Sagittarius

The Newsletter of the Astronomy Section of La Société Guernesiaise

2018

Forthcoming Events

WEA Course

Thursdays 7.30 pm at the Observatory
8th February – 15th March
(Enrolment necessary)

Public Open Days

These will comprise a talk or film show and observations if clear.

Bank Holiday Monday, 28th May
from 10.00 am to 12 noon
to observe the Sun.

Thursdays evenings from 26th July (from 9 pm) to 30th August (from 8.30 pm in August).

Thursday, 1st November, from 6 pm.

Additional open evenings may be arranged and will be announced via the media and on the Astronomy Section's website, www.astronomy.org.gg.

Contents

Section meetings

The Section meets at the Observatory every Tuesday evening at 8.00 pm, usually with a discussion topic starting at 9.00 pm.

Talks

Talks by invited speakers may be arranged during the year. Members and the media will be informed.

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www.astronomy.org.gg

Material for, and enquiries about Sagittarius should be sent to the Editor: davidleconte@suremail.gg.

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INTRODUCTION

Long-standing members of the Astronomy Section will recall that the Section's *Sagittarius* newsletter has for many years – in fact since 1993 - been published as an A5-size booklet. I started a newsletter during the 1980s when Section Secretary, as a monthly sheet, or double-sheet, of A4. It then grew into the booklet form with many articles, being issued bi-monthly, then, from 1998 as a quarterly, and then, from 2014, as an annual publication.

This year sees another change, reverting to the A4 format. The decision was made in the light of the increasing use of digital distribution, the greater flexibility afforded by this format, the ease of production, and the avoidance of increasing postage costs. It also means that we no longer have to fill an even number of pages (in fact divisible by four), and can accommodate longer articles. Having said that, this edition has fortuitously worked out at exactly 16 pages.

Most members receive it by email, and it is also posted on the Section's website as a pdf file. In both cases it can more easily be printed off if members (and others) wish to do so. I do hope members will find the format simple to use.

I am grateful to those who have submitted articles for this 2018 issue. Please remember to keep them coming. Although the newsletter itself is produced annually at the beginning of the year, there is no reason why articles - especially topical ones - cannot be published on the website at any time of the year.

Incidentally, it is hoped that the website, which has remained virtually unchanged in style since it started in the early 1990s will be completely refurbished during the coming year. Members' suggestions for improvements are welcome.

Editor

SECRETARY'S REPORT 2017

Our Annual Business Meeting was held on the 31st January. I took over the role of Treasurer from Peter Langford, who was also Section Secretary. Jean Dean from the Channel Islands Astrophotography Group took the position responsible for Imaging on our Committee. To support this, the meeting authorised expenditure for astrophotography equipment and subsequently a small concrete slab pad was installed behind the Meade Telescope building for astrophotography. Tom Harvey agreed to assist with our website, with Matt Skillett and I jointly to deal with computing requirements.

During February, Peter Langford advised that he would be unavailable for a number of months whilst undergoing a medical procedure. Frank Dowding nobly stepped forward to become Acting Secretary until the end of August, and from September onwards I have taken on the role.

Jean Dean organised the reinstatement of the All Sky Camera which had been on site for a number of years loaned by the University of Hertfordshire. The camera had proved to be useful particularly for looking up reported events, such as fireballs and the like, from previous nights, and it was decided to get a replacement as the camera had had to be returned to the University. Jean and Tom Harvey set up the camera and the upload to the website.

Educational and outreach events for the general public continued apace. The WEA "Stargazing" course is now in its 16th year and continues to be fully subscribed. David Le Conte has coordinated this course for the entire time, but is supported by other members (this year Frank Dowding, Jason Hill and Peter Langford) who give their time in preparation and delivery to continue to make this 6-week course a success. Unfortunately, cloudy skies often make the observational aspects of this course a challenge!

In April we had the pleasure of a visit of His Excellency the Lieutenant-Governor Vice-Admiral Sir Ian Corder and Lady Corder. This was not the best evening for observing, although we did get partial glimpses of the Moon which they were able to see through the Meade telescope.

Frank Dowding has coordinated our outreach activities for six or more years. In the summer months, particularly for the entire length of the school summer holidays, we organise public open evenings which are always well attended. During the winter we focus on groups, be it youth groups, schools of all ages, company social clubs and Women's Institutes. Frank has not only coordinated the events and liaising with the groups, but takes an active part by presenting a topic to each group. Frank will be stepping down from this role at the end of our "winter series" at the end of March. His dedication to this task will be sorely missed and it will be extremely difficult to replace him. This year's events he has overseen (as "front of house" to use his term) is as follows:

January	Guides
February	Blanchelande College (Years 1 and 2), Cubs, Ladies College (Year 8)
March	Houguette School, Elizabeth College (6th form), 9th Guernsey Scouts, Monkey Puzzle nursery at Kings, Les Voiles School
May	Castel Primary School, Solar Open Day (cloudy ☹)

July	Bowker family, Open Evening
August	Dartford Scouts, Sunshine nursery, Open Evening (x 5)
October	Halloween Open Evening
November	Beavers, Brownies, Elizabeth College Science club, Cubs, Air Scouts, Vale Primary, Catenian Association, Grammar School (6th form)

Frank has been assisted by David Le Conte, Jason Hill, Elaine Mahy, Debby Quertier, Geoff Falla, Paul Gavey, Jean Dean, Jim English and myself. This is quite an undertaking with many people giving up their time to encourage an interest in science.

