Eclipse plans

Plans for the solar eclipse continue. Registration details for the National Astronomy Meeting (NAM99) are now virtually finalised, and David arranged for an invitation to be sent to all Fellows of the Royal Astronomical Society. The NAM99 web site is now on line, with Fellows able to register through the Internet. At the time of writing some 140 Fellows have registered, with a total of 240 participants. This is considered to be a very good response so early before the Conference.

Enclosed with this newsletter is a sheet about a day trip to Alderney on eclipse day. Please read it carefully and take the appropriate action.

DLC

Change of Editor

David Le Conte, the founding editor of Sagittarius, has passed the editorship of the newsletter on to me. David began Sagittarius in January 1993 and until recently he produced six issues a year. On behalf of all Section members thanks to David for the considerable time and effort he has put in to the newsletter. He and Sagittarius have done much to promote astronomy in Guernsey.

Thanks to all the contributors to this issue. Keep those articles coming in!

Peter Langford

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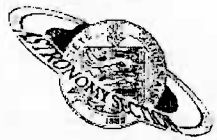
Sagittarius



The Newsletter of the Astronomy Section of La Société Guernesiaise

January - March 1999

Forthcoming events

Annual Business Meeting
Tuesday, 26th January
8.00 pm at the Observatory

Talk - Topic to be announced
Tuesday, 23rd February
8.00 pm at the Observatory

Red Giants
by Ken Staples
Tuesday, 30th March
8.00 pm at the Observatory

Talk - Topic to be announced
Tuesday, 27th April
8.00 pm at the Observatory

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Annular Eclipse - Gulf of Thailand
Royal Stars
Extinction of the Dinosaurs

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Centre inserts

Star chart

Sunset, twilight and sunrise times
Moon phases

1998 Leonid Watch

For the majority of us the Leonids were a disappointment. The sky on the evening of 17th November was cloudy and peak activity had already passed. ***Debby Quertier****, however, was a more determined observer than most. Here she gives her report.*

I had been looking forward to the 1998/99 Leonids ever since I became interested in the meteor showers. Certainly from what I had heard and read 1998 could provide something worth seeing. Opinions seemed to differ about the best time and place etc but I decided I would get up and look in the early hours of the 17th November. I had got details of the 1998 Leonid Watch from the Science Line and decided to do two half-hour watches and space them out with, I hoped, a bit of kip in between. I set my alarm for just before 2:30 am, questioned my sanity, and started the the first half-hour watch. Fortunately my bathroom window faces in just the right direction and I was glad I did not have to venture into the garden because, believe me, it was freezing! At 2:30 am Leo was nicely placed, rising in the East, and the sky was clear. I only recorded six meteors in half an hour but they were good. The first went out at 3 o'clock from the sickle and left a train. They were all bright and very fast, not travelling too far from Leo. Unfortunately a cloud came over and obscured Leo for about ten minutes and as 3 am approached so did more clouds.

I got up again just before 5 am. By this time Leo was almost as high as it would get. Just before 5 am I saw the most wonderful greenish meteor shoot down at 5 o'clock from the sickle. It left a very long-lasting train. It could have been magnitude -4. Once again in the 5 to 5:30 am period I only recorded 6 meteors (not including the one just before 5 am) but again the sky was partly obscured. The clouds were a funny thin covering with the stars disappearing and reappearing all the time, only the brightest showing through. The meteors were very fast and bright. With the clouds it was difficult to assess their brightness but they must have been at least magnitude 0 with the greenish one possibly a fireball.

At the observatory the previous week, the 10th November, it had been a beautiful clear night and we had seen several meteors. One or two were Taurids which, by comparison, "strolled" across the sky. On the night of the 17th there were various Leonid reports from the internet and there seemed to have been a lot of activity that morning between 3 and 5 am. I'd gone back to bed at the wrong time!

I got up every so often on the night of the 17th/18th but it was cloudy all night. I looked out several times the next night too but had no joy. I ended up really tired but glad I had made the effort.

