THE LIBERAL ARTS AND SCIENCES

The liberal arts and sciences – being astronomy, geometry, logic, arithmetic, grammar, music and rhetoric are very much a part of freemasonry and our rituals.

Freemasonry has a long and well documented relationship with science from its very earliest times, both in the operative and speculative forms.

One of the first things a newly entered freemason learns is the phrase – the earth, constantly revolving, etc.

From these words, we can make some deductions. The earth rotating round the sun argument was not generally accepted until 1727. (Heliocentric) Before that, it was generally accepted that the earth was stationary and everything else revolved round us. (Geocentric)

If we consider this fact, it brings us to an interesting correlation between the onset of speculative freemasonry and the climate of the times from the mid 1600's to the mid to late 1700's, a time known historically as the period of enlightenment.

In the mid 1600's people were still being persecuted and even executed for their beliefs and ideas, and the exchange of opinions, theories and scientific research was done in whispers behind closed doors. The great scientist, astronomer and antiquarian Elias Ashmole provides the first reliable mention of speculative freemasonry in 1688, by which time he had been a freemason for 35 years. He was a founding member of the Royal Society, along with people like Sir Isaac Newton.

The Royal Society consisted of scientists and philosophers. They met to witness experiments and discuss theories and new discoveries and were funded by rich benefactors.

Many of the topics discussed were innovative and highly sensitive and it is only natural that many like minded persons who could be trusted to be discrete and keep a secret would be attracted to freemasonry. Whether or not that was the case, many of the original and subsequent members of the RS were freemasons and lodges were often used as places to give lectures, demonstrations and show experiments.

In the mid 1600's, science was just starting to come of age. Astrology was giving way to astronomy and alchemy was turning to chemistry, as new discoveries were made and the great scientists like Newton were able to demonstrate and test the veracity of their theories and discoveries.

Sir Isaac Newton may or may not have been a freemason, but he undoubtedly mixed with members of many lodges and his esoteric interests would have been perfectly suited to membership. His laws of motion hold good to this day and work perfectly well alongside Einstein's theory of relativity.

This brings me on to my main interest of the moment, astronomy, this being generally considered to be, with geometry, the oldest of the sciences. Indeed, Astronomy and Geometry work hand in hand – the circumference of the earth was first calculated by Eratosthenes in the 5th century BC by

measuring the differing length of shadows from sticks at a known distance apart at the same moment in time, then using geometry to make the calculation. He was correct to within 2% - a remarkable achievement over 2,000 years ago.

All freemasons are encouraged to extend their researches into the hidden mysteries of nature and science – an exhortation that may well have been started by the members of the Royal Society.

The study of astronomy started in ancient times, when the patterns of the stars were given names according to the lines drawn between them to represent deities or figures. For example, Orion the hunter is a bright constellation or group of stars - seen in the winter.

Orion was named by the ancient Greeks after a giant mythical hunter who pursed another group of stars nearby known as the Pleiades or Seven Sisters. It was known by other names by older civilisations – the Babylonians knew it as Papushkal and Ninshubar, both messengers to the gods. The Egyptians named it after Osiris.

The familiar plough points us to the North Star and is probably one of the most useful aids to navigation for mariners. It is also known as the Big Dipper, but the astronomical name is Ursa Major, meaning the Great Bear – after the North American Indians name for it.

For anyone that has seen them, it can be imagined how much terror and awe that a strong display of the northern lights would create in people before we knew how and why they were caused.

This natural phenomenon is my all time favourite. When you see them as I did last week, you can easily understand the need of people to give a reason to them. Accordingly, they were attributed to various gods and many myths grew around them. My favourite one is the Vikings belief that they were caused by the valkyries, the warrior handmaidens of Odin, riding across the sky from Valhalla, the light reflecting off their swords and armour creating the dazzling display of changing colours and flashing curtains of light.

The first glimmer of understanding of why this occurred was made by one of the most famous freemasons ever, Benjamin Franklin. He observed them on many occasions on his journeys and theorised that they were caused by electrical charges around the magnetic Polar Regions. He was very close – it was only relatively recently that the correlation between solar activity and the intensity of the aurora was fully understood. It is basically charged particles of energy thrown out by the sun attracted to the magnetic Polar Regions, where they react with molecules in the upper atmosphere and create visible light. A solar storm will create a bright aurora – it has nothing to do with seasons or weather on the earth, it's there all year round, day and night.

But the ancients did their best with what they knew at the time. The earliest reliably dated chart or map of the stars is Egyptian and dates from around 1500BC and most cultures were familiar with the stars and their apparent movement around the earth.

In ancient through to late medieval times, the stars, moon and planets were most often associated with gods or the spirits of the departed and were believed to influence the lives of people, the seasons and to foretell disasters or good fortune.

In medieval times, up to the 16th century and beyond, it was believed that there were a number of spheres rotating round the earth in which the various stars, planets, the moon and the sun were embedded. The spheres were made of a substance called ether or quintessence, both words being poetically used today – something may have an ethereal quality or we talk about the quintessential substance of something.

We may laugh at such ideas now, but in the light of the times they were doing their best to explain and understand the nature of things and these were the best ideas that they could come up with. It lingers on in some places - even now, almost everyone knows their so called star sign and astrology remains a firm favourite in the popular press and serves as a platform to make huge sums of money from gullible people.