The Halloween Open Evening is of particular note. This was run over the October half term and started early in order to encourage children to visit. We decided to produce Halloween themed flyers for the event, and as part of a new initiative by the Société we were joined by the Entomology Section who erected a moth trap with Andy Marquis on hand to demonstrate and identify moths. Bat detectors were supplied by the Bat Group (ably operated, although not an expert, by my wife Jackie Spicer). Judy Porter did some face painting too. Some of us dressed for the occasion and the Observatory site was decorated with pumpkin lanterns. We were extremely fortunate with the weather and the Moon was available for the entire time. The queues to view with the main telescope were excessively long!

As in recent years we have had a visiting speaker and this year it was David Hughes, Emeritus Professor of Astronomy at the University of Sheffield. He gave us an entertaining talk about the Mysteries of the Solar System and his enthusiasm was strikingly infectious. The talk was very well attended at the Frossard Lecture theatre, Candie Gardens, and we were only just able to seat everyone. This time we did not seek sponsorship for the event, but as he was visiting Sark and Jersey the cost was spread, and nevertheless the cost was offset by a leaving collection.

The Channel Islands Group of Professional Engineers organised a talk by geologist Professor Sanjeev Gupta from Imperial College about NASA's Curiosity Rover on Mars. Curiosity Rover has been exploring the Gale crater since August 2012 and we were privileged to see some stunning images from Mars. The timing of transmissions from Mars means that Professor Gupta is in the fortunate position of being able to see new images before the American scientists are awake.

Peter Langford had instigated regular talks when we meet on a Tuesday evening and this has continued this year. The rule is, however, should the evening be clear then we observe with the telescopes, but nevertheless we have gone through a large list of topics. More recently we have used Royal Institution lectures to supplement our talks. Some highlights are in the table below.

Astronomical highlights 2017	David Le Conte
Introduction to image processing	Jean Dean
James Clerk Maxwell	Colin Spicer
International Space Station update	Frank Dowding
NASA Science Casts	Peter Langford
Messier Marathon	Colin Spicer
Globular Clusters	Frank Dowding
Richard Feynman lecture	Peter Langford
Newton's Laws of Motion and Classical Mechanics	Colin Spicer, Jason Hill
Orbital Elements	David Le Conte
Black hole firewalls - Sean Carroll and Jennifer Ouellette	RI lecture
Space tracking in the Apollo era	David Le Conte
Cassini and Huygens at Saturn	Frank Dowding
A Journey to the centre of the Sun – Lucie Green	RI lecture
The Great American Eclipse	David Le Conte, Elaine Mahy, Jason Monaghan, Tim Langlois
Molecules with sunglasses – third form of carbon	Colin Spicer
Some old astronomy books	David Le Conte
The Planets – Carl Sagan	RI Christmas lectures 1977

In July, David Le Conte gave us a presentation of his career as a professional astronomer in the UK and the United States. We found out that David's team was responsible for ground based photographs of Apollo 8's trans-lunar injection burn, which was the first time man truly left the Earth.

Colin Spicer
Acting Astronomy Section Secretary

GROUP BOOKINGS DURING 2017

A few years ago we took a decision aimed at preventing disappointment when a group of people arrived on a planned visit to our observatory only to find that it was cloudy or raining.

Our decision was to change our meeting room to a 20-seat theatre for the evening and to show films and illustrated talks on astronomy alongside the telescope viewing.

Since this decision was made, the number of group visits has increased each year. In fact 2017 has seen more than ever. This has included 3 adult groups, 9 scout groups and 12 schools.

As is usual during each year, there are very few visits after the clocks change at the end of March until the evenings become darker again in October, with the exception of one primary school that requested a visit during the day in May. This was very successful as their main concern was seeing the close up pictures of the planets as supplied by NASA.

A number of the scout groups were keen to achieve their Astronomy badges, with which we were able to help.

More schools have asked to come this year. These included 5- and 6-year-old children who always amaze me as to how much they already know, up to the 6th forms and school science clubs.

We have noticed a trend, particularly with the schools, in that requests are becoming more specialized. Astronomy is now being taught in some schools, and students are looking to improve their knowledge in specific areas.

At one time a request from a school to spend an evening with us was a matter of choosing a date suitable for both of us with someone to be available to man the telescope while another talked over the slides. But now we have the added requirement of making sure we have someone able to explain the specific area of astronomy requested. In the past this has always been David Le Conte, but now we are fortunate to also have the services of Jason Hill.

My role as Events Coordinator will come to an end in March 2018. It has only been successful due to the commitment of a number of individuals within our section, such as David Le Conte, Jason Hill, Colin Spicer, Geoff Falla, Elaine Mahy and Paul Gavey. I thank them all very much for their dedication and knowledge.

