Fornax, an Oven Full of Fuzzies

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Image source: Stellarium.org

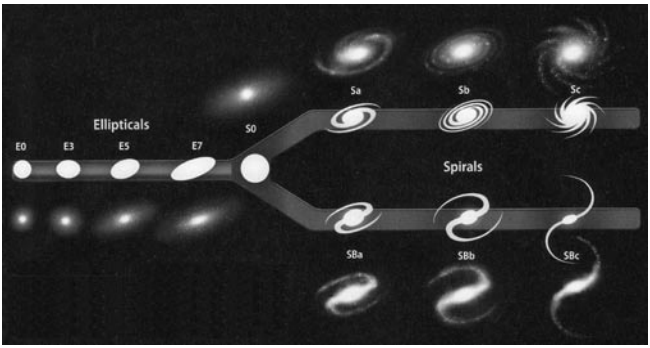
The constellation Fornax was previously known as Apparatus Chemicus, translated as Chemische Apparat, Chymische Ofen and L'Apparat Chimique in 1782, in honour of the celebrated chemist Antoine Laurent Lavoisier. These titles have, however, fallen into disuse for the constellation and only the name Fornax the Furnace has stuck (*Star Names: Their Lore and Meaning* - Richard Allen).

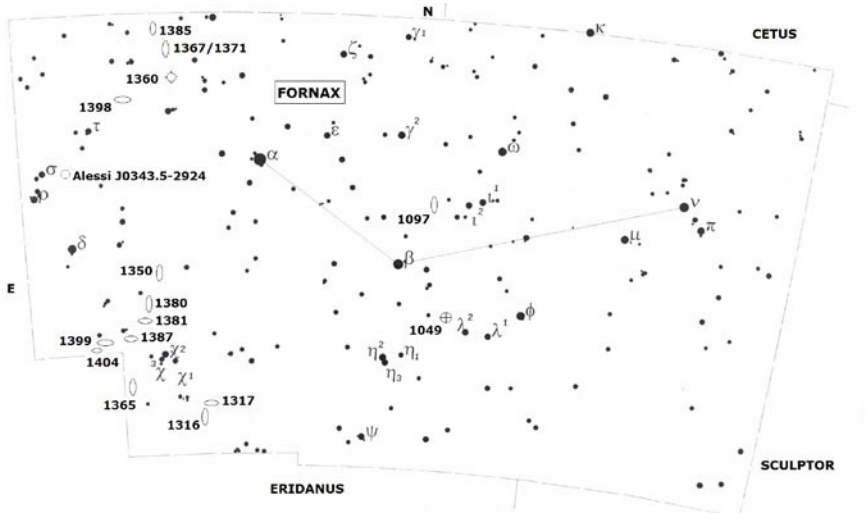
It is a constellation that is generously blessed with galaxies and is not at all reluctant to share them with us. The constellation Fornax is situated west of Eridanus and east of Sculptor, which is also situated in a galaxy-rich part of the starry skies.

Gaining an understanding of galaxies by just talking about them, or thinking about them, is not always very successful and can bring about confusion. Observing them sometimes seems to be even more difficult, but when you succeed in doing so, it is very satisfying.

As a warm-up exercise, let us first illuminate the panorama with omega Fornacis, a close pair of suns, fairly bright with a separation of 11" and position angle (PA) 237°. The primary has a lovely yellow-white colour, while its fainter companion reflects as a light grey-blue. The combination of colours makes this pair quite outstanding, and not shy to share a southern field of view encircled by galaxies.

If you aren't yet ready for galaxy pie, then have a look at iota[1]&[2] Fornacis, situated 2° south of omega, a beautiful, wide, buttery-yellow pair, shining with stars of magnitudes 5.7 and 5.8.





The Hubble's model with ellipticals on the left, lenticulars in the middle (SO) and both kinds of spiral galaxies on the right (*Astronomy* Magazine, Roen Kelly - NASA/ESA). Edwin Powell Hubble developed a classification system for galactic structure based on the design of a cosmic "tuning fork" diagram. This model to classify galaxy shapes makes it easy to deal with the different types.

A closer look at the constellation reveals that it is liberally strewn with galaxies – a real challenge to take on. Everything is there: from stately spirals and giant ellipticals in different classes, to barred, edge-on, ring galaxies, irregular's and the more unfamiliar early types of lenticulars.

