



A Misty Cloud on our Doorstep

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Earth is a mere speck in the Milky Way and to try and imagine and represent it in perspective is all but impossible. The soft band of the Milky Way is a reality that leaves one standing in amazement but understanding little. Gazing southwards here in favourable dark conditions close to the end of the year we are able to see the two Magellan satellite galaxies that revolve around our Milky Way. Observing them so closely provides an opportunity to try and bring the privilege of seeing them and grasping the reality of them a little closer together.

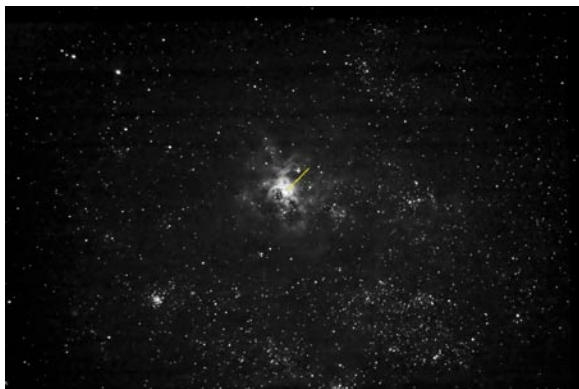
The explorer Amerigo Vespucci noted the Clouds as early as 1503, but it was Ferdinand Magellan, the Portuguese explorer, who documented the Magellanic Clouds in the 16th century and named them after himself in his report. Imagine for a moment the amazement and wonder such a sight would have produced in those early seafarers.

The Large Magellanic Cloud (LMC) forms an oval of approximately 6 by 4 degrees and astronomers classify it



Image source: Stellarium.org

as a nearly face-on barred spiral galaxy, approximately 160 000 light years distant. The larger part is situated in the constellation Dorado, with some overflow into the constellation Mensa. The Small Magellanic Cloud (SMC) apparently consists of two separate galaxies in nearly the same line of vision, with the Mini Magellanic Cloud (MMC) at the back. Despite the LMC's irregular shape it displays a bar and one spiral arm, though somewhat distorted. The SMC is nearly 200 000 light years from Earth and 10 times smaller than the LMC. According to the Mount Stromolo and Siding Spring Observatories there are actu-



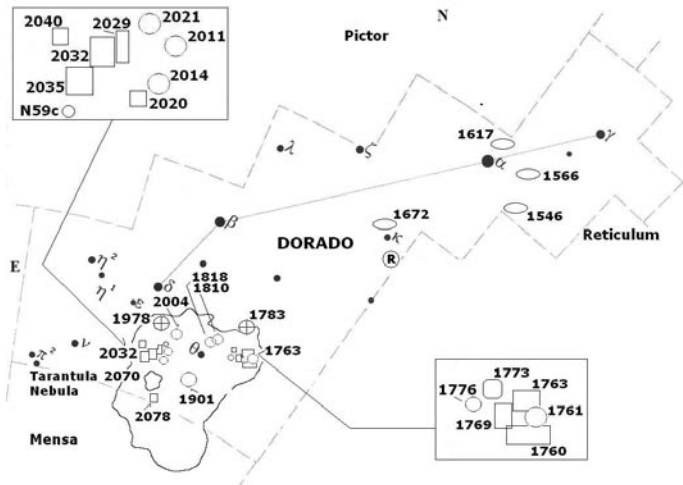
The Tarantula Nebula by Lucas Ferreira taken with a Sky-Watcher 203mm Newtonian Reflector (f/6); 2x1 minute exposures @ ISO 1600 and Pentax K110D DSLR.

ally three Magellanic Clouds. The Clouds may end up colliding with us or leave our Milky Way surroundings never to return.

Edmond Halley, who arrived at the island of St Helena off the west coast of Africa in 1677, wrote that the Magellanic

Clouds have the look of galaxies, and he observed small pieces of clouds and stars through his telescope. Halley also noted three nebulae, which were probably the two dusty Magellanic Clouds and the dark Coal Sack in the constellation Crux.

The constellation Dorado, named after the Goldfish, contains no stars brighter than magnitude 3. The typical goldfish is a colourful creature and a fast swimmer. Dorado is one of the constellations invented by Pieter Keyser and Frederick de Houtman during the years 1595-1597 and was included in the 1603 catalogue of Johan Bayer. In 1598 the Dutch astronomer Petrus Plancius inscribed the constellation on the first globe, according to Auke Slo-tegraaf. The constellation is situated just north-west of the constellation Volans, the Flying Fish. The South ecliptic pole (RA: 4h, Dec: -66°) lies within the constellation between eta and epsilon Doradus.