Frank Dowding
Events coordinator

… And many thanks to Frank for organising and manning all these events over the past years. In 2017 alone over 1000 people, including many children, have visited the Observatory, split more or less evenly between organised groups and public open days. – *Ed*.

ASTRONOMICAL EVENTS IN 2018

This year sees a very favourable opposition of Mars on 27 July and, on the same day, a total lunar eclipse. There will also be a naked-eye comet to look forward to. In January there will be two full moons – both of them 'supermoons' – and again in March, with no full moons in February.

PLANETS

Mercury will be visible in the periods around its greatest elongations:

Date	Elongation	Direction	Time
01 January	23º Western	Low in East	Before sunrise
15 March	18º Eastern	Low in West	After sunset
29 April	27º Western	Low in East	Before sunrise
12 July	26º Eastern	Low in West	After sunset
26 August	18º Western	Low in East	Before sunrise
06 November	23º Eastern	Low in west	After sunset
15 December	21º Western	Low in East	Before sunrise

Venus will be at superior conjunction on 09 January. It will have a close conjunction with Uranus on 28 March, and will be less than 1º from the just-passed-Full Moon on 16 February, very low in the west immediately after sunset. It will become prominent in the evening western sky from April, reaching greatest eastern elongation on 17 August, and remaining visible until September. It will be at inferior conjunction on 26 October, reappearing in November as the "Morning Star" in the eastern pre-dawn sky.

Mars will start the year as a morning object in the east, rising earlier and earlier as the months progress. It will be 1.3º from Saturn and just 0.4º from M22, the Sagittarius Cluster, in the morning of 02 April, low in the southeast.

It will reach opposition in Capricorn on 27 July, when it will rise as the Sun sets and be visible all night. This will be the best opposition for several years. Curiously, the planet will be closest to Earth four days after opposition, on 31 July. With a distance of 58 million km (36 million miles) it will be Mars's closest approach since 2003, which was itself the best one in 60,000 years. The next one, in October 2020, will be almost, but not quite, as good as this one, and we will have to wait until 2035 for a closer one.

However, with a declination of -25º Mars will remain low in our skies, reaching a maximum altitude of only 15º. Nevertheless, having a diameter of 24 arc-seconds it will certainly be worth observing and photographing. The south polar cap will be tilted towards the Earth, and some surface detail should be evident. It will have a magnitude of almost -3. It will remain an evening object for the remainder of 2018.

At the beginning of the year **Jupiter** will be a morning object, rising around 3.30 am. It will reach opposition on 09 May in Libra with an altitude of 25º, and will then remain an evening object until early November. It will reach conjunction with the Sun on 26 November and will reappear in the pre-dawn sky in mid-December.

During the summer we will have good views of the four Galilean moons, atmospheric bands on the planet's disc, and the Great Red Spot. Transit, shadow and occultation events involving Jupiter's moons can be calculated using a Java script at http://www.skyandtelescope.com/wp-content/observing-tools/jupiter_moons/jupiter.html on the *Sky & Telescope* website. (You may need to register at http://tinyurl.com/24kp25 and remember to enter the date in the US format: month/day/year). They can also be found in the 2018 BAA Handbook (pages 67-76). They can be simulated on software such as StarryNight (http://www.starrynightstore.com/), and some of the many astronomy apps, including the *JupiterMoons* app ($2.99) by Sky & Telescope, which also gives the transit times of the Great Red Spot. The Spot's transit times are also available at http://www.skyandtelescope.com/observing/celestial-objects-to-watch/transit-times-of-jupiters-great-red-spot/ (again using the US date format).

Saturn will start the year as a morning object, rising in the east in Sagittarius at 07.00 am, and rising earlier as the months go by. Opposition will be on 27 June, the planet rising as the Sun sets, and visible all night, but with a maximum altitude of only 18º. It will remain visible as an evening object, until early December. The rings are at a good angle for observation, and its brightest moons, especially Titan, should also be visible.

Uranus will be at opposition in Aries on 24 October, at magnitude 5.7. **Neptune** will be at opposition in Aquarius on 07 September, at magnitude 7.8.

PHASES OF THE MOON

New Moon	First Quarter	Full Moon	Last Quarter
		Jan 02	Jan 08
Jan17	Jan 24	Jan 31	Feb 07
Feb 17	Feb 24	Mar 02	Mar 09
Mar 17	Mar 24	Mar 31	Apr 08
Apr 16	Apr 22	Apr 30	May 08
May 15	May 22	May 29	Jun 06
Jun 13	Jun 20	Jun 28	Jul 06
Jul 13	Jul 19	Jul 27	Aug 04
Aug 11	Aug 18	Aug 26	Sep 03
Sep 09	Sep 16	Sep 25	Oct 02
Oct 09	Oct 16	Oct 24	Oct 31
Nov 07	Nov 15	Nov 23	Nov 30
Dec 07	Dec 15	Dec 22	Dec 29

SUPERMOONS

So-called 'supermoons' occur when the Full Moon happens to coincide with the Moon's closest approach to Earth ('perigee'), and therefore appear larger than usual. In 2018 there will be two such moons, both in January: on 02 and 31. So-called 'blue' moons have been said to refer to occasions when there are two full moons in a month, so perhaps should these be referred to as blue supermoons!

