

Advertisements

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

Submission of articles

Please ensure that articles for inclusion in *Sagittarius* are submitted no later than the deadline, and preferably long in advance, to give the Editor time to plan and prepare the newsletter.

Special insert

Included with this issue of *Sagittarius* is a special Liberation Day leaflet. We will be handing these out to anyone who pays a nominal charge on Liberation Day to look through the telescopes at the Albert Pier.

Don't forget!
Liberation Day Event
10.00 am - 11.00 pm
9th May 1995
Albert Pier

Come and help
or at least pay us a
visit.

A sponsor has not been found for this issue of the newsletter. If you can obtain sponsorship, or can suggest a possible source, please advise the Secretary, Treasurer or Editor.

This space is available at a cost of
£25.00.

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The next newsletter will be published early in July. The deadline for publication materials is 15th June.

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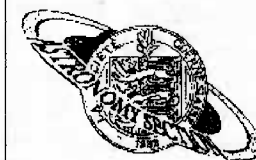
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Sagittarius

The Newsletter of the Astronomy
Section of La Société Guerneslaise

May/June 1995



Forthcoming events

Liberation Day Event

Tuesday, 9th May
10.00 am - 11.00 pm
at the Upper Walk,
Albert Pier

The Anthropic Universe **by Peter Langford**

Tuesday, 13th June
8.00 pm at the Observatory

Also regular meetings
Tuesdays and Fridays
from 7.30 pm
at the Observatory

Inside

Major articles in **bold**

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Centre insert

May/June star chart

Special insert

Souvenir Liberation
Day leaflet
and star chart

Liberation Day Event

Our major event this year happens on Liberation Day, Tuesday, the 9th May. It will take place on the Upper Walk, Albert Pier, from 10.00 am to 11 pm.

In the past we have invited the public to the Observatory to look through our telescopes. The Liberation Day event, however, is in the spirit of "sidewalk astronomy", popular in America, where telescopes are taken out onto the streets to enable passers-by a telescopic glimpse of the heavens.

We will have two telescopes - the 11-inch Celestron reflector and Rex Huddle's 4-inch refractor. The latter will be used to provide projected images of the Sun during the day. If it is cloudy, then we should be able to show views of the other islands, and events happening around the Harbour. At night the main objects visible will be the Moon (just passed first quarter) and Mars. We can expect lots of people, especially as the upper walk will be a prime spot for viewing the fireworks.

This will also be our major fund-raising event of the year. We will be selling helium-filled balloons (decorated with stars), posters of the view of the Channel Islands from space, postcards, and prints of photographs taken by Roger Chandler.

A sign-up form has been in the Observatory for the last few weeks, asking for volunteers to help man the stall and the telescopes. There will be a rota system, with members being asked to give two hours of their time during the day. There are still many places left, and your support is needed to ensure that the event is a success. Please let Geoff Falla know as soon as possible if and when you are able to help.

The Anthropic Universe

On Tuesday, the 13th June, at 8.00 pm at the Observatory, Peter Langford will be taking about the Anthropic Universe. The universe is big, has three dimensions and contains atoms, molecules, stars and galaxies. It also has intelligent observers - here we are to prove it! For beings like us to exist requires some remarkable coincidences amongst the constants of nature - so remarkable that some scientists think that the universe must have a purpose. Peter explores the topic at his talk on the 13th June.

Sundials - Date change

The talk by Richard Mallet on sundials, scheduled to be given on the 1st August has been rescheduled for Tuesday, the 25th July. Full details will appear in the next newsletter.

Computers

We currently have an old Apple II computer at the Observatory, and an old BBC B computer. Neither are in particularly good condition, and they are certainly not suitable for current astronomical use. We have recently evaluated a PC 386 computer, but concluded that it was too slow for our purpose, which requires large memory and high speed. This is particularly important for use with the CCD imaging system.

We are therefore looking for a high speed PC computer, and any member who knows of a possible source at a reasonable price, should let us know.

We should also be considering a modem and CD Rom drive. □

The Celestial Sphere

On the 14th March, David Le Conte spoke to members about the celestial sphere. Starting with early Egyptian concepts about the zodiac, epitomised by the ceiling at Dendera, the mediæval view of the universe, armillary spheres, astrolabes and orreries, he proceeded to describe modern mathematical uses of the celestial sphere.

After describing basic concepts, such as great and small circles, zenith and nadir, the celestial poles, meridians, transits, and the relationship between angles and time, David demonstrated by means of colour slides and computer graphics how to establish and measure positions on the celestial sphere. Coordinate systems followed, with explanations of Right Ascension, Declination and Hour Angle, the First Point of Aries (now in Pisces), and the Astronomical Triangle which can be used to transfer between equatorial and alt-azimuth coordinates.

Sidereal time was then introduced, with its use to convert from Right Ascension to Hour Angle, and vice-versa. Various methods were shown of how to calculate sidereal time.

David then explained the practical use of some of these concepts, especially by computerised telescopes, and the use of setting circles on our own telescopes.

The motion of the Sun during the year was then demonstrated with the aid of the Archimedes computer programs *Orrery* and *NightSky*, and the analemma was shown, with its relevance to the Equation of Time.

David concluded his talk with demonstrations of computer programs he had written showing the shadow movements of the Liberation Monument. □

Public Star Nights

Public evenings were held each night from Tuesday, the 4th to Friday, the 7th April. The weather was not too kind, and less than twenty members of the public turned up. Those who did come along, however, were enthusiastic and obviously grateful for the opportunity. The main objects visible were the Moon and Mars, although other objects were also shown, weather permitting.

It is possible that the late start (8.00 pm) discouraged many people with young children, and we shall have to give careful reconsideration to the future format of these public evenings. Your ideas are welcomed.

Although we also ran a telescope surgery on these evenings, no one brought in an instrument, so either everyone is happy with their telescope or have given up trying to use it!

Interestingly, although the week of Star Nights was publicised as a free event, we had better response on Tuesday, the 11th April, which was the first night of our regular Tuesday evening public sessions, for which a charge is made (£1.00 for adults, 50p for children). This started at 9.30 pm, and by 9.35 pm we had over a dozen people gathered around the telescopes.

It is strange that people are prepared to pay for something which they could have got for nothing a few days previously! I understand that this event was well publicised on Island FM, and that may have made the difference. Although the weather was good, the bright Moon did not make for very good observing, but everyone was nonetheless pleased with what they could see. □

The solar mirror project

As reported briefly in Sagittarius for March/April, our long awaited solar mirrors finally arrived in February, over a year after the order was placed.

