Advertisements

This space is available free to members for advertisements (preferably, but not necessarily astronomical).

LARGE TELESCOPE FOR SALE

12-inch, f/5 Newtonian reflector on equatorial mount.

Ideal for deep sky work. Fitted with Telrad finder, rack & pinion focuser and two eyepieces. Electronic drives to both axes: 11-inch RA worm wheel and 8-inch Dec worm wheel, with variable frequency oscillator enabling the drive to be used for accurate guiding. Mirror may benefit from being re-aluminised.

Contact Daniel Cave for more information (Tel. 63042 or 64415.
Email: dancave@dial.pipex.com).

Price £600 or nearest offer.

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60 mm Tasco refractor, with 30-90 mm zoom eyepiece. Alt-az mount on tripod. Small finder. Can be seen at Observatory.

Price £70 or nearest offer. Tel. 46434.

BOOK FOR SALE

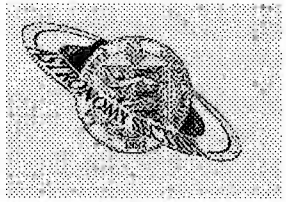
"*The Monthly Sky Guide*" by Ian Ridpath and Wil Tirion Published by Cambridge University Press. £7.95, paperback. (Normal price £8.95)

Contact David Le Conte, tel 64847.

COMET PHOTOS FOR SALE
Comet Hale-Bopp in colour

5"x 7" £2.50 12"x 18" £6.00
12"x18" £14.00 16"x 24" £20.00

Contact David Le Conte, tel 64847.



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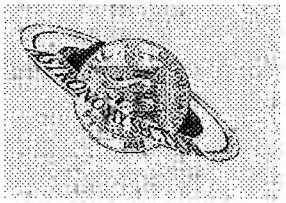
Opinions expressed in Sagittarius are those of the authors, and are not necessarily endorsed by the Astronomy Section or La Société Guernesiaise.

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

La Société Guernesiaise, Candie Gardens, St Peter Port, Guernsey. Tel 01481 725093

Sagittarius

The Newsletter of the Astronomy Section of La Société Guernesiaise



May/June 1997

Forthcoming events

Calendars
by David Le Conte
Tuesday, 20th May
8.00 pm at the Observatory

UFO Reality? – The Filmed Evidence
by Geoff Falla
Tuesday, 24th June
8.00 pm at the Observatory

Also:

Every Tuesday
from 7.30 pm
at the Observatory

and every Friday
after dark, when clear

In this issue

Red Giants Life on Mars?
Images in colour
Meetings in London, Winchester, Southampton, and Bahrain!

Inside

Centre inserts

Star chart. Moon phases,
Sunset, twilight, and sunrise times

Calendars

We all know that we use the Gregorian calendar, which was developed from the Julian calendar. But dozens of calendars have been used in history, all attempting to measure the passage of the seasons, and the apparent movements of the Sun and Moon. Some calendars are solar, some lunar, and some luni-solar.

Everything you ever wanted to know about calendars (and perhaps a bit more) will be revealed **by David Le Conte on Tuesday, the 20th May, at 8.00 pm at the Observatory.**

David will trace their development, emphasising their astronomical basis. There are common elements, and an interesting evolution. That evolution is continuing, with proposals for calendar reform being frequently advocated. ☆

Tuesdays and Fridays

Members are reminded that we have a general meeting every Tuesday evening at the Observatory, from 7.30 pm, on those Tuesdays when there is no special meeting. These are informal, drop-in events, with observing if it is clear, and general chat over a cup of coffee when it is not.

In addition, of course, now that the tourist season is starting we can expect more visitors to the Observatory. They are welcome any time after 9.30 pm. We currently promote this through the Tourist Board. If any member can think of other ways to advertise it (without cost), please let us know.

Don't forget that the Observatory is also open for members' observing on Friday evenings (and, of course, on other clear nights). ☆

UFOs – The filmed evidence

Well over a hundred years ago, and long before the modern term *UFO* came to be adopted, a mystery object in the sky was reported from both Guernsey and Cherbourg – on the same day.

In Guernsey on the 12th January 1836, at 6am, a large bright object appeared in the sky over St Martin's parish. The object was described as being as large as the Sun, and so bright that a pin could be picked up from the ground. The object was stationary for a few minutes before it moved away westwards at great speed, with rays darting out all around it.

On the same day, in nearby France, a sighting was also reported from Cherbourg. A luminous object was seen, appearing to be about two-thirds the size of the Moon. The object was described as having a dark cavity at its centre, and seemed to spin on its axis.

(Local report from the Guernsey Evening Press, 22 August 1969. French account included in the Report of the British Association for the Advancement of Science, 1860.)

It is now just fifty years since the beginning of the modern wave of UFO sightings reported in the USA in 1947, including the well-documented Roswell incident. Today, unexplained sightings – many by experienced observers – seem more widespread than ever, and reported from many countries. **On the 24th June, in *UFOs – The Filmed Evidence*, at 8.00 pm at the Observatory, Geoff Falla** will take the opportunity to mark the occasion, and to present some remarkable video film. There will also be a display selection of magazines and research material. ☆

GF

Comet Hale-Bopp – a super success

A ten-day period of excellent weather coincided with the climactic appearance of Comet Hale-Bopp, enabling superb observations, and some good photography and imaging. The open days, from the 2nd to the 4th April, were also a great success, despite indifferent weather. Indeed the first evening completely fog-bound our telescopes, disappointing some 250 people who turned up. The next evening started cloudy, but those of the 150 visitors who stayed after 10 pm were able to see the Comet as the skies cleared. The third evening was clear, and 300 people attended, getting good views.

So we had a total of about 700 people at the Observatory on those three nights, not counting the many who turned up on spec on other nights. (In fact, at one time so many were coming that we had to put out an "Observatory closed" sign to stop them interfering with photography.) Donations amounted to some £150.

Daniel Cave and David Le Conte spent several nights working on the Comet with the 14-inch telescope. Some excellent results were obtained – you can see one of Daniel's CCD images on the Section's Web page. Four initial photographs by David were on display, and sale, on our open evenings, and over 60 copies were ordered and paid for, giving the Section's funds a boost of over £100.