DWARF PLANETS AND ASTEROIDS

Pluto will reach opposition on 12 July in Sagittarius, at magnitude 14.2. **Ceres** will be at opposition on 31 January in Cancer, with magnitude 6.8. The other three dwarf planets (Eris, Makemake and Haumea) are too faint to be seen in most amateur telescopes.

The brightest asteroid **Vesta** will reach opposition on 19 June, when it will be magnitude 5 in Sagittarius. It will be 1º above the thin crescent Moon at 04.00 UT on 12 January, very low in the East, magnitude 7.

ECLIPSES

On 31 January a total lunar eclipse will be visible from Asia, Australia and part of North America, but not from this part of the world.

On 15 February there will be a partial lunar eclipse, but only in Antarctica and South America.

A partial solar eclipse will be visible from Southern Australia and Antarctica on 13 July.

On 27 July a total lunar eclipse will be visible from all of Europe, including Guernsey, where it will be seen as the Moon rises. The Moon rises at 20.52 BST. At that time the Moon will already be 20 minutes into the total phase of the eclipse. Maximum eclipse, however, occurs some 30 minutes later, at 21.21 BST. Totality ends at 22.13, and the Moon will leave the umbra at 23.19, finally leaving the penumbra at 00.30 BST.

This eclipse is almost a central one, ie the Moon passes close to the centre of the Earth's shadow. We can therefore expect it to be quite a dark one. It takes place in the constellation Capricorn – not a very rich star field. Nonetheless, being low in the south-eastern sky (azimuth 120º) it should be a lovely sight, and could create some interesting imaging possibilities with foreground objects.

A partial solar eclipse occurs on 11 August, but is not visible from Guernsey.

Be sure to take precautions not to look at the Sun directly unless your eyes and/or telescope are properly protected by a specialist solar filter.

OCCULTATIONS

05 January the 1.3-magnitude star Regulus will be occulted by the Moon, low in the west from 08.26 UT. However, the Sun will have risen 20 minutes earlier, making observation of this event doubtful. It will again be occulted on 01 March at 06.12 to 07.00 UT, the Sun rising at 06.53, so there may a chance of catching the start of this event.

There will be a lunar occultation of the first-magnitude star Aldebaran on 23 February, but again this will take place during daylight, at 16.33 UT, the Sun setting at 17.43. There will be a better, night-time occultation of Aldebaran at 23.45 UT on 22 March, very low (3º), at 290º azimuth. It will end at 00.14, just after the Moon sets.

LUNAR CONJUNCTIONS

The best conjunctions of the Moon and the bright planets, with their positions and separations are:

16 February	Venus	Very low in west after sunset	0.8°
01 June	Saturn	Early morning in southwest	0.5°
28 June	Saturn	Morning in west	1.0º
25 July	Saturn	Morning in southwest	2.6º
18 October	Mars	Evening in west	2.7º
11 November	Saturn	Low in southwest in evening	0.7º

PLANETARY CONJUNCTIONS

The best conjunctions between planets, with their positions and separations, are:

07 January	Mars and Jupiter	Morning in the east	0.3°
13 January	Mercury and Saturn	Morning in the east	0.6º
28 March	Venus and Uranus	Evening in the west	0.3°
02 April	Mars and Saturn	Morning in the southeast	1.3º

METEORS

The **Quadrantids** will peak on the night of 03/04 January, but will be badly affected by a wanning gibbous Moon. The **Perseids** will peak on the night of 12/13 August, with some 80 per hour. With a New Moon on 11 August conditions are very favourable for this shower. The richest annual shower, the **Geminids,** will peak on the night of 13/14 December. The waxing crescent Moon will set at 10.00 pm, so conditions should be very favourable.

There are, of course, minor meteor showers during the year, and sporadics may be seen at any time. For shower details see the 2018 BAA Handbook, pp98-99.

COMETS

Comet 21P/Giacobini-Zinner, the source of the October Draconid meteor shower, has a period of 6½ years. In 2018 there will be a particularly good apparition, making a close approach in September at a distance of 0.4 AU (58 million km, 36 million miles). It should start to become visible in telescopes in June, high in the evening sky in Cygnus. It will brighten rapidly and move north into Cassiopeia, then moving south and becoming mostly a morning object by September, when it could reach naked-eye magnitude 3½. It will pass close to M37 on 11 September and M35 on 15/16 September, giving some good imaging opportunities. It should be visible until the end of October.

Comet 46P/Wirtanen is predicted to be a binocular object in November, and possibly a naked-eye object in December, when it will be in the evening sky, remaining visible until March 2019. At its closest it will be just 0.078 AU away (11.7 million km, 7.25 million miles).

Comet 2016 R2 PanSTARRS might be 9th magnitude or brighter from the beginning of the year, and then fading. It will be well-placed for observing.

Detailed comet predictions for 2018 are available on the website of the British Astronomical Association's Comet Section: http://www.ast.cam.ac.uk/~jds/preds18.pdf. Also check the Heavens-Above website (heavens-above.com) for star charts showing comet positions, and use programs such as StarryNight for detailed location charts.

