Could Next Wednesday be Your (Un)lucky Day?

Writing in the 5th June 1993 issue of *New Scientist*, Philip Bagnell, President of the Society of Meteoritophiles, says that next Wednesday is the most likely day of the year to see (and perhaps get struck by) a meteorite.

He says that statistically, more meteorites fall in June than in any other month, with a peak on the 30th June. Since records began, there have been 116 meteorites in June. March is the lowest month, with only 57. He also claims that 17 people, several cows, and at least one dog are said to have been killed by meteorites. The dog suffered its fatal blow on the 28th June 1911 in Egypt, and is the only authenticated case of an Earthling being killed by a Martian (the meteorite being a rare specimen from Mars).

There have also been a number of close escapes. I myself saw the evidence of damage caused by a piece of the Barwell meteorite (which landed in Leicestershire on Christmas Eve, 1965), which bounced off a road and went through a window! ¤

DLC

May eclipse (un)observed

There was a partial solar eclipse on the 21st May, unfortunately not visible from Guernsey. However, it should have been visible from most of North America, and my daughter Sarah was in one of the best places - Calgary. However, she reports that it was pouring with rain at the time! ¤

DLC

Advertisements

Do you have anything for sale, or do you want anything (preferably, but not necessarily astronomical)? Advertise here - no charge.

New member

Welcome to new member Kate Mason, Science Coordinator for the Education Department, and based at the Education Development Centre, Mount Durand. ¤

Astronomy Section Officers

(and telephone numbers)

Section Secretary: Geoff Falla, 724101

Honorary Treasurer: Peter Langford, 720649

Education Officer: David Williams, 725088

The next newsletter will be published at the end of August. The deadline for publication materials is the 15th August.

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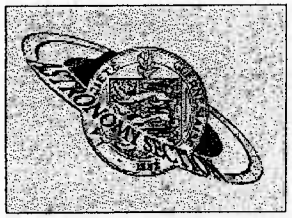
Sagittarius

The Newsletter of the Astronomy Section of La Société Guernesiaise



July/August 1993

Forthcoming events

U.F.O.s - Fact or Fiction?
by Antony Saunders
Tuesday, 29th June
8.00 pm at the Observatory

Introduction to Astronomy and the Night Sky
Tuesday, 20th July
8.00 pm, La Houguette School

Clean Up Day
Saturday, 7th August
9.00 am at the Observatory

Barbecue and Perseid Meteor Shower Count
Wednesday, 11th August
7.30 pm at the Observatory
(Rain date 12th August)

In this issue

The New Generation of Telescopes

The Origin of the Year and Calendar

A Visit to Jodrell Bank

Star Chart for July/August

Double Summer Time

plus a major article by Mark Humphrys, with no less than 14 finder charts:

The Local Group of Galaxies

Inside

Don't forget!

Next Tuesday, 29th June, Antony Saunders will be talking about U.F.O.s - Fact or Fiction. 8.00 pm at the Observatory. ¤

Specially for beginners

On **Tuesday, the 20th July** there will be an introduction to astronomy and the night sky - specially for beginners. It will start at 8.00 pm at La Houguette School, with a talk, slides and video. When it gets dark we will go up to the Observatory (weather permitting) for some practical viewing of constellations, Jupiter, and other objects. If you are just starting in astronomy this is your chance to learn more about the basics. This meeting is open to the public. ¤

Annual barbecue -

On **Wednesday, the 11th August at 7.30 pm** we will hold our annual barbecue at the Observatory. This is a "pot luck" event. Members should bring some food and drink suitable for the occasion, and don't forget to bring plates and cutlery. The more people who come the merrier, so bring family and friends. Raffle prizes would be welcome. If the weather is too poor, the event will be held on the 12th.

- and Meteor Count

The barbecue will be followed at about 11.00 pm by our annual count of the Perseid meteors. Conditions should be more favourable this year than last, and there is some possibility of a major storm of meteors.