The two mirrors are six inches in diameter. One is a reflecting mirror with a flat surface, while the other has a slightly concave surface to focus the Sun's image.

The focusing mirror was tested on two sunny evenings on an east-west line shortly before sunset, so that a near horizontal line could be obtained between the Sun and the mirror, and the image could be projected onto a screen standing on the ground.

First results showed a very satisfactory image of about eight inches diameter, with two groups of small sunspots visible on the second mirror held in a more stable position.

The focus distance was established at a distance of around 68 feet, about right for the planned focusing of the Sun's image from the south boundary of the site onto a screen within the Observatory building. It is thought possible that the system could also be used to reflect the image of the Moon.

It is planned that the reflecting mirror will be mounted on or near a window frame and preferably within the building. A temporary mount is to be made for the mirror, with the assistance of Lawrence Guilbert and Roger Chandler, until a more permanent mount incorporating a drive system can be provided. The mount to be set up near the south boundary for the focusing mirror will be a simpler device to hold the mirror in a fixed position.

We look forward to seeing the system set up, which should be well in time to study the beginning of the next rise in sunspot activity.

Geoff Falla

4 Solar eclipse 1999

Geoff Falla has made bookings for several members to stay at the Belle Vue Hotel in Alderney for the solar eclipse in 1999. Anyone other member interested should contact him soon.

Space research

The third part of Geoff Falla's article on *Landmarks in Space Research* will appear in the next issue of Sagittarius.

Heavenly Hosts

Planets have sleeping lives:
Like lazy bees in hives
That crawling flow and turn,
Earth's entrails burn.

Moons show a doubtful spark
Of life: they house the dark
Dead debris of us all
In ashly caul.

Comets come carrying clouds
Of resurrection shrouds:
Each fire-lit fall to earth
Prefigures birth.

Stars are not lifeless: rays
Flail through the dusty haze.
As animals eat feed,
So we that seed.

K.V. Bailey

Oscar Wilde (1854-1900)

"We are all in the gutter
but some of us are looking at the stars."

5 Famous Lives - 8 Sir William Herschel (1738 - 1822)

It seems a little odd to write about Herschel without making mention of other members of this most remarkable family:

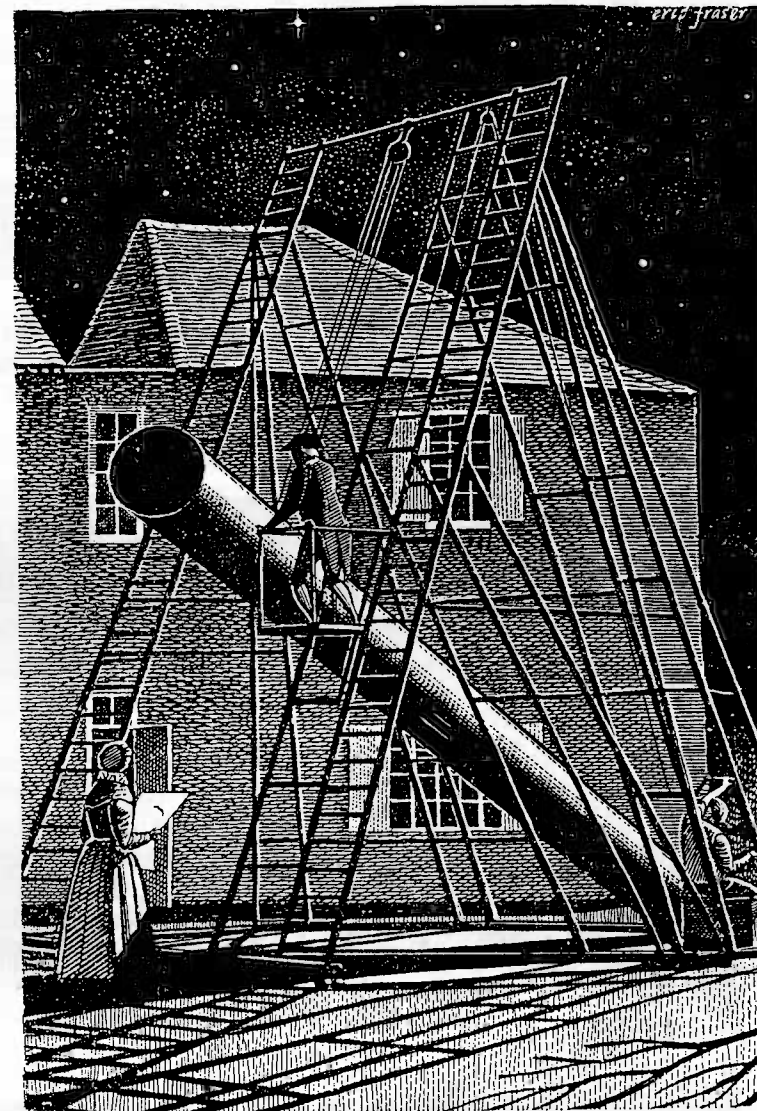
His sister Caroline, who assisted him, and provided much invaluable support, and continued working for 25 years after her brother's death, cataloguing stars.

His son, the famed Sir John Herschel, who extended and refined his father's work for many years before establishing his own reputation as an outstanding astronomer in his own right.

It is, I believe, correct to say that the Herschel family had a profound effect upon the science of astronomy, especially in the field of stellar and nebulae studies, and in establishing the early theories of cosmology. What a truly remarkable family!

Let me turn my attention to William. Frederick William, or, to give

him his correct German names, Friedrich Wilhelm Herschel, was born in Hanover on 15 November 1738. He was born into a musical family, his father being an army musician. The young William followed »»



Herschel's 40-foot telescope, with, probably, Caroline, his sister

his father into the army band, but in 1757 they fled to England where he and his family established themselves in Bath. William secured employment as a music teacher, and soon established his reputation as both a teacher and performer. In 1766 he was appointed church organist.

It was, in fact, as a result of his musical studies that he became interested in astronomy, initially as a result of reading a book about optics and telescope construction. Such was his fascination with the subject that he determined to build his own telescope - but no ordinary instrument. Herschel was more interested in deep sky objects, and not just the Sun, Moon and planets, so he resolved to build a telescope large enough to allow him to look further into the reaches of the universe.