The tail part of this tropical marine fish is projected through the magnitude 3.2 alpha and 4.2 gamma Doradus, which are located in the far north-western area of the constellation. The stars in the constellation give the impression of a slender figure about 179 square degrees long.

The star alpha Doradus is situated just 35 arc minutes south of the galaxy NGC 1617 in the same field of view. NGC 1617 is not that difficult to explore – you just need some patience and a few tricks. Move alpha Doradus to just outside your field of vision, use high magnification and concentrate! The galaxy displays a soft, elongated east to west oval which gradually brightens to a star-like nucleus surrounded by an outer envelope. The eastern edge of the galaxy appears very misty and high power treated me to some visible surface character in the form of a few knotty areas. IC 2085 is situated 11 arc minutes to the north

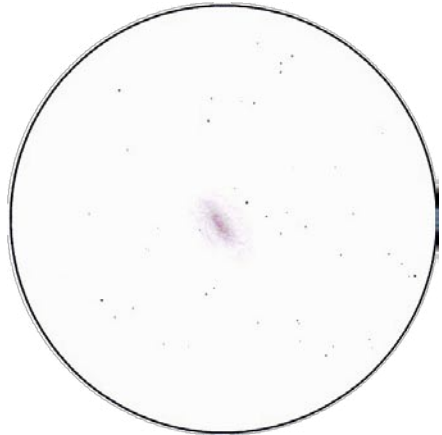
with a magnitude of 14, not confirmed at the time, but suspected.

One of the most beautiful open spiral galaxies, **NGC 1566**, also known as Bennett 25, can be found among a number of other galaxies, also known as the Dorado Group, just 2 degrees north-west of alpha Doradus. The galaxy displays a large oval in a north-south direction with a really hazy fringe. The north-eastern and south-western parts are very flimsy and look like extended spiral arms (see sketch). The large bright core displays a dense nucleus surrounded by a soft envelope. A few faint stars and dusty knots can be seen on the surface.

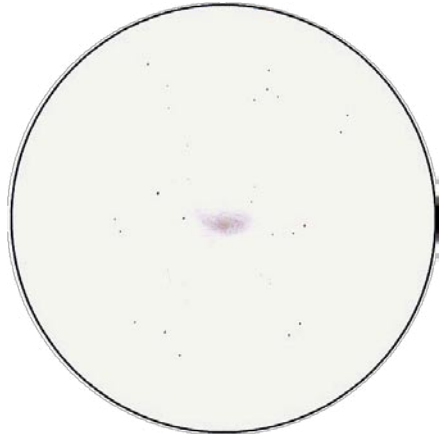
Another galaxy which is also part of the Dorado group is **NGC 1546**, situated barely 1 degree further south-west, close to the boundary with the constellation Reticulum. The galaxy displays a lovely, large, elongated oval in a north-west to south-east direction. The author's study of the galaxy showed a lot of detail on its surface. The middle brighter area is large, with a soft outer halo that displays a good amount of nebulosity on the fringes. A short string of stars runs from the galaxy's western side into the field of view and ends with a magnitude 7.7 star. The magnitude 10 star closest to the galaxy's western side has a very faint magnitude 11 companion. The star field truly complements the galaxy.

Between the fins of the heavenly fish, the galaxy **NGC 1672** can be seen, just 30 arc minutes north of magnitude 5.2 kappa Doradus in the middle area of the

constellation. The galaxy is an excellent example of a bar shape with a very elongated middle part in an east to west direction (see sketch). With high power the true character of the galaxy comes to the fore, with a well-defined bar showing off the bright pinpoint nucleus. Towards the eastern end of the bar a faint spiral arm can be glimpsed extending northwards. This



NGC 1566 or Bennett 25



NGC 1672 or Bennett 26

large bright galaxy displays a very misty washed-out outer halo, more so towards the northern and southern ends.

An outstanding red Carbon Mira star, **R Doradus**, which the author strongly recommends observing, is situated 2.5 degrees south of kappa Doradus and 2.5 degrees east of alpha Doradus.

The variable-magnitude 3.8 beta Doradus, situated on the northern edge of the LMC, represents the watchful eye of the goldfish and is easy to see.

To explore the LMC imagine a scene with the goldfish taking a breath of fresh air above the cloudy waters. On the far northern edge of the cloud a globular cluster pokes its nose up into the air out of the stormy sea. **NGC 1783**, also known as Bennett 28, is an outstanding object, slightly oblong in a north-south direction. This globular has all the parameters, becoming denser towards a compact centre with stars resolved over the surface and particularly with short star spikes on the outer edges. A few references classify it as an open cluster.