This should be a fun evening, so come along. If you cannot stay for the meteor count, come for the barbecue anyway. ¤

Clean Up Day

Saturday, the 7th August will be the annual Clean Up Day at the Observatory. There are plenty of jobs for everyone, so come between 9.00 am and 1.00 pm, wearing suitable clothes. ¤

Open garden helps funds

The Open Garden day on the 25th April was a great success, with about 150 people visiting John Hodder's garden. Thanks to those who helped: David Williams, David and Dorothy Le Conte, Debbie Quertier, Geoff Falla, and of course John and Yvonne Hodder. The total take, including entrance fees, teas and cakes, was £182 - a terrific contribution to Section funds!

The garden really looked beautiful, and a credit to John. Some of you may have seen it, and him, the next week on the ITV programme *Grass Roots*. ¤

Amazing antiques

Graham Green brought along some amazing charts and books to our meeting on the 1st June. The oldest was a map of Europe dated 1482 - the first to name Guernsey (as Granezo). Examples of 17th and 18th century star charts and astronomical texts were shown. Graham's particular interest is in pre-18th century charts, because they are far more artistic than the later charts which are more technical, and he pointed out that the delineations of the present constellations were invented because they were no longer represented pictorially.

We hope to publish a more detailed account of these charts and texts in a future issue. ¤

Astronomy Section Helps Hubble

Harald Shenk of Sheboygan, Wisconsin is using the Hubble Space Telescope to study asteroids that have displayed comet-like comas, and has asked for amateurs willing to perform ground-based observations of them while Hubble studies them from space.

Geoff Falla has offered the assistance of the Astronomy Section in this project, and the offer has been welcomed. Observations are to be made of asteroids Elsa (11th magnitude or brighter) and Jokaste (about 12th magnitude), during the week of the 15th - 21st November. They should both be well within the capabilities of the 14-inch telescope (and probably the 11-inch), although the Moon will be approaching first quarter.

Harald Shenk says that in early March he visited the Space Telescope Science Institute in Baltimore, and used the Hubble to take ultraviolet spectra of asteroids Oceana and Hildago. Both asteroids were located within one second of arc on the first try! A long exposure was taken of Hidalgo. Since it was crossing the orbit of Jupiter it was unlikely to show any sign of a coma, and indeed the spectra looked very similar to a plain solar spectrum. ¤

Talk provides rewards

On 27th April David Le Conte gave a talk on astronomy to St. Paul's Methodist Church Ladies Fellowship. The Fellowship has since sent a kind donation of £30 for the Astronomy Section's funds.

For the "its a small world" department, it transpired that one of the audience was (distantly) related to Stephen Hawking! ¤

Jupiter activity observed

Jupiter, with both red and dark spots, photographed by Daniel Cave on the 9th April 1993

On the 9th April Daniel Cave and David Le Conte, using both the 14-inch and 11-inch telescopes to observe Jupiter and its Great Red Spot, noticed a dark spot or area on the disc. Photographs were taken, and the best of these is shown above. The original, on a slide, shows considerably more detail than this photocopied image.

The dark spot can clearly be seen on the right of the image, with the Great Red Spot on the meridian. So what is it? Reports in the astronomical magazines indicate that it was first observed on the 4th April, and is regarded as heralding renewed activity in the South Equatorial Belt, which has shown no prominence for some time. ¤

Halley 1, Bamboo 0

No entries were received for the competition relating the period of Comet Halley to the flowering of bamboo, so no lucky winner. However, any late ideas will be published in a future issue, so don't give up just yet! ¤

A Happy New Year to You All!

Not quite New Year yet, but the subject of David Williams's article concluding his series on the origins of units of time

As we know, the month was reckoned as the lunar cycle, the year was reckoned on the solar cycle. The solar year was measured as the time the Earth takes to travel around the Sun - an exact measurement is 365 days, 5 hours, 48 minutes, 46 seconds, to be precise!

The lunar month is approximately 29½ days long. If you multiply 29½ by 12 you arrive at 354 days, so confusion could reign as this is 11 days short of the solar year. You've guessed it - confusion did reign. Here is the story of the unravelling, and guess who played an important role?

The Ancients were agricultural people who needed to know the times of year when to plant and when to harvest their crops. It was important for them to know especially when to plant, and so a calendar was needed.