The *Guernsey Evening Press* of 14 April carried on the front page a large coloured photograph of the Comet taken by David, with the Longue Rocque neolithic standing stone, which is not far from the Observatory. The *Press* had previously (12 March) carried a black-and-white photograph of Comet West, taken by David while at Kitt Peak National Observatory, Arizona, in 1976.

The Comet stimulated an enormous amount of interest. "Hale-Bopp" became a household word. The public certainly took it to their hearts, and a lot of people have said that they are sorry it is now disappearing, for ever. It has also been an educational experience. People now have a much better idea of what a comet is, and what one looks like, including the fact that it does not race through the sky.

A fact sheet was prepared for issue at the open evenings. People were amazed to learn how small the comet nucleus was (about 30 miles wide), how long the tails were (at least 20 million miles), and how far away it was (over 120 million miles).

The most commonly asked question, however, was: *"what's this hair dryer for?"*! (It's for drying off the corrector plate when dewed up.) ☆

Planetary geology talk

On the 4th March Mick de Pomerai gave a talk to the Geology Section on the geology of the solar system, and several members of the Astronomy Section accepted his invitation to attend.

After a brief review of solar physics, Mick described each of the planets in turn, with the aid of colour slides, with emphasis, of course, on the inner rocky planets, and the rocky moons of the outer planets. The Earth was not omitted, and Mick explained the Earth's formation and geological development, showing some spectacular pictures of the Earth from space.

It was a stimulating talk, about familiar objects from a different viewpoint. ☆

The Moon

Geoff Falla's talk about the Moon, on the 22nd April, was well attended, and those who came were rewarded with a thorough presentation on the Earth's nearest neighbour.

Geoff pointed out that the Moon was the easiest astronomical object to observe. Despite that we spend little time doing serious observing of it. During his talk, therefore, Geoff described the principal features of interest, divided into five sectors.

Geoff reviewed three theories for the formation of the Moon, favouring the idea that it was formed by a large object striking the Earth. He mentioned that it would take 81 Moons to make a mass the size of the Earth, and that the Moon has a gravitational pull just one-sixth that of the Earth.

Strictly speaking, the Moon does not revolve around the Earth, but the Earth and Moon together revolve around a common centre of gravity. The Moon's revolution period (the sidereal month) is 27.3 days, but because of the motion of the Earth around the Sun, it takes a further 2.2 days for the Moon to return to the same place. Therefore, the synodic month (or lunar month or lunation) is 29.5 days.

Geoff described eclipses of the Moon and the Sun, and the effects of libration upon the amount of surface which is observable from the Earth (a surprising 59%).

In a comprehensive talk, Geoff discussed the Moon's surface, transient lunar phenomena, and unmanned and manned lunar exploration. It was good to learn more about an object with which we are all familiar, but to which we often pay insufficient attention. ☆

Occultation occulted

The occultation of Aldebaran by the Moon on the 14th March was, unfortunately, itself occulted by cloud, so nothing at all was seen. There is another chance of an interesting occultation in November, when Saturn will disappear behind the Moon from 01.28 am to 2.21 am on the 12th. ☆

Moon partially eclipsed?

The partial lunar eclipse in the early morning hours of the 24th March was not observed from the Observatory. No doubt it happened and was seen, but conditions were less than perfect, and, given the unsocial time, no effort was made to observe it. In fact, I have not heard of anyone who did watch it! - Ed. ☆

Media appearances . . .

The Astronomy Section has been the recipient of much positive publicity in the media over the last few weeks, mainly because of the Comet's appearance.

Ken Staples and David Le Conte each made two or more appearances on BBC Radio Guernsey in connection with the Comet. Ken gave his usual monthly interviews on Pat Lihou's show, and David appeared on Island FM.

In addition, Geoff Falla was interviewed by Radio Guernsey about the appearance of solar flares in mid-April.

. . . and talks

David Le Conte gave two talks on general astronomy in March – to the Western Morning and St Sampson's Women's Institutes.

Ken Staples gave a talk in April to the St Matthew's Church Wives Group. ☆

The Solar System

On the 17th March Dr Mark Biddiss presented a lecture with slides at Candie on the subject of the Solar System. Dr Biddiss was formerly at University College London, and is now a freelance science consultant, which includes giving talks to schools and other groups. He was in the Island for a short visit in association with the Ladies' College, giving talks to several schools as part of National Science Week.

The lecture was an entertaining and informative tour of the Solar System, explaining details of the formation, geology and conditions existing on the planets and many of their moons. A good selection of slides was used, with computer simulations of the surface of Mars and Venus. Dr Biddiss worked with scientists in the USA at the time of the Magellan Venus Mapping Project.

In reply to interesting questions after the lecture, Dr Biddiss agreed with the view that there must be other planetary systems, and probably intelligent technologies could be envisaged which would overcome the apparent limiting factor of the speed of light. For this reason it seemed rather unwise at this time to dispatch space probes carrying detailed information on the human race – and where to find us.

Dr Biddiss participates in both commercial and BBC radio programmes; in particular the BBC *Science Line* questions (Mon - Fri, 1 pm - 7 pm, tel 0345 600444). ☆ ***GF***

Women's Institute visit

Several members of the St Sampson's WI visited the Observatory on Wednesday, the 19th March, following David's talk the previous day, and saw the Comet, of course, plus Mars and the Orion Nebula. ☆

Life on mars?

In August 1996 it was announced that fossil traces of micro-organisms had been found in a meteorite identified as having originated from the planet Mars.

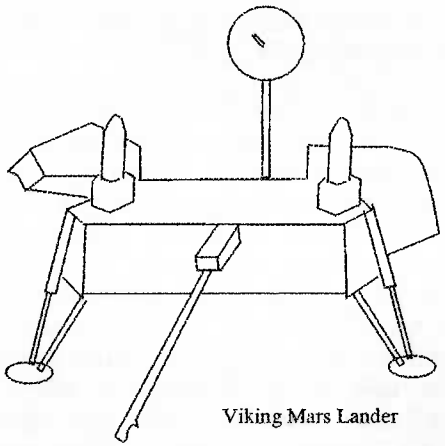
The meteorite, designated *ALH 84001*, had been discovered lying on the ice in the Allen Hills area of Antarctica in 1984, but had only recently been subjected to more detailed scientific analysis. Since the announcement of the fossil traces discovery, further tests on the meteorite have so far supported the initial findings. Tests on another meteorite judged to be of more recent Martian origin seem also to have strengthened the evidence.