Herschel set about the task with great relish and determination. As with his musical skills, he established his reputation as a maker of high quality telescopes, and so he was much in demand. Remember, he was also a full-time teacher of music; telescope construction was merely a hobby! However, it provided a useful supplement to his income as a teacher (I know the feeling!!). He also made his own eyepieces, the greatest magnifying power being 6450 times. His later telescopes were of such a high standard that they outperformed the instruments in use at the Royal Greenwich Observatory.

It must be remembered, as I wrote earlier, that he was still considered an amateur, but by 1781, using his telescopes, he had completed two surveys of the heavens, and it was during the course of the third survey, in March 1781, that he came across his most famous discovery, which was thought to be a comet.

The new comet discovered on 13 March 1781 was not, of course, a comet, but the planet Uranus. Herschel recorded his observations, and sent off reports to Cambridge University, and to his friend Dr William Watson, a fellow member of the Bath Literary and Philosophical Society. It was Dr Watson who sent the work on to the Astronomer Royal of the day, Dr Nevil Maskelyne.

After many months of further observations and calculation by independent scientists, it was determined that the new object was in fact a planet, the first to be discovered since pre-historic times. Its orbit was beyond that of Saturn, and it was named after the first supreme god of Greek mythology, Uranus.

The discovery was to set the seal on Herschel's future. He was to be elected a Fellow of the Royal Society, and awarded its highest honour, the Copely Medal. With the help of his friend, Dr Watson, he was also able to secure an annual pension of £200 from the King, George III. This pension was to allow him to "give up his day job" and concentrate his huge energy and skills upon matters astronomical. The King also appointed him as one of his astronomers, and as a result William and Caroline moved to live near Windsor.

Herschel was a man of enormous energy, and using his telescopes, which were the largest of their kind in the world, continued with his deep sky observations, firstly at his home in Datchet (1872), and later at his home on old Windsor (1877), before finally settling at Slough in 1788. It was here, in 1789, that he built the then largest telescope in the world, with a mirror of 40 inches diameter, and a focal length of 40 feet - truly one of the wonders of 18th century science and technology. »»

During his lifetime Herschel devoted his energies to stellar astronomy, cataloguing over 2500 nebulae and star clusters. He also published 70 scientific papers on subjects ranging from the motion of the solar system through space, the discovery in 1800 of infrared rays, and many planetary and solar object observations.

He also attempted to explain the appearance of nebulae, which were so far away that even with his skills and telescopes, he consistently failed to resolve them. These objects he called "island universes"; today we know them as galaxies. Their existence was difficult to explain, and his fellow astronomers never fully appreciated his work. Indeed, it was not until the early 20th century, and the pioneering work of Edwin Hubble, that we began to understand the true nature of galaxies.

With his observations, Herschel drew back the frontiers of astronomy. He did not

become a professional full-time astronomer until the age of 43, but his name will be forever ranked as one of the greatest scientists of his age.

Knighthood in 1816 for his contribution to astronomy, he had married in 1788, having one son, John, who was to continue his father's work. His sister Caroline returned to Hanover on his death in 1822, and spent the remainder of her life publishing her brother's work, a catalogue of 2500 nebulae and star clusters. For this she received the Gold Medal of the Royal Astronomical Society in 1828. She died in 1847.

Herschel died peacefully, worn out by his labours, in 1822, aged 83 years. □

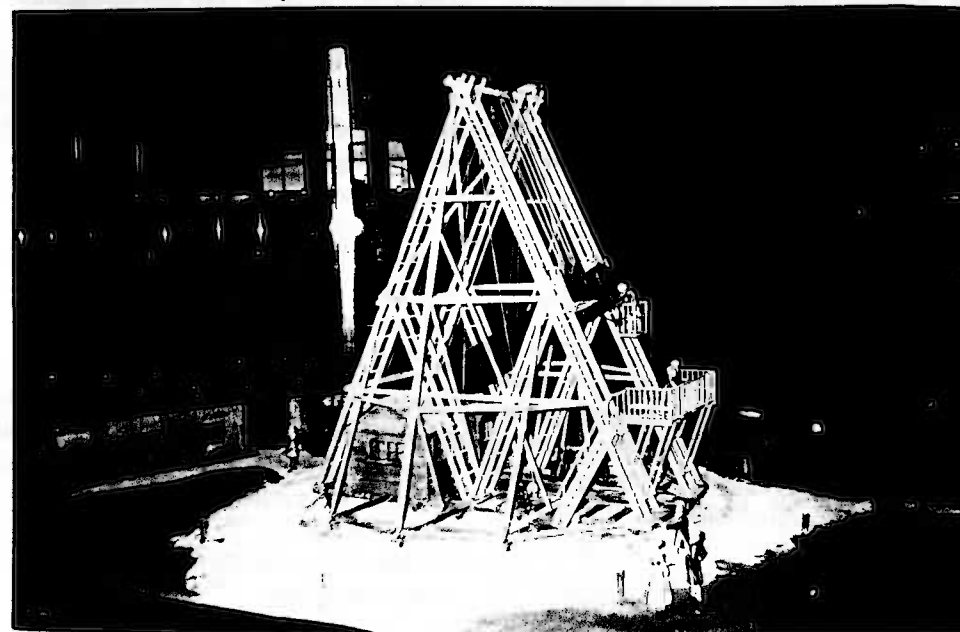
David Williams

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Model of Herschel's 40-foot telescope, at the Deutsches Museum, Munich

Binary Pulsars by Daniel Cave

After the initial discovery of pulsars in 1967 by Professor Hewish and Jocelyn Bell, there was a lot of interest in them. The research into their structure and evolution soon died away, however, as many of the questions regarding their nature were answered. Today we see renewed interest in these strange objects, especially binary pulsar systems. This interest is not so much in the pulsars themselves, but in the experiments in which they can be used.

There are approximately 600 known pulsars. Most are located in the disk of the galaxy and only a small number of these are known to be binary systems. One pulsar is created about every 100 years in our galaxy, usually by supernova explosions. There are a number of different configurations that binary systems could possibly have. These are:-

1. A pulsar orbited by another neutron star (possibly another pulsar).
2. A pulsar surrounded by one or more planetary bodies.
3. A pulsar and a normal star as its companion.
4. There is even the possibility of a young pulsar with a stellar mass black hole (though none have yet been detected).

