The coming winter months

The sky is starting to change and when we are leaving the observatory now we are seeing the Pleiades in the east. It won't be too much longer before we begin to see Orion and the familiar winter stars. Meanwhile the summer triangle is still around, as is Mars, Uranus, Neptune and Pluto

Lunar eclipse

The second lunar eclipse of the year will be on the night of the 8th/9th November, starting at 23:32 GMT and finishing at 03:04 GMT

Meteors

Viewing of the Leonids, about the 17th November, will be not be hindered by the Moon, but no meteor storm is expected this year. The Geminids, around the 12th December, will however be affected by the Moon.

CCD camera

The new CCD camera has finally arrived. There have been some teething problems and the instrument had to be returned for repair. David Le Conte is still experimenting with the set up and plenty of practice and learning will be required to use this new piece of equipment to its full potential. However, some images have been obtained and there are great hopes that the instrument will be a valuable resource for the future.

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Sagittarius

The Newsletter of the Astronomy Section of La Société Guernesiase

October - Dec 2003

Forthcoming Events

Lunar Eclipse
11.32pm Sat 8th to 3.04am Sun 9th November

Leonid meteors
Monday 17th November

Geminid meteors
Friday 12th December

Christmas meal
Tuesday 9th December
-contact Debby Quertier for details

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

Inside

Centre inserts

Star chart
Sunset, sunrise, moonset and moonrise times

Section News

The Observatory has been open every Tuesday from mid-July to the beginning of September and on clear nights we have had at least 100 visitors. The highlight of the summer has been Mars, closer to Earth than it has been for many thousands of years, and both young and old appeared delighted to see the planet so clearly. Through the telescope the south polar cap was clearly visible along with dark markings on the surface. The red planet is still shining brilliantly in the south and will do so for a while yet, though gradually it will grow fainter and we will not see as much detail. A display on the theme of Mars was set up in the Observatory building, showing the past, the present and what the future holds with the Beagle Mission. We ran a video programme and also set up a model of the Solar System which showed the positions of the planets in relation to one another, demonstrating especially how close Mars was to Earth. The set up inside the Observatory proved as popular as the observing outside.

Visitors have still been turning up and we continue to get enquiries about whether the Observatory is open. Even when we are not open officially we are not turning anyone away and, as long as it is clear, we are continuing to show people Mars and other objects.

Although Mars was the main attraction we also showed visitors the Andromeda Galaxy, the Hercules cluster, the Ring Nebula plus many other objects that could be easily found in binoculars. We made use of smaller telescopes as well as our main instruments, the Meade and the Celestron. We recently purchased a laser light, with a narrow beam that stretches far into the sky, which has been perfect for pointing out objects to a large group of people. One keen-eyed visitor spotted the group of three satellites that travel together in a triangular formation (as seen by members on earlier occasions) – very strange they looked!

We held our barbecue on the 11th August and later we were joined by several visitors, as well as Radio Guernsey. Everyone settled down in anticipation of the Perseids, but alas they did not materialise – in the time we watched we saw only 3 or 4, a very disappointing performance from what is a normally a very reliable shower.

Jessica Harris has been doing a weekly Radio Guernsey spot on astronomy in general, with an emphasis on Mars. The local press and radio stations have both advertised our Open Evenings and they have generated a lot of enquiries. The Guernsey Press featured an article about Mars written by Geoff Falla, with some wonderful pictures alongside. Our details were included on the National Astronomy Week website and I have recently written back with the feedback from the visitors we had. It has been a very successful summer.

Debby Quertier

The Latitude Connection - 2

Geoff Falla follows up on his previous article
'The Latitude Connection - Coincidence or Correlation'

The original article 'The Latitude Connection - Coincidence or Correlation' appeared in the October-December 2000 issue of Sagittarius. It set out a number of examples in the solar system where prominent surface or atmospheric features are found to be at a latitude of about 19 to 20 degrees north or south of the equator. These examples included Olympus Mons on Mars - the largest known volcano in the solar system, also the Hawaiian volcano of Mauna Kea, the largest such structure on Earth, and at the same north latitude as the giant Martian volcano. Other examples at similar latitudes were Jupiter's Great Red Spot, the volcanic activity on Jupiter's moon Io, Neptune's Great Dark Spot, and the solar cycle of Sunspots -in particular at maximum activity. - but with no generally accepted mechanism which could help to explain it.