In August 1975 the first American Viking probe was launched, soft landing on the surface of Mars in July 1976. The prime object of the mission was to take soil samples and use an on-board laboratory to test for evidence of life in the Martian soil. The first tests were very positive, but then it was claimed that further experiments gave conflicting results. Scientists judged the tests to be inconclusive, but the officially announced conclusion from NASA was that there was no evidence for life in the Martian soil, and that the apparently positive results obtained initially must have been the result of some kind of chemical reaction.

In February 1980 Dr Robert Jastrow, Founder and Director of America's Goddard Institute for Space Studies, announced that, following investigation of data from the Viking probe, a clear, unmistakable signal for life had been identified, and that evidence indicated at least a primitive life form on the planet. He claimed that other scientists who had carried out checks on the soil data had ➡

been under pressure to say nothing of the findings.

More information on these events is now being made more widely known. Three different types of test on the Martian soil samples by the Viking probe all gave positive results, indicating the presence of living organisms, but several aspects of the results were difficult to explain. Dr Gilbert Levin, one of the principal scientists involved in the Viking mission, conducted a key experiment to search for life in the soil, and still believes that he found it.



Viking Mars Lander

No satisfactory alternative explanation for the results has been found. The apparent discovery of fossilised microbe traces in Martian meteorites, together with the fact that microbial life can be found in the most extreme temperatures, and the depths of the oceans on Earth, where there is no light, has strengthened his certainty.

Dr Levin found that there was much publicly acknowledged conflict between members of the Viking biology team. One supposedly decisive conclusion, that there was no life on Mars, was based on a mass spectrometer experiment which found no evidence of organic molecules. The absence is explained by accepting that, with no protecting ozone layer, the Martian soil would be bleached by the Sun's ultraviolet radiation. Measurements by both Earthbound telescopes and by space probes orbiting Mars have not yet, however, properly identified its spectral signature.

The mass spectrometer used for the Mars experiment was also used to analyse samples of soil from Antarctica as a test before the Viking mission. The test revealed no organic life, even though living organisms were known to be present. There was clear evidence that the mass spectrometer was far below the sensitivity level required for the experiment.

It is hoped that further experiments and Mars missions will eventually resolve the issue and reveal the truth. A book by Nicholas Booth on the enigma of possible life on Mars is scheduled to be available in 1997 from publishers Simon and Shuster.

☆ ***GF***

Web page hits exceed 100!

As you may be aware, the Astronomy Section has had its own World Wide Web pages since 1995. They were extensively overhauled at the beginning of 1997, and a web counter was incorporated to keep track of the number visits to the page. As of 4 May 1997, 112 people had visited the page containing information about the Section and its activities (though a few of them would have been me checking the page counter!).

More updates are planned for the future, so do take a look. The URL for the page is:
http://ds.dial.pipex.com/town/estate/vs76/astrosec.htm

Daniel Cave

Red Giants – by Ken Staples

Red giants are many in the universe, and are normally discussed in conjunction with white dwarfs, but for this purpose we will try to be singular, and concentrate, wherever possible, on the *red giants* alone.

A *red giant* star is an old star, coming to the end of its life. It should be accepted here that all stars must adhere to the same laws of physics that every other living thing has to – in that they are born, live their life, and then die. Most important is the fact that their deaths start the next chain-reaction of birth for new stars, and the cycle starts all over again.

At this point it is worth noting how a star comes into being *naturally*. We start with the most abundant element in the universe – *hydrogen*. The universe is filled with thin clouds of hydrogen that float about in space between the stars. In the swirling motion of these tenuous clouds, atoms sometimes come together, by accident, to form small pockets of gas.

These pockets are temporary condensations in an otherwise highly rarified medium. Under normal circumstances the atoms fly apart again, after a short time, as a consequence of their random motions, and the pockets of gas quickly disperse back into space. However, each atom exerts a small gravitational attraction on its neighbour, which counteracts the tendency of the atoms to fly apart. If the number of atoms in this pocket of gas is large enough, the accumulation of all these separate forces will hold it together indefinitely. It then becomes an independent cloud of gas, preserved by the attraction of each atom in the cloud to its neighbour.

With the passage of time, the continuing influence of gravity, pulling all of the atoms closer together causes the cloud to contract. The individual atoms 'fall' towards the centre of the cloud, under this influence; as they fall they pick up speed and their energy increases. This increase in energy heats the gas and raises its temperature. This shrinking, continuously self-heating ball of gas is an embryonic star. All of this is now necessarily assisted by the debris left behind after a nova explosion of a *red giant*.

So what is a red giant? It is a phase that a star goes through, once it has transformed its supply of hydrogen into helium by nuclear reactions. By this time the star has already lived 99% of its entire life. The contracting ever-heating core now turns its helium into carbon, and its temperature has now reached 200 million degrees.

From this point onwards the history of the star is determined by its size. In the case of small stars, the collapse continues until all the matter of the star is squeezed into a lump the size of the Earth. The density of the collapsed star is so great that a volume the size of a matchbox would weigh 10 tons. The collapse makes the surface glow white-hot, and these shrunken white-hot stars are called *white dwarfs*. Once the white dwarf has radiated the last of its heat into space its temperature drops until it fades into a blackened corpse.

A very different fate awaits a large, massive star. Its collapse generates even greater amounts of heat than a white dwarf. Its temperature now has risen to 600 million degrees, and at this point carbon is turned into the heavier elements like ➠

silicon and sodium. Once the supply of these elements has been exhausted, contraction continues, further temperature increases occur, until all the elements up to iron have been manufactured.

It is at this point that its final collapse begins. Because no energy can be squeezed out of iron from any sort of nuclear reaction, it cannot rekindle any of its fire, so the collapse continues until the fire finally goes out and the star commences its final collapse under its own weight.