The radiation bursts that are observed to come from pulsars occur at very short periods and with extremely high precision. When present in binary systems, these properties make pulsars extremely useful for revealing all manner of information about the system. Theories on planet formation, general relativity, neutron star magnetospheres and the evolution of globular clusters can all be tested with

binary pulsars (along with many others).

If there is an object in orbit around a pulsar, then the gravitational field of the companion causes the primary to wobble as they both orbit the common centre of gravity. These motions can be detected on Earth as slight Doppler shifts in the pulse frequency. As the pulse frequency of these objects can be measured with extremely high accuracy, minute fluctuations can be observed. In fact, in the most sensitive cases, an object slightly smaller than the Earth's Moon in orbit around a pulsar would produce a detectable Doppler shift in the observed pulse frequency.

Gravitational waves, as predicted by Einstein's theory of general relativity, have not yet been directly detected. Due to the extreme conditions that are found within binary pulsar systems, they are important tools in the detection of the waves. The first and one of the most interesting binary pulsars was discovered in 1974 by Hulse and Taylor. The PSR 1913+16 system consists of two neutron stars, with masses of 1.44 and 1.39 solar masses, separated by only 2.8 solar radii. The pulsar member emits a radio pulse every 0.059 seconds, and the orbital period of the system is a rather rapid 7.75 hours. This means that the mean velocity of these stars is about 0.1 percent of the speed of light.

Due to the fact that these two objects are moving so rapidly, and because of the intense gravitational field, the system should be a strong emitter of gravitational waves. If gravitational radiation occurs then it will carry energy away from the binaries and cause the orbital period of the system to reduce. »»

This gradually reducing orbital period will lead to the advancement of periastron, the point at which the companion is closest to the primary. In the extreme case of PSR 1913+16 it has advanced by nearly 90 degrees since the system's discovery in 1974.

Observations of PSR 1913+16 made at the Arecibo Observatory strongly support the theory that gravitational radiation exists. (Observations of PSR 1913+16 agree with those predicted by general relativity to 1%). Other gravitational theories can be ruled out by the observed effects. Modern gravity wave detectors are now verging on the sensitivity needed to conclusively detect gravity waves directly, rather than just detect the effects on a binary pulsar's orbit.

Young pulsars (those associated with supernova remnants) are observed to have smaller rotation periods (less than about 0.1 seconds). From this we may deduce that during the lifetime of a pulsar its rotation speed slows. Younger pulsars are also observed to have higher magnetic field strengths. The formation of a high mass binary system, that is one containing two neutron stars, is thought to proceed as follows:-

- A binary star system is initially composed of two main sequence stars (call them A and B).
- Star A's outer hydrogen atmosphere overflows its Roche lobe (the region in which gravity binds it to star A). Star A loses much of its outer hydrogen atmosphere and becomes a 'helium star'.
- Stripped of its outer atmosphere, star A then goes supernova, forming the first neutron star.

- Roche lobe overflow of star B occurs, feeding matter onto the neutron star and stripping star B of its outer atmosphere.
- The matter gets funnelled onto the polar regions of the first neutron star which can give rise to pulsed X-ray emission. From the Earth we may see what is known as a massive X-ray binary (MXRB). When this matter transfer stops, the neutron star may 'switch on' as a pulsar.
- The matter transfer leads to neutron star A spiralling in towards star B. The binary system has now shrunk in size considerably due to angular momentum and mass losses. The neutron star A and 'helium star' B are now in close circular orbits.
- 'Helium star' B explodes as a supernova leaving a two neutron star system in eccentric orbits.

It is assumed that star A becomes the pulsar as the rotation of star A would be accelerated by the accretion of material from star B, but it may be possible for either of the stars to emit pulsed radiation. In many of the cases outlined above the supernova explosion separates the binary system; it is therefore only in a very few cases that this scenario is completed.

In low mass binary systems containing a pulsar and low mass companion the formation process is slightly different. It is thought that the primary initially occupied a large volume, with the companion star and progenitor going through a 'common envelope' phase where the two stars actually share the same outer atmosphere. This causes the companion to spiral further into the primary very quickly, stripping the primary of its outer atmosphere in the process. »»

The primary member of the system undergoes a supernova explosion, forming a new neutron star. Matter from the companion can now start accreting onto the neutron star. This accretion process 'spins up' the neutron star to very high rotation speeds over a period of about 107 to 108 years. During this phase, the system may be seen from the Earth as a low-mass X-ray binary. When compared with single pulsars or to high mass binary pulsars, low-mass binary pulsars are observed to have lower magnetic field strengths and lower spin rates. Initially it was believed that the magnetic field of the pulsar was strong to begin with, but decayed rapidly to its observed level.

Several possible mechanisms were proposed to account for this. It is now believed, however, that the pulsars have always had low magnetic field strengths, and that no field decay is necessary. Recently, a number of searches for binary pulsar systems have been initiated, and already a number of new pulsars have been discovered as a result. Using radio telescopes and often observing at a frequency of around 430 MHz, the galactic disk has been systematically searched. Now observations of higher galactic latitudes are being made in order to locate more binary systems. With improved techniques giving higher accuracy, many gravitational theories can be further examined to see if they hold up under the tighter constraints. Precession of the pulsar's spin axis, predicted to occur by relatively, has yet to be detected. There are few systems which have the correct properties to allow for the tests. One which has recently been discovered is PSR 1534+12. The exceptionally strong and narrow pulses emitted by this system allow

the high accuracy timings needed to verify the spin axis precession to be made. If this effect is detected it will be further support for relativity, and will put further restraints on alternate theories of gravity. □

