Sagittarius

The Newsletter of the Astronomy Section of La Société Guernesiaise

October – December 2007

Forthcoming Events

Public Lecture:

Dr Michael Hoskin
(Astronomy historian,
Cambridge University)

The Megalithic Tombs of Brittany in their European Context

22nd October : 8.00 pm
Lecture Theatre, Frossard Centre, Candie Gardens.

Public Open Evenings:

23rd October: 7.00 pm
16th November: 7.00 pm

Astronomy Section Christmas Meal

11th December: 8.00 pm
Fleur Du Jardin

In addition, the Section meets at the Observatory every Tuesday evening, and Friday if clear for observing.

Inside

Inserts

Star chart

Sunset, sunrise, moonset and moonrise times

Section News

Once the again the Perseids BBQ was well attended and we were fortunate with a moonless clear night. We observed over 40 meteors between 10.30 and 11.30 pm although most were very faint. (Thanks to Barbara Waldron for donating the disposable BBQs).

There has been a lot of labour at the Observatory over the summer. The Meade building has been reroofed and large amounts of gorse and foliage cleared to the east and west boundaries (thanks to those involved). An urgent job is to redecorate the Main building before next years WEA course.

The Section Christmas Meal will be at 8.00 pm on 11th December at the Fleur Du Jardin – please contact Debby if you would like to attend.

David Le Conte has advised that there is a public lecture by Dr Michael Hoskin (Cambridge University) entitled ***The Megalithic Tombs of Brittany in their European Context*** at 8.00 pm, Monday, 22 October at the Lecture Theatre, Frossard Centre, Candie Gardens.

Dr Hoskin is a renowned historian of astronomy and is the Editor of *The Cambridge Concise History of Astronomy*, *The Cambridge Illustrated History of Astronomy*, and of the *Journal for the History of Astronomy*, which he founded. With Sir Patrick Moore he is Honorary Vice-President of the Society for the History of Astronomy. He has a particular interest in 18th century astronomy, he has recently published a biography of William and Caroline Herschel, called *The Herschel Partnership*.

His talk to La Société Guernesiaise, will concentrate on his interests in prehistory, and particularly the orientation of dolmens, as described in his book *Tombs, Temples and Their Orientations*.

Dr Hoskin has conducted a survey of orientations of dolmens throughout western Europe, the Mediterranean islands and north Africa, and has personally measured some two thousand. In recognition of this work, a building under construction at the archaeological site of Antequera is being named Centro Solar Michael Hoskin.

During his visit to the islands Dr Hoskin and David Le Conte will carry out measurements of the orientations of megalithic tombs in Jersey. This will complement and extend David's work on the astronomical implications of the orientations of Guernsey dolmens, described in his lectures in Guernsey last November and in Cambridge in April, and in his article in the 2005 *Transactions*.

Colin Spicer

A Lighter Look Into The Darkness

Close to Home

We live on the 3rd rock from the Sun in our Solar System, which is one of many such planetary systems in a Galaxy called the Milky Way. There are eight planets in our system (Pluto has just been demoted to a 'dwarf planet'), but we are fortunate enough to be on the one that sustains carbon based "life as we know it Jim". Earth is about 8,000 miles in diameter and on average (depending where we are in our yearly orbit) approximately 93 million miles from our Sun. This means we have the right amount of light, warmth and rain to create the right environment for us to thrive. Just as a matter of interest the Earth is spinning at about 1,000 miles per hour at the equator and travelling around the Sun at about 65,000 miles per hour, no wonder we feel dizzy sometimes ("stop the World, I want to get off", but not so easy now you know that). Our orbit around the Sun takes 365¼ days (one year), but if you lived on Mercury (closest to the Sun) it takes 88 days and Pluto (farthest from the Sun) it takes 248 years.