Early man based his calendar on the changing seasons, but later refined this by observing the motion of the stars, planets and constellations. In this way they gathered the information necessary to know accurately when to plant their crops.

Later, the Egyptians, whose calendar dates from about 4200 B.C. based their calculations upon the annual flooding of the Nile. They realised that the Nile flooded at approximately the same time each year, and that this coincided with the rising of the Dog Star Sirius just before sunrise. Based on these observations, the Egyptian priests calculated an interval of 365 days between successive floodings. »»

They then divided this time into 12 months each of 30 days, and added the extra 5 days at the end of the last month.

(Interestingly, this calendar was a day wrong in every 4 years, but the error corrects itself every 1460 years!)

The Babylonians also used a 12 month calendar, but this was based on the lunar month and so caused many problems.

Let's now jump to the people who really know about time (or at least know how to get their own way!) - the Romans, and the Julian Calendar.

You will remember that the Romans originally used a 10-month year, but later changed to a 12-month year. The Romans were very superstitious people who believed that even numbers represented death and odd numbers life. As a result, all the months had 29 or 31 days - except February, which had 28 days (well, you have to die sometime!).

In 46 B.C. Julius Caesar decided to correct previous inaccuracies and to sort the calendar out once and for all.

The pre-Julian calendar consisted of 355 days, but his was to be based upon the 365 day solar year, with one year in four being 366 to mop up the ¼ day left over.

He also changed the months, making 5 of them 30 days, and 6 of them 31 days, plus 29 for February with 30 in a Leap Year. (He obviously wasn't superstitious - remember the Ides of March!) However, the new calendar did work quite well, and it lasted for over 1500 years.

In 1582, a change was made, and a new calendar introduced - why? Well, the Julian version was 11 minutes too long - not much, I agree, but over 1500 years it adds up. »»

As a result, by 1582 there were 10 days too many. Pope Gregory XIII issued a decree. He ordered the 10 days to be dropped from the calendar, and to offset any future inaccuracies he also ordered that the Leap Year be omitted in the final year of each century, unless it could be divided by 400.

This new calendar was called the Gregorian Calendar, and is still in use today.

You may be interested to know that Britain did not adopt the new calendar until September 1752 (being anti-Catholic - as opposed to anti-European today). By this date, the error was now 11 days, so September 1752 read September 1st, 2nd, 14th, etc.. Riots ensued in the streets, but the people did not secure the return of their 11 days - poor things! ¤

David Williams

A magic lantern orrery?

Recently, I was shown an intriguing object - an antique "orrery" smaller than a hand. For the uninitiated, an orrery is a mechanical device to show the motions of the planets around the Sun. They were popular in the 18th century, and there is a famous painting of one by Joseph Wright in Derby. Usually, they were table-top size, and quite ornate.

What was remarkable about this one was not only its tiny size but also its design. The planets were marked by coloured glass mounted on concentric rings which were turned very simply by means of cogs. The owner and I could only think that it was designed to be used in a magic lantern, and projected onto a screen. Has anyone seen anything similar? ¤ ***DLC***

Out of the Mouths . . .

Letters from children of La Houguette Primary School, following a talk on astronomy and looking at the Moon through the 11-inch telescope.

"Thank you for coming to our school and giving us the talk on stars. I'm sorry I couldn't come to the talk after, but I had to go to club I thoroughly enjoyed it. I liked the slids and the bit about the eclips. Zoe was sick, and now wishes she hadn't been ill because she missed you."

". . . Our talk from you was way better than work. . . ."

"P.S. I bet you it is fun."

" . . . I did not know that the earth was so small compared to the sun. Thankyou for helping me to learn."

"I had never seen pictures of other gallaxies before today."

"Thank you for giving up your lunch break to teach us about Astronomy. I was the boy who couldn't spin a little ball round and round and the slides were very good."

"When I was little I wanted to be an astronomer like you but now I want to be a concorde pilot but if I do become a pilot I can fly at night and look at the stars.

Once when I was 7 my mum woke me up at 2 pm *(sic)* and took me to my window where I saw a milky way twice the size of a hotel. I tried to count how many stars there were but I lost count in 6 seconds. It's very hard.