Daniel Cave

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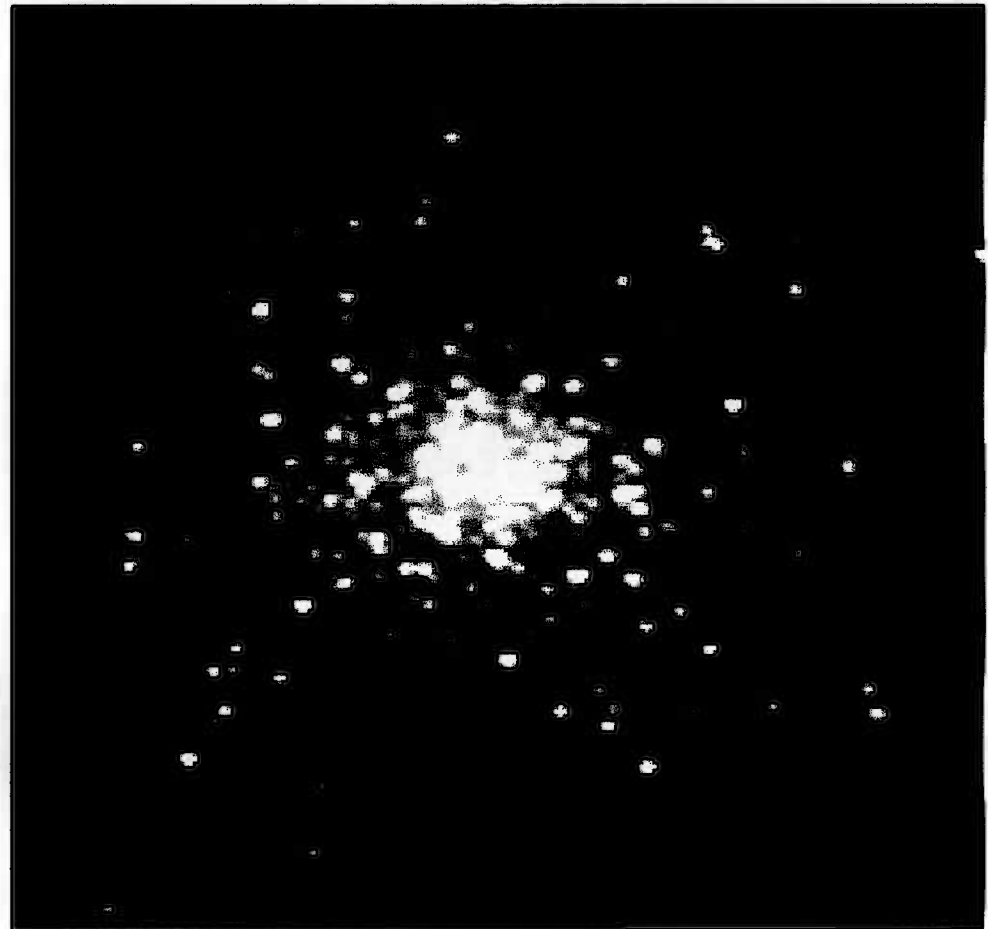
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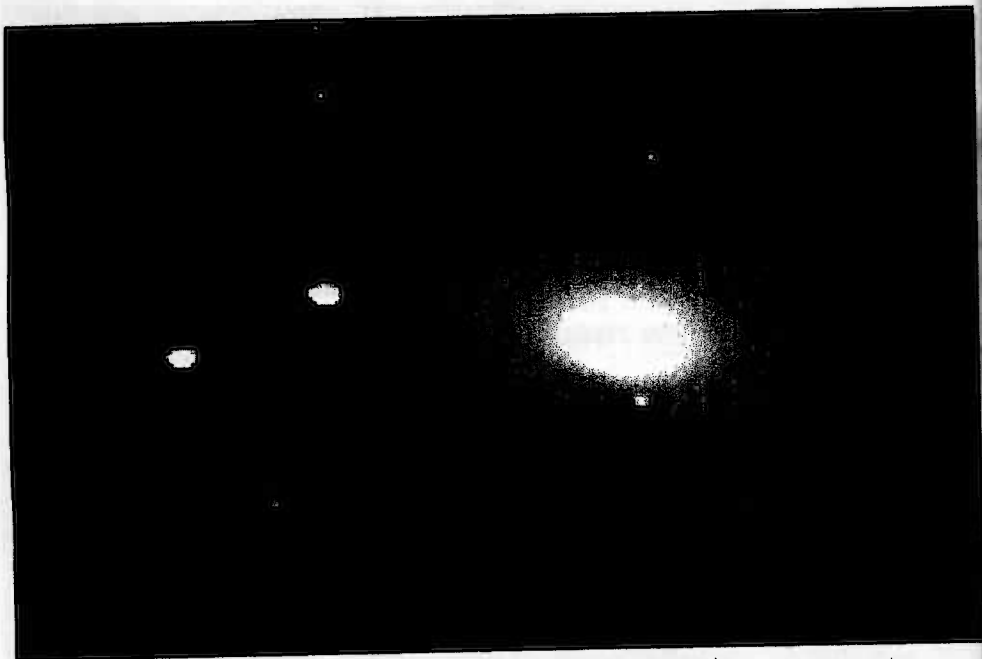


New results by Daniel Cave

Below and on the next page are several fine CCD images obtained by Daniel, using the Starlite Xpress CCD with the 14-inch telescope, and his own 10-inch Dobsonian.



M13 The globular cluster in the constellation Hercules.



M81 The spiral galaxy in the constellation Ursa Major



M57 The Ring Nebula in the constellation Lyra

The Liberation Monument - Part 4 - by David Le Conte

Finding True North

In Part 3 of this article we considered several possible ways to find True North accurately. We actually used a combination of these methods, checking one against the other.

First, Sean Harvey, who is not only a member of the Astronomy Section, but was also the States surveyor given the responsibility for laying out the Monument accurately, laid out a north-south line across the harbour, passing close to the Monument position. He did this by using the Universal Transverse Mercator Grid shown on the Ordnance Survey maps. However, there was some doubt about the accuracy of this Grid, which does not conform exactly with either the UK Grid or the French Grid.

Therefore, Sean checked the line by observing the shadow from a very tall lamppost at the harbour, and comparing the results with solar position predictions calculated by the author. This was done on several days, and discrepancies were analysed. It was concluded that the main discrepancies were due to a slight leaning of the lamppost. Sean was able to check the amount of lean, which appeared to change from day to day (the lamppost was actually telescopic and was probably affected by the wind), and make appropriate corrections. We were still not satisfied, however, that we had established True North to the required accuracy (better than one minute of arc, and preferably to one hundredth of a degree).

We concluded that the most accurate method would be to use the Pole Star. I

had acquired the computer program *Mica*, which is issued by the US Naval Observatory, and is as accurate as the Astronomical Almanac. We were thus able to predict the position of the Pole Star to a accuracy better than one arc-second. By off-setting an optical instrument by the appropriate amount from the Pole Star, and taking a bearing on the ground, we would be able to determine True North to the required accuracy - or at least that was the theory. We first used John Ferguson's 10-inch computerised Meade LX200 telescope. This is equipped with software which enables the telescope to be set to True North, and, by an iterative process to get fairly accurate results. John, Sean and I spent several hours at the harbour, battling with intense light pollution. Not only did we have to contend with the bright harbour lights, but we also managed to pick the evening when Santa Claus switched on the town Christmas illuminations!