I have sent my report to the Science Line and will be interested to read the reports in the astronomy magazines. I don't know what the experts are predicting for 1999 but I am prepared to sit up all night.

Le Riche Centenary Fund grant for new telescope

The Astronomy Section has been awarded a grant of £3,500 towards a new 16-inch Meade telescope by the Le Riche Centenary Fund. Acknowledging the generous donation on behalf of the Section David Le Conte told Fund Director Mrs Anne Binney that the donation would give our fund-raising efforts a big boost. The Trustees have asked for a brief report and photograph of the telescope when it arrives for use in their annual report and for a small plaque to be displayed to recognise the Le Riche Centenary Fund contribution.

PML

Leonid Spectacular

While most of us in Guernsey were disappointed not to have seen anything of the expected Leonid meteor storm in November, one Guernseyman was thrilled by a magnificent display. He told me that, looking out of his front door early in the morning, before sunrise, he saw a series of bright flashes - exactly as predicted. Indeed, they were bright enough to be reflected from buildings and trees with a yellow-orange light. After watching these for a few minutes he was about to retire, quite satisfied that he had seen the Leonids, he was apalled to see the dustcart on its morning round, coming down the road. On the roof was its yellow-orange flashing light, brilliantly lighting up buildings and trees!

DLC

Christmas Quiz

A select band gathered at the observatory for the Quiz and Supper Evening on 15th December. David Le Conte, pictured below, was the quizmaster.

Questions were from past issues of Sagittarius. Despite the advantage this gave Geoff Falla, who had written many of the articles, it was Debby Quertier who came out top. David presented her with an astronomy calander and she gets to set the next year's quiz questions.

Astronomy Talks

On 14 October David gave a talk on astronomy to the St John's Women's Institute. On 16th November he gave a talk about the 1999 eclipse at the Annual Dinner of Rotary Guernesiais.

Eclipse Quotations

David's web page of quotations about eclipses has been considerably expanded, with almost 200 quotations now available. So far as we are aware, it is the only one like it. NASA has now adopted the page and included it on its own eclipse web site.

Moons of the Solar System

A talk by Frank Dowding on 17 November 1998

In previous talks to the Section Frank has told us about each of the planets. Continuing his solar system theme this time Frank turned his attention to the moons.

The moons range in size from Jupiter's Ganymede, with a diameter of 3,270 miles, to Mars's moon Deimos, only 10 miles across. Our own Moon, at 2,160 miles, is the fifth largest.

There is a major distinction between moons of more than 250 miles in diameter and those that are less. Above that size moons are spherical while smaller than that they are irregular shapes. Only 21 moons in the solar system are bigger than the magic number.

Temparature is another feature. At a distance beyond a point just this side of Jupiter ice does not melt. Water on any moon further out than that should stay frozen. Interestingly though on some moons the ice has melted and scientists are trying to understand why.

Frank described what is known about the evolution of the moons. Most of them, particularly those around the larger planets of Jupiter, Saturn, Uranus and Neptune, formed at the same time as the planets. From the swirling nebula the large planets created miniature versions of the solar system around themselves by the same gravitational mechanism. Jupiter is a good example. The density of its moons reduces outward from the planet just as we have the less dense planets like Jupiter and Saturn further from the Sun than the denser inner planets Mercury, Venus, Earth and Mars.

The 61 solar system moons (excluding our own Moon):		
Mars	2	
Jupiter	17	(4 spherical)
Saturn	18	(7 spherical)
Uranus	15	(5 spherical)
Neptune	8	(2 spherical)
Pluto	1	(1 spherical)

Not all moons can be where they are through that process. For instance, a few moons have retrograde orbits, that is they orbit the planet the "wrong way". Four of Jupiter's small irregular moons and one small moon of Saturn are retrograde but the most notable example is Neptune's largest moon, Triton. Such moons cannot have evolved with their planets so how did they get there? The smaller retrograde moons are probably captured asteroids but Triton is a bit of a mystery. It may have been developing into a planet somewhere else until Jupiter flung it out of orbit towards Neptune.

