available. It has already released photographs showing that the landing site of the American spacecraft Spirit, in the Gusev Crater area not far from the Mars equator, has a rather strange greenish colouring over an area of several hundred square miles. It has also been announced that Mars Express has detected methane in the atmosphere of Mars. It is thought that this may indicate the presence of a biological process, rather than being the result of past volcanic activity.

Other countries are also becoming involved in space research. Japan just failed in its mission to study Mars from orbit with the Nozomi spacecraft towards the end of 2003,when the flight was severely affected by a solar storm and propulsion problems.

So far, the various planned missions to Mars have achieved rather mixed results - more so than for most of the space missions to other parts of the solar system. It is hoped that future Mars projects will be increasingly successful, paving the way perhaps for a manned flight, and more effective exploration in the not too distant future.

Geoff Falla

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Sagittarius

The Newsletter of the Astronomy Section of La Société Guernesiaise

July – September 2004

Forthcoming Events

Observatory Clean Up Day
31st July – 10 am

BBQ
Perseids Meteor Shower
12th August (Thursday)
7.30 pm

Talk – Supernova
By Frank Dowding
5th October – 8.00 pm

Viewing Programme:

July – Public Open Days
August – Public Open Days
September – Double Stars

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

Inside

Inserts

Star chart

Sunset, sunrise, moonset and moonrise times

Section News

Those of you that have visited the Observatory recently will have noticed the stylish new doors fitted to the main building. This was organised by Debby Quertier whose husband John made an excellent job of the carpentry.

Over the last couple of months Jessica, Geoff and Peter have embarked on a major sort/clear out of the main building. Magazines have been archived and Geoff has reorganised the library shelves. We have many duplicate books and these will be offered members, a list will appear with next quarter's Sagittarius.

Whilst on the subject of maintenance – this year's **Observatory Clean Up Day is Saturday 31st July starting at 10 am.** Last year only a small amount maintenance took place and that was down to the efforts of individuals. We desparately need to paint the outside of the Meade Observatory and redecorate in the Main building. So please come along and make a day of it – why not bring a BBQ or a picnic? The more people that turn up will make the job easier as well as a social and fun event!

On the social side, another date for your diaries, the **Annual Barbeque at the Observatory will be held on Thursday 12th August starting at 7.30 pm.** This is held to coincide with the peak of the Perseid meteor shower so after we have eaten we will get the deckchairs out (in the dark!) and gaze skywards and count the glowing trails. Those that attended last year will remember that the shower was a bit of a disappointment and only a few meteors were spotted before midnight.

Frank Dowding has offered to prepare a talk on SuperNova and this is scheduled for Tuesday 5th October at 8 pm. Please come along, Frank's talks are well researched and interesting and deserve a good sized audience.

The main astromonical event over the last 3 months has been the transit of Venus. David Le Conte has described our observations in his article on page 4. We were honoured to be joined by Silvie Browne from New York who had found the articles published on our website, concerning the transit, to be the most informative. She was undeterred by David's warning of potential murky skies in Guernsey and that travelling a little further to Egypt might me a safer bet. It was good to see that the transit received so much national television coverage (albeit daytime TV!). During our preparations for the event a number of us spent some time realigning the Takahashi with the Meade.

Two comets visited us towards the end of May. Comet NEAT and Comet Linear (both named after the observation programmes that discovered them). Linear was only visible in the northern hemisphere for a short period towards the end of June and I am not aware that it was observed by any members.

Comet NEAT, however was observed a number of times although it did not live up to the published expectations (which were to achieve 1st magnitude brightness). David, Peter and Geoff worked with the CCD camera to obtain some images although these were disappointing (due to the object and no reflection on the skill of the operators!). The CCD images show a 4th magnitude star which is of equivalent brightness to the comet's image. Personally, I was very pleased with the views of the comet I obtained from binoculars (20x60) and found the comet more striking than expected when I first saw it. This goes to show that for larger objects eg comets, Andromeda galaxy and Pleaides, the narrow field of view in a large telescope isn't necessarily the best choice of instrument.

We have held 3 public open days during last quarter although I was away for two of these. The last in June we had intermittent cloud but nevertheless we had an interested audience of 15-20 people who were able to view the Moon and Jupiter (now descending eastwards in the evening sky).

