

Ursa Major

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Ursa Major

Ursa Major, the Great Bear, is the third-largest constellation in the sky and the easiest to find from Central Ohio: it holds the **Big Dipper**, seven bright stars that form the most recognized shape north of the equator. The Dipper is not the constellation — it is an *asterism*, a popular pattern that happens to sit inside the much larger figure of the Bear, whose fainter legs and head trail off to the west and south of the bowl. From Columbus you do not need either fact to find it. Look north. The Dipper is up there year-round.

Finding it

The two stars at the front of the bowl, **Dubhe** and **Merak**, are the pointer stars. Draw a line through them, bowl to top, and extend it about five times their separation; it lands on **Polaris**, the pole star, and points the way to [Ursa Minor](#). Follow the curve of the handle the other direction — "arc to Arcturus" — and it swings down to the orange star Arcturus, well south of these four circumpolar figures.

Ursa Major is circumpolar from Columbus, which sits almost exactly at 40°N (39.96°N). The rule for circumpolar visibility is arithmetic: at latitude ϕ , a star never sets if its declination is greater than $90^\circ - \phi$. At 40°N that threshold is 50°. Six of the seven Dipper stars clear it comfortably — Dubhe at 61.75°, Megrez at 57.03°, Merak at 56.38°, Alioth at 55.96°, Mizar at 54.93°, Phecda at 53.69°. The seventh, **Alkaid**, sits at declination 49.31°, a shade under the line. In strict geometry it grazes the horizon at its lowest point each day; in practice, atmospheric refraction lifts objects near the horizon by roughly half a degree, and from most sky in Ohio, Alkaid stays visible — low, often behind trees or rooftops, but not truly gone. The other three figures in this set, [Ursa Minor](#), [Draco](#) and [Cassiopeia](#), all sit well inside the circumpolar zone with no such edge case.

The Dipper rides highest, nearly overhead, on spring evenings; by autumn it has swung down close to the northern horizon, which is exactly the shape several of the myths below build on.

The stars

RA and Dec below are J2000, matching the values the site's own chart is built from.

Star	RA (h)	Dec (°)	Ma g	Dista nce	Spectral type	Name meaning
Dubhe (?)	11.0 62	61.7 5	1.7 9	123 ly	K0 III, orange giant	Arabic <i>zahr al-dubb al-akbar</i> , "back of the greater bear"
Merak (?)	11.0 31	56.3 8	2.3 7	79.7 ly	A1 IV, blue-white subgiant	Arabic <i>al-maraqq</i> , "the flank"
Phecda (?)	11.8 97	53.6 9	2.4 4	83.2 ly	A0 V, blue-white dwarf	Arabic <i>fakhth al-dubb</i> , "thigh of the bear"

Megrez (?)	12.2 57	57.0 3	3.3 1	80.5 ly	A3 V, white dwarf	Arabic <i>al-maghriz</i> , "the base," the root of the tail
Alioth (?)	12.9 00	55.9 6	1.7 7	82.6 ly	A1p, chemically peculiar	Arabic <i>alyat al-hamal</i> , "the sheep's fat tail"
Mizar (?)	13.3 99	54.9 3	2.2 3	82.9 ly	A2 V, white dwarf	Arabic <i>mi'zar</i> , "apron" or "girdle"
Alkaid (?)	13.7 92	49.3 1	1.8 6	103.9 ly	B3 V, blue dwarf	Arabic <i>qa'id banat na'sh</i> , "leader of the daughters of the bier"

Dubhe is a slow-moving giant well off the main sequence; everything else on the list is still fusing hydrogen in its core, which is part of why five of the seven turn out to be traveling companions (below).

Mizar and Alcor

The bend in the handle, Mizar, has a fainter naked-eye companion, **Alcor**, about 12 arcminutes away — close enough that most people need genuinely sharp vision to split them, which is why for centuries the pair has doubled as an eyesight test. The tradition is best documented in the Arabic-Persian world: the 13th-century writer al-Qazwini recorded that people tested their sight against this star, and Arab and Persian sources describe it being used to screen soldiers for keen eyesight. Similar claims are made for other cultures — Bedouin tribesmen, Native American groups testing children, Japanese folklore reading a failed sighting as an omen — with less direct documentation behind them, so treat those as widely repeated rather than independently attested.

Mizar's own history in the telescope era is unusually dense with firsts. Giovanni Battista Riccioli resolved it into two stars, Mizar A and B, around 1650 — one of the first double stars ever found with a telescope. Two centuries later, on 27 April 1857, George Bond and John Whipple photographed it through Harvard College Observatory's 15-inch refractor, the first double star ever captured on film. In 1889, Harvard astronomer Edward Pickering found that Mizar A's spectral lines split and shifted on a 20.5-day cycle — the first spectroscopic binary ever discovered, a technique that opened up thousands of close pairs no telescope could ever separate visually. Mizar B turned out to be a spectroscopic binary too, in 1908. Then in 2009, an infrared search for a planet around Alcor instead turned up a faint stellar companion to Alcor itself, and confirmed that Alcor shares Mizar's motion through space closely enough to be gravitationally bound to it. What looks like one star to a careless glance, two to sharp eyes, is six stars once instruments get involved — one of only two known sextuple star systems within 130 light years of the Sun, the other being Castor.

The Ursa Major Moving Group

Merak, Phecda, Megrez, Alioth and Mizar all sit within a few light years of each other in distance — roughly 80 to 83 light years out — and share a common motion through space. British astronomer Richard Proctor identified this in 1869: aside from Dubhe and Alkaid, every star in the Dipper drifts toward the same point in Sagittarius at the same rate, about one Moon-width every 16,000 years. That shared motion, cataloged as the **Ursa Major Moving Group** (Collinder 285), marks these five as siblings born from the same cluster roughly 300 million years ago, now drifting apart but still moving in loose formation. Dubhe and Alkaid are unrelated stars that merely happen to lie along the same line of sight from Earth, each moving on its own path.