The name Bennett used in some of the descriptions in this article and elsewhere refers to Jack Caister Bennett, an accomplished amateur astronomer born on 6 April 1914 in Escort, KwaZulu-Natal, South Africa. He passed away on 30 May 1990. Bennett was a dedicated South African comet-hunter who patrolled the skies in the late 1960s. He picked up a magnitude 9 supernova in NGC

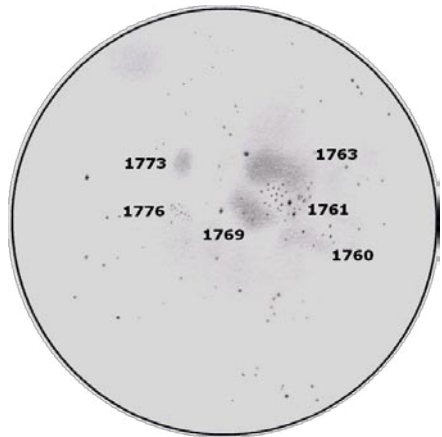
5236 (M83), becoming the first person ever to visually discover a supernova since the invention of the telescope. He compiled the Bennett Catalogue, a list of 152 objects to help observers eliminate them in comet searches. The constellation Dorado contains no fewer than eleven Bennett objects: NGC 1549 = Ben 23, NGC = 1553 = Ben24, NGC 1566 = Ben 25, NGC 1617 = 25a, NGC 1672 = Ben 26, NGC 1763 = Ben 27, NGC 1783 = Ben 28, NGC 1818 = Ben 30, NGC 1866 = Ben 33, NGC 2070 = Ben 35 and NGC 2214 = Ben 36.

A lovely, complex area permeated with clusters and nebulosity is situated just 30 arc minutes to the south of the globular. The first impression is of three very bright irregular gas clouds that fill a field of nearly 20 arc minutes. The focus of the complex area is **NGC 1763**, also known as Bennett 27, which resembles a cocoon enveloped within a gas cloud, also the largest and brightest object in this field of view (see sketch). Careful and accurate viewing will reveal a handful of stars within the nebulosity. The cluster **NGC 1761**, situated just south of NGC 1763, displays approximately 20 faint stars well resolved. Against the very uneven flimsy nebulous complex **NGC 1760** an emission nebula situated further south displays a soft, hazy, elongated “inverted bowl” with quite a few faint stars embedded in the hazy extensions. The quite impressive dusty field can be observed through binoculars. Situated to the south-west of NGC 1763, the oblong emission nebula **NGC 1769** is part of the larger complex and impresses the observer with

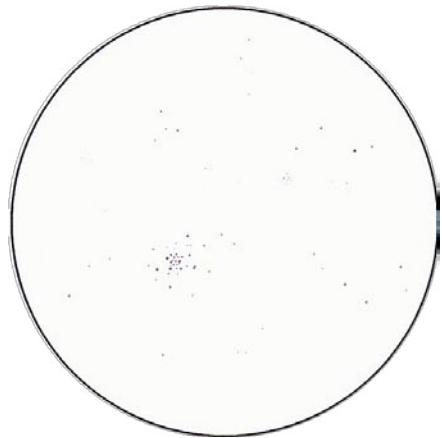
its bright, dense appearance, quite outstanding against the background nebulosity. The much smaller **NGC 1773** displays a round, quite bright patch of nebulosity to the north of NGC 1769, with just a few pinpoint stars in its midst. Bear in mind that the size and magnitude of the emission and diffuse nebulae are very difficult to determine. Most of the index data differs largely.

The open cluster **NGC 1818**, situated only 50 arc minutes to the east, is rather impressive and resembles a small, bright, round hazy patch with a compact middle (see sketch). With higher power a few stars of varying magnitudes form short strings within the outer regions of the cluster can be seen. I could spot the very faint glow of the unresolved smaller cluster **NGC 1810** about 6 arc minutes to the north-west. NGC 1810 shows up as a faint, roundish glow with a half-moon of faint stars towards its western side.

One of the easier and larger globular clusters to spot in the LMC can be found in the north-eastern extreme of the constellation. **NGC 1978** displays an oval that is quite bright with a very hazy impression. It could easily be mistaken for a galaxy; however, with careful observation a few extremely faint stars can be detected on its surface. What makes observation a little difficult is that the object is embedded in the flimsy haziness of the cloud. Further south-west and in the mist of the cloud one of the author's favourite small open clusters, **NGC 2004**. The group is situated 1.5 degrees north-east of the magnitude



NGC 1763, etc.