THE SUN

We are now well past the maximum of the sunspot cycle in 2014, but there can still be outbursts of activity, with displays of the aurora borealis (and australis) at high latitudes.

Details of sunspot numbers are at www.ips.gov.au/Solar/1/6, and real-time views of the Sun are at https://umbra.nascom.nasa.gov/newsite/images.html. Auroral alerts, with lots of other information, are at www.spaceweather.com.

EQUINOXES AND SOLSTICES

The following are the dates and times of the equinoxes and solstices in 2018:

Vernal Equinox	20 March	16.16 UT
Summer Solstice	21 June	11.08 BST
Autumnal Equinox	23 September	02.55 BST
Winter Solstice	21 December	22.23 UT

SATELLITES

The International Space Station (ISS) is regularly visible from Guernsey, looking like a very bright star crossing our skies from west to east. Also of interest are flashes from the Iridium satellites (which occur virtually every night), and periodic launches of ISS servicing craft. Many other, fainter, satellites appear every night. Details of the times and directions of visibility (together with sky charts and much more) can be obtained from www.heavens-above.com, linked from our webpage www.astronomy.org.gg/iss.htm.

WEA COURSE

The Astronomy Section's annual six-week WEA "Star Gazing" course at the Observatory will be run from 08 February to 15 March. It is usually over-subscribed, so early enrolment is recommended. See www.wea.org.gg, or telephone 237888.

OPEN DAYS

The Observatory will be open to the public again for a number of evenings during the year, including weekly openings on Thursdays during the summer school holidays (19 July to 30 August). Details will appear on our website and will be sent to the local media.

David Le Conte

CALENDAR OF ASTRONOMICAL EVENTS IN 2018

Month	Date	Time	Event
January	01	Before sunrise	Mercury at greatest western elongation
January	02	All night	Supermoon
January	03	05.34 UT	Earth at perihelion (147,097,233 km)
January	03/04		Quadrantid meteor shower (unfavourable)
January	05	08.26 UT	Lunar occultation of Regulus
January	07	Morning	Mars and Jupiter conjunction (0.3º)
January	09		Venus at superior conjunction
January	13	Morning	Mercury and Saturn conjunction (0.6º)
January	31	All night	Supermoon
January	31	All night	Ceres at opposition (magnitude 6.8)
February	08	19.30 UT	WEA course starts at Observatory
February	16	After sunset	Venus conjunction with Moon (0.8º)
February	23	16.33 UT	Lunar occultation of Aldebaran
March	01	06.12 UT	Lunar occultation of Regulus
March	15	After sunset	Mercury at greatest eastern elongation
March	15	19.30 UT	WEA course – final class
March	20	16.16 UT	Vernal Equinox
March	22/23	23.45 - 00.14	Lunar occultation of Aldebaran
March	25	01.00 UT	BST starts
March	28	Evening	Venus and Uranus conjunction (0.3º)
April	02	Morning	Mars, Saturn and M22 conjunction
April	29	Before sunrise	Mercury at greatest western elongation
May	09	All night	Jupiter at opposition
June	01	Morning	Saturn conjunction with Moon (0.5º)
June	19	All night	Vesta at opposition (magnitude 5)
June	21	11.08 BST	Summer Solstice
June	27	All night	Saturn at opposition
June	28	Morning	Saturn conjunction with Moon (1º)
July	06	18.46 BST	Earth at aphelion (152,095,566 km)
July	12	After sunset	Mercury at greatest eastern elongation
July	12	All night	Pluto at opposition (magnitude 14.2)
July	19	Evening	Observatory Open Evenings start
July	25	Morning	Saturn conjunction with Moon (2.6º)
July	27	All night	Mars at opposition
July	27	20.52 - 23.19 BST	Total lunar eclipse
August	12/13		Perseid meteor shower (very favourable)
August	17	Evening	Venus at greatest eastern elongation
August	26	Before sunrise	Mercury at greatest western elongation
August	30	Evening	Observatory Open Days end
September		All night	Comet 21p/Giacobini-Zinner
September	07	All night	Neptune at opposition (magnitude 7.8)
September	23	02.55 BST	Autumnal Equinox
October	18	Evening	Mars conjunction with Moon (2.7º)
October	24	All night	Uranus at opposition (magnitude 5.7)
October	26		Venus at inferior conjunction
October	26		Venus at inferior conjunction
October	29	02.00 BST	BST ends
November	06	After sunset	Mercury at greatest eastern elongation
November	11	Evening	Saturn conjunction with Moon (0.7º)
November	26		Jupiter conjunction with the Sun
Nov/Dec		Evening	Comet 46P/Wirtanen
December	13/14		Geminid meteor shower (very favourable)
December	15	Before sunrise	Mercury at greatest western elongation
December	21	22.23 UT	Winter Solstice

REFERENCES

SkyMap Pro and *Starry Night Pro* software
https://www.fourmilab.ch/images/3planets/elongation.html
http://www.seasky.org/astronomy/astronomy-calendar-2018.html
http://www.timeanddate.com/
http://www.alpo-astronomy.org/jbeish/2018_MARS.htm
https://www.ast.cam.ac.uk/~jds/preds18.pdf
https://www.imo.net/files/meteor-shower/cal2018.pdf
https://www.timeanddate.com/
RAS diary 2018
There is a useful list of Internet resources on pages 114-5 of the 2018 BAA Handbook, which is available at the Guernsey Observatory.