There are similarities with our own Moon. It is now known that it too came from somewhere else. After wandering between the planets it is thought to have crashed into the Earth with a glancing blow. To say this was a large impact is an understatement! The collision left some of the Moon on the Earth and took some of the Earth with the Moon. The Moon virtually broke up then reformed and evolved into its present orbit.

Frank then took us on a detailed guide of the major moons, starting with our own, illustrated by a series of impressive slides. He described how remarkably different each moon is one from the other.

Of special interest is the Cassini space probe headed towards Titan, Saturn's largest moon. It was launched in November 1997 and is due to arrive at Titan in November 2004. After taking up orbit around Titan it will release a smaller probe, called Huygens, which will gently descend by parachute to the surface of Titan. It will take measurements of its atmosphere while falling then, once landed, it will take measurements of the surface. Titan's atmosphere is similar to the Earth in that it is mainly nitrogen, but it is ten times thicker. Because of the thick atmosphere its surface cannot be seen but it appears to be a liquid ethane or methane, substances which on Earth are made by decayed organic matter. Infra red images show an area of high ground and it is here that Huygens will land. Scientists believe that Titan's environment was similar to that of the Earth before life injected oxygen into the environment.

Clearly the more astronomers know about the moons of the solar system the more they find to discover. All those attending enjoyed Frank's thoroughly-researched talk. Thanks to Frank for giving an insight into this fascinating area.

PML

TIME

Time is a river flowing,
from place to place.
Time is the earth turning,
from day to day.
Time is the world revolving,
from season to season.
Time is the universe evolving,
from eon to eon.

Tom Butler

I'am Tristan Knight aged seven. In the summer I stand at the door and watch the Constellation. For instance Ursamajor or Orion. I have been to the astronomy house at St Peters. A man called Ken showed me the telescope. Whith all the other things. Now it is getting dark earlyer I hope to go up some time to have a look on a dark night through the telescope. I really want to see the eclipse. My favrate stars are the stars on Orion's belt and the pole star.

Tristan Knight

The Christmas Star

In her first article for Sagittarius ***Jessica Harris*** *looks at the Star of Bethlehem. What might it have been?*

For my debut article, my chosen subject is fashionably late, but nevertheless I hope interesting to readers of Sagittarius, some of whom may have already seen plenty of imaginary stars over the last few weeks of partying.

My topic is The Star of Bethlehem. The first question was whether it was fact or fiction, after all the only known recording of this event is made in the Bible, so practically all information had to be gleaned from one source for chronological purposes, bar a few historical facts albeit sometimes a bit hazy.

For the purpose of this article, I assumed the event to be true, (otherwise a very short article) put religion to one side, and concentrated on the scientific side of the investigation. After all, one recording in one book, no matter how popular, would not be proof enough to convince a scientist of a happening or event. More evidence had to be sought.

We know that the heavens were being observed, and happenings therein recorded and charted, long before this period in time. Both the Greeks and the Chinese were renowned astronomers. The history of the night sky, as seen by them, we still learn from today. Babylonians by the 4th century BC could predict many astronomical events. So how come such a "wondrous star" was not observed and recorded by many of the sky watchers and astronomers of that time?

I first looked up the text in the Bible that mentions the star. It was interesting to read different versions of the Bible describing the observers we now know as "The Three Kings" or "Three Wise Men", as Magi or Astrologers (that dreaded word). These were learned men of their time and well respected and accepted. They reported having seen a new, very bright star in the east. Believing it to be a sign they followed it for some considerable months.

Before any research could start into looking at what event may have caused this sighting, a date had to be established. This was probably the most difficult part, as the exact date of Christ's birth is not really known. The Bible tells us that Christ was born in Bethlehem, due to his parents travelling there to pay taxes, and lived there for a while afterwards. Then the family fled to Egypt, for two years, to escape Herod, who ordered the slaughter of all children aged two and under in Bethlehem and around the outlying coastal areas. History tells us that Herod died after an eclipse of the moon. Two eclipses would have been seen from Jerusalem around this date, a partial eclipse in 4 BC and a total eclipse in 1BC.