Tuesdays from 20th July until 31st August are now devoted to Open Days throughout the school holiday period. We have prepared a large number of 'Flyers' this year, many of these being distributed by the Tourist Board to Hotels and Guest Houses so we expect to be busy! If you want to help please come along!

Public Open Days for the rest of the year:

Tuesday 21st September – 8.00pm

Tuesday 19th October – 7.00 pm

Tuesday 30th November – 6.30 pm

The early starts in October and November will be an opportunity for children's hands on sessions as planned for February which the weather did not allow.

The viewing programme to date has not been a great success – mostly due to cloudy skies. However we did hear a short talk by Geoff Falla on Double Stars but were unable to continue with the observing side which we now aim to do in September. In future we will select a topic for a given month (such as Moon observations or 'Finding Your Way Around the Night Sky') rather than planning for a specific night.

As a final point we are looking for a research project for the Section. We spend a lot of time providing public observing either by open evenings or with specific groups and it would be good (in view of the quality of our instruments) to be able to contribute to the science of astronomy. The most likely approach would be to join a programme operated by a national amateur astronomy organisation such as variable star observations or sky surveys (eg supernova, variable star). Suggestions most welcome.

Colin Spicer

The Transit of Venus

The first transit of Venus across the disc of the Sun since 1882 was witnessed by an eager group at the Observatory on the 8th June. We started preparations at 5.30 am, setting up the 6-inch coelostat about one metre from its normal position, in order to catch the early morning Sun. Present were: Jessica Harris, Geoff Falla, Peter Langford, Frank Dowding, Colin Spicer, David Falla, myself and Sylvie Browne, a visitor who had travelled all the way from Albany, New York, having read about the transit on our web site. There was also a number of other visitors, and more joined us during the morning, albeit that we had decided not to open to the public, preferring instead to concentrate on observations of this significant event.

Peter manned the coelostat, with Jessica making the 'official' observations with it. Colin observed with the 16-inch Meade, Geoff with the 11-inch Celestron, and I used the 5-inch Takahashi refractor. All telescopes were, of course, fitted with proper solar filters, and all gave good images. Sylvie gamely took on the important task of calling out the time, second by second, at the crucial contact moments, using a radio-controlled clock.

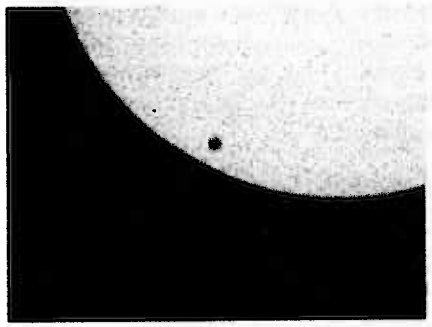
Our prime objective was to record the times of the four contacts, when the disc of Venus touched the limb of the disc of the Sun. We had pre-registered all instruments with the European Southern Observatory, which was coordinating observations world-wide, and calculating values of the astronomical unit from the data. The unit is, of course, very well known, and this was, therefore, an academic exercise designed to gain an insight into the methods used in the 18th and 19th centuries, when such transits were regarded as providing important opportunities for accurate determination of the scale of the solar system.

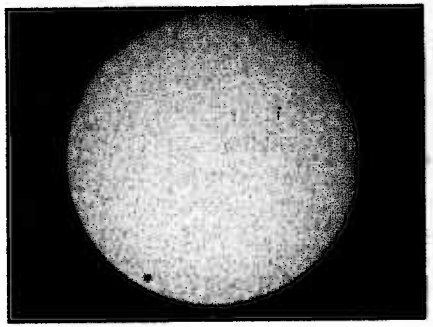
A further objective was to record the event photographically. I attempted digital photography of the first contact with the Takahashi, not very successfully, but did obtain good images of the coelostat image. Frank recorded the coelostat image on video.

Initial conditions were perfect. We carefully observed and recorded the first and second contacts, and then carried out general observations while waiting the six hours until the last two contacts. However, thick fog rolled in at about 8.45 am, and lasted the rest of the morning, blocking out the Sun. The Meteorological Observatory at the Airport advised that this was general, not localised, and that there was likely to be a cloud layer above the fog. We telephoned several locations around the Island, but were unable to find anywhere where the Sun could be seen, so we decided to stay at the Observatory, in the hope that the situation would improve, and to provide hospitality and information to the expected media and school children.

