

deep-sky delights



***Plough north-
wards, to the
Big Dipper***

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Ursa Major, the Big Dipper or Big Bear, also known as the Plough, is essentially a northern constellation. (For the purpose of this article I will refer to this constellation by its more common name, the Big Dipper.) This constellation is only just visible low down on the northern horizon as we approach autumn here in the southern hemisphere but is totally invisible from



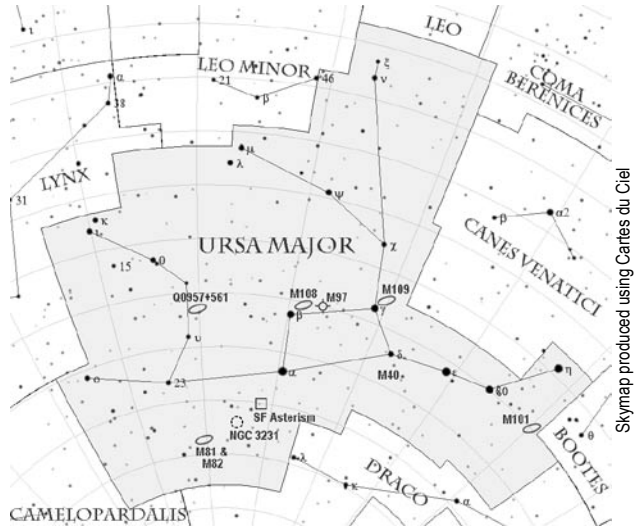
Image source: www.stellarium.org

positions further south. Thanks to my favourably situated northern observatory the greater part of the constellation's seven brightest stars, representing the shape of a Big Dipper, are visible to me as a bonus.

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The handle of the Big Dipper is quite easy to see, with three prominent stars swinging out from this famous constellation. Mizar (Zeta Ursae Majoris) is a double star *par excellence* and one of the best known in the northern skies. Mizar and its naked eye companion, the magnitude 3.9 Alcor, east-northeast of Mizar, are conveniently located in the handle's bend as the central, naked-eye double star. However, the magnitude 2.2 star Mizar itself is a true binary with its secondary just 14" to the south-southeast, the first binary to have been found through a telescope in 1662 and also the first binary to be photographed in 1857. Johann Liebknecht nicknamed this double star Ludwig's Star in 1722 in honour of his German King. The central five stars of the Big Dipper all belong to the Ursa Major moving cluster also known as Collinder 285.

During my visit to a northern hemisphere astronomical camp a few years ago I had the privilege of studying some of the objects that aren't visible from the southern hemisphere. To see those northern hemisphere constellations invoked in me a feeling of having lost my way among the stars, and my eyes kept wandering southwards trying to locate those very familiar and more well-known sights. As far as I was concerned, Capella and Regulus could just as well



have belonged to some unknown constellations. Indeed, seeing Cepheus, Draco, Camelopardis and Ursa Minor was quite strange. The camp I went to is situated in the lovely countryside of Portugal's Caldas de Monchique, and offered me the use of an 8-inch Schmidt-Cassegrain telescope with a magnification of 133x and 200x.

The four corner stars (Alfa, Beta, Gamma and Delta) of the bowl shape are most conveniently situated to point the way to some of the Big Dipper's lovely deep-sky objects. Alfa and Beta Ursae Majoris are also known as the northern pointers because they point to the star Polaris and the north pole. The Big Dipper holds in its cup a huge number of galaxies in various categories, as well as a few outstanding Messier objects.

Merek, or the magnitude 2.3 Beta Ursae Majoris, the western corner star of the

Dipper bowl, is just 1.5 degrees west of **NGC 3556 (M108)** which can be seen in certain southern parts of South Africa. Messier 108 was discovered by Pierre Mechain on 16 March 1781. It appears as a small, nearly edge-on oval in an E-W direction, with a barely brighter central part. With careful observation faint dark patches become visible on its misty surface, with a more conspicuous patch just west of centre. A magnitude 12 star close to the galaxy's core can easily be mistaken for a supernova. Surprising, pictures of M108, however, show a very elongated core.