THE GREAT AMERICAN ECLIPSE

The 21st August 2017 saw 'The Great American Eclipse', the path of which stretched clear across the USA, from Oregon to South Carolina. Three Guernseymen and their families watched it independently from near the small town of Guernsey in Wyoming, while one Astronomy Section member observed and photographed the final partial phase from the island of Guernsey. Here are their stories.

TIM LANGLOIS:

I don't pretend to have any in-depth knowledge of astronomy, but ever since the total solar eclipse over the Bailiwick in August 1999 I have been fascinated the these astronomical events. I viewed the one in Mongolia, China on 1st August 2008, and also Queensland, Australia on 14th November 2012.

Most recently I travelled with my wife to Guernsey, Wyoming, USA to view the 'Great American Eclipse' on 21st August 2017. I had been in contact with Sheridan Williams, a leading eclipse expert, and was originally planning to go to Idaho, but when he announced he was going to Casper WY, I looked at the path of the eclipse and realized the centre line of totality passed very close to Guernsey, so we decided to fly into Denver and drive up a few days before the big event.

With so many people descending on what is a very small town (pop.1147), I got in contact with the mayor and he very kindly put us up in a hotel his sister-in-law was renovating, right in the centre of town. It was great to meet the local people and have time to get to know the area and the history of the place. All fascinating stuff, and we got a real sense of what it must have been like for the original settlers and native Americans in the 1800s. Guernsey was a key hub on the Oregon trail and old Fort Laramie is just 20 minutes down the road.

The eclipse was on the Monday, so on the Friday we did a reconnaissance of the area. We drove north out of Guernsey on route 270 to Patten Creek right on the centre line. The whole area was open grassland, with rolling green hills and plenty of opportunities to park off-road. As totality was due at 11:45 am and the weather forecast looked good, all round visibility was assured.

The Guernsey Gazette informed us that the town had been planning for the huge influx of people for nearly a year and I know that the mayor, Edward Delgado, had been very busy organizing camping sites, food, showers, loos and emergency care. Eclipse glasses were available everywhere, and in one shop we met a lady buying a pair for her dog!

You wait years for an eclipse to arrive, and then it is days and finally hours. The excitement builds as everyone gathers and hours turn to minutes. It is deceptive because the partial eclipse phase takes over an hour to complete, but then everything speeds up and the 'second contact', the start of the total solar eclipse, lasts just seconds, and totality less than 2½ precious minutes. In the 30 seconds or so before totality we turned our backs to the Sun and looked west. For myself, one of the strangest sights is watching the Moon's shadow racing towards you at over 2,000 mph. In seconds the bright daylight darkens and turns to all the colours of a sunset, a 360 degree twilight and then total darkness. So dark that you need a torch to find anything. The stars come out!!

To then look up, with naked eyes, and see the Sun extinguished by a huge black disc is both awe inspiring and humbling. Everyone around is yelling and shouting in amazement. The feeling is unique and indescribable. There is an element of fear and certainly if a total solar eclipse lasted for longer than minutes, people would be scared. It gets cold quickly. Imagine losing our Sun?

JASON & LINDA MONAGHAN:

A couple of years ago we noticed that a total eclipse of the sun coincided with our 35th wedding anniversary, and would make a memorable event. At first we planned to go to Kansas, where the longest totality would be and we figured the weather would be the best. However we were making this part of our annual holiday and decided that driving up the Mississippi in August would be unbearably hot. The alternative idea was to make for Guernsey, Wyoming, which was also on the path of totality and lent the whole expedition an extra level of interest. We therefore made the eclipse an early part of a two week driving loop, flying in and out of Denver.

We initially thought we were being a bit geeky and would be more or less alone up there, but half the aeroplane seemed to be full of Europeans heading for the eclipse, some with astronomical instruments in their hand luggage. The story intensified by the time we reached Cheyenne, with warnings about congestion on the weekend of the eclipse. Cheyenne was the closest we could find accommodation, even booking early. The bars were full of people in various 'Great American Eclipse' t-shirts. Perhaps our idea of setting off from Cheyenne at 8am was a little optimistic, and maybe 6am might be smarter. In the event we were awake at 4 so simply set off north. The interstate was already solid traffic, two lanes northbound with nothing coming the other way. Traffic kept moving and we made the 100 miles or so in two hours, the sun coming up as we drove into Guernsey.

For the last few miles every truck stop and layby was already full of parked cars and farmers were renting space in their fields for $50. That made the $17 we had paid online to enter Guernsey State Park look like a bargain. From Google Maps we figured that would be the best open space to watch from, not wanting to trust finding a roadside stop. It was not quite on the line of maximum duration but well within the totality zone. The park was highly organised, with a choice of several fields set aside for the thousands of cars pouring in and military-looking portaloos positioned at welcome intervals. Our chosen viewpoint was closed off but we drove as deep in as we could and parked with the multitude. The sun was only just up, there was a breeze and it was a pleasant but chilly breakfast on the rim of an impressive canyon that formed the centre of the park.

