

Hi. This is Bill Mundhausen at the Orion Center in Camdenton, Missouri and this is a script for a tour of the Springtime night sky. This tour of the sky is designed for about 9 pm on May 5th in mid-northern latitudes appropriate for most of the continental United States. If you're viewing much before that time or much before that date, stars and constellations will be east of the suggested locations. If you're viewing much after that time or much after that date, stars and constellations will be west of the suggested locations. You'll enjoy this sky tour best if you're in the darkest place you can find, away from city lights or in a planetarium.

THE DIPPERS

Let's start by getting our bearings. Remember where the Sun set? That's west. Now face that direction—your right shoulder now points north 90 degrees to your right, your left shoulder points south 90 degrees to your left, and directly behind you is east. The point straight up over your head (90 degrees from the horizon) at the top of the sky is called the zenith. Now turn right and face north.

The easiest star group to find now is the Big Dipper. At this time of year, it's located high overhead in the evening—near the zenith. The Big Dipper stands out as a group of second magnitude stars (Second magnitude stars are fairly bright, but not the brightest in the sky) arranged in the shape of an upside-down bowl and handle. The four stars that outline the dipper's bowl surround an area of the sky about as big as your fist at arm's length. The bowl of the dipper seems to be emptying its contents toward the northern horizon. The three stars that form its handle extend in an arc off toward the right, in a generally easterly direction. The two westernmost stars in the bowl of the dipper—the two at its left side, away from the handle—are called the pointer stars because they point toward Polaris, the North Star. To find Polaris, draw an imaginary line extending through the pointer stars of the dipper down toward the northern horizon. Go about six times the distance between the two pointer stars, or roughly three times the width of your fist at star's length and you will come to Polaris, which is a second magnitude star. Have you found it?

Good. Polaris is called the North Star because it is less than one degree away from the point in the sky at which the Earth's north pole points. As a result, all the stars appear to turn around Polaris during the course of the night, because of the Earth's spin. Remember where Polaris is, since it's a handy landmark (or, we should say, skymark!). Now let's look at the Big Dipper again. Contrary to popular notion, the Big Dipper is not strictly speaking an official constellation; rather it's a recognized non-constellation star group called an asterism. The Big Dipper is contained within the constellation Ursa Major, the Great Bear. The rest of the stars making up Ursa Major are fainter than the stars of the Big Dipper and they're harder to see. The Big Dipper makes up the long tail of the Great Bear and the rear portion of his body. Bears in sky mythology seem to be blessed with longer tails than their earthbound counterparts! Extend the top and bottom lines of the dipper's bowl to two fainter stars to the left—that is, to the west—of the pointer stars to complete the front portion of his body and beyond that to one star for his nose. A yet fainter star represents his eye. Extending toward the upper-left, off the body stars are the front and rear legs of the Great Bear, although local sky conditions may prevent you from seeing those dimmer stars.

Now look at the three stars making up the handle of the Big Dipper or tail of the Great Bear. The middle star of that group has a dimmer companion that is not easy to see, being very close to the east (that is, to the right) of it and slightly down from it. The brighter middle star of the handle is called Mizar and the dimmer companion is called Alcor. This pair of stars is said to have been used by people long ago as a test for eyesight. If you could detect Alcor, the fainter companion to Mizar, then your eyesight was judged to be quite good. Alcor and Mizar are so far away that the light you see from these stars tonight left there about sixty years ago, and thus astronomers refer to them as being 60 light years away.

Now let's find the pointer stars again at the western end (that is, the left end) of the bowl of the Big Dipper. Follow the imaginary line again down to Polaris, the North Star. Polaris itself is the end star in the handle of the Little Dipper. A line of stars fainter than Polaris curves to the east (that is, the right) and upward toward the handle of the Big Dipper from Polaris, forming a smaller dipper with a handle bent up from the bowl position. The entire Little Dipper—handle and bowl—can be just about covered by your two fists together at arm's length. Except for the two at the end of the bowl, these stars are quite faint and you may have difficulty seeing them. The bowl of the Little Dipper opens leftward to the west. Note that the Big and Little Dippers open somewhat toward each other, so when one is dumping its contents, the other is catching them, and vice versa.