The Sun

Our Sun (the one we orbit round) is a Star like all the other stars out there, a sun is a star, a star is a sun, same thing, we just happen to call our own Star "the Sun". Our Sun is quite average, average size, average brightness just about average everything, but very important to us, because without it the Earth and "life as we know it Jim" couldn't survive. Our Sun is half way through its life time which make its age about 5000 million years**,** it's made up (like all other stars) by two gases Hydrogen (very volatile) and Helium (the one that make balloons stand straight and your voice sound like Donald Duck if you inhale it). Every second the Sun converts 600 million tonnes of Hydrogen in its core by nuclear fusion to 596 million tonnes of Helium. The remaining 4 million tonnes of Hydrogen is converted to energy and makes its ways to the surface and shines out into space. Each second the Sun radiates more energy than man has used since the beginning of civilisation. The surface temperature of the Sun is about 6,000 degrees Celsius and core is 15 million degrees (a grain of sand this hot would cook a person 93 miles away (150 kilometres). Light from our Sun take 8 ½ minutes to reach Earth and the distance between the Sun and Earth is 93 million miles (one astronomical unit). Even so our Sun is small compared to some other stars out there in space. For instance the star Sirius (the Dog Star) in the constellation of Canis Major (the large dog) is 26 times brighter than our own Sun. By the way Sirius is the brightest star in the night sky seen from Earth and it's about 8½ light years away from Earth (I'll explain light years later). There are other stars that are thousands of times bigger than our Sun and other stars that are only the same size as the Earth. Our Sun's diameter is nearly 870 thousand miles (1,400,000 kilometres, for those of you that work in metric). It would take over a millions Earths to make up the mass of our Sun.

The Moon

Most people can't avoid noticing the Earth's only natural satellite, the Moon. The Earth has only one moon, but other planets have whole moon families, for instance Saturn, at the last count, had 64 (all different sizes, some bigger than our Moon and others the size of large trucks), Uranus has about 25 plus moons and they are all named after characters in Shakespearean plays (don't ask my why). Our Moon is about 2,000 miles across and just short of 250,000 miles from the Earth depending on its orbit. Its orbit around the Earth takes 28 days starting with no Moon and getting bigger each night until it gets to full Moon and then getting small until there is no Moon again. This effect is called waxing (getting bigger) and waning (getting small) and is caused by the sunlight shining on the Moon's surface. Depending on where the Moon is in its orbit round the Earth it catches more sunlight on the surface until it is full. The Moon (just like a planet) has no light of its own and can only shine by reflected sunlight. When the Moon is ¾ lit it is called a Gibbous moon, also when then are two full moons in one month this is called a Blue Moon (doesn't happen very often, hence the saying "once in a blue moon"). There are two main theories as to where the Moon came from, one is that it is a piece of the Earth that broke off when in the very early days, when the solar system was forming, the Earth was struck by another very large object and a piece broke off and formed the Moon and was then captured in the Earth's orbit. The second is that as the Earth was forming the Moon formed from bits that didn't quite make it to the Earth. There is a third theory that the Moon is made of green cheese and the Clangers and the Soup Dragon live there, but modern technology and the Apollo Moon Landings have more or less proved this to be untrue.

Plotting Space

When astronomers observe the night sky it's important to know how the stars are plotted in relation to the Earth and where you are on the Earth. From Earth, the Moon, Planets and Stars all seem to travel in an arc from east to west every night, it's actually the Earth rotating that gives this effect (anything else travelling in a different direction is probably a man made satellite or Aliens). All bodies in space are travelling very fast in all different directions, but because the Earth is so far away from them their 'proper motion' need not bother us on Earth for viewing purposes. So, we imagine that the stars are fixed and painted on the inside of a giant sphere (like being inside a giant beach ball) and the Earth is suspended right in the middle. We then project the lines of latitude, longitude and the equator into space (the inside of the beach ball) and plot the star on them. In the sky, latitude is called declination, while longitude is called right ascension. Declination is measured in degrees starting from 0 degrees at the celestial equator to 90 degrees at the poles (declinations north of the equator are positive and south are negative).

Right ascension is measured in hours, minutes and second where an Earth-day of 24 hours marks a full rotation of 360 degrees. The baseline of 0-hour right ascension is the point on the celestial equator where the sum is found on the first day of Spring in the Northern Hemisphere (now keep up the boring science bit is nearly over).