Despite the lack of visibility it was an enjoyable morning, especially as we had had good early results. We were able to show the constant stream of people our images, and computer simulations followed the course of the transit in real time. The Guernsey Press, Channel Television and BBC Radio Guernsey conducted interviews with us, and we played hosts to some 50 children from La Houguette School.

The results of our observations were as follows (times in UT). No times were recorded for the Celestron, and I did not record the first contact time with the Takahashi, using it for photography instead.





Observations and Results

Telescope **Observer**	**Coelostat** Jessica Harris	**Meade** Colin Spicer	**Takahashi** David Le Conte
Contact 1:	05h 21m 52s	05h 21m 30s	- (photography)
AU (km)	150,458,302	150,281,206	-
Error (%)	0.575	0.457	-
Contact 2:	05h 39m 08s	05h 38m 29s	05h 39m 10s
AU (km)	149,260,158	148,945,078	149,276,294
Error (%)	0.226	0.436	0.215
Average:			
AU (km)	149,859,210	149,613,142	149,276,294
Error (%)	0.175	0.010	0.215
Contact 3:	-	-	-
Contact 4:	-	-	-

The predicted contact times were:

Contact 1:	05h 20m 00s	Contact 2:	05h 39m 38s
Contact 3:	11h 03m 40s	Contact 4:	11h 23m 17s

The accepted value of the astronomical unit (AU) is 149,597,870 km

Note the considerable differences in recorded times between observers using different instruments: 22 seconds for the first contact, and up to 41 seconds for the second contact. Even those observing the contact on the projected coelostat image interpreted what they saw differently. As expected, the first contact was particularly tricky, as, of course, Venus was not visible until its black disc started appearing against the bright solar limb. But even the second contact was problematic.

The differences were not, we believe, because of the infamous 'black drop' effect, which was blamed in the 18th and 19th centuries. Indeed, there was very little evidence of a black drop (an observation confirmed by other reports published on the Internet). Rather, it was simply because it was found quite difficult to judge when the contact actually occurred. I found myself changing my mind during the event as to when it happened: "That's it. No, now, No ...". It is not surprising, therefore, that the calculations of the astronomical unit showed considerable variations.

We will all remember the 2004 transit of Venus for a long time. So will those who joined us for the event, including all the schoolchildren, who, although they did not see it 'live' (the fog interfering during their visit), did see images, and were rewarded with certificates which had thoughtfully been prepared by Jessica and Debby.

David Le Conte

Geoff Falla's regular roundup of articles from popular Astronomy and Space Journals

The formation of Black Holes. Astronomers are confident that they know how the smaller black holes are formed - from gravitational collapse after the supernova explosion of a star. The formation of larger black holes remains more of a mystery. (Astronomy, March 2004)

Cosmic Snowstorm. The process of planet formation. It is thought that the planets formed by coagulation from the original disc of material around the Sun. The formation of the inner planets would have been followed by the much slower build up of mostly icy material from collisions in the more outlying parts of the system. (Astronomy, March 2004)

Getting started in Astronomy. A supplement guide explaining the different types of telescope, optical and radio telescopes, interferometry using two or more telescopes, the celestial sphere, coordinates for locating objects, and planetary alignments. The first of three supplements. (Astronomy Now, April 2004)

Globular Star Clusters. Theories on globular star clusters have been changing. It was previously thought that all of these clusters were ancient systems at the edges of galaxies including our own. It has been found that not all of these are old systems, and that some of them are still growing. (Astronomy Now, April 2004)

The Outer Limits. It has been difficult to build up a true picture of the far reaches of our solar system, from Pluto to the more recent discovery of substantial objects in the Kuiper Belt, up to twice as far away. A set of articles. (Astronomy Now, April 2004)

Exoplanet Starathon. There are now more than a hundred Sun-like stars known to have planets around them. A list of these stars and their coordinates gives an opportunity to locate most of them. (Astronomy Now, April 2004)

NASA Mars rover Spirit. The first of the two latest Mars Rover vehicles landed successfully on 3rd January. A detailed account and images at the start of investigations at the landing site in Gusev crater. (Astronomy April 2004)

Picturing the Heavens in the 19th century. An account of several of the most notable celestial photographers of the 19th century (including the astronomer Warren De La Rue, who specialised in lunar photography and stereoscopic images, **and lived in Guernsey**.) (Sky and Telescope, April 2004)