What happens next *cannot* be recreated by man on Earth. The ultimate collapse is *catastrophic*. The heat generated by this collapse drives the core temperature up to *100 billion degrees*, and every possible nuclear reaction comes into play. It is in the last gasp of life that the heaviest elements, those extending beyond uranium, are produced. The star now rebounds from this final contraction in one massive explosion, which will disperse into space all of the elements that have been manufactured in its interior during its lifetime.

In this way, the life story of a star is a cycle of *dust to dust*. The exploding star is called a *supernova*, and it sprays the materials of the star back into space, where it will mingle with fresh hydrogen clouds, and the supernova debris will start the system of birth all over again.

Our Earth is composed almost entirely of all the 92 known elements; so we owe our corporeal existence to events that took place billions of years earlier, in stars that lived and died long before our solar system came into being. We are all made of *star-stuff*. ☆

Ken Staples

Colour images by Daniel

This is a first for Sagittarius – colour images. Four images taken by Daniel Cave appear on pages 9 and 12.

The North America Nebula

This image of the North America Nebula in Cygnus was taken using the 8-inch Schmidt camera, working at f/1.5. The film used was Ektachrome 200 and the exposure was 15 minutes. The exposure was guided throughout to correct for tracking errors.

During the exposure a plane passed through the top left hand corner of the frame, leaving a trail. The Pelican Nebula can be seen at the centre of the image. The photograph was scanned into a computer and the faint nebulosity was enhanced to give the final image shown.

Image: © Copyright 1993-1997 Daniel Cave.

The Orion Nebula (M42) & M43

This is another Schmidt camera image taken on Kodak Ektachrome 200, and showing the famous Orion Nebula (M42) and the blue nebula (M43) to its left.

The camera was working at f/1.5 for the 10-minute exposure.

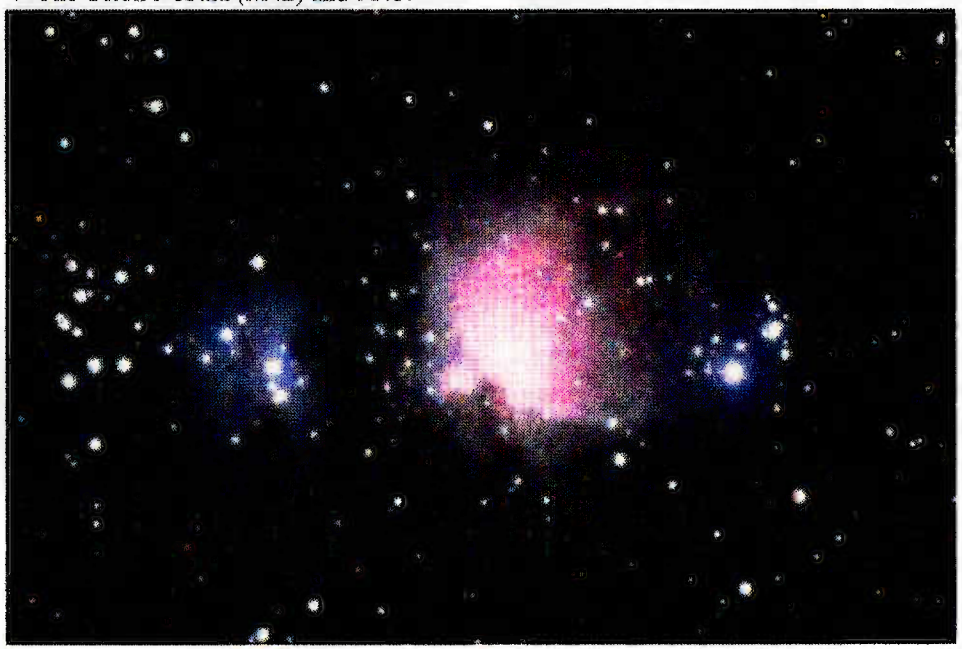
This image is cropped from a much larger area, which shows Orion's belt.

The image has been scanned onto computer and, since the image was taken in morning twilight, the background has been darkened to give a more pleasing image. This technique is an excellent way to resurrect otherwise spoilt photographs.

Image: © Copyright 1994-1997 Daniel Cave.

△ The North America Nebula.

▽ The Orion Nebula (M42) and M43.



European Astrofest 97

Once again European AstroFest was held at London's Royal Borough of Kensington and Chelsea Town Hall last February. The two-day event was well worth attending, providing something for all those interested in astronomy.

The established format of talks plus trade fair has proved very popular over the last few events, and was once again very well planned and attended.

Monica Grady, now famous for her involvement with the Martian meteorite, was back again this year and described her findings in a series of two talks. Monica concluded that whilst the discovery of possible signs of life was very exciting, she believed that the current evidence was not conclusive. Maybe an answer will be found with the international mission to Mars currently en-route to the red planet.

Jeff Hoffman, one of the NASA astronauts involved in the first Space Telescope service mission, gave two well-illustrated talks. He showed the audience his rather unique home video of life on-board the space shuttle, and described many of the day-to-day activities of an astronaut. This included the rather dramatic deployment (and subsequent loss) of the experimental tethered satellite.

In addition to the series of talks there was an extensive exhibition of astronomical merchandise from many of the country's well-known suppliers.

Rosemary Naylor attended a well-stocked bookstand, with other exhibitors including Starlight Xpress (CCD cameras), David Hinds Ltd (Celestron Telescopes) and the British Astronomical Association.

Starlight Xpress were showing their brand new CCD camera to an interested crowd. Broadhurst, Clarkson and Fuller always had many customers around their stand, packed with the latest telescopes from Meade. The universities and other educational organisations also made up a large proportion of the exhibitors.

