

Your First Observing Session – an illustration

(reasonably accurate in winter & spring)

What can I see?

A lot depends on where you are located. Things such as light pollution (the glare of streetlights, etc.) and weather conditions often hide many of the stars. If you stargaze from a dark clear site thousands of stars are visible using just your eyes (using binoculars dramatically increases that number, and can show you things other than stars). Let's go outside and take a look around.

What equipment do I need?

Surprisingly little. You can make your observing sessions as simple or as complex as you'd like. For the purposes of your first stargazing session, all you need is a lawn or lounge chair, or maybe a blanket (if you lay on the ground), and a flashlight (preferably with the end covered in red plastic). Remember to dress like it's 20 degrees cooler than it really is - evening temperatures drop fast, and you won't be moving around much. Optionally, bring along a pair of basic binoculars to extend your visual abilities. If you couldn't get totally away from a streetlight, try to position yourself near some edge that can block it out. And you really need a planisphere or star chart of some type.

What are those?

A star chart or planisphere is a very useful tool to have, like a roadmap to the heavens. A star chart is usually circular in shape and represent how the sky above us appears at a specific time of the year. Notice the use of thin lines between stars to help you see the patterns that make each individual constellation (an established & named group of stars). A planisphere is similar, except the star map is on a disc which can be rotated to represent the stars at any time of night and day of the year. To use either of these, hold it above you and turn it so that North on the chart is pointing to actual North (we'll get to that soon). On star charts and planispheres, the brighter the star is, the bigger the dot that represent it. Use only as much light as you need to read the chart.

Under the stars...

OK. Here we are, enjoying the great outdoors. The sun set at least an hour ago, and twilight has finally succumbed to nightfall. The sky is nice and clear, with nary a cloud to block our view. Take a good look around you - isn't it glorious? The darker your location, the better the view (so also avoid evenings when there's a big fat moon in the sky). The longer you look, the more stars you can see, as your eyes adapt to the dark over 20 minutes or more. Why, you may even see some odd-looking dim fuzzy patches up there. These patches often will disappear if you look directly at them, a sure sign of an interesting binocular target for later.