To digress for a moment - If anyone thinks that their star sign has any bearing on their lives or destiny, let me just explain that the popular form of astrology in the west is sun based, that is your star sign is decided by which constellation of the zodiac the sun was in when you are born. There are other forms used by different cultures, all equally useless.

They use 12 signs or names of constellations in the astrological zodiac. However, there are actually 13 zodiacal constellations, the 13th being named Ophiucus. I've heard of a Sagittarian, but never an Ophiucan.

The next major obstacle is that the charts that astrologers use are hopelessly out of date. When they were originally drawn, the sun may have risen in a given constellation. However, due to a change over time of the earth's axis of rotation, the sun does not rise in those constellations that your birthday falls upon now. In addition, on the same day each year, the earth may be up to 22,000 miles further or closer to the sun due to the shape of its orbit, which is not perfectly circular. That is not an insignificant error. The ancients knew nothing about the planets Neptune, Uranus or Pluto and when Pluto was named as a planet, the astrologers seized upon it and used it. It is now no longer a classed as a planet, as there are bigger objects in the solar system. It is merely a large asteroid – yet they still use it in their false claims.

So brethren, a warning – do not believe your horoscopes!

As knowledge increased, astrology turned into astronomy and science as we know it began to take over.

Galileo was the first person to make and use a telescope and he found that Jupiter had 4 moons orbiting round it – still named the Galilean moons – io, calypso, europa and Ganymede. He found that moon had craters on it and was the first to discover sunspots. His observations confirmed the theory of Nicholas Copernicus that the earth was not the centre of the universe, rather that the earth orbits the sun, as do all the other planets. And that the sun was just one star amongst countless billions of others.

Galileo was sentenced to house arrest for the rest of his life for this belief and forbidden to speak of it.

Astronomy gathered momentum and new discoveries were constantly being made. Newton's laws of motion were used to predict the existence of the planet Neptune and the former planet Pluto and they were found exactly where they were expected to be. Bear in mind these early scientists had no computers – everything was worked out on paper.

So on to modern astronomy.

In the past 100 years, the scale and nature of the universe has become clearer, although we still only know a fraction of what remains to be learnt.

We know about the planets in our own solar system and have sent spacecraft to visit them all. Most fascinating for me is the sheer vastness of space. Let me give you some figures to illustrate how big space is.

Light travels at a speed of 186,000 miles per second. The sun is 93 million miles from us and the light takes over 8 minutes to reach us.

You could fit 1.14 million earths into the sun.

Sunlight takes 5 ½ hours to reach Pluto on the outer edge of our solar system.

Our sun is one of 3 billion stars in our galaxy, which we know as the Milky Way.

Almost every star you see in the sky in the milky way, the concentration of stars being most dense in the belt you see across the sky on a dark night.

The next nearest galaxy is Andromeda, which is 3million light year from us. Andromeda contains over a trillion stars.

There are estimated to be over 500 billion galaxies in the visible universe.

The furthest galaxy we have observed so far is 13.5 billion light years away.

Our sun is 4.5 billion years old. Humans as a species have been in existence for approx 150,000 years.

The NASA space shuttle is the fastest manned vehicle ever – it would take it over 38,000 years to travel one light year travelling at 17,500 mph.

Modern astronomy techniques are revealing that many stars in our galaxy have planets around them. There is no reason to believe that life may not be present on some of them. There may be

billions of civilisations out there – or we may be the only one. At the moment, there is no scientific evidence one way or the other.

Another very important issue is the possibility of a collision with an asteroid or other space object – as seen in Russia recently. Currently in the news is the comet PANSTARRS. Although there is no danger of a collision, this object was detected and named after the Panoramic Telescope Survey and Rapid Response System, a huge collection of enormous telescopes whose job it is to detect objects that may impact upon the earth. It is not a matter to be taken lightly – there have been several extinction events in the history of the planet and there's an awful lot of matter floating around in space that could potentially wipe out life altogether on this planet.

So, brethren. In conclusion. When we learn and quote that phrase – 'The earth revolving on its axis etc., just pause to consider the hidden mysteries of nature and science, go out on a clear dark night and gaze upwards. Ponder on the vastness and scale of the universe we live in and our place in it. And consider extending your researches. Take some time to look upwards and at the moment, the brightest object – apart from the sun and moon – in the sky is not a star, it is the planet Jupiter. Look at it through binoculars and you will see the 4 moons round it that were first seen by Galileo 400 years ago, and ponder on how, in that short space of time, we have gone from imprisoning the man who discovered them to sending a spacecraft to them and photographing them in incredible detail. Look for Orion the hunter and seek out the middle star in his belt – through binoculars it is a fuzzy grey patch – through a telescope it springs to life in incredible colour, a huge swirl of multi coloured gas and dust particles known as the Great Nebula. Seek out the galaxy Andromeda which, when viewed through a telescope covers an area in the sky more than 3 times the size of a full moon and is the furthest object visible to the naked human eye.

I will be pleased to try to answer any questions any of the brethren may have.

WM and brethren, thank you for your kind attention.