The standard of talks at this year's AstroFest was high, with a wide variety of subject matter meaning that once again it was well worth attending. I look forward to attending AstroFest 98! ☆

Daniel Cave

Light pollution legislation

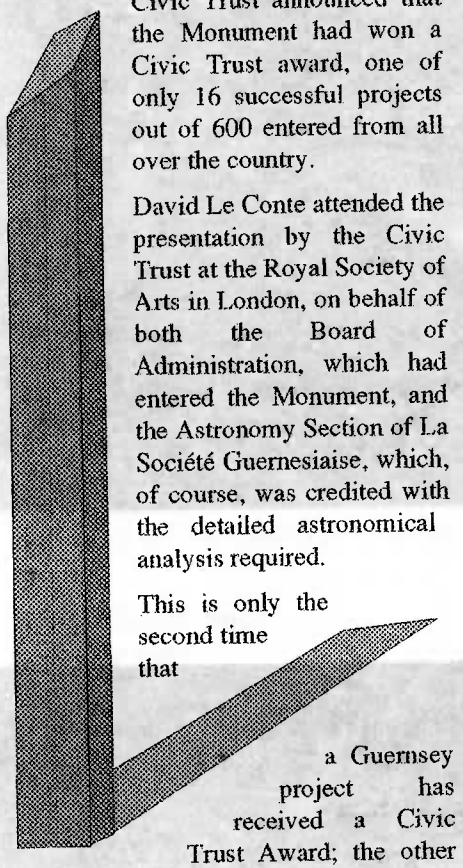
The Board of Health's proposals for changes to the public health legislation, to include, *inter alia*, the designation of light as a nuisance (but not as a pollutant), were passed by the States on the 25th February. The draft legislation will now have to be brought to the States for approval.

During the debate, which included discussion of proposals for new environmental pollution legislation, a number of States Members expressed concern at the increasing amount of light pollution. The President, Conseiller Sue Plant, said that the Board would take note of these comments, and would consider the possible introduction of an Ordinance, after consultation with the IDC.

The day before the debate, the *Guernsey Evening Press* published a letter by Ken Staples, Light Pollution Officer, together with a cartoon. Certainly, the subject of light pollution has, with Ken's able assistance, been given much prominence. Only a year ago few people would have heard of "light pollution". ☆ ***DLC***

Liberation Monument

The Liberation Monument has been much in the news lately. On the 17th April the Civic Trust announced that the Monument had won a Civic Trust award, one of only 16 successful projects out of 600 entered from all over the country.



David Le Conte attended the presentation by the Civic Trust at the Royal Society of Arts in London, on behalf of both the Board of Administration, which had entered the Monument, and the Astronomy Section of La Société Guernesiaise, which, of course, was credited with the detailed astronomical analysis required.

This is only the second time that a Guernsey project has received a Civic Trust Award; the other one was St James Concert and Assembly Hall in 1986.

The actual award will be presented to the States of Guernsey at a ceremony in Guernsey on the 7th May.

In the meantime, and in preparation for the announcement, a special Web page about the Monument has been set up, courtesy of GuernseyNet. It can be visited at:

http://www.guernsey.net/monument

The citation issued by the Civic Trust reads as follows:-

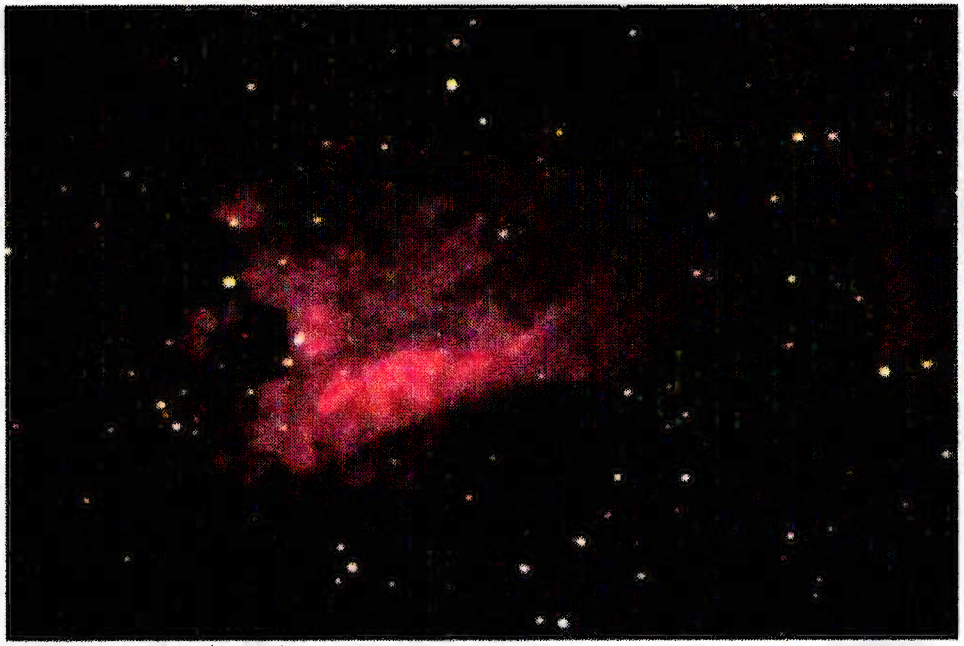
This unique and highly symbolic monument commemorating the 50th anniversary of the Liberation of Guernsey has successfully avoided the "statue in the middle of a roundabout" solution and has worked with associated environmental improvements to enhance a key area of St Peter Port's harbourside.

Inspired by the prehistoric standing stones found on the island, the obelisk is constructed of 50 layers of polished dark Guernsey granite, one layer for each year of freedom between 1945 and 1995. The top layers are sheared away to represent the years of occupation endured by the islanders. The column is positioned so that on Liberation Day (9 May) each year, the path of the tip of its shadow accurately marks the curve of the nearby stone bench. The bench and platform are of white French granite so as to enhance the visibility of the shadow cast by the obelisk. Inscriptions on the seating record the major events of 9 May 1945, and the shadow points to each event in turn within a few seconds of the prescribed time.

The monument is sited on a busy route linking the town centre and harbour – an area that has evolved untidily. The obelisk has become central to a wider scheme of traffic reorganisation, paving and landscaping which has greatly improved the visual amenity of the area.

This is a work of austere beauty that captures a moment in the island's history with power and precision." ☆

DLC



△ The Swan Nebula, M17.

▽ Comet Hale-Bopp, 29 March 1997.