Modern scientists these days accept that the time period to research in can be anything from 8-1BC, so looking within this time scale we do find several events that may have been the The Star of Bethlehem.

Possible explanations for the Christmas Star

Venus Venus certainly can be bright enough, and because it is seen in the west in the evening and east in the morning. A very convenient answer, but unlikely, as the Magi knew the night sky well and would have probably known Venus and its movements.

Meteors Meteors can certainly be bright enough to be The Star, anyone who has seen a true fireball will tell you of its magnificence, but they are not long enough sustained to be The Star.

Comets Chinese observers had been recording comets for over a 1000 years before the birth of Christ. They went into great detail recording the time, colour, length of the tail, region of the sky it was heading and how long it stayed in vision. This was very important to them, as it was a new sign in the sky and had to be recorded for the Emperor. The Babylonians made similar recordings on stone tablets in the 2nd and 3rd centuries BC, if the Star of Bethlehem had been a comet it would have been recorded in the east. A comet has the size, brightness and duration to be the Star. It can be as large as ninety degrees in the sky, when compared to the full moon at half a degree this makes it 180 times bigger and therefore difficult to miss in the heavens. It has been suggested that Halley's comet was the Star of Bethlehem, its great ellipse takes 76 years and it was last seen in 1986. It would have been visible in 12 BC, putting it out of our time frame. In our time frame, there is really only one comet bright enough to fit the bill. This was a comet that appeared in 5 BC, and was recorded by either the Chinese or the Babylonians. It appeared for about 70 days in the constellation of Capricorn.

Chronology

BC	
8	Tax Decree
7	
6	Possible birth date as the family spent two years in Egypt
5	
4	Partial Lunar Eclipse
3	
2	
1	Total Lunar Eclipse

Novas A nova, or more so a supernova, would make the perfect and more likely Star of Bethlehem. Its initial brilliance lasts for weeks. Present day astronomers can look back in time and pinpoint supernovas, but unfortunately there are no supernovas recorded in our time frame. However, there is a smaller stellar explosion, less dramatic, that fits our time frame. The Chinese recorded them and called them guest stars. One such happened in 5 BC next to Altair in the constellation of Aquila.

Planetary Conjunctions In the evening on June 17th 2 BC the planets Jupiter and Venus slowly moved closer towards each other. As they set in the western sky, and about an hour before they set, they actually appeared to merge. Venus moved in front of Jupiter. This is a very rare event. It has only happened once since in 1818, and is next forecast to happen again in 2065. The other conjunction possibility has derived from excavations from ancient Babylon, and

involves Jupiter and Saturn. Tablets have been found with recordings of the skies in 7 BC, giving daily records of the paths of Jupiter and Saturn as they crossed the night sky. This would have lasted several months, the two planets seemingly to partner each other in a dance through the heavens. Between May and December 7 BC they almost merged three times. The second time was in the constellation of Pisces on 15th September (this being a date that some modern scientists give for Christ's birth). This very rare event occurs only once in hundreds of years, and to happen in Pisces is even more rare, only once in eight hundred years.

Jessica Harris

Astronomy and Space - References for further reading *compiled by Geoff Falla*

Planetary Nebulae. Aging stars and different stages in the formation of planetary nubulae. *Sky and Telescope, October 1998*

Globular Star Clusters - Dynamic Lives. The oldest known star systems, found at the edge of the Galaxy. M13 in Hercules is the best known example for observers in the Northern Hemisphere. Competing theories for the existence of collapsing clusters. *Sky and Telescope, October 1998*

Europa. Even better photographs now obtained in close-up, showing the remarkable surface features on this Jupiter moon. *The Planetary Report September/October 1998*

Far Distant Galaxies. Advanced techniques used to identify some of the most distant galaxies yet discovered. *Astronomy, October 1998*