A familiar galaxy to find is more or less in the middle area of the Fornax oven's shelf: **NGC 1097** is situated just 1.7° east of iota Fornacis and 2.2° north of the orange-coloured beta Fornacis. Also known as Arp 77 and Bennett 10, the galaxy displays an elongated and diffused barred spiral, extending from the north-west to the south-east, with a bright bar-shaped nucleus that works up to a stellar point. Towards the north-western rim of the galaxy the companion galaxy NGC 1097A is barely seen as a dusty patch. With very high magnification and perhaps with larger than average amateur telescopes, traces of spiral arms can be seen as soft wisps of haze streaming outwards from the eastern and western sides. A triangle of three attractive yellow magnitude 10 stars is visible slightly to the south. NGC 1097 is also a Seyfert-type galaxy, and in deep photographs has revealed four narrow optical jets. Halton Arp interpreted these jets as manifestations of the currently weak active nucleus. Studies

show that the jets are in fact composed of stars and could well be the shattered remains of a cannibalised dwarf galaxy. Arp is known for his 1966 catalogue, *Atlas of Peculiar Galaxies*, which lists 338 examples of interacting and merging galaxies.

Feeling brave now? Then try the trio galaxy group NGC 1858, 1859 and 1860 situated just a degree south-east of NGC 1097.

The Fornax Dwarf Galaxy, also catalogued as ESO 356-G4, is situated barely 40' north-east of lambda Fornacis. A tough nut to crack is the globular cluster **NGC 1049,** situated inside the northern part of this dwarf galaxy. The object truly has the character and hazy look of a galaxy, but I doubt whether anyone can resolve any stars in this object. The globular cluster was discovered by John Herschel in 1834, but the parent dwarf galaxy was not discovered until 1938 by Harlow Shapley. Do not miss out on the beautiful trio companion stars eta Fornacis situated 2° south-east of the galaxy.

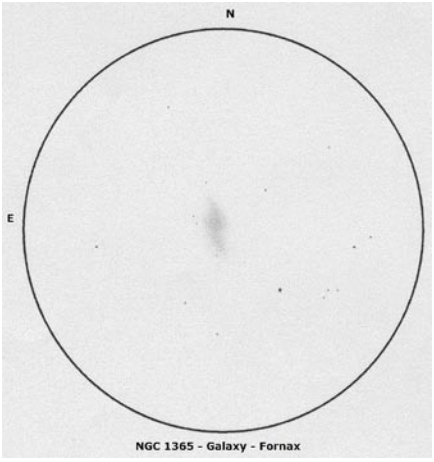
The easiest way to the Fornax galaxy cluster is to locate chi Fornacis in the midst of galaxy world towards the far south-eastern part of the constellation. The area is home to as many as 30 NGC galaxies. The south-western flank of the Fornax Cluster weaves around **NGC 1316.** It is also a lenticular galaxy with unusual dust lanes and is about 70 million light- years away. The galaxy is also known as Arp 154 and Bennett 14. This object is an active giant radio galaxy with a super-massive black hole, known as Fornax A, which has been feeding on a remnant it cannibalised. NGC 1316 is slightly elongated in a north-east to south-west direction. The companion galaxy **NGC 1317**, on the northern tip of NGC 1316, is much smaller, round in shape, and brighter towards a sharp, dense core. It would not be strange if NGC 1316 eventually absorbed NGC 1317. A few faint stars between the two galaxies connect the pair beautifully (see sketch). The trio galaxies NGC 1316 A, B and C are situated north-west of the pair. Another faint baby companion, NGC 1310, lies further away to the west, but is perhaps too faint to glimpse.

NGX 1316 and NGC 1317 - Galaxies - Fornax

The treat of this galaxy swarm in Fornax are the dozens of star cities that can be seen dotted about in the background,

around **NGC 1365**, which is also known as Bennett 16, usually known as the largest barred spiral, but is sadly not a member of the Fornax group of galaxies. Although the galaxy displays a low surface brightness, the bar lines up beautifully from east to west, with a relatively bright small nucleus. Higher magnification, however, brings to the fore the barely visible flimsy arms of this spectacular object. The arm from the western end fades towards the north, while the other arm stretches from the east in a southern direction. Both arms decrease in brightness towards the edges, with the western arm perhaps better defined. NGC 1365 could possibly see as the shape of our own Milky Way.