With an 11.40am eclipse we had time to reconnoitre our viewpoint and chose a hill slope away from the crowds with a view east. Most people stuck by their cars. The sky was cloudless, and it was hard to believe our luck. The start of the eclipse was exciting but then it became a wait, ho-hum, watching the half hour tick away, starting on the picnic early. It became very hot and we were on the edge of sunburn out in the open, but as the moon made inroads into the sun's disc the temperature began to fall. Our bridge camera just refused to take pictures but the cine camera was set up on a tripod and captured totality and the final diamond ring. It became darker but there were no birds around to notice. A breeze blew up. Using eclipse glasses we watched the final moments, then suddenly had to whip them off.

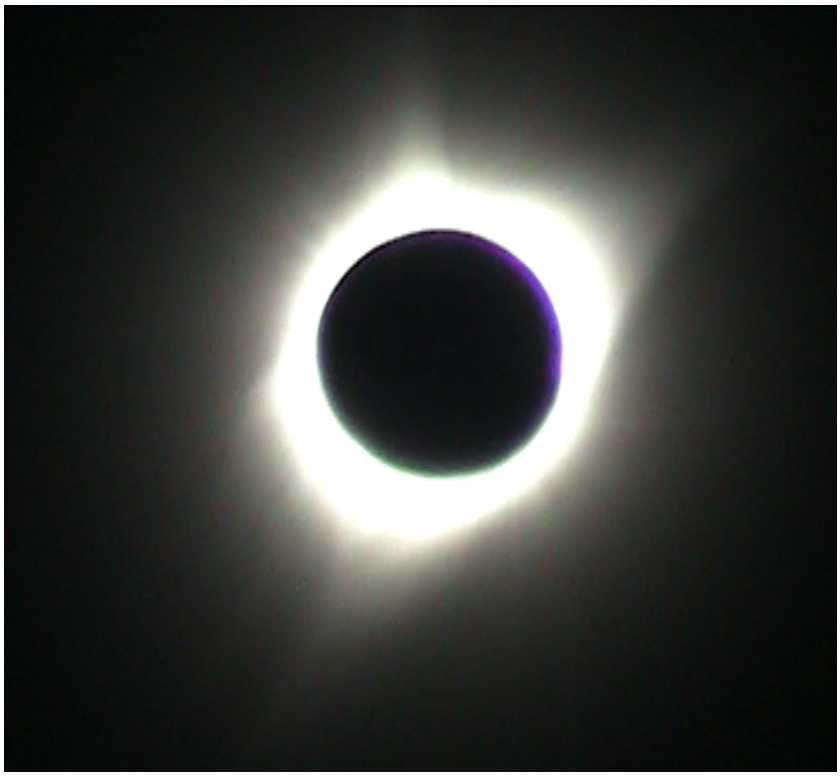


Image of the eclipse from Guernsey State Park (Jason Monaghan)

The corona was simply stunning. It was hard to believe that those pictures in magazines were actually true. A few stars came out, and the whole horizon became a 360-degree sunset'. Fiddling with the camera meant it missed the moment a jet plane

crossed the moon during totality. Then came the diamond ring and it was glasses on time again. With so little time, we could not take in everything. We did not see the moon's shadow, although it brightened quickly once totality was over. Over the hill we could hear the crowd whooping and hollering. As we opened the picnic proper we were amazed to hear cars already leaving within two minutes of totality ending. We stayed for the whole thing before joining a 45-min queue of cars leaving the park. Guernsey Wyoming was a little place worth a 20-minute stop to buy and post cards and say hello at the tiny museum/tourist office where we swapped a copy of 'The Story of Guernsey' for one of their t-shirts. For the rest of the afternoon as we drove into South Dakota we passed nose-to-tail traffic coming the other way. Far from being for the geeks, the Great American Eclipse was probably watched by more people than had ever watched a total eclipse before. It was an occasion to be remembered.

DAVID LE CONTE:

The eclipse of the century, at least for the USA, was predicted to be seen by more people than any previous total solar eclipse, the narrow (65 mile) band of totality extending clear across the country from Oregon to South Carolina, and with major partial eclipse phases visible from every state.

My planning for it started two years previously, the date of 21 August 2017 being fixed in my mind. It coincided with an invitation to my wife Dorothy and I to join friends at their time-share in the Colorado Rockies, so the natural place to head for a good observing spot was just a three-hour drive away in Wyoming. By coincidence, one of the towns in the path of totality was named Guernsey, after a Charles Guernsey who had operated a cattle ranch there from 1880 to 1926. It seemed an appropriate place to make an eclipse observation base.

So the day before the eclipse we headed north along Interstate Highway 25, heeding the many warnings of major traffic problems, some 100,000 people being expected to drive to Wyoming from Colorado for the event. When we arrived we found it a bit surreal seeing many Guernsey signs for shops, hotels, offices and the Guernsey State Park. I presented Mayor Ed Delgado with a Guernsey (island) flag, with which he seemed delighted and said he would hang it in his office. Dorothy presented him with a Guernsey pound note. The townsfolk seemed to know little about our island, but did show interest.