Imaging Exoplanets. It has so far only been possible to detect planets in

orbit around other stars from the gravitational effects produced, but astronomers may soon be able to observe these planets directly using more powerful telescope systems. The race to obtain the first images, and further information from spectral analysis. (Sky and Telescope, April 2004)

The Lunar 100 Challenge. As a challenge for lunar observations, a list of hundred objects including a variety of lunar features has been compiled - from the easiest to the most difficult, with information on how to find them. (Sky and Telescope, April 2004)

Roving the Red Planet. NASA's two Mars rovers both landed safely, on opposite sides of the planet, and where surface water is thought to have existed in the past. A summary of the missions to date, and what has been found (Sky and Telescope, May 2004)

Transits of Venus. Reports of 19th century expeditions to observe a transit of Venus, with the assistance of photography - which had not been available to the astronomers of the previous century.
(Sky and Telescope, May 2004)

Great Comets. Two comets were visible in May, in particular comet NEAT being more visible in our own hemisphere. A review of some of the great comets of the past, including comets Hale-Bopp, Hyakutake, Halley, West and Arend-Roland, with some excellent photographs showing their differences. (Astronomy, May 2004)

Deep Space. A set of articles focusing on the early history of the universe, and the formation of galaxies. The Hubble Space Telescope has played a key role in extending the boundaries, and there is further knowledge on how galaxies have developed, the microwave background radiation, and the early formation of massive stars. (Astronomy Now, May 2004)

Genesis Planet. A giant planet has recently been found in the M4 globlar star cluster in Scorpius. There are surprising discoveries about the planet - that it is apparently almost as old as the universe itself is thought to be, and that it orbits a binary system consisting of a pulsar and a white dwarf star. (Astronomy, May 2004)

Does Mars have Flowing Water? There are large numbers of dark streaks seen to be appearing on the slopes of Martian craters and valleys. The most likely explanation is that these are signs of present flows of surface water. (Astronomy, May 2004)

Mars Encounters

The planet Mars is very different to Earth, but is still found to be the most Earth-like of all the planets. It has a very similar length of day, seasonal variations produced by the present almost identical tilt of its axis, and has icy polar caps - which are now known to contain both carbon dioxide and water ice. Although Mars is much smaller than our own planet, and now looks to have very dry conditions, recent evidence seems to have confirmed that it once had plenty of water on its surface, with a much more substantial atmosphere - which may have permitted the development of life in some form.

All of this explains why we are so interested in the red planet, and why there is a drive to find out more about it, by sending spacecraft there - to orbit Mars, or to attempt landings so that more detailed investigations can be carried out.

Over the years there have been many of these attempts. Some have achieved notable success, but many more have ended in failure for various reasons with, it should be said, one or two rather mysterious episodes.

Since 1960, out of a total of more than thirty attempted missions to Mars, only about a dozen of these have been a complete success up to the present time. During the first ten years of spacecraft missions the aim was just to achieve a successful flyby of Mars, and to transmit images back to Earth. Most of these attempts, particularly during the earlier years, were by the then Soviet Union. Although it had previously been the pioneer in space flights, with achievements such as the first space probes to the Moon, the first manned flight in Earth orbit, and a space station, there was only failure or just partial success when it came to Mars. There has still not been any completely successful Russian mission up to the present time. It was the Americans who obtained the first successful Mars flyby images in 1964, with the Mariner 4 spacecraft. The NASA space agency has gone on to achieve several successful orbiting craft and landings, sending back information and photographs which are steadily building up our knowledge of the planet.

The latest entrant on the scene is the European Space Agency, with its Mars Express orbiter. The British Beagle 2 lander, which was carried by Mars Express, seems to have failed to achieve a successful landing. The apparent loss of Beagle 2 was a particular disappointment for the British team led by Professor Colin Pillinger, since the spacecraft had been specially designed to search for indications of past or present life on Mars. The Mars Express spacecraft itself achieved orbit successfully in December 2003, and soon began to send back highly detailed images and other information.

The most successful of the early orbiters was Mariner 9, launched in 1971. This spacecraft sent back more than 7000 images of the Martian surface, revealing amazing volcanic structures and canyons - larger in scale than anything on our own planet, and a complete surprise.