Within a wide field of view the planetary nebula **NGC 3587 (M97)** is situated only 48' SE from Messier 108. The Owl nebula, as it is popularly known, appears larger than I had expected. A soft envelope enfolds this circular 3.5' round glow, although the surface brightness is low. Two dark patches on either side of the nebula, diagonally towards the NW and SE position, indicate the owl's eyes. The halo appears grey in colour, with the northern and southern parts of the nebula slightly brighter. The Owl's central star shines weakly at magnitude 14 making it difficult to glimpse. Although I studied the owl nebula from my southern vantage point, it was much more outstanding with numerous fine details, seeing that it was much higher up, in the northern skies. In 1848 their likeness to owls' eyes led the deep-sky observer Lord Rosse to give the nebula its nickname and it has stuck ever since.

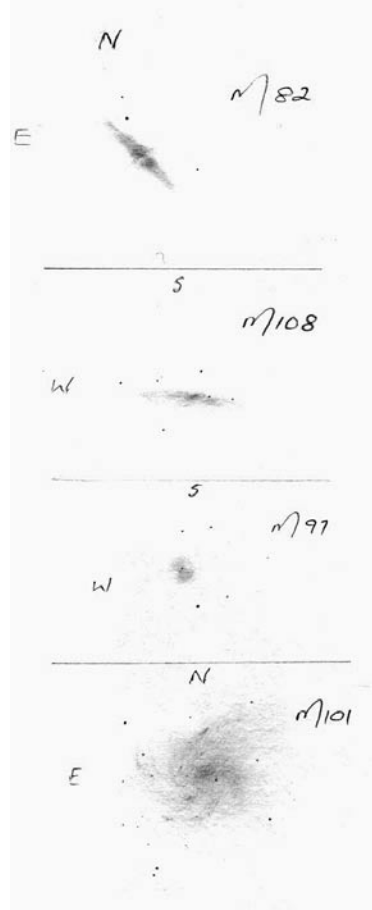
Turn back to Beta and 1.5 degree west to find a little **asterism** discovered by the American amateur **Sue French**. The star string, as I saw it, looked rather like a mini dipper (N-S) which quite aptly reminds of the Dipper constellation. The brightest star, magnitude 7.4 HD93847, is situated in the northern part of this asterism of about seven stars, whose arrow points north.

One of the most inspiring and scientifically important objects is the Quasar, **Q0957+561**, situated about 2 degrees west of Asterism Sue French. The galaxy NGC 3079 points almost directly to the position of the Quasar a mere 10' to the north. The quasar is a single object but with the surrounding galaxies, which act as a gravitational lens, the quasar splits into two points of light barely 6" apart. A very faint, massive galaxy is believed to lie in front of the southern component as seen from our viewpoint. The bending of light from more distant objects towards our line of sight was predicted by Albert Einstein in his general theory of relativity. The Double Quasar's light has been travelling for about 9 billion years in its journey towards Earth.

The bottom line of the bowl, indicated by Beta and Gamma Ursae Majoris, brings us to the next Messier object. The galaxy **NGC 3992 (M109)** is situated barely 40' SE of the magnitude 2.3 Gamma Ursae Majoris, which indicates the south-eastern corner star of the Dipper's bowl. Messier 109 shows up as a soft, elongated oval in an ENE-SWS direction with a soft, hazy

appearance. Notable is the elongated bright central part, sprinkled with a few faint stars on its surface. Higher power reveals the bar extending a great distance along the halo of this barred galaxy. Messier 109 lines up with a magnitude 10 star situated 5' towards the south-west. Being one of the faintest Messier objects it is advisable to shift the intruder star, Gamma Ursae Majoris, out of the field of view.

The lovely open spiral **NGC5457 (M101)** is situated about 5 degrees east of the naked-eye double star Mizar (Zeta Ursae Majoris) in the far eastern part of the constellation, a mere 30' west of the constellation Boötes. Messier 101 displays a lovely, large, irregularly round galaxy, gradually extending its light to the exterior with a fairly bright large centre and smaller nucleus. What makes this face-on spiral so special is the mottling and nebulosity embedded on the dusty surface, which is indicated by several NGC numbers. In excellent dark-sky conditions the faint spiral structure appears like flimsy, curved streaks of nebulosity. A considerable collection of stars can be glimpsed as part of the galaxy. It is estimated that M101 is somewhere in the region of 15 to 20 million light years distant. A few supernovae have been recorded in this galaxy in the past 50 years. M102, was discovered



(top) My rough sketches of the Messier objects discussed in the text.