Comet Observing. Comet Hale-Bopp was a recent spectacular event, but there are often smaller yet still interesting comets to be observed. *Astronomy Now, October 1998*

NASA at Forty. The US space agency NASA celebrates its fortieth birthday. History of NASA's formation and development including a year by year summary of some of the highlights. *Astronomy Now, October 1998*

Jupiter's Moon Io - An Electrical Generator. A new discovery that Io is an electrical generator, the result of interaction with Jupiter's magnetic field. Io is surrounded by a glow as gases from its volcanoes are energised. *Daily Telegraph, October 15 1998*

Space Interferometry Mission. A new space observatory is planned to cover important areas of astrophysics. It will be able to discover, by accurate positional measurements, if there are planets of at least Earth size around the one hundred stars closest to us, within a distance of thirty light years. *Modern Astronomer, October 1998*

Japanese Mars Mission. The Japanese spacecraft Nozumi (Hope) was launched on a two year flight to Mars on July 4th. It will study the geology and meteorology of the planet and its moons Phobos and Deimos. *Modern Astronomer, October 1998*

Meteorites. Investigations into the major meteorite event in Greenland on December 9th, 1997, now thought to have been the first recorded meteor from outside the Solar System. Also a study of a meteor impact site in Saudi Arabia which turned desert sand into glass. *Scientific American, November 1998*

Earth from Space. Photographs of Earth taken by interplanetary spacecraft Voyager I, including an image of Earth and Moon taken in September 1997. *Astronomy and Space, November 1998*

Supernovae and the Crab Nebula. Supernova events, in particular the explosion recorded by Chinese astronomers on July 4th, 1054 which produced what we now call the Crab Nebula with a pulsar at its centre. *Astronomy, November 1998*

Telescope Mirrors. New methods in the manufacture of advanced technology mirrors. *Astronomy, November, 1998*

Planetary Nurseries. The study of dust surrounding many nearby stars, appearing to reveal different stages of evolution and planetary formation. *Astronomy, November 1998*

Meteor Crater, Arizona. A visit to the famous crater in the desert near Flagstaff, Arizona. *Astronomy, November 1998*

Leonid Meteors. The Leonids in history, and prospects for 1999. *Astronomy, November 1998*

Planets of the Solar System. A summarised guide with facts and photos including all of the Solar System's nine planets and many of the moons. *Astronomy Now, October 1998*

GF

THE ECLIPSE IN ALDERNEY

If you want to see the total solar eclipse from Alderney, NOW is the time to take action.

Accommodation is very limited. The Alderney Tourist Information Centre (tel. 823737) has an Eclipse Accommodation List.

There will be day trip ferries, but space will be very limited. Contact CLBS International Ltd (tel. 724659) to reserve a place. You could also try Aurigny Air Services (tel. 822886) to reserve a flight to Alderney.

The Royal Astronomical Society delegates attending the National Astronomy Meeting in Guernsey will be travelling by ferry from Guernsey to Alderney for the day. There may be a few places for members of the Astronomy Section, and their families. If you are interested please contact David Le Conte (tel 64847). However, you are also strongly recommended to make your own, alternative arrangements, as space cannot be guaranteed until the number of NAM delegates is known.

DLC

Annular Eclipse, 22 August 1998 - Gulf of Thailand

*By a stroke of luck **Mark Humphrys** was in the right place to observe a solar eclipse*

My latest job has taken me to the Gulf of Thailand, about 100 miles off the coast of Malaysia, 105°E and 5°N. I'm working on a ship called the OTS Yeoman. We're carrying out a seismic survey for Esso Malaysia.

During a lull in the work load I was playing around with my latest piece of software on my laptop computer, "Redshift3". I was trying the different

menus, the guided tours and various other aspects of the software. It's actually rather good and for £29.95, excellent value. On this particular day it earnt is price 10 times over. I had plugged in the coordinates for the ship's location and changed the displays to suit, changing the star magnitudes and the amount of deep sky objects visible on the screen. I decided to try the "Home" page, a little tab at the top of one of the control boxes. Up came a series of menus. One of which was the "Sky Diary". I clicked on it and it started to generate a listing of all the astronomical events that would occur in August. It indicated which would be visible from my location. I run through the list, it showed where the planets would be, what the phases of the Moon were, the Perseid meteor show on the 12th etc. One on the 22nd caught my eye, Eclipse of the Sun.