We experienced difficulties with levelling the instrument with sufficient accuracy, and then getting consistent results. The greatest problem turned out to be caused by a misprint in the telescope manual, which made the telescope behave erratically. Later, during further trials at the Observatory, we identified this problem, and were able to get quite good results with the telescope. However, these would still not have been sufficiently accurate for our purpose. The manual also did not indicate the kind of accuracies which could be obtained. Since then, Meade have been advertising their new model which is claimed to give one »»

arc-minute accuracy, so clearly the model we were using was less accurate than that.

Sean then had the idea of using his surveying instrument, called a Total Station, for the purpose, as it has a night-time operational mode. We used this most successfully, obtaining consistent results, not only on the Pole Star but also other

stars, of better than 10 arc-seconds, and probably as accurate as 5 arc-seconds.

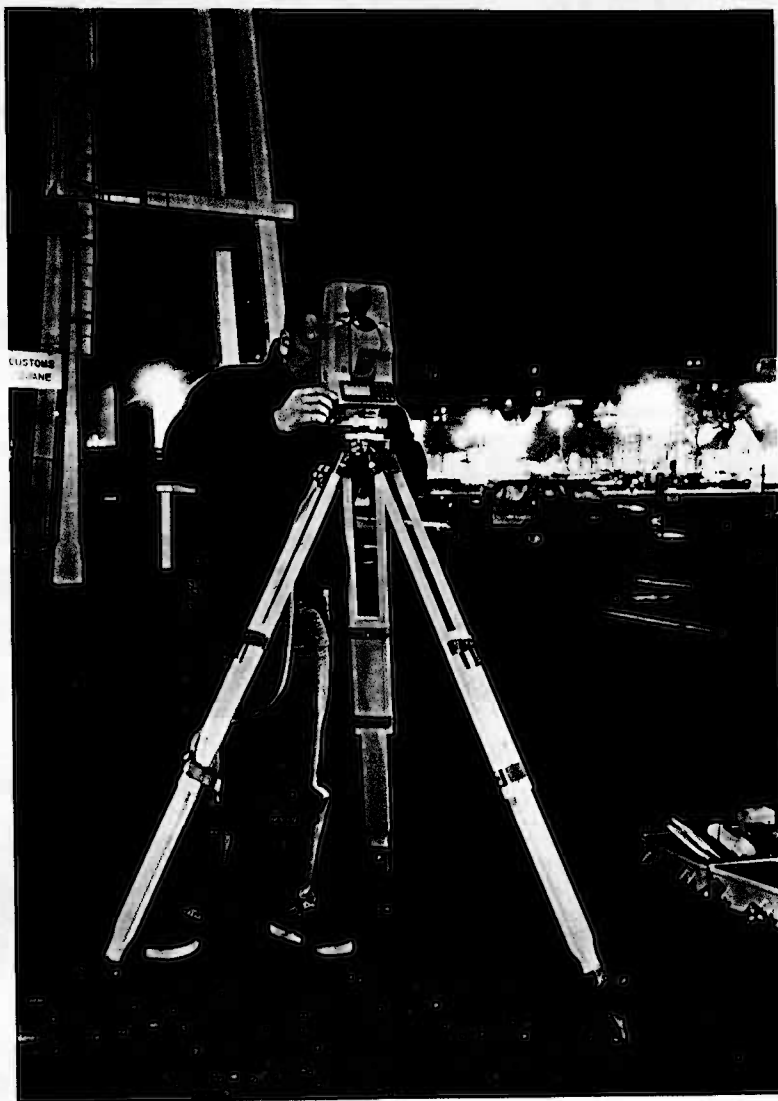
We were thus able to determine the direction of True North to an accuracy of about two thousandths of the degree, — well within the hundredth degree accuracy required.

These results also confirmed Sean's original north-south line based on the Grid.

So we had established True North. But there were other problems facing us, and these were more difficult as they were subjective.

The height and shape of the obelisk

In a previous issue I have shown that a pointed gnomon will not cast a sharp shadow at long distances. The shadow of the Liberation Monument obelisk is nearly 35 metres at its maximum on the 9th May, and therefore the top of the obelisk had to be over 30 cm long in the north-south »»



Sean Harvey operating the Total Station to determine True North

dimension, while at midday, with slanting shadow lengths (ie from the top of the obelisk to the tip of the shadow) of only 5½ metres, the width of the obelisk top need only be 60 mm in the east-west dimension.

This sounds fairly simple, but in practice the determination of the best shape, and consequently height, of the top of the obelisk has been the most difficult task. In designing the top it has been necessary to ensure that one part of it does not inadvertently affect the shadow created by another part.

There is also the shortening effect of the light from the top of the Sun to be taken into account. This requires the obelisk to be slightly higher than the mathematical calculations based on the centre of the Sun would indicate. But how much higher? Does one take the top of the Sun, or somewhere between the top and the centre? And does this vary during the day?

A further effect is the fact that, as the top of the obelisk cannot be a point, its shape means that the shadow is, in effect, lengthened slightly, but by different amounts during the day.

It was also decided that the shadow should extend slightly onto the back of the seating, so that it "pointed" upward towards the inscriptions.

Finally, we wished to take into account what would happen to the shadow in future years. For example, in 1996, a leap year, the 9th May is one day "later", and the shadow is therefore shorter than in 1995.

While calculations of these effects could be, and were, done, the inter-relationships between these various effects, and the very subjectiveness in the appearance of the shadow, meant that exhaustive

experiments had to be carried out.

The Monument designer, Eric Snell, designed a suitable shape for the top of the obelisk, based on the theoretical information. We (Eric, Sean and David) then conducted full-scale experiments, first with a two-dimensional model mounted on top of the New Jetty. This particular experiment was designed to determine the effect of the light from the top half of the Sun.

The second experiment was carried out on the bowling green at Beau Sejour, with a three-dimensional full-scale model of the top metre of the obelisk, mounted on a tower scaffold. The bowling green was the flattest area we could find in Guernsey, being within a 3 mm tolerance.

These experiments were severely hampered by the appalling weather between November and February. There was also the problem that the Sun, on the few occasions when it appeared, was, of course, at a much lower altitude than it would be in May. Nevertheless, we were able to come to some initial conclusions.