Stars on the equator have declination 0°; the north celestial pole has declination +90° north. Polaris (the North Pole stat) has a declination of +89.2°, less than one degree from the polar point.

The altitude of the celestial pole is always equal to the latitude of the observer (that means where you are standing on the Earth). Guernsey has a latitude of 49° 30' (lets call it 49° North for cash), the celestial pole will therefore be 49° above the horizon.

So if we then subtract 49 from 90, we get 41 (at least we did when I went to school, but that was a long time ago), this means that any object with a declination north of +41° will never set, it will remain above the horizon all the time and will be what is called a circumpolar object (meaning it always rotates around the celestial pole and never drops below the horizon out of view).

Objects with a declination of south -41° will never rise at all and will never be seen from Guernsey.

A Light Year

Before I go on any further (when I get going on Astronomy I can't stop, you may have noticed), I had better explain a 'light year' (no it's not just made up from 'Star Trek'). Light travels at 186,000 miles per second, so in a year it covers 5,880,000,000,000 (usually stated as nearly 6 million million when talking about light years, "what's a few million miles between Astronomers").

The Milky Way

Our own Galaxy, the Milky Way (it came first not the chocolate bar), is made up of approximately 100 thousand million suns (stars), many of them far larger or brighter than our Sun. Rigel in the constellation of Orion the Hunter (a winter constellation) shines with 60,000 times the candlepower of our Sun and is over 900 light years away (5,400,000,000,000,000 miles), in fact the light that we see shining from Rigel actually left the star around about the time of the Battle of Hastings (you know, when Harold got hit in the eye with an arrow). Every time we look into space and view an object we are never seeing it as it is at present because of the astronomical distances (get it astronomical!) that the light has to travel to get to us here on earth. Even the light from our own Sun is 8½ minutes old by the time it reaches us. In a sense we are looking back in history or putting it another way perhaps, doing a bit of time travelling (although we don't actually have to go anywhere).

The stars of our Galaxy are arranged in a flattened system with a pronounced central nucleus (it has been said that the shape resembles two fried eggs laid back to back!) The whole Galaxy measures 100,000 light years from side to side (600,000,000,000,000,000 miles), and our Sun is positioned about 32,000 (192,000,000,000,000,000 miles), light years from the centre. When looking along the main plane of the Galaxy, we see many stars in more or less the same direction, this produces the effect known as the Milky Way, a luminous band that stretches out across the darkened night sky (unfortunately this effect is not seen in bright city lights or a large town).

All bright naked-eye stars (you don't have to be naked to see them) belong to our own particular Galaxy, but still we are only at the very beginnings of things. Far away in space we can make out other galaxies, these are quite separate systems. There is a particularly famous one that is easily seen with small binoculars and with the right conditions even the naked-eye and it's called the Great Spiral Galaxy in the constellation of Andromeda (sometimes known as the Andromeda Galaxy). It is seen as a faint fuzzy patch of light and probably not that impressive until you know that it is our closest neighbouring galaxy and is about 2 million light years way (12,000,000,000,000 miles).

The 200-inch (that's the size of the mirror in the telescope) reflector telescope at Palomar in California is capable of photographing 1,000 million other galaxies. The most distant galaxies so far recorded are several million light years away.

The edge of the whole universe is estimated to be 14-16 billion light years away (that's a lot of zeros).

For the time being let's look at things much closer to our little spot in space. The Human race has been observing the night sky for century after century and history tells us that many civilisations have studied, worshipped and been influenced by space and particularly the stars and planets. Amongst the most famous are probably the Mesopotamians, Babylonians, Greeks, Chinese and Egyptians and they recorded what they saw and we still refer back to them even today. Since the beginning of civilisation men have joined imaginary lines from star to star and made pictures, these have come to be the patterns we now call the constellations, very few of them resemble the object that they are supposed to look like. We have to remember that when these constellations were first drawn in the night sky the conditions that our ancestors were looking at them in were dramatically different from today. For a start there wasn't the light pollution that we have to put up with in our modern times, they didn't have street lights or greenhouses lit up at night, there were no security light or cars with headlights driving round the roads.