For all of these eruptive type features, and the most prominent ones, to be at the same latitude by chance seemed to be more than just a coincidence

It was hoped that further information would come to light, and in February 2003 an article on the same theme appeared in 'The New Zenith', the monthly publication of the Vectis (Isle of Wight) Astronomical Society. In this article Alan Matthews set out the same examples, also noting that Saturn's equatorial belts are at a latitude of 20 degrees north and south. Additionally, the fact was noted that if a tetrahedron - a four sided shape of three triangular sides and a base - is placed within a sphere with its apex at the pole, the three base points will be at the surface 120 degrees apart - and at a latitude of 19.5 degrees

This also indicated that there may be some unrecognized mathematical rule or process governing the circulation of material within a sphere. If such a process has been recognized, it does not seem to be generally known.

As it was more than two years since the publication of the latitude connection article in Sagittarius, a copy was sent to the editor of 'The New Zenith'. This was forwarded to Mr Matthews, and the editor also asked if the article could be reprinted. (The reprint appeared in the July issue of The New Zenith.)

Also in the last several years, further information has been found which also seems to be relevant.

In the case of Jupiter, apart from the Great Red Spot - which as we know is a semi-permanent feature of unknown cause, there are also the familiar dark belts with lighter zones. It has always been accepted that the dark belts were areas of descending atmospheric motion, while the lighter zones were areas of rising motion. When the Cassini spacecraft travelled past Jupiter between October 2000 and March 2001 on its way to Saturn, and there was the opportunity to study Jupiter's atmosphere in close detail, it was reported that the findings overturned the previous ideas which had been accepted for the last fifty years. (Astronomy Now, May 2003.) The discovery of a rising motion in the dark belts appears to be in line with the idea that these are also eruptive type features. The dark belts vary in prominence, and sometimes one or other of these belts is hardly visible at all. Some years ago when this happened, a single large dark spot was then seen to reappear. This was photographed by Astronomy Section member Daniel Cave. The spot soon spread out along that line of latitude, to re-form the more normal appearance of the belt. This event in itself was perhaps an indication of the true nature of these belts.

One suggested mechanism is that there are 'cylinders' of material with different rotation rates within Jupiter, and that these give rise to surface features. (The New Solar System, Sky Publishing 1981.) Other research claims to have found that rising vortices of material within a rotating sphere combine to come to the surface at particular points.

Like Jupiter, Saturn also has these darker but much less prominent equatorial belts, and they seem to be more precisely located at the recurring latitude of 20 degrees north and south of the planet's equator.

Since we know our own planet better than any other planet or moon in the solar system, are there any known circulation patterns above or below the surface which may help to explain why these rising or eruptive type features seem to be most active at a particular latitude?

It has been pointed out that in Earth's atmosphere there are cells of air circulating in particular regions to the north and to the south of the equator. (Peter Langford.) Perhaps there is a similar circulation pattern in slow moving material below the surface. It is known that there are hot spots at particular locations, and that these areas are not affected by movements of the Earth's crust over the course of time.

Magnetic anomalies producing unreliable compass readings are also evident at some locations. Particular areas are found, for example, in the western Atlantic near the Bahamas, and at similar latitudes in the western Pacific. Both of these areas have been acknowledged as having navigational dangers because of these magnetic variations. It is not known if ocean trenches may be of

relevance, but should also be noted, again because of the particular location. One of the deepest Atlantic trenches, if not the deepest, is near Puerto Rico. The maximum depth, of more than 30,000 feet, is to the north of the island - and is once again found at between 19 and 20 degrees north latitude. There seem to be few such areas of great depth in any of the equatorial regions.

Are there still other examples in our solar system where particular geographical or atmospheric features are found to occur at these same latitudes? Apart from Olympus Mons on Mars, and its counterpart in Hawaii at an almost identical latitude, as already mentioned, there is also reported to be an active volcanic area on Venus at the same north latitude. Although it cannot be observed directly because of the very dense atmosphere, the surface of Venus has already been mapped accurately by radar.

In the case of our own Sun, it is already apparent from the cycle of sunspot activity that the pattern of inner circulation may be similar to that of the planets, with less activity evident in the equatorial regions.

Will a comparable pattern of energy circulation be found elsewhere; extending also to other stars? With the introduction of a new generation of powerful telescope systems, and different techniques, perhaps it will not be too long before some of the distant stars can be studied in more detail.

Geoff Falla.