I have always wondered how many stars there are in the world. If there about 60 million stars in one milky way and there are loads of milky ways and that's only half. I wonder."

Don't we all! ¤

A Visit to . . . Jodrell Bank

I approached Jodrell Bank from Congleton, and immediately got lost in the lanes. On my previous visit, a few years ago I approached from the M6, and that was much easier (take exit 18, go to Holmes Chapel, and follow the A535 towards Chelford for about 3 miles (sorry, 5 kilometers). However, I soon saw the giant Lovell Radio Telescope towering above the landscape. I continued to the car park, paid the entrance fee, and proceeded to the Science Centre.

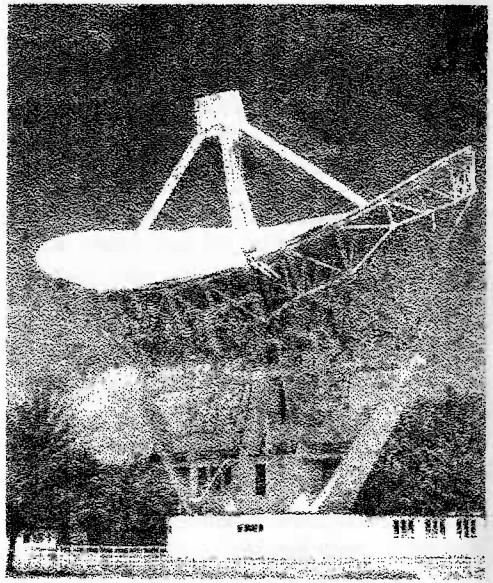
I recall that this was a big disappointment a few years ago, with poor displays, mostly of old equipment and worn-out exhibition material. However, the displays have been transformed, complete with a number of hands-on activities especially good for children, and a talking-head Isaac Newton introducing the exhibits!

Through the windows I got a good view of the 76-metre Lovell Telescope, originally called the Mark I, and as big as the dome of St. Paul's! There is even a mock-up of the control room, which shows where the telescope is pointing at that moment. I also went outside and saw the impressive life-size replica of the box located at the telescope's focus. Also visible is the smaller, elliptical Mark II telescope.

I found it fun to operate the controls of a small, 7-metre, radio telescope which is equipped with a meter showing the radio output. The idea is to point it towards the sun and see the needle soar.

The Jodrell Bank telescopes are used in conjunction with others in Cambridge and elsewhere in the country to form MERLIN, the Multi-Element Radio-Linked Interferometer Network. This »»

acts as a single telescope 233 kilometres across! The telescopes are also used in conjunction with radio telescopes on other continents.



The Mark II radio telescope at Jodrell Bank

The work carried out at Jodrell Bank includes studies of fast "millisecond" pulsars - dead stars which spin hundreds of times a second. They also study interstellar molecules (such as ammonia and alcohol!), active galaxies and quasars which emit huge amounts of radio waves, and the cosmic background radiation.

A great deal of basic astronomy can be learned from the displays in the Science Centre, and it is well worth taking the time (especially as there seems to be at least a dozen children at each exhibit).

Unfortunately, the same cannot be said of the Science Centre's 170-seat planetarium. The show was undoubtedly the worst I have seen - a confused mish-mash, illustrated by poor slides, and guided by a poorer operator. As the recorded »»

commentary referred to a particular object, such as a planet, the operator was supposed to point it out with a torch pointer. However, he missed (either in space or time) on virtually every occasion. How the poor audience was supposed to follow this I have no idea; they must have left totally confused.

A visit to the small souvenir shop was rewarding. Then back outside is a 35 acre tree park, the Granada Arboretum, with trails, 2,500 varieties of trees, a picnic area and play area. There is also an "Environmental Discovery Centre".

My conclusion: Jodrell Bank is well worth a visit of a few hours, but do avoid the planetarium! (Co-incidentally, the July issue of *Sky and Telescope* has an article lamenting the poor presentation by many planetarium operators in the U.S.A.) ¤

David Le Conte

Jodrell Bank Science Centre and Arboretum are open from Easter to the 31st October from 10.30 am to 5.30 pm, and the rest of the year on weekends and Christmas holidays only, from 12 noon to 5.00 pm. The Admission charges (1992) are: adults £3.20, children £1.80, OAPs £2.40. The address is: Macclesfield, Cheshire SK11 9DL, tel. 0477 71339. ¤

BBC order for star dial

Recently we mentioned orders for our star dial which was advertised in *Gnomon*, the newsletter of the Association for Astronomy Education.