The Viking 1 and 2 missions, launched in 1975, marked another major step forward. With the success of these two landers came the first attempts at soil analysis, to discover if there was perhaps any evidence of life. The first results were surprisingly positive, but it was thought that some kind of chemical rather than biological reaction must have been responsible for the results. This was because one of the tests, using a mass spectrometer, indicated a conflicting negative result - with no evidence of organic material. Although the official ruling was that there was no evidence of life, it has since been admitted that the sensitivity of the test experiment in question was far less than required, and no similar chemical reaction seems to have been found to duplicate the results which were obtained in the soil analysis tests.

Dr Gilbert Levin, one of the principal scientists involved in designing the Viking soil test experiments, maintained his conviction that the Viking experiments did, in fact, detect the presence of life. In recent years the official 'no evidence of life' standpoint has tended to shift towards a more reasonable view that the tests were inconclusive - especially when it is accepted that an alternative explanation for the soil test results has continued to be a problem. The Beagle 2 mission was intended to continue the search for evidence of life, and was equipped with a mass spectrometer far more sensitive than that used in the Viking experiments.

The Viking 1 orbiter also obtained a large number of images of the surface, including the startling resemblance to a human face on a large scale - about a mile long and more than a thousand feet high, on the plain of the Cydonia region. This image was filed away as a trick of the light, without being further investigated, until it was discovered about four years later by two imaging engineers working on another NASA project. It was found that another Viking image, taken under different lighting conditions, and with computer enhancement, revealed apparent confirmation of the face with further details. A more recent image released by NASA seems to show a more natural rock formation. However, to add to the intrigue there are other structures which have also been found nearby in the same area of Cydonia, and which also look more artificial than natural features - all of this calling for further investigation with more detailed images.

Russian scientists also showed interest in these apparent anomalies, and in 1988 two spacecraft were launched to orbit Mars, and to attempt a landing. Phobos 1 was apparently lost after an incorrect command was sent but Phobos 2 achieved orbit successfully in January 1989. Two months later, however, the probe was lost near the Mars moon Phobos, in mysterious

circumstances. A televised news report on June 8th 1989, revealed that while it was photographing the surface of Mars, an object was seen coming towards the spacecraft - just before all contact was lost. The science journal Nature later reported the conclusion of Soviet scientists that the spacecraft had perhaps been left spinning after being struck by an object. The spacecraft was declared lost, not just that there had been a communications failure.

In 1993, the NASA spacecraft Mars Observer was lost as it was preparing to enter Mars orbit, and in 1999 there was further disappointment when the Climate Orbiter and Polar Lander missions also failed. In the case of the Climate Orbiter an incorrect command was sent to the spacecraft, and the Polar Lander was lost - together with its two intended surface penetrating mini probes when braking rockets were apparently activated prematurely.

In spite of these disappointments there have, however, been several major successes. Mars Global Surveyor was launched in 1996 and is still operational, sending back very detailed images, but many of these were officially classified secret - and were therefore unavailable for public viewing. Caution is perhaps understandable in view of the 'canals' of Mars debate in the past, but this should surely not prevent the release of photographs in the interests of keeping everyone informed of ongoing developments. It was recently reported that a United States Congressional Inquiry was necessary before some of these images were released. The reason for the photographs being kept from the public is that they appear to show features which do not conform with some of the present ideas about conditions on the surface of Mars. NASA has admitted, however, that there is ample evidence of water on Mars in the past, and that the discovery of life is the long term aim.

The first Rover exploration vehicle, Mars Pathfinder, landed in July, 1997, and remained operational for several months as it explored a short distance from its landing site, examining rocks. In October 2001 the spacecraft Mars Odyssey began orbiting Mars, analysing the surface content. Large quantities of hydrogen were detected, and thought to be locked up in ice below the surface.

The most recent orbiter, the European Space Agency's Mars Express, has obtained further confirmation of the presence of large amounts of water ice on the planet's surface. The spacecraft also has ground penetrating radar to detect the likely presence of water below the surface, and its depth.

Two more ambitious Mars Exploration Rover vehicles, named Spirit and Opportunity, landed at the beginning of 2004 on opposite sides of the planet, both of these landings in areas where it is thought water could have existed, and perhaps the confirmation of life still existing, may be a long process. Meanwhile, the presence of the European Mars Express spacecraft in orbit should ensure that another separate source of information is