The group of stars forming the Little Dipper is the same group which forms part of the constellation Ursa Minor, the Little Bear. Just like the Big Dipper, the Little Dipper is not really a whole constellation but rather an asterism. Just as the end stars of the Big Dipper's bowl are called the pointers, we also have a name for the end stars in the bowl of the Little Dipper. They're called the "Guardians of the Poles."

Winding between the Big and Little Dippers is a faint group of stars belonging to the constellation Draco, the dragon. The line of stars forming Draco curves to the right around the bowl of the Little Dipper and then downward. Then the curve reverses and bends to the east to the right of the Little Dipper ending in an irregular box of four stars forming the dragon's head. The box is about the same size (and about the same brightness) as the bowl of the Little Dipper, and it's about as far to the right of the Little Dipper as the Little Dipper itself is below the Big Dipper. Now if you have trouble finding Draco, as with any portion of this tour, you may find it useful to look at a constellation map.

BOOTES THE HERDSMAN

Let's use the Big Dipper again to find another star—and another constellation. Find the handle of the Big Dipper. Notice that it forms a curve. If you follow the curve of the handle for about twice the handle's length, you come to a very bright first magnitude star, slightly orange, called Arcturus. If we remember that a curve is an arc of a circle, we have a way to remember the name of the star in addition to how to find it. Starting with the handle of the Big Dipper, say to yourself, "Follow the arc to Arcturus." It takes you to the star and it gives you its name. Arcturus itself is about 36 light years away, so its light takes about 36 years to reach us, and you're seeing it as it was 36 years ago.

Arcturus is the brightest star in the constellation Bootes, the herdsman. The other, dimmer stars of the constellation are scattered back toward the Big Dipper, but east of the curve from the Dipper's handle to Arcturus.

Now turn so you're facing in the direction of Arcturus—roughly southeast—so you can look at it somewhat more easily. If your sky is dark enough, then you can find other stars in Bootes. About one fist-width above and to the left of Arcturus is a pair of stars about half a fist-width apart. Farther from Arcturus is another pair of stars still farther apart. The whole group, with Arcturus at the bottom, is reminiscent of an ice cream cone—notice that there's even a star just above the cone—opposite Arcturus—to form the scoop of ice cream. Just to the east of Bootes—to the left of the ice cream cone opposite the Big Dipper—is a little horseshoe or half circle of stars. Another way to find this little constellation is to go straight Out from the handle of the Big Dipper, not to follow the curve of the handle. This half-circle of stars which you can probably cover with your hand at arm's length is called Corona Borealis, which means the Northern Crown.

VIRGO THE MAIDEN

Let's go back now to the Big Dipper. If we follow the curve of the Dipper's handle to Arcturus again and then continue onward somewhat more than that far once again along this suggested curve for about three more handwidths, we come to the bright blue-white star Spica not too far off the southern horizon. That bright blue-white star may be off the southeast, south, or southwest horizon, depending on the precise time of night during which you're viewing. The easiest way to locate it is by following the curve of the handle of the Big Dipper through Arcturus to this star called Spica. Some people remember the saying "follow the arc to Arcturus and spin on to Spica," or "drive a spike to Spica." Spica is the only star of such brilliance in that part of the sky. So, if you followed the curve suggested by the Dipper's handle beyond Arcturus about as far again, you come to Spica. Spica is so far away that its light requires 200 years to travel across the space that separates it from us. Since light travels about 186,000 miles each second, 6 trillion miles a year, it might seem that distant Spica would be a very bright star if we were close to it, and indeed, brilliant Spica is 2000 times more luminous than our Sun. Spica is the brightest star in the constellation Virgo the maiden. Virgo is made up of a number of stars above and both east and west of Spica which are considerably fainter than Spica itself is.

LEO THE LION

Let's look back at the Big Dipper again. Locate the bowl's pointer stars—remember, the ones that point toward Polaris? Now draw an imaginary line the other-way through the pointers, in a direction away from the North Star. About forty degrees away on this line—or about four times the width of your fist, we come to the area of the constellation Leo, the lion. The brightest star in this region is Regulus. Turn southward now so you're facing this bright star. It appears in a star formation that looks like a backward question mark bulging to your left.