NGC 1818 and 1810

4.8 gold-coloured theta Doradus. This cluster gives the impression of a comet flying away from a swarm of faint stars to its north-eastern side. The group displays short strings of stars with less activity towards the southern part. These are very good example of where the field of view plays a role in the characterising an object's impression.

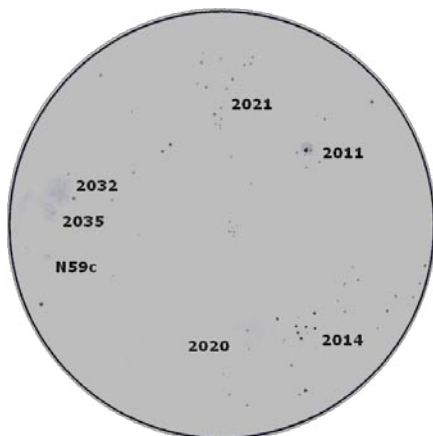
Around 8 arc minutes to the south there is a very small knot that could be an unresolved triple star. Drifting through the mists of the LMC brings to the fore many knots of faint stars interspersed with nebulosity. Using telescopes, binoculars or the naked eye, the LMC is a truly wonderful object to share with others.

NGC 2032, the larger and brighter, north-western, uneven nebula appears to move away from **NGC 2035**, giving it a slightly elongated appearance (see sketch). **NGC 2035** is rounder, slightly fainter, with a few very faint stars embedded on the dusty surface. The two objects barely touch each other (almost like a pair of parted lips) and form the most outstanding figure in the field of view. Around the above observation was a small round patch of nebulosity just 2.7 arc minutes south of **NGC 2035**. All the nebulae in this area were brilliantly enhanced with an UHC Filter. The author was unable to find any data about this nebular patch, and a query was forwarded to Brian Skiff, an astronomer at Lowell Observatory. He said the object was catalogued by Karl Henize^[1] in 1956 as **LHA 120-N59c**. It is centred on a 14.5-magnitude star that is obviously the star that fluoresces the circular nebula. The position of the star is: RA: 05h35.39.7, Dec: -67°37'04".8 (J2000). Interestingly, the nebula is not easily found in reference data.

In the same field of view the misty **NGC 2020** is situated 20 arc minutes south-east of **NGC 2035**. The emission nebula

displays a soft, even, round glow, very smooth, that fades away into the field. The ignited star that fluoresces the nebula is relatively easily to see, and gives the impression of riding along on top of this glow. The magnitude 12.2 star on the southern end of the nebula is a distracting factor drawing the eye away. Nebulosity very much interweaves the lovely star grouping **NGC 2014**, about 5 arc minutes north-west. And although small, the relatively compact group **NGC 2011** just to the north is relatively bright. **NGC 2021** displays an elongated scattering of faint stars in the northern part of the complex, somewhat triangular in shape, with the triangle pointing south. A flimsy peace of nebulosity **NGC 2029** is situated just east of **NGC 2021** and close to the north-west edge of **NGC 2035**.

A very large, loose group of about 50 clearly visible stars and a handful of fainter ones are situated more or less in the middle area

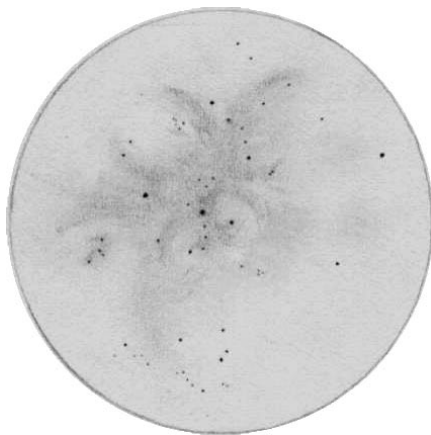


NGC 2032, etc.

of the LMC. **NGC 1901** spans an area of more than 30 arc minutes. It is a very nice object to study through binoculars.