The latest order is from Hendrik Ball, Producer for BBC Television. ¤

Patrick Moore's visit helps Observatory

The visit to Guernsey by Patrick Moore resulted in La Société receiving over £1000, mostly from the entrance charges for the talk at Beau Sejour. This has gone a considerable way in helping to pay for the new observatory building, which has cost La Société just over £2000. We are very grateful to Patrick for paying his own air fare and not charging any fee for his appearance. The only cost to La Société was accommodation and the hire of the hall.

The Section's own funds are fairly healthy. We made over £100 in sales of publications following Patrick Moore's talk, and this has largely met the additional costs for the new building which were incurred by the Section.

However, it is hoped to build up the Section's reserves further in order to acquire a CCD and computer (see below).¤

A British CCD camera

CCDs have mostly come from the U.S. However, details have recently been received of a new CCD imaging system which is due to be available in August. It is made by a British company called Helius Designs. It has an array of 485 x 375 pixels, and is cooled to -70°C.

The manufacturer claims that the device is the most sophisticated available, and provides an equivalent increase in sensitivity of 4 times. A control interface between the CCD and computer holds the images and controls the camera. Software then provides manipulation and enhancement of the image. Prices start at £1470. Any ideas for raising money? ¤

The New Generation of Telescopes

In the last issue of Sagittarius Daniel Cave described Active Optics, especially as applied to the New Technology Telescope in Chile. Now he provides a summary of other technologies being used for large telescopes.

Segmented telescopes are currently being used in only one telescope - the W.M. Keck telescope. At present, one of its two 10m telescopes is completed. It is hoped that when both are finished they will be usable as an infra-red/optical interferometer. Each mirror is composed of 36 hexagonal segments, each with a complex off-axis section of a hyperboloid.

The segments are produced with a technique known as stressed mirror polishing. Horizontal levers are attached to the rim of the circular mirror blank. Carefully calculated weights are then hung onto these levers, deforming the mirror's shape. The mirror is then ground and polished to a spherical figure. When the weights are removed the mirror springs into its required off-axis shape.

The circular disk is then cut into a hexagon so that it will fit into the mosaic mirror. Sensors (small capacitors) determine the relative positions of each segment in the final mirror, and computer controlled actuators keep them in the ideal position.

Spin casting of mirrors has been developed recently at the University of Arizona. The spinning of the mirror's mould containing molten glass causes the glass's surface to take on a concave shape. The glass is then cooled until it can hold this shape. Then the furnace stops rotating. Slower cooling (annealing) follows. This glass blank requires much less grinding »» than a conventionally flat one, which saves time, glass and money. The blank is also extensively honeycombed to allow rapid cooling and reduced weight, while maintaining strength.

These mirrors typically have focal ratios as low as f1.0 or f1.5, in order to give a wide field of view and to keep telescope tubes and domes compact. These mirrors require stressed lap polishing in order to be fabricated, as normal polishing methods do not work on very "fast" mirrors. A computer controls the shape of a sub-diameter polishing tool to ensure continuous contact between the lap and the mirror.

Multiple mirror telescopes (MMTs) utilise several mirrors to gather light. In present MMTs the resolution is that of each individual mirror, while the light gathering power is that of the mirrors combined. In the new generation of MMTs the mirrors will be used to perform optical interferometry. This will mean that the resolution will be that of a mirror having a diameter equal to the separation of the mirrors. Thus incredibly high resolutions will be possible.

Daniel Cave

A list of the instruments belonging to the new generation of telescopes appears on the next page.

