars are forming.

Follow a line from Orion's Belt to the south and east to see find blue-white star Sirius, the brightest star in the heavens. The star is part of the con-

stellation Canis Major, the Big Dog. North and slightly east of Sirius lies the star Procyon ("pro-SY-on") in Canis Minor, the Little Dog.



The constellation Orion in the southern sky in mid winter.

Follow the belt of Orion to the northwest to find Taurus and the bright star Aldebaran. Follow a diagonal from blue-white Rigel at the foot of Orion through orange-red Betelgeuse in his shoulder to find the stars Castor and Pollux in the constellation Gemini, the Twins. And directly above Orion you'll find the constellation Auriga, also set in the Milky Way. Its bright yellow-white star Capella twinkles almost directly overhead.

By mid-February through March, look to the east. Here you will see rising the constellation Leo once again and a few of the same stars you met in the spring sky. At winter's end, the Earth has nearly made a full trip around the Sun, and the cycle of stars and constellations through the year begins again.

Key Sights in January-March: The bright octagonal group of stars Capella, Castor and Pollux, Procyon, Sirius, Rigel, Aldebaran, and Betelgeuse. The constellations Orion, Gemini, Canis Major, Taurus, and Auriga.

What to Do Next

"Do not be afraid to become a stargazer. The human mind can find no higher exercise." – Garrett P. Serviss

The short tours in the guide have taken you on a whirlwind tour of the night sky through the year. You've discovered the basic layout of the sky and how it appears to move from day to day and season to season. You've toured the brightest stars and constellations visible each season in the northern hemisphere.

And perhaps you've discovered an amazing thing… that knowing something about the night sky makes it more interesting, not less.

If you are ready to learn many more stars and constellations as well as star clusters and nebulae, look for the detailed tour of the night sky with a pair of binoculars in the course called *"Stargazing for Beginners: A Binocular Tour of the Night Sky"*. It's a great "next step". You can learn more about the course at this link.

Also, you can get regular e-mail updates from *One-Minute Astronomer* about astronomy and stargazing along with a series of free e-books (including this one) to help you understand more about what to look for in the night sky and about how to select equipment such as binoculars or a small telescope. You can get a free subscription to *One-Minute Astronomer* at this webpage…