The Magellanic Cloud is home to **NGC 2070**, also known as Bennett 35, the great looped nebula situated in the south-eastern part of the Cloud and probably one of the most amazing objects in the southern night sky. Known as the **Tarantula nebula** due to the striking similarity it shows to the tarantula spider of Australia, the largest arachnid of its kind in the world, and easily spotted with the naked eye, with NGC 2070 as the Tarantula's heart. Also known as 30 Doradus, it is situated approximately 190 000 light years from earth, and is almost 600 to 700 light years in diameter. Some astronomers believe that 30 Doradus is the nucleus of this neighbourhood galaxy, but on the other hand it is not very centrally placed. The inner core consists of stars that are very hot and large, their combined radiation being responsible for its brightness, especially the brilliant cluster R136, home to the recently discovered super massive stars, several of which have masses well in excess of 200 solar masses. R136a1 starting off at 320 solar masses! See *MNASSA* Vol 69 Nos 11&12.

The very large gas nebula unfolds in long, soft, cloud-like arms, gently enfolded with dark, stripy inlays from a soft but strong inner part. With higher power the inner part displays a tight, bright overwhelming core (see sketch). Soft, nebulous gas trails and filaments extend beautifully in soft streaks of light that fade away and mingle with



NGC 2070, the Tarantula Nabula

the dark of night. The southern part of the nebula is more complex, unfolding in a veil of misty haziness. The northern part appears tighter and more defined, and with a bit of imagination a large starry spider can be seen lurking in the nebulosity. Star splinters dot the surface of this outstanding object like dewdrops on frosted glass.

Another complex group of objects is situated only 35 arc minutes south of the great Tarantula nebula in the LMC. No fewer than eight objects can be seen in a field spanning only 10 arc minutes. **NGC 2078**, a diffuse nebula, is the northern focus of four combined objects forming a clear S shape. The nebulosity around the other three – NGC 2083, NGC 2084 and NGC 2079 – is quite strongly defined, although the dusty surroundings are clearly seen.

Supernova 1987A, the titanic supernova explosion, was first observed on 23 February 1987 just to the south-east of the

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Tarantula nebula. The star Sanduleak -69°202 was a magnitude 11.7 star before the outburst. It blazed with the power of 100 million suns and brightened up more than 2 000 times than it was before. Although the supernova itself is now a million times fainter than 23 years ago, light echoes are just beginning to show in the space surrounding it. Supernova 1987A was a blue super giant, with a core collapse that should have left behind a neutron star, but no evidence of that has yet turned up.

This supernova was discovered by Albert Jones of New Zealand, who has made over half a million variable observations in his lifetime. He also discovered two comets, the first in August 1946 and the second in 2000. The Minor Planet (9171) was named in his honour, but he decided to name it Carlyndiane after his wife, using her first two names. What a wonderful way to gift your wife with a piece of heaven.

References

[1] *MNASSA* Vol. 69 Nos. 9 & 10. Oct. 2010

Object	Type	RA (J2000.0)	Dec	Mag	Size
NGC 1546	Galaxy	04 ^h 14.6	-56°04'	10.9	3.0'x1.7'
NGC 1566	Galaxy	04 20.0	--54 56	9.7	8.3'x6.6'
NGC 1617	Galaxy	04 31.7	-54 36	10.4	4.3'x2.1'
R Doradus	Mira Variable	04 36.8	-62 05	4.8-6.6	Per. 338 d
NGC 1672	Galaxy	04 45.7	-59 15	9.7	6.6'x5.5'
NGC 1763	Open Cluster/Neb	04 56.8	-66 25	8	5'x3'
NGC 1761	Open Cluster	04 56.6	-66 28	9	1.2'
NGC 1760	Emission Nebula	04 56.6	-66 32	11	2.5'
NGC 1769	Emission Nebula	04 57.7	-66 28	10	2.5'
NGC 1773	Open Cluster/Neb	04 58.2	-66 22	10	2.5'
NGC 1776	Open Cluster	04 58.7	-67 26	12	1.2'
NGC 1783	Globular Cluster	04 59.0	-65 59	11	3'
NGC 1810	Open Cluster	05 03.4	-66 23	11.9	1.2'
NGC 1818	Open Cluster	05 04.2	-66 26	9.7	3.4'
NGC 1901	Open Cluster	05 17.8	-68 26	7	40'
NGC 1978	Globular Cluster	05 28.8	-66 14	9	3.9'
NGC 2004	Open Cluster	05 30.7	-67 17	9.6	2.7'
NGC 2032	Emission Nebula	05 35.3	-67 34	10	3'
LHA120-N59c	Reflecting Nebula	05 35.6	-67 37	14	1'
NGC 2070	Emission Nebula	05 38.6	-69 05	5	30'x20'
NGC 2078	Diffuse Nebula	05 39.6	-69 45	10	1.5'