With thanks to Alan Matthews. (Isle of Wight)

John Langley, editor of The New Zenith, has also asked if anyone has further information which may help in explaining this phenomenon of an apparent latitude connection.
(Additional comments also to Peter Langford, editor of Sagittarius.)

Meteorites - A Bicentenary

Interplanetary debris that burns up as it travels through Earth's atmosphere is called a meteor but if it survives to reach the ground it is called a meteorite. It is now two hundred years since meteorites were officially accepted as being extraterrestrial. For a long time there was resistance to the idea that stones could fall from space, in spite of occasional reports that the stones had been picked up after being seen to fall. A more reasonable explanation seemed to be that the stones were already on the ground, and had been struck by lightning - so they were never properly investigated or examined.

The reality of the events was finally accepted by the French Academy of Science, following a remarkable fall of meteorites at L'Aigle in Southern France, on April 26, 1803.

Geoff Falla

Astronomy and Space - References for Further Reading *by Geoff Falla*

Lonely Planets. A new class of object, of planetary mass, is being discovered far removed from any star. A number of these free-floating 'planets' have been found in the last five years. They all appear to be several times the mass of Jupiter, but are not yet officially classified. *Astronomy, June 2003*

Why there is a need to return to the Moon. There are several reasons why a return to the Moon is needed, not least because it is a natural space station. Advances in technology should make the return easier than it was for the Apollo missions. *Astronomy, June 2003*

Searching for Alien Earths. Astronomers are looking forward to discovering Earth-like planets around other stars, perhaps also detecting signs of life. Two new satellite observatories are being built, by NASA and by the European Space Agency, to develop the search. *Astronomy, June 2003*

Two new Comets. Two comets have been discovered which are both expected to become easy naked-eye objects - one particularly favourable for northern hemisphere observation. Both of the comets are due to be visible in the Spring of 2004. *Astronomy Now, July 2003*

The Future of the Solar System. As the Sun ages it will become brighter and hotter, expanding as it does so. The habitable zone will move outwards to Mars, and beyond. *Astronomy Now, July 2003*

Mysteries of Mars. A selection of some of the best images of the Martian surface from orbit, by William Hartmann of the Mars Global Surveyor imaging team. *Sky and Telescope, July 2003*

Goldilocks and the Three Planets. Why was Earth's atmosphere 'just right' for the development of life, while the conditions on Venus, and on Mars became more unsuitable? *Astronomy, July 2003*

The Constellation of Sagittarius. The centre of our galaxy is located near the western edge of Sagittarius, low in the southern sky in summer. A description of the many interesting objects to be found - many star clusters and nebulae, including the large Lagoon Nebula (M8) and the Triffid Nebula (M20). *Astronomy, July 2003*

Mars - Hidden Water. Surface features on Mars now indicate that there may be large amounts of water and ice below the surface, as well as in the polar caps. Several spacecraft missions should soon give a better estimate of just how much water there may be. *Sky and Telescope, August 2003*

Gamma Ray Astronomy. Gamma rays originate from violent events in the Universe. They are the most energetic form of radiation, with the shortest wavelength in the electromagnetic spectrum. Several space projects have been launched or are planned, including NASA's Swift mission due for launch in December to study gamma ray bursts. *Sky and Telescope, August 2003*

Mars - History and Science. With Mars at its closest to Earth in recorded history, a set of articles describing the observations of Mars since the invention of the telescope four centuries ago, the scientific studies to discover more about the past on Mars, and the current missions to land Rover vehicles on its surface in January 2004. *Astronomy, August 2003*

Europe's VLT observatory in Chile. The new system of four very large telescopes in Chile is nearing full operation. Working in combination, the telescopes will produce images equivalent to that which could be obtained with a 200 metre mirror, and at extremely high resolution. *Astronomy Now, August 2003*

Europe's Smart-1 Moon Mission. Due for launch in August, the Smart-1 mission will study the Moon's surface in close detail for the first time. It will also be testing new technology for future deep space missions, and the use of ion engines with power from solar panels. *Astronomy Now, August 2003*

Meteorites - Origin and Types. The origin and analysis of meteorites. Not all of them are from asteroids and other debris dating back to the formation of the solar system. Some meteorites are from Mars and the Moon. *Astronomy Now, August 2003*

Astronomy in Retrospect (Astronomy Magazine 30th Anniversary). From the first flyby of Jupiter by Pioneer 10 in December 1973, the twin Viking Mars landers in 1976, and the Voyager flyby missions to all of the outer planets. The Hubble Space Telescope and its major discoveries, dark energy and the accelerating expansion of the Universe. A summary of the major events and photographs of the last 30 years. *Astronomy, September 2003*