The Swan Nebula, M17

This image was taken in the summer of 1994 through the Celestron C-14 and the Lumicon Giant Easy Guider. The telescope was working at about f/7.5 and the exposure was 30 minutes.

Throughout the exposure guiding corrections were made to compensate for small tracking errors in the telescope's drive. Without these corrections, the image would be trailed. The film used was hypersensitised Kodak Ektachrome 200. Hypersensitisation is a process that increases the effective film speed for long exposure photographs. The image was then scanned into a computer and the colour balanced to give the image shown on the left.

Image: © Copyright 1994-1997, Daniel Cave.

Comet Hale-Bopp, 29 March 1997

This is a tri-colour CCD image of Comet Hale-Bopp, and is amongst the first tri-colour images taken at the Observatory (we recently purchased a set of filters allowing us to make colour images using the CCD camera). A standard lens was attached to the camera to give the wide field needed to record the comet's long tail.

Three images were taken (through red, green and blue filters) and later combined on computer to give the final colour image. The combined exposure time was around 10 minutes.

The dust tail (white) and the ion tail (blue) can both clearly be seen in the image.

Image: © Copyright 1997, Daniel Cave.

Bahrain revisited – with Hale-Bopp

I last visited Bahrain in December 1993 with that most distinguished astronomer and companion D O Le Conte, FRAS (*Who? – Ed.*). However, this Easter, Helen, Ruth and I revisited Helen's sister Fiona, who is still teaching there. Needless to say, we had a splendid ten days, in temperature varying from 23°C to 31°C.

The main thrust of this report is to share with you a few thoughts and notes about a lecture I attended at the Arabian Gulf University (AGU). It was organised by the Bahrain Astronomical Society (BAS), and I knew about it from an article in the English language paper *The Gulf Daily News* of Tuesday, 1st April.

The article was about Comet Hale-Bopp in general, but it also advertised, under the heading "Symposium Planned", details of a lecture to be held at 7 pm that evening at the AGU. There were to be three presentations, and all the speakers were local astronomers, members of the BAS, and professors at Bahrain University's Physics Department.

The AGU is five minutes walk from Fiona's flat in Sulmaniya – I found it quite easily. In fact, I was the first to arrive.

At 7 pm one of the professors asked if there was anybody who had not yet seen the comet. He took a group of 6 or 7 people out, including the TV camera crew. On their return, the three speakers took their seats before an audience of about 30 people, and the Chairman introduced them: Prof Shawqi Al Dalal, Dr Waheeb Al Naser, and Dr Nabeel Shukry. ➡

The first presentation was very good, and concentrated on the history and mythology surrounding comets. There was considerable coverage of Halley's Comet return in 1986. We were shown the different parts of the comet, the nucleus, coma, halo, ion and dust tails. I should point out that after ten minutes or so the talk was stopped because of the nightfall or Ishaa call to prayer.

Presentation two was meatier – it concentrated on the chemical/physical composition of comets. We learned how comets' composition compared to interstellar matter, how the head and tail contain different elements, and, most interestingly of all, how in Halley they found an abundance of organic matter. We were shown spectrographic plates displaying the wavelength of laboratory samples of the bacteria e-coli, and how they compared with those found in Halley – fascinating stuff!

The final presentation was all about Hale-Bopp, its discovery, orbit, speed (currently 11 km/sec), and best observing times from Bahrain (19 April at 6.30 pm). The camera crew decided at this point to orbit the audience, and went walk-about. The speaker ignored them, and carried on with his presentation, although having a camera and bright lights right in front of you is rather off-putting.

All in all, a very interesting evening, made all the more fascinating for me as it was conducted entirely in Arabic!

At the end of the presentation the Chairman apologised publicly to me, but they had already prepared their talks in Arabic – I thanked him for his concern, but told him I had taken five pages of notes, and had managed quite well really – he appeared impressed, and invited me to remain for the question and answer session – so I did.

The evening may have been in Arabic, but the combination of slides, OHP, and the odd word here and there made for an enjoyable evening. The people were friendly and helpful – they invited me to an observing evening on the 5th. Sadly, this proved to be a cloudy night. The most touching moment for me was the Chairman's apology. He need not have given it, and I did suggest that perhaps I should learn some Arabic by my next visit – the audience appreciated that. ☆

David Williams

David, who is now based in Ipswich, paid us a fleeting visit in early May. Further articles by David are promised for future issues of Sagittarius.

Living on the Moon

In the small Scottish town of Kirriemuir there is a piece of land called "The Moon".

Recently, houses have been built on it. So it is now possible to live on the Moon!

Any offers?

I am indebted to Linda Dinnie, a recent visitor from Scotland, for this fascinating piece of information. ☆

DLC

Tidal history

I was recently asked by the Guernsey Museum whether it was possible to determine the state of the tide in the mid-morning of the 14th July – 1556! They wanted this information for a graphic they were preparing for the new museum in the Main Guard building at Castle Cornet.

Perhaps surprisingly, it was not too difficult to answer this question, and I was soon able to tell them that the tide was rising, high tide being about 11.00 am. It was a neap tide, probably quite a small one, with high tide being only about 6.5 to 7.0 metres.

I started by checking three computer programs to determine the phase of the Moon. All gave similar answers, with First Quarter Moon being about 12.30 pm. I checked that they were using the Old Style (Julian) Calendar for that date. I then checked with Mücke and Meeus's *Canon of Solar Eclipses*. There was a solar eclipse on 4 December 1554. Solar eclipses always occur at New Moon. Between that date and 14 July 1556 there were 3875 days. The lunar synodic period (new moon to new moon) is 29.53059 days (ref *Explanatory Supplement to the Astronomical Almanac*, page 698.).

3875/29.53059 = 131.2198 lunar periods. Therefore, 1556 July 14 is 0.2198 lunar periods past New Moon.

0.2198 x 29.53059 = 6½ days. Therefore, on 1556 July 14 the Moon was 6½ days, ie close to First Quarter.

For good measure, I sent an e-mail to the Librarian at the Royal Astronomical Society, and asked if he would check solar eclipses closer to the required date, and whether there was any book which gave the historical phases of the Moon.