I thought that it would be one of the events not visible from here. Clicked on it and the details of the eclipse appeared in the box to the right. In small letters at the top of the box read "Visible from current location". I must confess I didn't believe it, I thought I'd entered the wrong co-ordinates, or the software was wrong. Without getting my hopes up I double checked everything, all was OK. Another part of the program is a menu called "Events" and in the menu you can select eclipses. I clicked on it and it generated all the eclipses occuring in 1998. It listed two in 1998, the one on 22nd August visible from "current location".

By now I was getting quite excited, wondering what the chances were that I would be on a ship in the middle of nowhere directly in line with an eclipse. Still I had nagging doubts. I went up to the bridge and consulted the Nautical Almanac. Lo and behold, page 22, a map showing the path of the eclipse going right across the Gulf of Thailand. I had August's "Astronomy" with me, so I quickly thumbed through it and found a paragraph devoted to it, next to an article about the Kappa Cygnid meteors. I cursed myself because I had read that article only days before. By now I had convinced myself that there was going to be an eclipse. There was 5 days to go.

The next three days we had rain storm after rain storm, thick black clouds all day long. I kept looking out hoping that it would clear. The seas were rough and the ship had trouble keeping station - it has dynamic positioning, thrusters keep it in the same place all the time without the need to anchor. The thrusters were struggling.

The 22nd dawned bright. I was up at about 5am, my normal time, for shift at 6. The sky was clear. Orion was high in the sky. Jupiter directly overhead. It was going to be a good day.

The 21st was still overcast but the rain storms had gone, and the wind had died down. I was secretly hoping that it would clear. By now everyone on the boat knew that there was an eclipse coming, I hadn't stopped talking about it.

The 22nd dawned bright. I was up at about 5am, my normal time, for shift at 6. The sky was clear. Orion was high in the sky. Jupiter directly overhead. It was going to be a good day. I eagerly waited for the Sun to rise. The eclipse was due to start at about 07:00, reach maximum at about 08:10 and finish at 09:40 or so.

I had borrowed some welder's glass from the Chief Engineer, they had even taken the glass out of their welding masks! At about ten past seven, I noticed the Moon starting to take a "bite" out ot the Sun. By 07:30, the "bite" was much larger. One of the lads called across to the other vessels (we have a total of 4 small ships in our fleet) and casually mentioned "Oh did you know that there's an eclipse at the moment?". "What!!....." then radio silence for the next hour or so.

By 08:00 there was a very noticeable change in the light, everywhere was dusky, you could tell we were in a shadow. The seascape was very eerie, the calm sea took on a very oily appearance. It never went completely dark, unfortunately we were too far north of the main track to see the annular eclipse completely, but the Sun was reduced to a very thin sliver. I didn't really keep an eye on the time as I was more enthralled by what was happening, but I think the maxima occured at about 08:15 or so. I looked for stars but failed to see any, perhaps it was just too bright. All the lads were lined up along the side of the ship, taking turns to look through the pieces of welder's glass. One of the lads even got out the ship's sextant and used that to view the eclipse.

I took several shots with my instamatic camera, the plate of welder's glass over the lens, but they failed to come out. The

Sun was still very much over exposed and there was no indication of the eclipse. On several photos, however, internal reflections in the welder's glass are visible which clearly show the eclipse.

The other thing that I noticed was the drop in temperature. At these latitudes the temperature, even early in the morning is quite high - mid 90's, but in the middle of the eclipse it became quite pleasant. But that did not last long - the high temperatures returned all too quickly. By 08:30 the scene had brightened quite considerably, the notch was now becoming smaller as the moon crossed the other limb.