Stellar Chemistry. All of the chemical elements originate from the stars in supernova explosions, but the element fluorine seems to be something of a mystery, and its exact origin is presently uncertain. *Sky and Telescope, September 2003*

Star Atlas Uranometria. It is now 400 years since the star mapping work of Johann Bayer was first published. Uranometria set the standard for scientific accuracy and artistic presentation. *Sky and Telescope, September 2003*

A Story of Mars – from BC to the 27th August 2003

by Debby Quertier

Long before the birth of Christ, astronomers knew that the stars we see in the night sky were fixed in relation to one another - except for five 'wanderers'. These five 'wanderers' as we now know them are the planets Mercury, Venus, Mars, Jupiter and Saturn. Their positions in relation to the stars was always changing and their movements could be seen over a few days. Nothing else was known of these wanderers but they were all a little different to one another. Mercury and Venus (the brightest of them all) were seen either in the west after sunset or in the east before sunrise. Jupiter and Saturn were bright, with Jupiter being the brighter, and then there was the reddish one with its brightness changing over time. This planet was named Mars after the god of war, due to its angry red colour. It was believed that the stars and planets revolved around the earth, which was thought to be at the centre of everything, though no truly satisfactory explanation could be given for the movements of the planets.

It was not until 15th century onwards that men such as Copernicus, Kepler and Galileo dared to question long held beliefs, and then with the invention and use of the telescope in the 17th century, that we realised that the planets were other 'earths' orbiting our sun, as did our own.

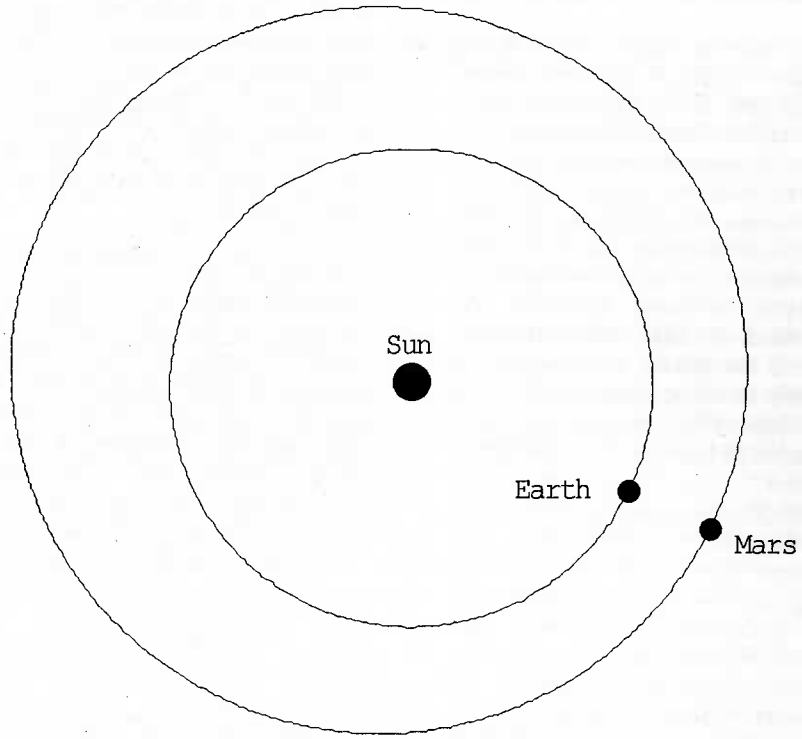
Astronomers were able to see the beautiful ring system of Saturn, the bands across Jupiter, the phases of Venus and Mercury and strange dark markings and polar caps on Mars. As telescopes became more powerful, three new planets, Uranus, Neptune and Pluto were discovered, in 1781, 1846 and 1930 respectively, making the family of nine we know today. We wanted to know more about these planets; they were all so different, was it possible that there was life on any one of them? Observations continued and by the late 19th Century an Italian astronomer named Giovanni Schiaparelli noted dark lines on the surface of Mars and termed them 'canali', meaning channels in Italian. This was interpreted as 'canals' by American astronomer, Percival Lowell. He was working on mapping Mars at the now famous Lowell Observatory at Flagstaff Arizona and was so convinced that these lines were man-made that he drew up maps, and for a while he and many others believed that there must be advanced life on Mars. Speculation was rife and so Mars was a hot contender for life elsewhere in our Solar System – speculation fuelled by science-fiction writers and the desire we all have to learn if anyone is out there. Man needed to see the planets first hand and, with the Russian launch on the 4th October 1957 of Sputnik, the first artificial satellite in space, man's exploration of space began.