The backward question mark is about 15 degrees high, or about one-and-a-half fist-widths. (This star pattern is sometimes called the "Sickle," too, because of its shape. The star Regulus is the point at the bottom of the backward question mark or sickle. The sickle and Regulus form the mane, head, and chest of Leo, the Lion, in sky mythology. Leo is looking toward the west, to

your right. To the left to the east of the sickle, is a triangle of stars forming the rear portion of Leo. This triangle is about a third of the way toward our old friend Spica—to the left and down from Regulus.

GEMINI THE TWINS

Let's turn back north now to the Big Dipper and Polaris. Find the bowl of the Big Dipper. Find the two stars that form the bottom of the upside-down bowl. A line draws along these two stars to the west—to your left—leads in the general direction of two bright stars fairly close together in the western sky about five or six fist-widths from the Big Dipper, and about half a fist apart. These are the twin stars, Castor and Pollux in the constellation Gemini, the twins. Castor is the one that is closer to the Big Dipper and Polaris. In mythology, Castor and Pollux form the heads of the Twins and their bodies are envisioned in the dimmer stars which lie to the west—down toward the horizon— from Castor and Pollux.

CANCER THE CRAB

Now turn back to the south and find Leo the lion again—remember the backward question mark ending in the star Regulus? If you're having difficulty finding Leo, remember to use the pointer stars of the bowl in the Big Dipper, but go away from the North Star Polaris. Now that you have found Leo again, look between Leo and Gemini the twins—Gemini is about as far to Leo's right as the star Spica is to Leo's left. Between Leo and Gemini there are no particularly bright stars. You might, though be able to find a bunching of very dim stars close together. Perhaps you'll need binoculars to see them well. This bunch of dim stars is a star cluster known as the Praesepe star cluster or, more popularly, the Beehive in the constellation Cancer, the crab.

Star clusters like the beehive cluster are groups of stars which are fairly close to one another and actually move through space together. They may have formed from the same cloud of gas and dust and thus have a compact look when we view them. When we observe them with binoculars or telescopes they appear as parts of the sky with significantly more stars than others.

The constellations Gemini the twins, Cancer the crab, Leo the lion, and Virgo the maiden, all lie along the great circle in the sky known as the ecliptic. This is the plane of the Earth's orbit extended out to the stars. Since all the planets orbit the Sun in nearly the same plane, they are seen near this great circle and in those constellations. If there appear to be bright stars in these constellations— bright stars which I haven't mentioned—then they are almost certainly planets. Planets change their places against the background of the stars from night to night, week to week, year to year.

Occasionally, you might see a meteor, or so-called shooting star. These streaks of light aren't really stars at all, but rather small particles from space. We see these bits of space debris—either natural or perhaps small pieces of spent satellites or rocket boosters—hitting the top of the stratosphere, typically some 50 miles or so straight up. They move so fast—usually about 17,000 to 25,000 miles per hour—that friction bums them up very rapidly. Very rarely does any solid material survive the passage through the atmosphere to Earth's surface. About seven or so meteors can be seen each hour on the average on a clear evening from a good dark viewing

location. If you're in the city where streetlights brighten the sky, or if the Moon is in the sky (particularly at full phase), then you'll see fewer meteors. At times, though, more than the average number of meteors can be seen. Such events are called meteor showers. They occur each year when the Earth moves through streams of particles in space which orbit the Sun, often along the paths of old, worn-out comets. During such showers, 15 or even more meteors per hour can be seen from a clear, dark place, depending on the particular shower involved. In spring, the so-called Lyrid meteor shower occurs around April 22nd and the Eta Aquarids around May 5th.

If the Moon is out tonight, you might try looking at it through a pair of binoculars for a truly fascinating look. Craters, gray flat regions called maria, mountains, ray streaks during full Moon, and other surface features can be seen easily. If the Moon isn't out, though, use your binoculars to scan slowly across the sky, and enjoy the wealth of stars that your binoculars can uncover.