By 09:00 it was more-or-less all over, most of the lads had gone back to their computers and workstations. I just leaned over the rail wondering about the next eclipse.

Mark Humphrys

Eugene Kranz at Beau Sejour

Debby Quertier *heard the famous NASA flight director when he came to Guernsey*

I was lucky enough to attend the talk given by Eugene Kranz at Beau Sejour at the end of the Risk 98 conference in mid-September. Eugene Kranz, of course, was the NASA flight director who led the mission to bring the ill-fated Apollo 13 safely back to Earth, and his talk was the culmination of Risk 98. He spoke for about an hour and followed it with a question and answer session, which I had to miss, but the talk was marvellous.

He talked of his years at NASA, from the early days when President Kennedy spoke of putting a man on the Moon by the end of the decade, the tragedy of Apollo 1 when three astronauts were killed in a fire on the ground, up to the lunar landing. He then spoke in detail of the dramatic events of the Apollo 13 mission. He said he was often asked how accurate the film was - it was accurate though some details had been slightly overstated for dramatic effect - things like arguments and pauses while decisions were made. In reality the decisions had to be made quickly and accurately - failure was not an option. The NASA team was young. The senior staff were in their thirties and the bulk of the staff was made up of people in their twenties. It was even more remarkable that they had no computer.

The Apollo 13 film retold the nailbiting events very accurately and I really enjoyed hearing it all from the man himself. It was a wonderful unexpected treat from my job.

Debby Quertier

Twice in a Blue Moon

As everyone knows a blue moon is a very rare event. It only occurs when there are two full moons in the month. The second full moon is called a blue moon. This quarter blue moons are not so rare. We have one in January and one in March. February on the other hand has no full moon at all.

PML

THE ROYAL STARS
by Tom Butler

Have you ever wondered about the location of the Four Royal Stars? What, you haven't heard of the Royal Stars, four or otherwise? No wonder, these are stars that were of special interest to the ancients. Because of the phenomenon of precession of the equinoxes they are no longer of major importance to modern astronomers.

Star gazers for thousands of years have accurately mapped the path of the sun among the fixed stars. Most astronomers, amateur and professional, are familiar with the rhyme that begins "The Ram, the Bull and the Heavenly Twins", This rhyme has been used for centuries to prompt us to the order of the zodiac. Of course, we have all used the term "the first point of Aries". Both show the point in the sky where the sun apparently crosses the equator on its path northward. We know that these are both out of date by centuries and that that point now lies not in Aries, the Ram, but in Pisces, the Fish. What happened, and what has all this to do with the Royal Stars?

There were two points on this path that were of special importance to the ancients. These were the points where the Sun crossed the equator, first on its journey north and the second, 180 degrees farther along the ecliptic, where the Sun crossed the equator on its way south.

Ancient astronomers, or more accurately for their time astrologers, had carefully mapped the path of the Sun, the most important of the wanderers, the planets they revered as powerful gods. They also noted that these wanderers never strayed more than nine degrees from the path of the chief god, the Sun. This path was named by the ancient Greeks, the ecliptic.

There were two points on this path that were of special importance to the ancients. These were the points where the Sun crossed the equator, first on its journey north and the second, 180 degrees farther along the ecliptic, where the Sun crossed the equator on its way south. Nearly as important to them were two other points on this path where the sun was the farthest south and where it was at its northernmost point.

At the time of naming the first constellations, some five thousand years ago, the chief religion of the Fertile Crescent from Persia to Egypt, honored the bull. So they named the group of stars around the point where the sun crossed the equator on its northward journey Taurus, the Bull. Because this also indicated the time for planting and for new growth, the time when the Nile flooded and life began anew this was their New Year. It was natural that this time of plowing and cultivation should be named after Taurus who plowed the celestial fields.

The stars around the autumnal equinox and those around the summer and winter solstices were grouped into constellations and given the names Scorpio, Leo, and Aquarius, respectively. These were the only ones in the original zodiac.