Early Mariner probes to Mars in the sixties revealed an apparently barren landscape. Those probes that were successful showed the surface of Mars to be rocky and more like our moon rather than a place suitable for habitation. As the Viking missions of the seventies sent back pictures, landed on the surface and analysed samples, a strange landscape was revealed. A huge valley stretched across the planet, a valley that, if placed on earth, would stretch across the entire USA, dwarfing the Grand Canyon in length, breadth and depth. There were huge volcanoes, Olympus Mons being the largest volcano (or mountain) in the solar system towering at over 15 miles high and making Everest look small in comparison. Large areas of Mars were covered with channels that resembled dried up riverbeds and features that looked as if huge floods had caused them. At times the planet was seen to suffer huge dust storms that engulfed the entire surface. What made these features seem all the more dramatic is the fact that Mars is just over 4,000 miles in diameter, about half that of the earth, yet its mountains and valleys are higher, deeper and longer and its storms stronger. But with the polar caps of Mars changing with the seasons and the 'dried up river beds', all seemed to strongly suggest that water once flowed on Mars and, if there was water, what about life?

In 1996 a Martian meteorite, ALH84001 as it became known, was found in the Antarctic and thought to have microscopic structures within it that looked like bacteria found on Earth. There were varying opinions on this and despite many tests there is not conclusive proof that the structures seen are actually evidence of early Martian life.

On the 4th July 1997 the Mars Pathfinder, landed on the Ares Vallis area, an area believed to have been caused by a huge flood in the distant past. Rocks were analysed and the way they were laid over the surface suggested that running water could have left them there. NASA's Mars Global Surveyor began orbiting Mars in March 1999, successfully mapping the surface in detail and monitoring the atmosphere. Images sent back again showed areas that did look as if they had been caused by water. Observations continued to show that there was running water on Mars millions of years ago and now, with the British mission Beagle 2 due to land on Mars on Christmas Day 2003, followed by two USA missions, we may well have our many questions answered. Beagle 2 is well equipped and has a mole that can move along the surface and drill down for soil samples, environmental sensors, a robotic arm, electronic and telecommunications systems. The samples will be analysed on Mars and reports sent to scientists back on Earth.

Earth and Mars on 27 August 2003



Evidence to date does suggest that millions of years ago there was running water on Mars and where there was water there may have once been life. We may not be expecting Beagle to find any little green men but it may find evidence of simple organisms. Perhaps Mars was similar to the Earth in the early stages of the Solar System but then as life began to take hold on Earth it failed on Mars, Mars being that much colder and further away from the Sun. No one knows for sure, but there are plenty of theories around, from what is scientifically feasible to those that are better suited to the pages of science-fiction books.

On the 27th August 2003 Mars was at the closest point it had been to earth for 60,000 years – about 35 million miles away, it can be closer but only by another half a million miles or so. Telescopes all over the world turned to study the surface.

There has been a great deal of interest in this close approach, we may not have seen a great deal more detail than other approaches when Mars is say a couple of million miles further away but the fact that it was the closest in such a long time made it so special and something that many people wanted to come and see in a telescope, as well as it being a beautiful sight to the naked eye.

The findings of the Beagle 2 and NASA missions are now awaited with interest and a great deal of curiosity.

Debby Quertier

Mars Facts and Figures	
Diameter	4,200 miles
Distance from Sun	Varies from 128,000,000 miles to155,000,000 miles due to its elliptical orbit
Time taken to orbit the Sun	687 days
Length of Martian day	24 hrs 37 mins 22.6 secs
Moons	Two – Phobos and Deimos. Both are small potato shaped moons between 10-20 miles across. Phobos is 3,000 miles from the surface of Mars and orbits 3 times in a Martian day – imagine seeing our Moon really low and passing over 3 times a day!
Angle of inclination of axis	23 deg 59 mins. Hence Mars has seasons similar to Earth but each lasts almost twice as long as it takes Mars longer to orbit the Sun (Earth is 23 deg 27 mins
Average surface temperature	-23 C
Colour of sky	Pink during the day and blue at night

Debby Quertier's article also appeared in the Autumn 2003 edition of Communiqué