I was pleased to hear from him that there is indeed such a book: H H Goldstine's *New and Full Moons, 1001 BC to AD 1651*. This gives New Moon on 7 July and Full Moon on 22 July 1556. So this confirms that First Quarter was on the 14th July.

Examination of tide tables for recent years shows that on the day of First Quarter, low tide occurs at about 0400 hours, and high tide at about 1100 hours.

Neap tides occur about two days after First Quarter. (Similarly, neap tides also occur about two days after Last Quarter, and spring tides occur about two days after New and Full Moon).

I then calculated the effect of the Moon's distance, and also that of the Sun. This I did by using the formulae in Meeus's *Astronomical Algorithms* to determine the dates of lunar perigee and apogee, and those of perihelion and aphelion. This showed that on the subject date both the Moon and the Sun were relatively far from the Earth, so the tide must have been a small one.

There was also interest in the night sky on the 29th December 1672, when the Castle donjon was blown up, the gunpowder stored in it having been ignited by lightning. This was actually a bit harder than the first question, as Guernsey was still on the Julian Calendar, whereas most computer programs assume the Gregorian Calendar after 1582.

Nevertheless, by converting between the calendar dates, I was able to provide the Museum with star charts showing, not only the constellations and planets visible that night, but also the fact that the Moon was just past Last Quarter, and, at the time of the explosion (between midnight and 1.00 am), had just risen. ☆ ***David Le Conte***

RAS NAM 97 . . .

I attended part of the Royal Astronomical Society's National Astronomy Meeting (NAM 97) from the 7th to the 10th April, at the Physics and Astronomy Department of the University of Southampton. This is the Society's major annual meeting, and it was attended by about 500 delegates, mostly from the UK, but a few astronomers from other countries. Most were graduate students and postdocs, eager to present and discuss their research.

Some 300 papers were presented during the four days of the conference, with three lecture theatres in concurrent use most of the time. In addition, there were plenary sessions each day, and one day there was a special programme for teachers.

Professor Sir Martin Rees, Astronomer Royal, kicked off by giving a lecture entitled *Supermassive Black Holes and Active Galaxies*. He pointed out that Einstein's equation predicted black holes, where the mass and radius was appropriate to the Schwarzchild radius. The peak phase of quasar population was when the universe was about 2 billion years old, but the peak quasar density was only 2% of the galaxy density at that time. Most quasars are now dead. Therefore, either quasars with a lifetime of about 2 billion years form in 2% of galaxies, or, more likely, every galaxy goes through a quasar phase lasting about 40 million years.

A black hole must form in the centre of a galaxy unless the gas falling into the galactic centre is converted into low mass stars. The Hubble Deep Field shows that early galaxies were prevalent over quasars. The record redshift for a quasar is $z = 4.9$, but there are probably galaxies with redshifts of $z > 5$.

M31, the quiescent Andromeda Galaxy, shows central revolution motion consistent with a central black hole of between one million and one billion times the mass of the Sun. Proper motions of stars in the centre of the Milky Way Galaxy are also consistent with a black hole.

Professor Rees pointed out that the important discovery of a central black hole in NGC 4258 was overshadowed by the HST observations of M87. The telescope used on NGC 4258 had a resolution 100 times better than the HST, but the HST cost 100 times as much, so got the attention of the media!

He listed 8 galaxies for which there was good evidence for a central black hole. He then discussed the motions of stars and galactic material in active galaxies, and pointed out that the proposed Laser Interferometer Space Antenna would be able to detect a star orbiting a black hole.

Concluding his informative and occasionally light-hearted talk, Professor Rees said that three inter-acting black holes could cause two to go one way, and the third to hurtle through intergalactic space, and left us with the thought that even now there might be a black hole hurtling towards us!!

The programme arranged for teachers included talks on Buckyballs and the chemistry of interstellar media, the geology of the Earth, Moon and Mars, and astronomical software. In the afternoon there were practical activities, including a portable planetarium, Moon rock samples, a Buckyball kit, software demonstrations, and, most interesting, school spectroscopes and other devices arranged by Alan Pickwick of the Manchester Grammar School.

The evening of the first day was devoted to a public lecture, entitled *A Universe of Colour*, by the astrophotographer supremo, David Malin. In a highly entertaining talk, he showed us a large number of superb slides taken with the 3.9 metre Anglo-Australian Telescope, and the 1.2 metre UK Schmidt Telescope in Australia.

He started by showing pictures of the night sky from the Australian site, demonstrating the almost complete lack of light pollution. Many of his photographs are now very familiar, but I had not seen these before. Nor had I seen the last few pictures, wide-angle views of the galactic centre region.

The next morning, Dr Nick White spoke on *Black Hole X-Ray Binaries*. He recommended a book by Kip Thorne called *Black Holes and Time Warps*. Where Professor Rees's lecture was on super-massive galactic centre black holes, Dr White concentrated on stellar mass black holes, which can result when a massive star collapses. These can be detected as components of binary star systems.

There are two classes of these black holes: ones with high-mass companions, such as Cygnus X-1, and those with low-mass companions, such as AO620-00 in Monoceros. If the X-ray source is greater than three Sun-masses then it is probably a black hole system. If it is about 1.5 times Sun's mass then it is a neutron star.

After discussing the observed effects in some detail, Dr White said that the existence of stellar mass black holes was well passed the "proof" stage. There were now 10 well-established black hole systems, most with late-type companions, and another 15 candidates.

In a highly proficient lecture, using computer projection, Professor Malcolm Longair spoke on *the 3CR Radio Galaxies – Clues to the Origin and Evolution of Galaxies and Quasars*.

3CR is the Third Cambridge Catalogue of radio sources. Professor Longair described new observations of radio galaxies with the Hubble Space Telescope, at redshifts in the range 0.6 to 1.8, which give new insights into the origin and evolution of radio galaxies, quasars and galaxies in general, together with their significance for galaxy and quasar evolution.

I attended a few of the specialist sessions, which were highly technical presentations of research papers. There were few trade stands (mostly books), but there was an excellent exhibition of David Malin's pictures. My wife and I also enjoyed the Conference Dinner in the Great Hall at Winchester.