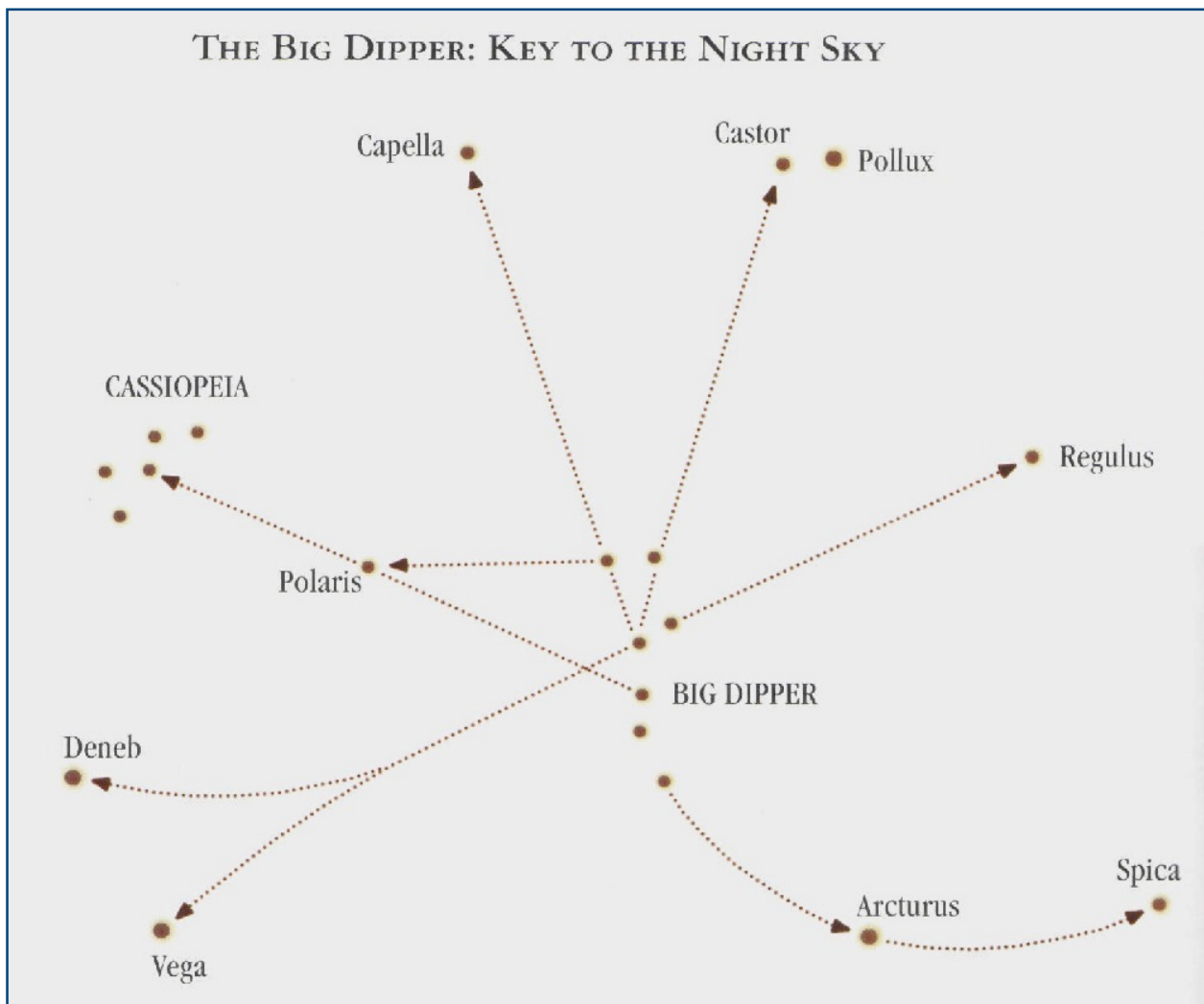
The first thing to do is find the constellation *Ursa Major* on the star chart (if it's not clearly seen you might attempt this part later in the evening – for now jump down to 'Moving South'). Notice its placement on the chart – to get oriented, note that the chart's center represents straight up, and its edges represent the horizon. Now try to pick out that constellation in the stars – it's in the northern part of the sky (there's that North thing again).

The first thing you'll notice is that the constellations look a LOT bigger in the sky than they appear on the chart, which is unavoidable since the whole sky has been compressed to a single page. And it's likely you'll see a lot more stars in the sky than are shown on the chart. Basic star charts usually only depict the brighter stars, to reduce confusion.

If you found Ursa Major, you should at least be able to see the seven stars that make up the main familiar part that we call the *Big Dipper* (4 stars form a bowl, and the other three stars make up a

slightly curving handle). Find the two stars of the bowl that are opposite from the handle. Now, draw an imaginary line in the sky from the bottom bowl star thru the top bowl star, extending the line way over till you come very close to another star a little dimmer than the Dipper stars. This new star is called Polaris, or the North Star. As you can see, it's not that bright, contrary to what many think. It also happens to be the tip of the tail of Ursa Minor the Small Bear (which is the same as the end of the handle of the Little Dipper, a much harder to recognize pattern).

The technique you just used to find Polaris is called *star-hopping*. This means that we can find stars and other objects by their position relative to easier-to-find objects. Trace a line with your finger on the properly positioned star chart, then try to trace the same line with your finger in the sky. Check the diagram below for other valuable star-hops the Dipper stars can provide. Other ways to star-hop include visualizing geometric shapes formed by the stars, with the object you are seeking being one of the points of the shape, or maybe being in the center of the shape, etc.



So what makes Polaris so special, and a great starting point? Well, it's located very close to the Celestial North Pole, which defines the 'pivot point' of our sky. It's the only star that seems to stay put - all the other stars in the sky seem to revolve around Polaris. Rising in the East and setting in the West, they trace out great arcs in the sky (which are plain to see if you take a long time-exposure photo of the sky). If your night sky is clear, you can always find your compass directions – when facing North, East is on your right, West on your left, and South is behind you.