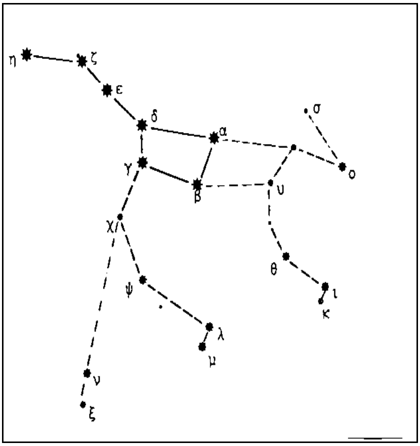
In those days when it got dark it was truly dark, as in pitch black. The only light was that of perhaps the occasional bonfires, sometimes candles, or moonlight, because of this they saw a lot more stars then we do today (also depending on how much they had had to drink, well perhaps some things don't change much after all).

Therefore when we look at constellations now we only see the very bright stars and not the much fainter ones that help make up the pictures they could see long ago.

The Constellations
Ptolemy, who was a great astronomer, lived and worked in Alexandria between 120 AD & 180 AD, was the first person to catalogue the constellations of the Northern Hemisphere. He made a list of the most popular 48 and it is those main 48 that we still look for today, although they have been added to since Ptolemy's time (88 in total).

Most of them have stories made up about them, telling us what they represent and why they were put in the heavens. They are mainly all to do with the legends and tales of the Greek and Roman gods and their carryings-on. Although interestingly the names of most of the bright stars in the night sky were named long before the constellations were and are mainly all named in Arabic.

Let's take The Plough for instance, it is probably the most recognised and one of the oldest constellations in the Northern Hemisphere, this is probably because it never sets below our horizon and therefore is always visible. The seven stars of The Plough are known by many names (the American's call it 'The Big Dipper', the British 'The Plough', 'The Saucepan' and also 'King Charles' Wain', because of its shape), but its true name is Ursa Major meaning the Great Bear. Therefore we only see the asterisms of Ursa Major (which is The Plough).



The Constellation of Ursa Major showing the asterism of The Plough

An asterism is a picture within a picture, or part of a picture; the dictionary explanation goes like this 'a prominent pattern or group of stars that is smaller than its constellation'. There are quite a few of these, we just see the brightest stars instead of the whole thing, no wonder they don't look like what they are suppose to resemble. For instance, the constellation of Cassiopeia the Queen of Joppa, her asterism looks like a wonky 'W'.

In mythology, Ursa Major was originally Callisto, handmaiden to the goddess Juno and daughter of King

Lycaon of Arcadia. She grew more beautiful than Juno herself; as a result Juno became very jealous. To keep Callisto from harm, Jupiter, king of Olympus, turned her into a bear. Arcas, Callisto's son, was out hunting one day, he saw the bear and was just about to kill it with his spear when Jupiter stopped him. He turned Arcas into a bear also - Ursa Minor, and placed both of them in the sky. Both constellations follow each other in their never-ending journey around the celestial pole.

During the spring evenings Ursa Major is almost overhead, and even when it is at its lowest during the winter evenings, it is still well above the northern horizon. Ursa Major also is one of the night sky's main signposts, due to it being circumpolar (meaning it never drops below our horizon therefore it is always visible in a clear night sky), and depending on what time of year it is, can point the way to many other constellations.

I hope you have enjoyed just a little of what Astronomy is about, I've tried to put in the fun bits and still have not touched on eclipses, comets, asteroids or meteors (shootings stars) let alone any cosmology or astrophysics, but I'll keep that for another day.

Jessica Harris

Uranus

Uranus is a long way from the Sun and consequently from us. This makes it difficult to study the planet in any detail. It is known to be similar in size to Neptune, its closest neighbour but less massive and apparently with quite a featureless surface. Or so it was thought.

Uranus has always been a conversation piece. You see, any normal self respecting planet spins on its axis so giving the surface a night and day. Some planets take longer than others to do this, but this is what planets do best. Even dwarf planets like Pluto, Eris and Ceres are more or less upright and spin. But Uranus is not upright at all. It spins, taking around seventeen hours, but the inclination is 82° making it almost horizontal. Whereas the Earth's north pole points towards Polaris, which has a declination of +89°. The north pole of Uranus points towards the star known as 15 Orionis, at the top of the Orion constellation, with a declination of +15°. It would be rather like Earth being tilted away from Polaris and instead leaning over towards Aldebaran.

