

URSA MAJOR

The Great Bear

by Teoh Hui Chieh

**“And forever the Great Bear circles the North Star,
forbidden to set below the horizon of the sea to rest as the other constellations”**

Ursa Major, the Great Bear, is the third largest constellation in the sky, after Hydra and Virgo. This northern constellation is circumpolar – visible throughout the year – in the mid-northern hemisphere, but to us at the equator, it is mainly visible from January to August, and is best viewed in the evening from April to July.

This constellation is mainly known for its famous asterism, the seven stars that make up the Big Dipper or the Plough, which is among the oldest recognized patterns in the sky. The Big Dipper makes up the rump and the tail of the bear, while the surrounding fainter stars make up the front part and its legs. For one to make out the shape of the bear really needs some imagination.

The Big Dipper can be used as a beginner guide in the night sky: The two outer edge stars that make up the “bowl” of the dipper – Merak (β) and Dubhe (α) – are pointer stars to Polaris, the North Star. Connect a line between the two stars and extend the line five times the distance between them to the north, it will end up at Polaris.

By following the arc from the “handle” of the dipper, it will lead to a bright orange star known as Arcturus in constellation Bootes. If we continue to extend this arc further south, we will reach Spica in Virgo and finally end up at constellation Corvus. This is known as “Follow the Arc”.

Mizar (ζ) – the second star from the end of the handle – is a famous optical double star with its fainter companion, Alcor. With good eyesight, one can make out Alcor with just the naked eye, and the

ability to see the second star is a traditional test of eyesight.

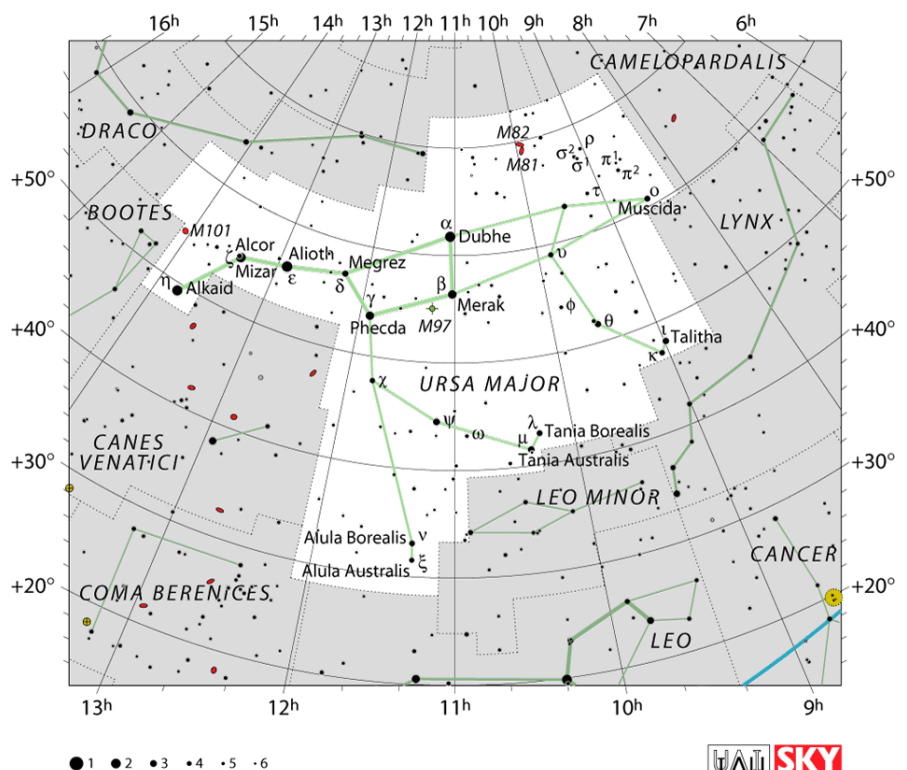
One may need some imaginations to make out the shape of this celestial bear.

In the Greek mythology, Ursa Major is the beautiful maiden named Callisto. One day, Callisto was hunting in the forest, grew tired and laid down to rest. The King of Gods, Zeus noticed her and was attracted by her beauty. Eventually, he managed to get around with her and Callisto was pregnant. When Hera, Zeus’ wife, discovered that Callisto had given birth to a baby boy, she was

furious and determined to take revenge. She turned Callisto into a big bear so she would no longer be beautiful.