(left) A picture of me taken during the Astronomy Camp in Portugal.

by Pierre Mechain on 27 March 1781. He found both M108 and M102 using a 3-inch refractor from Paris, France. However, in 1783, Mechain announced his discovery of M102 was an error, indicating it to be the same object as M101. Although the issue should have been resolved, controversy remains, with NGC 5866 thought to be the most likely candidate for M102.

Now for a few objects that most definitely cannot be observed from our southern viewpoint:

Delta Ursae Majoris, the magnitude 3.2 super white star, establishes the NE corner of the Big Dipper's bowl and points the way to **Messier 40**. This object is definitely comprised of just two stars. Johan Hevelius reported it in 1660, seen as a nebula through his instrument. The two magnitude 9 stars are 49" apart, with the western component a fraction brighter. The galaxy NGC 4290 is situated barely 10' towards the west, a very faint elongated haze that could well be the nebulae seen by Hevelius, but this is only my runaway guess. Even though Messier 40 is only a double star, it was still important to me to confirm an observation of this object. The northern observers did not find me smart or amusing for my so called double star observation. However, I realised that Messier 40 is inaccessible from the southern hemisphere and completes the Messier list.

The open star cluster **NGC 3231** is located in the far north of the constellation. An imaginary line from Alpha Ursae Majoris

points to the North Pole, with the cluster situated 6.5 degrees north from Alpha Ursae Majoris, or its common name Dubhe. The star cluster is very loosely composed and slightly elongated in a NW-SE direction. The only indication that I was observing in the correct star-field was the two magnitude 7.5 stars that stood out very prominently at both the NW and SE outer edges of the grouping. The core area consisted of fainter stars closer together.

Perhaps the two best-known galaxies in the northern hemisphere are **NGC 3031 (M81)** and **NGC 3034 (M82)**, almost at Declination +70°. What an absolute delight for this southern observer to be able to study these famous galaxies. Messier 81 and 82 were discovered by Johann Bode on a cold winter's night in December 1774 and added to Messier's list in February 1781. They are part of the second nearest galaxy group (10 million light years distant), after the Sculptor group of galaxies which is around 8 million light years away. Our own Milky Way also belongs to the Sculptor group of galaxies.

Messier 81 appears as a soft, large oval cloud in a NNW-SSE direction, which grows slowly brighter towards a non-stellar nucleus with a well outstanding large halo surrounding it. The flimsy exterior had me catching my breath with its beauty, resembling almost lacy streaks misting away from the core. Messier 82 is located only 38' further north and very different in shape. The outstanding brightness and shape of this cigar-shaped galaxy in an

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ENE-WSW direction took me by surprise. The high surface brightness is remarkable, with a nucleus that appears off-centre towards the SE part of the halo. Clear in my mind to this day is the strikingly broken middle part which cuts the central area in two parts. The western part is considerably brighter in comparison with the mottled eastern part, which gradually disappears into nothingness. On my last night at the camp I repeatedly went back to observe these two galaxies!

During my flight back home south I pondered the beauty of the universe, the North Polaris Star and decided there was something unusual about friendships made through astronomy. It does not matter if these are old or new friends, close or far abroad, they always share and endlessly talk astronomy. There is an old song that goes: "South of the border, down Mexican way ..." – or is it "... South Africa way"? This is where I fell in love with the stars. ☆

Object	Type	RA (J2000.0)	Dec	Mag	Size
NGC 3031 M81	Galaxy	09 ^h 55.6	+69°04'	6.9	24'x13'
NGC 3034 M82	Galaxy	09 55.8	+69 41	8.4	11.2'x4.6'
Q0957+561	Galaxy	10 01.2	+55 54	16.4	1'
NGC 3231	Open Cluster	10 26.8	+66 48	9	4'
Sue French's	Asterism	10 50.6	+56 08	6.8	15'x9'
NGC 3556 M108	Galaxy	11 11.5	+55 40	10.0	8.7'x2.2'
NGC 3587 M97	PlanetaryNebula	11 14.8	+55 01	9.9	170"
NGC 3992 M109	Galaxy	11 57.6	+53 23	9.8	7.6'x4.3'
M40	Double star	12 22.4	+58 05	9.0&9.6	49" sep.
NGC 5457 M101	Galaxy	14 03.2	+54 21	7.9	29'x27'