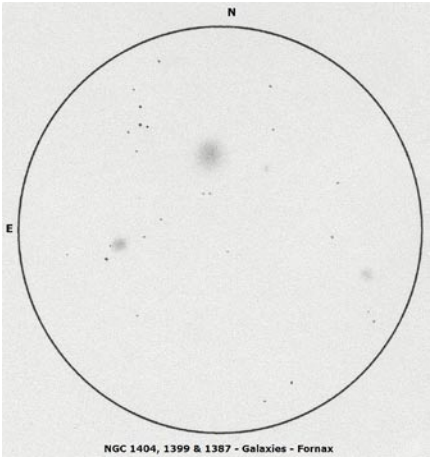
In the heart of the Fornax group of galaxies, **NGC 1399**, situated north-east of NGC 1365, appears as one of the largest and brightest elliptical galaxies. Also known as Bennett 19, the galaxy displays a hazy outer envelope and brightens gradually towards a large core and tight prominent nucleus. A faint star superimposed on the northern edge of the core region lends a completely different look. The galaxy is located some 65 million light-years from Earth. Astronomers using the Chandra X-ray Observatory have discovered an intermediate-sized black hole in NGC 1399, ripping a star to shreds. The shredded debris shows spectral lines of oxygen and nitrogen, but no hydrogen – a sign that the disrupted star was a white dwarf (*Astronomy* magazine).



NGC 1365 - Galaxy - Fornax

The companion galaxy **NGC 1404**, also known as Bennett 20, is situated only 8' to the south-east. This companion galaxy is little more than half the size of NGC 1399. Although small, it displays with pride a quite bright circular glow and dense core, beautifully rounded off with a red-coloured magnitude 8 star about 2' toward the south.

Barely 20' west, another elliptical galaxy, **NGC 1387**, occupies a spot in this crowded cooking oven full of fuzzies (see combined sketch with NGC 1399, 1404, with 1387 on the western edge). Although rather small and faint, it displays yet another round ball of light, brightening to a star-like nucleus. The galaxy is also known as Bennett 18 and with higher magnification displays a soft outer envelope. This rich group of galaxies could be as far as 45 000 light-years away.



The edge-on galaxy **NGC 1381** find its home 25' north-west of the mother galaxy NGC 1399. It displays a slightly stretched-out ellipse from north-west to south-east with an obvious centre.

A fat, oval-shaped galaxy **NGC 1380** is situated further towards the northern edge of the galaxy group; it is not a spindle in the real sense of the word, but still very elongated in a north-south direction. Also known as Bennett 17, it is an impressive moderately large galaxy gradually brightening to an almost star-like nucleus. Three more galaxies, NGC 1373, 1374 and 1375, approximately 20' to the south-west, form a fine group. This area is dotted with galaxies and the best way to explore it, is to use a detailed star map in excellent dark skies.

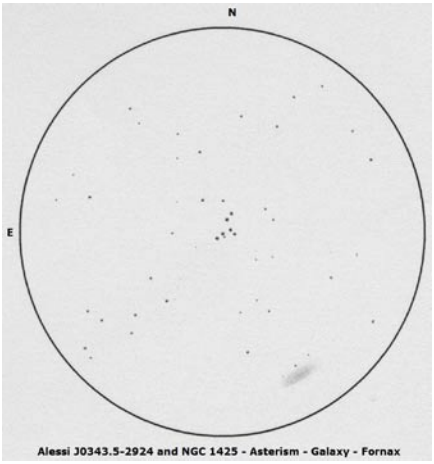
Interestingly, astronomers pushed the NASA/ESA Hubble Space Telescope to its limits when they found a very dim and tiny object, in Fornax called UDFj-39546284, which is likely to be a young compact galaxy. The object existed 480 million years after the Big Bang, only four percent of the universe's current age. More than a hundred such mini-galaxies would be needed to make up our own galaxy, the Milky Way. It is possibly the most distant object ever seen in the universe. Its light will have travelled for 13.2 billion years to reach Hubble, which corresponds to a red shift of around 10. The age of the universe is more or less 13.7 billion years (NASA/ESA).

Just outside and towards the north of this dense and rich galaxy area is the somewhat lonely member, **NGC 1350**. It is a beautiful spiral galaxy, displaying a dust lane stretching in a north-south direction, and gradually brightening to a small but very bright nucleus. A slight, flimsy haziness can be glimpsed towards the western edge. The galaxy is also listed as Bennett 14a. A very faint star is situated in the southern tip and a delicate double star can be seen 4' away in the north-eastern field of view.