It was not until the construction of the Monument was well under way, in March 1995, that we were able to conduct some really meaningful experiments. These were done on the Monument site itself, using a one-third scale model, and the paving of the Monument as a sort of giant sheet of graph paper. The results thus obtained were excellent, and gave us considerable confidence in the design.

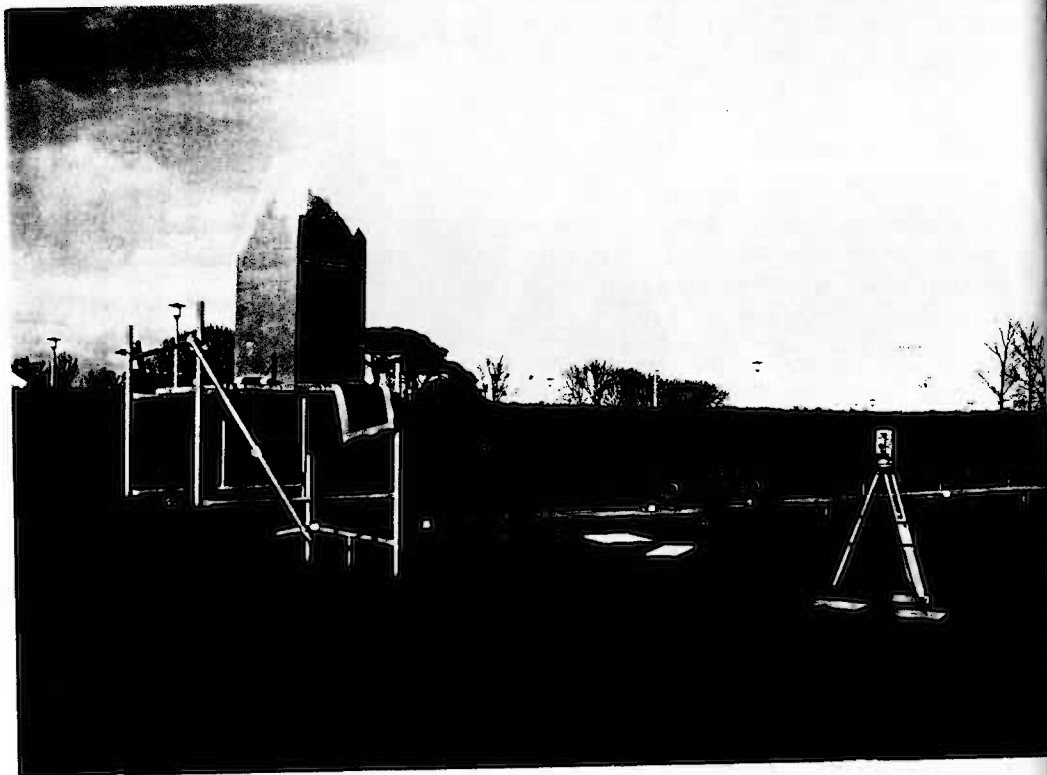
The last set of experiments, of course, had to await the completion of the Monument, when the top of the obelisk could be put temporarily into place. They were carried out on 21, 23 and 29 April (and are continuing even as I write this article!). »»

The result of this experimental work is a shape, size and height for the top of the obelisk which will provide the optimum appearance of the shadow throughout the day, and the best shadow length for the foreseeable future.

This project has been a fascinating one, requiring all the skills of astronomical prediction, computing, and observational experimentation. I am satisfied that the result is not only pleasing to the eye, a public amenity area which will become extremely popular, and probably a unique and most accurate device. However, you cannot tell the time by it!

The moment of truth, of course, will be when the Monument is unveiled by Prince Charles at 1.30 pm on the 9th May 1995. The shadow should then be passing beneath the letter "D" in the word "ISLANDS" - part of the inscription "... and our dear Channel Islands are also to be freed today — Winston Churchill."

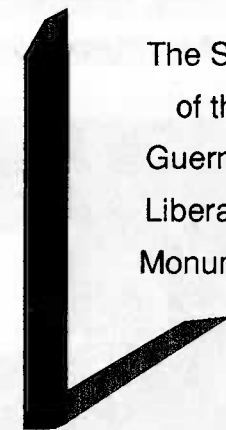
The Liberation Monument is a manifest demonstration of the symbiotic relationship which the arts can have with the sciences. The Astronomy Section will be associated with it for as long as the Monument lasts - possibly hundreds of years. □ **David Le Conte**



Full-scale experiment on the bowling green at Beau Sejour

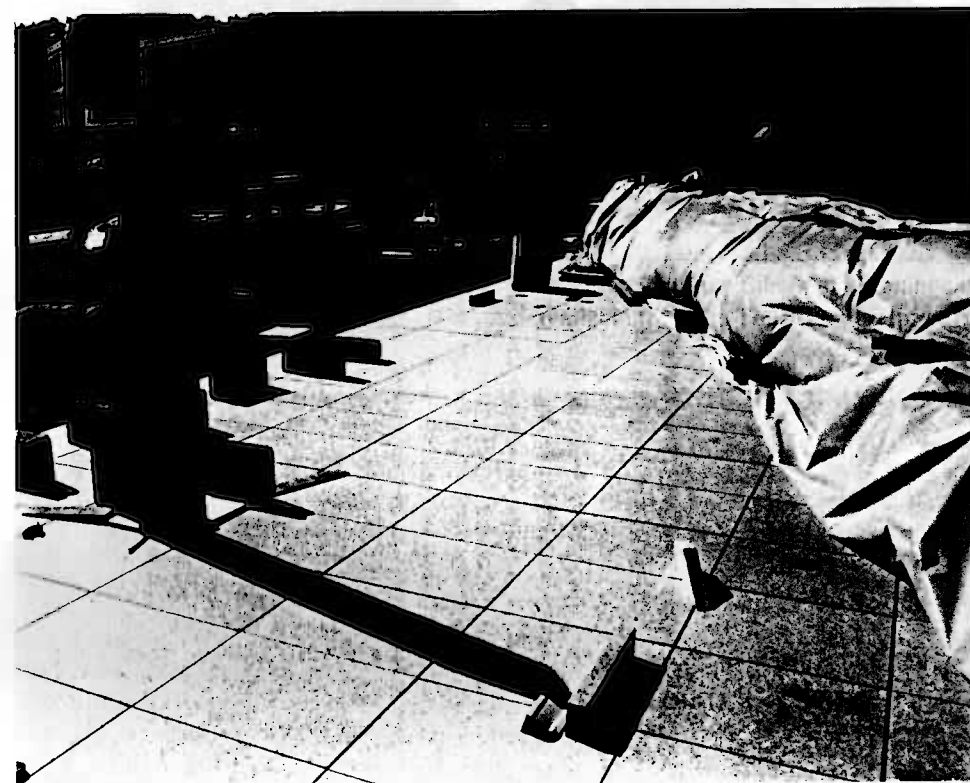
Astronomy Section members who have worked with the artist and designer, Eric Snell, on this project are: Daniel Cave, Sean Harvey and David Le Conte. Geoff Falla, as Section Secretary, lent his support, and we are also most grateful for the strong and public support provided by Griff Caldwell, President of La Société Guernesiaise.