Uranus has a number of moons. All are smaller than our moon and each has a name given after a Shakespearean character. There are twenty four in all, most are very small, but five can be seen from large earth telescopes; namely Umbrial, Titania, Oberon, Arial and Miranda. All orbit around the planet's equator, even though it is lying on its side.

Uranus' magnetic field is also curious. For many other planets, the magnetic field emanates from its core. Not so with Uranus. The field appears to be centred half way between the core and the surface, in a specific place and the axis of the north / south magnetic poles are offset from the rotational axis by 60 %.

So Uranus orbits the Sun on its side, always pointing towards 15 Orionis. This means that during one year, Uranus will have direct sunlight on each of its poles and twice on the equator. Its path around the Sun takes 84 Earth years. Since William Herschel discovered the planet in 1781, Uranus has only completed about two and a half of its years.

When Voyager 2 visited Uranus, it revealed a very bland, featureless world. This generated all sorts of discussion as to why Uranus was not stormy like Neptune, Saturn and Jupiter. It was speculated that Uranus had a different type of core which did not allow internal heating. However when Voyager visited, Uranus' north pole was pointing towards the Sun, which had the effect of putting the planet into a dark wintry sleep. Now 26 years later, Uranus has moved further in its orbit, allowing the Sun to shine on the equatorial areas and causing methane bubbles to be drawn to the surface which in turn crystallize (Uranus being composed of mostly hydrogen and helium). Now when Hubble and other large telescopes look at Uranus, it is indeed becoming a colourful and stormy place. This will not last for long, in the 2030's the south pole will face the Sun and the rest of the planet will return to winter.

Frank Dowding

Adolphus Collenette, 1841-1922

In a recent article in *Sagittarius* (April-June 2007), I reported on the astronomy lectures given to the Mechanics Institute at the Guille-Allès Library from 1890 to 1914. I mentioned that several of them were given by a Mr A Collenette, and I asked if any reader knew who he was.

Richard Hocart has drawn my attention to the fact that Adolphus Collenette was a very active member of La Société Guernesiaise, and was President, 1895-6. His obituary appears in the Société's *Report and Transactions* for 1992, and runs to no less than seven pages.

He was a scientific all-rounder, but primarily a geologist and meteorologist. He was a Fellow of the Chemical Society, had a business manufacturing sterilized mineral waters, and published a treatise on tomato diseases. He published 14 papers in the *Transactions*, mostly on geology, and gave 36 lectures at the Guille-Allès, of which he was a Council member and Honorary Museum Curator.

He was, however, mostly known for his meticulous meteorological measurements, a task which he took over from Dr Samuel Hoskins, who started them in 1843. They form a most important record of Guernsey's historical climate. He posted daily weather reports and forecasts at the Guille-Allès, which were much consulted. Shortly before his death the States of Guernsey took on the responsibility for meteorology, converting for the purpose the building which we now know as the Lukis House Observatory in Grange Road.

Obituaries appeared in a number of journals, including *Nature*. The Société obituary states that he was for many years the life of the society, and a true Guernsey *savant*.

David Le Conte

Geoff Falla's regular roundup of articles from popular Astronomy and Space Journals

Comets and Origins. The study of cometary material can provide valuable information about the evolution of the solar system. Results from the Stardust mission flyby of comet Wild 2 in January 2004, with a sample return of comet particles in 2006, and the Deep Impact mission to comet Tempel I in 2005 have both produced important discoveries - including confirmation of the variety of organic material contained within comets. (Astronomy Now, June 2007)

The Supernova Next Door. Eta Carinae is a giant star in the southern constellation of Carina. The star erupted in the 1840s before settling down again, and it is thought that its unpredictable behaviour and current brightening could lead to a supernova explosion becoming visible at any time. At 7,500 light years away, however, it is at a safe distance. (Astronomy, June 2007)