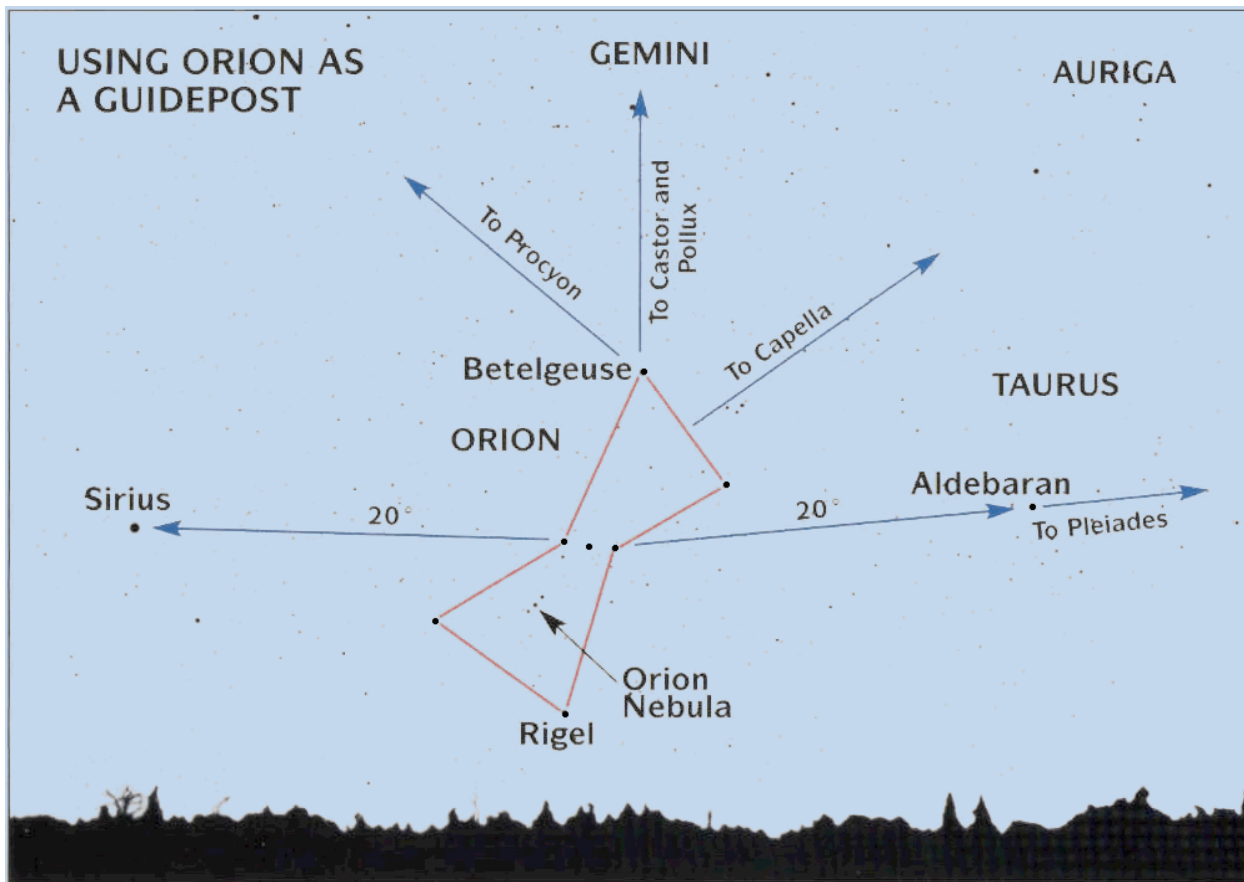
Now let's try a star-hop over to Cassiopeia the Queen, with its distinctive M-shape, on the other side of Polaris from the Dipper. From the diagram above you can see exactly how to form a line from one handle star thru Polaris that will point right to Cassiopeia. Did you find it? Note that Cassiopeia (as it rotates around Polaris) appears in many different orientations during a year, and is generally low & hard to see after April.

Are you getting the hang of this? If it's March or later (or late in the evening), you can try a more ambitious star-hop, covering a lot of sky. Look at the lower right part of the Dipper diagram above – can you see a long arc traced from greatly extending the curved handle of the Dipper thru two bright stars in the east/southeast sky? Well, that is the basis for a saying often quoted by stargazers - “arc to Arcturus, then spike to Spica”. Cool, huh? Well, this memorable adage really helps us to remember the rather lengthy star-hop...even accomplished astronomers use it!