Tom Butler

The Extinction of the Dinosaurs
by Geoff Falla

The extinction of the dinosaurs some 65 million years ago was for a long time a total mystery. It was not known whether the apparently quite sudden extinction was the result of failure to adapt to changing environmental conditions, or if there was some catastrophe on a global scale. The dinosaurs could have perhaps adapted to a gradual change in climatic conditions, but the probable reason for the mass extinction at the end of the Cretaceous period was unknown until quite recently.

> *The most beautiful thing we can experience is the mysterious*
>
> *Albert Einstein*

The material iridium, identified as being the vaporised fallout from meteor or asteroid impacts, has been discovered at various widely separated locations. More importantly, it has been found in a layer corresponding with the boundary between the Cretaceous and Tertiary periods of geological history, 65 million years ago. In 1980 the science journal Nature published an article by Louis and Walter Alvarez of the University of Berkeley, California, which suggested for the first time an extra-terrestrial cause for the Cretaceous-Tertiary extinction, and that the impact of a large object had resulted in the extinction of most of the living species of on Earth at that time, including the dinosaurs. The site of the impact had not however been identified.

On the Yucatan peninsula in Mexico the Chicxulab formation was already a known feature, but its true nature and extent was not discovered until 1991. Marine surveys and core samples revealed the presence of a huge impact structure extending out beneath the seabed in the Gulf of Mexico. The circular formation was found to be well over a hundred miles in diameter. Radiometric survey data provided the age of the impact crater - 65 million years, the same dating as for the great extinction of species. The core samples revealed the history of the area, with pre-asteroid fossil remains covered by a layer of impact material. Dust from the impact would have filled the atmosphere cutting out sunlight and reducing the temperature, the effects lasting for several thousand years.

Other impact craters are known and can be compared. The famous meteor crater in Arizona is about one mile in diameter and around 50,000 years old. Most of the craters on the Moon are the result of impacts, with the prominent rayed crater Tycho for example being 60 miles in diameter and about 100 million years old. We all remember the recent event on Jupiter in July 1994 when the fragments of comet Shoemaker Levy 9 produced large impact markings in Jupiter's atmosphere. The resulting awareness of the possible danger to Earth from a major impact which could come at any time has led to the setting up of a Near Earth Asteroid Watch by astronomers. However, in the event of a dangerous approach being identified there is doubt if any preventative measures would be possible or practical.

Research into the history of mass extinctions over the past 500 million years has revealed that while some have involved the extinction of around a third of living species on Earth, others have been more serious and would have taken a longer recovery period. There seems to have been about six major events in which more than two thirds of living species have become extinct, sometimes coinciding with already known evidence of well-dated impact craters.

As for the possible reasons for periodic impacts and resulting extinctions, there is perhaps an answer in the rotation of our Solar System around the centre of the Galaxy. The rotation does not appear to follow a flat course around the plane of the Galaxy, but is sometimes above it and at other times below the plane. The period of this up and down motion is around 30 million years, so that when the Solar System is passing through the plane of the Galaxy rather more dense surrounding material can be expected and the chances of an impact are increased.

So, should we be worried about all this and our possible fate? Probably not. Although there are plenty of meteor showers and quite a few meteorites, nobody yet seems to have been killed by one. Just a few holes in roofs seems to have been the worst that has happened so far. Unless there is something much bigger heading our way in the near future we can just enjoy the meteors safely and the ever-changing spectacle of the night sky.

Geoff Falla

Fund-raising for new telescope

An open day was held at David Le Conte's house on Saturday, 28 November. On sale were eclipse viewers, books, leaflets, posters and T shirts. Over £50 was netted for the telescope appeal fund.

Secretary Ken Staples has been busy approaching local retailers to persuade them to stock eclipse viewers. The Section benefits from any viewers sold in Guernsey. A local bank has already purchased 500 viewers for its staff to help them enjoy the eclipse.

T-shirts featuring David's eclipse photos and other designs can be obtained from Maureen Pitman at Solar-T, telephone 713498