Bruno Alessi who sifts through the galaxies discovered an asterism in the eastern part of the constellation forming a triangle to the north-east with NGC 1350 and alpha Fornacis. Asterism **ALESSI J0343.5-2924** can be found more easily situated midway between the stars tau and sigma Fornacis. The group displays a modified letter J with a

few, approximately magnitude 9 yellow-coloured stars. The top bar is towards the south and also houses a double star. The grouping stands out well against the starry field accompany by the galaxy NGC 1425 towards the south-west.

The Two-Tiered Spiral galaxy, perhaps better known as **NGC 1398**, can be found in the north-eastern part of the constellation. Also listed as Bennett 19a, this large round spiral galaxy displays a relatively high surface brightness. The galaxy brightens evenly to a compact dense nucleus with the edge displaying a soft and hazy outer envelope. Very high magnification is needed to glimpse the outer spiral arms responsible for its nickname. According to astronomers it is not known why the central bar in some spiral galaxies rotates around the disc at different speeds from that of individual stars.



What a nice surprise to find a bright and eye-catching planetary nebula just a degree north-west from **NGC 1398**. **NGC 1360** is a large irregular planetary nebula that displays an oval glow in a north-south direction. With careful observation and higher magnification it shows an uneven texture with a slightly brighter northern region. Also known as Bennett 15, this object is bathed in a pale washed-out grey colour and hosts a magnitude 10.5 centre star, visible with careful observation. An attractive white-coloured magnitude 6 star is situated approximately 20' to the north-west of this planetary nebula.

Perhaps the two northern-most NGC galaxies in Fornax are NGC 1367 and NGC 1385. The brighter of the two, NGC 1367, also listed as **NGC 1371** (slightly confusing!), is situated only a degree north of the above-mentioned planetary nebula. The galaxy displays a very soft oval, relatively large with a slightly brighter nucleus. What makes this galaxy special is the pair of orange-coloured stars situated close to the north-eastern edge.

The last galaxy to be discussed in this very special constellation is **NGC 1385**, barely 30' south of the border with Eridanus. Like so many other galaxies this one also displays just a faint oval haze against the background star field. It appears elongated in a north-south direction, brightening gradually towards its nucleus. The colourful star field comes

as a bonus and complements the galaxy in a very special way.

You were warned that there are many fuzzies cooked up in this chemical oven? What a delightful journey through this galaxy world to be able to discover and explore these misty, distant Milky Ways. ☆

Object	Type	RA (J2000.0)	Dec	Mag.	Size
NGC 1049	Glob. Cluster	02^h39^m7	-34°17′	12.9	4′
NGC 1097 Bennett 10	Galaxy	02 46 2	-30 15	9.2	10.5′x6.3′
NGC 1316 Bennett 14	Galaxy	03 22 7	-37 12	8.2	13.5′x9.3′
NGC 1317	Galaxy	03 22 8	-37 06	10.8	3.5′x3.0′
NGC 1350 Bennett 14a	Galaxy	03 31 1	-33 38	10.3	6.2′x3.2′
NGC 1360 Bennett 15	Planetary Neb	03 33 3	-25 51	9.4	390″
NGC 1365 Bennett 16	Galaxy	03 33 6	-36 08	9.3	10.9′x6.5′
NGC 1367 NGC 1371	Galaxy	03 34 7	-24 56	10.6	4.9′x3.4′
NGC 1380 Bennett 17	Galaxy	03 36 5	-34 59	10.0	4.8′x2.8′
NGC 1381	Galaxy	03 36 6	-35 18	11.5	2.6′x1.0′
NGC 1385	Galaxy	03 37 5	-24 30	10.7	3.6′x2.4′
NGC 1387 Bennett 18	Galaxy	03 37 0	-35 31	10.8	3.1′x2.8′
NGC 1399 Bennett 19	Galaxy	03 38 5	-35 27	8.8	8.1′x7.6′
NGC 1404 Bennett 20	Galaxy	03 38 9	-35 35	9.7	4.8′x3.9′
NGC 1398 Bennett 19a	Galaxy	03 38 9	-26 20	9.5	7.1′x5.2′
ALESSI J0343.5-2924	Asterism	03 43 5	-29 25	8	16′