The consequence is that the Dipper is not a fixed shape — it is a slow-motion snapshot of five siblings and

two strangers. A hundred thousand years ago the bowl was shallower and the handle bent differently; it would not have looked like a dipper to anyone. A hundred thousand years from now, computer models of the stars' proper motions show the same five continuing to drift together while Dubhe and Alkaid pull away in their own directions, flattening the recognizable ladle into something closer to a blade. The shape on the site's chart tonight is one frame of a very long film.

Myth and history

The oldest surviving name for this pattern is Mesopotamian: the tablets of **MUL.APIN** (compiled from older material, canonical by roughly 1000 BCE) list **MUL.MAR.GÍD.DA**, "the Wagon," among the northern Stars of Enlil. Homer's *Iliad* (Book 18), from roughly the same era, calls the same stars "the Bear, which men also call the Wain" — the Bear name appears to be native Greek, the Wagon name inherited from further east, sitting side by side in the same passage.

The Greek myth usually attached to the figure is the story of **Callisto**, a companion of Artemis seduced by Zeus; transformed into a bear (by a jealous Hera in most tellings, sometimes by Artemis as punishment for breaking her vow), she was later placed among the stars by Zeus, sometimes alongside her son Arcas. This is the standard Hellenistic-Roman literary catasterism, told in the constellation-myth collections attributed to Eratosthenes and to Hyginus's *Poetic Astronomy*, and retold in Ovid — a literary explanation layered onto a pattern the Greeks had almost certainly been calling a bear for centuries before anyone wrote the Callisto story down.

Arabic astronomers read the same seven stars as a funeral procession: the four bowl stars are **Banat Na'sh**, the bier, and the three handle stars are mourners walking behind it, with Alkaid — literally "the leader" — at the front. That reading survives directly in the star names still in use today.

In Chinese astronomy the same seven stars are **Beidou**, the Northern Dipper, one of the most important patterns in the sky: its handle swept around the pole through the night and through the seasons, and Chinese astronomers used the direction it pointed at dusk to mark the year's progress, a role that carried into Taoist religious symbolism as well as state timekeeping.

Among the Mi'kmaq of Nova Scotia and the Iroquois of the St. Lawrence valley, ethnographers recorded a hunting story built on the same seasonal motion: the bowl is a bear, the handle stars are hunters in pursuit. As autumn wears on and the handle sinks toward the horizon in the evening sky, the farthest hunters give up the chase one by one; the last ones catch the bear, and its blood — in the story — is what turns the maple leaves red. In winter the bear's skeleton lies on its back across the northern sky; by spring a new bear rises and the hunt starts over. Hindu tradition reads the same seven stars as the **Saptarishi**, the Seven Sages, immortal through the strength of their asceticism, and Hindu cosmology marks long eras of time by which Sage presides.

That a bear-shaped reading of this particular pattern turns up independently among Greeks, Siberian groups, and Indigenous peoples of northeastern North America — communities with no plausible direct contact for tens of thousands of years — has been used by some comparative mythologists to argue for a genuinely ancient, shared root reaching back before the peopling of the Americas. Others treat it as coincidence: a long body with a short tail and a rounded bowl for a haunch is simply what a bear-shaped imagination sees in this arrangement of bright stars, arrived at more than once. Neither position is settled; both are worth knowing.

Deep sky

Object	Type	Magnitude	Distance	Note
M81 (Bode's Galaxy)	Spiral galaxy	6.9	~12 million ly	Binoculars show it as a soft glow; a small telescope starts to show the spiral structure.
M82 (Cigar Galaxy)	Starburst galaxy	9.2	~12 million ly	38 arcminutes from M81 in the same field; gravitationally disturbed by its neighbor, undergoing an intense burst of star formation.
M101 (Pinwheel Galaxy)	Spiral galaxy	7.9	~21 million ly	Face-on and about 70% wider than the Milky Way; low surface brightness makes it a dark-sky target.
M97 (Owl Nebula)	Planetary nebula	~9.9	~2,030 ly	Low surface brightness for its magnitude; needs a telescope and a dark site to show the two "eyes" that give it the name.

Key dates

Date	Event
c. 1000 BCE	MUL.APIN lists MUL.MAR.GÍD.DA, the Wagon, among the Stars of Enlil.
c. 8th century BCE	Homer's <i>Iliad</i> names it "the Bear, which men also call the Wain."
c. 150 CE	Ptolemy catalogues Ursa Major among the 48 constellations in the <i>Almagest</i> .
c. 1650	Riccioli resolves Mizar into two stars, one of the first double stars found with a telescope.
27 April 1857	Bond and Whipple photograph Mizar at Harvard — the first double star ever photographed.
1869	Richard Proctor identifies the shared proper motion of five Dipper stars, later cataloged as the Ursa Major Moving Group.
1889	Mizar A becomes the first spectroscopic binary ever discovered.
1930	The IAU fixes the modern constellation boundaries.
2009	Alcor is found to be a binary itself, and confirmed gravitationally bound to Mizar — six stars in one system.

Related

- [Ursa Minor](#) — the pointer stars aim straight at its brightest star, Polaris.
- [Draco](#) — coils in the gap between the two Bears; holds the ancient pole star Thuban.
- [Cassiopeia](#) — the other unmistakable circumpolar landmark, on the opposite side of the pole from the Dipper.