You can hear Eric Snell talking about the Liberation Monument, and the Astronomy Section's role in it, on Radio 4's *Kaleidoscope* programme at 4.30 pm on Bank Holiday Monday, the 8th May. □



The Story of the Guernsey Liberation Monument

A leaflet about the Liberation Monument is available from the Tourist Board, price 5p.



One-third scale experiment on the site of the Monument

An interview with . . . Helen Sharman



Helen Sharman, Astronaut, makes a point to Geoff Falla and David Le Conte (photo by Guernsey Evening Press)
Geoff Falla and David Le Conte were fortunate to meet Britain's first astronaut during her recent visit to Guernsey.

Short, with short cut dark hair, she exudes an eagerness in pursuing her mission in life. And I am not talking about the Mir Mission which she participated in so singularly just a few years ago. She sees herself as a campaigner for science. "People talk about the arts, but not about science", she says. She therefore goes about the country making appearances, on a commercial basis, intent on bringing the excitement of science to the people.

A chemist by profession (she was a research chemist at Mars confectionery - hence the "girl from Mars" headlines - before she became an unemployed astronaut), she is particularly interested in the magnetism and chemistry of space, especially the solar wind, plasma, and the

effects of space travel. "People cannot experience weightlessness", she points out, but "children should have greater access to space than just watching a game of golf on the Moon".

In a polished performance, she had just enthralled a large audience with her vivid description of the rigours of years of training in Russia, and the excitement of going into space for a few days to join the cosmonauts on the Mir spacecraft. The element of danger was strong, and I am sure that everyone in the audience was full of admiration.

She described one exception - a waitress in her old café in England, who asked what it was like on the Moon. When Helen explained she had just gone around the Earth a few times, the waitress said "oh, is that all!" and did not refer to it again. □

David Le Conte

Sundial Conference

My wife and I attended the Annual Conference of the British Sundial Society at Grantley Hall, near Ripon, Yorkshire, from the 21st to the 23rd April. There were 80 people present, including representatives from America, Germany and Ireland. Members came from all walks of life, with some being interested in the historical, artistic and craftsmanship of the subject, while others were interested in the astronomical and mathematical aspects.

A number of papers were presented during the Conference, on a wide variety of topics. I gave a paper on the Liberation Monument, and displayed a model and associated materials, and there was considerable interest in them. □

David Le Conte

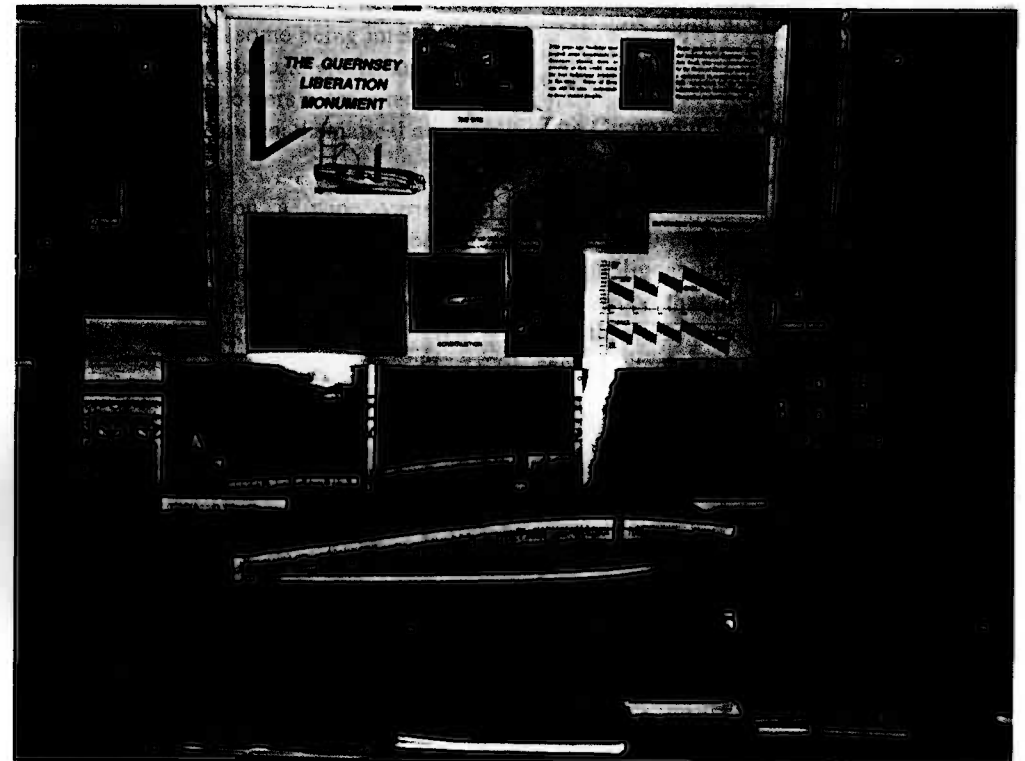
19 Educational activities

Beavers observed

On Thursday, the 9th March, from 6.30 pm to 7.30 pm, several Beavers (young boy scouts), and about five leaders and parents visited the Observatory. Although rather cloudy, they did each manage to catch a telescopic glimpse of the Moon, Mars, and the Orion Nebula. Geoff, Roger and David were in attendance.

The Grammar School and intelligent life

In March, David Le Conte was interviewed by Grammar School students planning an assembly presentation about the possibility of intelligent life in the universe. It is understood that the presentation went well, and that they also used a tape recording sent by Stephen Hawking! □



Display about the Liberation Monument at the British Sundial Society Conference