The First New World. Until William Herschel discovered the planet Uranus in 1781, it had been known that apart from Earth, there were just five other planets - as far out as Saturn. Royal astronomers at Greenwich, and a French astronomer, had seen the more distant planet a number of times between 1690 and 1771, but dismissed it as a star. It is now confirmed that Uranus also has a ring system, and 27 moons, but the planet still has some mysteries. (Astronomy, June 2007)

Solar Activity - Storm Watch. High levels of solar activity can affect communications, electrical supplies and GPS navigation. At present the Sun is in a quiet period of the solar cycle, but there are forecasts that the next cycle could be perhaps 50 per cent stronger than the previous one. Studies of the different kinds of solar emissions and effects are reported. (Sky and Telescope, July 2007)

Planetary Nebulae. A set of articles focusing on how a planetary nebula is formed from a star, the distinctive nebula shapes and colours, a guide to observing them, and a selection of the best ones to see. (Astronomy Now, July 2007)

The James Webb Space Telescope Project. Details of a new space telescope being built which will be much larger than the Hubble telescope, and designed to use infrared imaging. It will be able to look even deeper into space and farther back in time to the very early period of the universe, when the galaxies were formed. (Sky at Night, July 2007)

How Large can telescopes be? There are plans to build several giant telescopes, much larger than anything presently in operation. The largest of these is the European OWL project, which is to have a mirror system more than 300 feet in diameter. It is expected that the new telescope will allow images of planets around other stars to be obtained for the first time. (Astronomy, July 2007)

Phoenix - The new Mars Spacecraft. The Phoenix space probe was launched in August, and is due to land in the north polar region of Mars in May 2008. It is planned to dig into the ice to analyse samples, which it is thought may contain organic compounds necessary for life. The craft will also be able to obtain more information about the Martian atmosphere. (Astronomy and Space, August 2007)

The Voyagers at 30. It is now 30 years since the two Voyager spacecraft were launched on a 'Grand Tour' which included the outer planets. A review of the major achievements. They continue out towards the edge of the solar system and have power for about another 15 years, and are able to still obtain useful information about solar emissions - the solar wind. (Astronomy Now, August 2007)

Electronic Imaging. A set of articles focussing on the dramatic changes in modern astrophotography. Standard photography has now been largely replaced by more modern techniques using webcams, digital cameras and CCD cameras. (Astronomy Now, August 2007)

Japanese spacecraft studies the Sun. The Japanese Hinode spacecraft was launched in September 2006, and is now obtaining X ray solar images of magnetic activity and flares. It has found that active regions are much more extensive than was previously thought. As the peak of the next solar cycle approaches it is also hoped to obtain a better understanding of why the Sun's atmosphere is so much hotter than expected. (Sky and Telescope, August 2007)

In Caroline Herschel's Footsteps. Caroline Herschel was the sister of the 18th century astronomer William Herschel, and became the first famous female astronomer also encouraging William in his endeavours. She found twelve new star clusters and two galaxies, using a small reflecting telescope and also discovered eight comets. A list of the Caroline Herschel Objects, and where to find them. (Sky and Telescope, August 2007)

Galaxy Zoo. A public project launched to assist in the identification of galaxy shapes. It seems that visual observation is better for this than the use of computers, so the public are being invited to participate. (Astronomy Now, September 2007)

Einstein's Universe. Articles focusing on Einstein's Theory of Relativity and how its application to gravity and the speed of light led to one of the greatest changes in our understanding of the Universe. (Astronomy Now, September 2007)

What lurks between Galaxies? The space between galaxies is largely void, but very low density gas in this may provide clues to how galaxies formed and evolved. (Astronomy, September 2007)

The Dumbbell Nebula. All about M 27 in the small constellation of Vulpecula. The Dumbbell was the first planetary nebula to be discovered, and can be found against a full background of stars in the Milky Way, not far from Cygnus. (Astronomy, September 2007)

From Chaos to the Kuiper Belt. How the present Kuiper Belt evolved in the solar system's development process, involving a relocation of the major planets. (Sky and Telescope, September 2007)

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