. . . and NAM 99

Part of my motive in attending NAM 97 was to learn about the nature of the conference, which is coming to Guernsey in 1999. It will be held at Beau Sejour Leisure Centre in August, during the week of the total solar eclipse, with delegates being ferried to Alderney for the day of the eclipse.

Planning for this conference is starting, as are plans for the eclipse, and La Société and the Astronomy Section are likely to be fully involved. I have held initial discussions with RAS officers in Southampton and London, and have met with Tourist Board staff, and the President and previous President of La Société. I have also visited Alderney, and toured likely eclipse sites with Mike Maunder. ✯

David Le Conte

BAA Winchester Weekend

I attended part of the British Astronomical Association's Winchester Weekend, at King Alfred's College, on Saturday and Sunday, 5th and 6th April. This, so far as I am aware, was the first time a delegate from the Astronomy Section had attended this event. It is held every year, and is very much directed at the amateur astronomer who wants to improve his or her observing techniques, and share experiences. So it emphasises the practical aspects of astronomy.

I had missed the opening evening, on the Friday, when John Mason had spoken about *Meteor Observing*. I also missed John Wall's Saturday morning talk entitled *Telescope Engineering for Beginners*. My wife and I arrived mid-morning, and I caught most of Nick Hewitt's personal selection of *Deep Sky Exotica*. After lunch Lillian Hobbs demonstrated three *astronomical software programs*, and there was then a chance to enter Bob Mizon's *Starlab Planetarium*, a portable, inflatable theatre for about two dozen people.

In the evening we heard Stuart Clark talk about the subject of his new book, *Redshift*. And then, after dark, it was observing from the roof of the Students' Union Building. There was a variety of telescopes, including a 12-inch telescopic Dobsonian, a 12-inch Meade, an 8-inch Celestron, and huge Russian binoculars. The favourite subject was, of course, Comet Hale-Bopp, although Mars also received attention. The ambient light, however, was dreadful, with outdoor illumination, indoor lights shining through uncurtained windows, and security lights. Nevertheless, the congenial atmosphere was conducive to a good evening.

How to take great astronomy photos

Sunday morning brought a most entertaining and instructive talk by Mike Maunder, entitled *Getting Started in Astrophotography*. Mike began by expressing concern about the issue of archiving CCD material, and emphasising the benefits of using old technology. He startled the audience by holding up a disposable camera, and saying that it was very useful for astrophotography. He was referring to the many atmospheric effects seen during daylight hours, and which so many of us miss, such as solar halos, sun pillars, tangential arcs, and sun dogs.

Mike then got quite technical, showing Russian Luviter cameras (costing just £19.95!), and emphasising the benefits of their large-format, leaf shutters, and good quality lenses. Many in the audience, including me, must have shrunk in our seats as he stressed the problems of using zoom lenses and SLR cameras (I use both), although he did suggest trying an SLR camera with binoculars, which gives an effective focal length of about 500 mm. However, I was pleased to hear him advocate the use of Kodak Gold Pro film, as I have been using this film for the comet.

Mike gave some simple mnemonic formulae. For example, don't hand-hold a camera with an exposure time which is greater than the reciprocal of the focal length of the lens. So, a 135 mm focal length lens must be used at a speed of at least 1/135 second, ie 1/500 or 1/1000.

Another mnemonic was what he called the "5-6 rule". Using film with a speed of 50 or 60 ASA, stop the lens down to f5 or f6, and expose for 5 or 6 seconds, adjusting for films of other speeds. ➡

Mike had several other surprises in store for us. He said that after using slide film for many years he felt that negative film was now better for astronomy.

He demonstrated a Canon T70 camera (£150 second-hand), and a Mamiya Press camera with a 6" x 9" format (£300-400).

For nebulous subjects the faster the lens the better the picture, whereas for star fields aperture is important. He showed us pictures of his set-up for meteor photography. This, as with all the other equipment he showed, was very cost-effective, with powered rotating "shutters" made from portable fans costing £1 and redundant 'phone cards!

Mike then showed us examples of his photographs, which amply demonstrated his stress on astrophotography as an art form. He used some of them also to demonstrate problems of defects in equipment and its use.

Mike Maunder's reputation as an excellent astrophotographer is well deserved. His photographs have been widely published, especially his solar eclipse pictures. But even when the weather or the subject does not cooperate Mike is still able to obtain superb photographs by including foreground objects, and selecting his settings carefully.

It was a beautiful experience, sitting in the darkened auditorium watching his pictures projected onto the giant screen.

Guernsey in the limelight

Mark Armstrong, who discovered a supernova last year with his 10-inch Meade telescope and CCD system, gave a talk on *Supernova Patrolling with a CCD Camera*. There is now a network of supernova patrollers around the world, and Mark, for example, is able to check dozens of galaxies for supernovae each night.

The last session, on Sunday after lunch, was dedicated to five-minute spot talks. The talks ranged from general presentations by societies, to detailed descriptions of individual research.

Faith Jordan from the Isle of Wight spoke about deep-sky visual observing with an 8½-inch Newtonian. Alan Dowdell of the BAA showed his photographs of Comet Hale-Bopp. John Wall, telescope builder, described his new 42-inch(!) reflector. Charles Wise described experiences with the media. Richard Doolly demonstrated a motorised orrery. Malcolm Jones, FAS Publications Secretary, talked about his work. Richard Baker lambasted the press, especially the Guardian, for scare reports about the dangers of being killed by a comet, and Nick Heath described the 1965 solar eclipse, as seen from New Zealand. He had also set up satellite tracking units, and run the 16-inch telescope of the Canterbury, NZ, astronomy society.

Then it was the turn of your Editor. I described, with the aid of colour slides, our observatory and society, and explained briefly our work on the Liberation Monument.

There were a few trade stands, including Rosemary Naylor's *Earth and Sky* book stall, David Hinds's Celestrons, Bob Mizon (light pollution), AWR Technology, and Poyser Engineering. I put some of our pictures on display, but I was surprised that more societies did not take the opportunity to show their results.

The organisation of the event was excellent, thanks to Richard Flux, Chairman of the Vectis Society. ☆

David Le Conte