Moving south...

If you are blessed with a really dark sky, parts of the winter Milky Way just might materialize, looking like a thin hazy cloud extending from north of Cassiopeia all the way over to the southern horizon just left of Orion. While our galaxy is not nearly as obvious in the winter as in the summer, it is still a region rich with tiny stars & other celestial objects when viewed with binoculars. You are literally viewing the disk of our galaxy from the inside out!

For most of the winter & early spring, the other well-known ‘sign-post’ constellation hangs out in the southern sky – Orion the Hunter. Many folks are already familiar with this fellow, and know that the short line of 3 equal stars in the middle forms the Hunter's belt. The bright orange-red star above the belt is Betelgeuse (literally ‘armpit’ in Arabic) and others nearby constitute the upper torso, while blue-white Rigel & stars beneath the belt form legs, feet, etc.



Also in our diagram arrows show various possible star-hops to nearby bright stars & their associated constellations. Following the line of the belt stars to the left (and down a little) leads to Sirius, the brightest star in our sky. Your star chart should show it at the top of Canis Major, the Big Dog. Likewise you can follow the same line to the right (and up some) to find Aldebaran, a yellow-orange star, which is the eye of Taurus, the Bull. If your sky is fairly dark you will see that Aldebaran is on one tip of a V-shaped group of stars – this V is the lower part of the horns of the Bull. If you continue going to the right (west) past Aldebaran, you'll soon come close to what may look like a fuzzy patch. Upon looking more closely, you'll see a little dipper-shaped cluster of 6 or 7 stars. This is **not** the Little Dipper, which is in the northern sky – it's a truly unique object.

This little group of stars is known as the *Pleiades*, or Seven Sisters, and can be seen in the emblem on the front grill of every Subaru vehicle. Interesting, huh? Legend has it that American Indian tribes tested the eyesight of their scouts by having them count the number of stars they could see in it - how many can you see? The Pleiades is now known to be a young 'open cluster', stars that were born together & remain close together in space. The Pleiades look great in binoculars.

Branching out...

You may want to try the other star-hops indicated on our diagram above – in particular follow the up-arrow all the way to the constellation Gemini (the Twins), with its two bright stars Pollux & Castor side-by-side representing the heads of each stick-figure twin. Not far from here is another fine winter/spring open cluster called the 'Beehive' (also labeled M44). It is located in the center of the constellation Cancer, which is dim & difficult to find - but you should be able to detect the Beehive as a large smudge located midway between bright constellations Gemini & Leo. It's hard to make out individual stars, but this expansive cluster should be obvious particularly when you don't look directly at it – this is called using averted vision.

Now you should be aware that often there are a few bright 'stars' in the sky that aren't shown on your star chart, and thus can cause confusion when star-hopping. These are one or more of the brighter planets (Venus, Mars, Jupiter, Saturn), which are typically only shown on charts that are custom printed for the current month. They change position amongst the stars over a period of days or weeks, which is how they came to be called planets (comes from the Greek word for 'wanderer'). To tell planets from stars at a glance note that stars tend to twinkle much more....

OK. So now we know how to use a star chart to identify various constellations and find some neat celestial objects. Not bad at all! If you have a decent pair of binoculars, look at these objects again and notice the great increase in the number of stars & overall detail that's visible, including colors. For a steadier view through binoculars, try sitting in a chair or laying on your back and propping your arms against your body and the chair (or ground) for additional stability. When you do look at the Pleiades or the Beehive in binoculars or a small telescope, you will instantly see a jewelry box of glittering diamonds in the sky. You should be able to see dozens of stars, many with varying hues – just gorgeous!

Well, that's plenty for your first session under the stars. I hope you found it relaxing & enjoyable, but remember – we've just scratched the surface of a universe with immense depth. With practice, you'll be able to pick out fainter & fainter objects. If any planets are up, you might want to look at them also, especially through binoculars or even a telescope. But remember that experienced stargazers recommend just getting out and looking up for a good long while before dropping big \$\$\$ on a telescope. Why, with nothing but a good pair of binoculars, it's actually possible to see the four brightest moons of Jupiter, which form their own planetary system. So keep lookin' up!