Callisto’s son, Arcas, however, was adopted and grew up to be a hunter, while Callisto, as a bear, continued to live and roam in the forest. One day, Callisto found herself face to face with Arcas. She recognised that it was her son and was so overjoyed that she rushed up to him, forgetting that she was a bear. Arcas, not knowing that the bear was her mother, thought that he was being attacked. He raised his spear and was about to hurl it at the bear.

It was just in time that at this moment, Zeus happened to be looking down from Mount Olympus and he quickly intervened by turning Arcas



Constellation

Ursa Major

into a bear. Zeus then grabbed them both by the tails and swung them into the heavens, becoming the constellation Ursa Major and Ursa Minor (some say that Arcas becomes the constellation Bootes). Unlike earthly bears which have short stubby tails, these two celestial bears have long tails, probably due to the swinging of the tails by Zeus.

This was not the end of the story...

When Hera found out that her husband had given Callisto and Arcas honoured places in the heaven, she was enraged and plan for more revenge on them. She went to find the God of the Sea, Oceanus, and persuaded Oceanus never to let the bears rest below the sea horizon.

Thus, as seen from mid-northern latitudes where the ancient Greek was, these two celestial bears never

set below the horizon; they will always have to be on the move on their long and endless journey around the pole, never permitted to sink beneath the sea horizon to rest.

Other versions of the story say that Callisto had been turned into a bear by Zeus himself to disguise Callisto from Hera's revenge, and some say by Artemis to punish Callisto for losing her virginity. ☾

<u>Abbreviation</u>	<u>Genitive</u>	<u>Area</u>	<u>Order of Size</u>	<u>Brightest Star</u>	<u>Magnitude</u>
UMa	Ursae Majoris	1280 degree ²	3	Alioth (ϵ Ursae Majoris)	1.77

Notable Objects:

M81 (NGC3034) – Bode's Galaxy

M81 belongs to a group of galaxies known as the M81 Group with it as the brightest member. M81 has a well-defined spiral arms surrounding a bright central mass of stars. M81 sometimes is called the Bode's Galaxy because it was originally discovered by Johann Elert Bode, in 1774.

- M81 can be found by extending the imaginary line from γ Ursae Majoris to α Ursae Majoris about the same distance northwestward. M81 is only 38 arc-minutes apart from M82.
- M81 is visible in binoculars as a soft glow of light. It appears large, bright and oval-shaped through telescopes. Its needle-shaped core is easily noticeable with delicate wisps of spiral arms (with averted vision) surrounding it.
- It shares the same low-power field with M82 just slightly to the north.

<u>Type</u>	<u>Magnitude</u>	<u>Size</u>	<u>Distance</u>	<u>Location</u>
Spiral Galaxy	6.9	27' × 14'	~ 12 million light-years	RA 9h 55.6m Dec +69° 04'

M82 (NGC3031) – Cigar Galaxy

M82 is another member of the M81 Group. It is less massive and fainter than M81. The irregular shape of M82 was believed to be caused by a relatively recent close encounter with M81 that distorted its shape. During this encounter, interstellar clouds were caused to collapse and trigger bursts of new star formation – a good example of a starburst galaxy.

- M82 is only 38 arc-minutes north of M81.
- M82 is visible in binoculars as a small misty patch, sharing the same field as M81. It appears much smaller and dimmer than its neighbour.
- A small aperture telescope will show its elongated or "cigar" shape.

<u>Type</u>	<u>Magnitude</u>	<u>Size</u>	<u>Distance</u>	<u>Location</u>
Irregular Galaxy	8.4	11' × 4'	~ 12 million light-years	RA 9h 55.8m Dec +69° 41'

M101 (NGC5457) – Pinwheel Galaxy

M101 is a splendid face-on galaxy, which shows a distinct asymmetry in long exposure photographs. The giant spiral disk of stars, dust, and gas is 170,000 light-years across, almost twice the size of our Milky Way Galaxy. M101 is estimated to contain at least one trillion stars.

- M101 lies on the eastern edge of Ursa Major, about 4 degrees east of the famous double star Mizar and Alcor.
- It can be spot by using a pair of binoculars, but the details can only be revealed by using telescopes.
- A small aperture telescope will show a bright and compact central region surrounded by a faint haze. Larger aperture telescopes will be able to discern the spiral structure.

<u>Type</u>	<u>Magnitude</u>	<u>Size</u>	<u>Distance</u>	<u>Location</u>
Spiral Galaxy	7.9	29' × 27'	~ 25 million light-years	RA 14h 03.2m Dec +54° 21'