Incidentally, there is a guide to the world's largest telescopes in the July 1993 issue of Sky and Telescope. It lists no less than 41 telescopes with apertures of at least 92 inches. It also lists 12 Schmidt telescopes (the largest being 2m in Germany), and 12 large refractors (all dating from the 19th century!). ¤

The new generation of telescopes

Name	Location	Aperture (m)	Technology	First light
New Technology Telescope	Chile	3.58	Active	1989
W.M. Keck Telescope	Hawaii	2 x 10	Segmented	1990
ARC Telescope	New Mexico	3.5	Spun cast	1991
Weapons Lab	New Mexico	3.5	Spun cast	1991
MMT	Arizona	6.5	Spun cast	1993
WIN Telescope	Arizona	3.5	Spun cast	1993
Columbus Project	Arizona	2 x 8	Spun cast	1994
Very Large Telescope	Chile	4 x 8	Active	1995
Magellan Project	Chile	8	Spun cast	1996
NOAO	Hawaii	8	Spun cast	1997
NOAO	Chile	8	Spun cast	1997
Japanese NLT	Hawaii	7.5	Active	?
UK Large Telescope	?	8	Active	?

Calling all budding radio astronomers

Mark Humphrys has placed an advertisement in the June issue of the Amercian *Astronomy* magazine. He wants to contact radio astronomers about the design of antennae, amplifiers, receivers, data recorders, and software for radio observations. He also wants information on publications and groups interested in radio astronomy. Mark says that he is thinking of setting up an amateur radio telescope system when he eventually leaves his present job on board ship in exotic parts of the world. One rarely hears or sees anything about amateur radio astronomers, but there must be some out there. Good luck, Mark!

- and calling all budding astronomy authors

Articles are needed for future issues of Sagittarius. Do you have an idea for an article? Or perhaps a new series of articles? If not, here are a few suggestions to start you off.

Quiz questions.

Thumbnail sketches of early astronomers.

Different sorts of telescopes.

Book reviews.

Software reviews.

Reviews of magazine articles.

There must be dozens more ideas for articles, so get writing! ¤

Double summer time

There has been much discussion in the media recently about the possibility of moving to "single/double summer time", the time used in the Central European Time zone which covers most of Europe. The arguments in favour of such a change include improved communications and trade with Europe, reduced crime, and energy savings. There could be some disadvantages to the agriculture and construction industries.

But what would be the effect on astronomy? The times of sunset, and therefore evening twilight would, of course, be even later in the summer than it is now. I have calculated the times (in UT or Greenwich Mean Time) of sunset, evening twilights, morning twilights and sunrise for the latitude of Guernsey for the middle of each month.

The definitions of the different types of twilight are as follows: the end of evening (and beginning of morning) civil twilight, nautical twilight and astronomical twilight occurs when the sun is 6°, 12° and 18° below the horizon, respectively. Although really dark skies for astronomical purposes occur only between the end of evening astronomical twilight and the beginning of morning astronomical twilight, in practice useful observation can be made based on the times of nautical twilight.

The charts on the next page show the clock times of evening nautical twilight, taking into account an advance of one hour in the summer (as now) or one hour in winter and two hours in summer. Double summer time will result in some very late starts for evening observing in mid-summer - after midnight in June!

David Le Conte

Greenwich Mean Times of sunset, evening twilights, morning twilights and sunrise.

		Evening twilight			Morning twilight			
Date	Sunset	Civil	Nautical	Astronomical	Astronomical	Nautical	Civil	Sunrise
15 Jan	1639	1715	1755	1833	0606	0644	0724	0800
15 Feb	1730	1803	1840	1917	0531	0608	0645	0718
15 Mar	1815	1847	1924	2003	0434	0513	0550	0622
15 Apr	1903	1937	2018	2104	0315	0401	0443	0516
15 May	1948	2026	2118	2226	0146	0255	0346	0425
15 Jun	2018	2102	2205			0217	0319	0403
15 Jul	2012	2053	2149	2318	0114	0243	0340	0421
15 Aug	1928	2002	2047	2138	0251	0342	0427	0503
15 Sep	1824	1856	1934	2014	0357	0437	0515	0548
15 Oct	1720	1752	1829	1906	0446	0523	0600	0633
15 Nov	1628	1703	1742	1819	0531	0608	0647	0723
15 Dec	1611	1649	1730	1809	0602	0641	0722	0801