Presenting our flag to the Mayor of Guernsey, Wyoming (centre).

On the right are David and Dorothy Le Conte, and on the left are friends Susan and Bill Humphrey.

The next day turned out to be perfectly clear, with not a cloud in the sky. I headed some 15 miles further north into the hills on Route 270, close to the centre line of the eclipse, where not only would the total phase be longest (still a mere 2 min 28 sec) but also the eclipse would be central. There were wide open spaces, so one could stop virtually anywhere, but I chose an animal sanctuary where many others had gathered.

People prepared their cameras, tripods and telescopes covered with special solar filters. Eyes were similarly protected by eclipse glasses, essential during the long partial eclipse phases. Precisely at 10.23 Mountain Daylight Time there was 'first contact', the Moon appearing to take a tiny bite out of the Sun. Gradually the eclipse progressed, taking 1 hour 20 mins before 'second contact' marking the beginning of totality. I was busy during this period taking pictures every 5 minutes, my single lens reflex camera with a 500 mm mirror lens being set on its tripod low to the ground to minimise wobble.

As the eclipse progressed it got noticeably darker and cooler. The animals, mostly horses, had been kept indoors in case they were spooked by the event. Cattle in the next field, however, continued to graze, oblivious to what was happening.

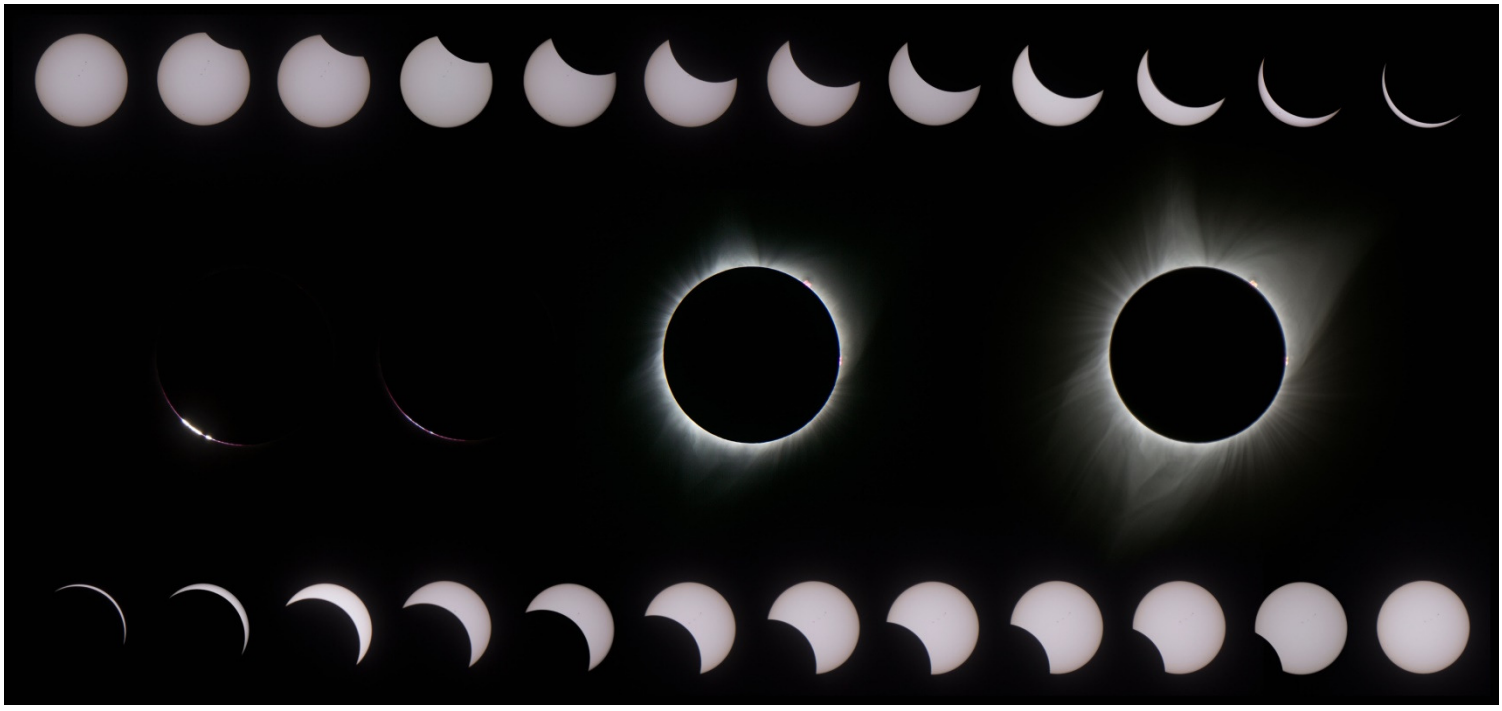
Just before second contact I removed the camera filter, and eclipse glasses were set aside, it being quite safe to observe the brief total phase with the naked eye and optical devices. Exposures were rapidly changed in a (successful) attempt to capture the glorious sight of the fully eclipse Sun, with its stunning corona – the Sun's outer atmosphere.

In the meantime sky watchers all over the area were treated to the sudden dramatic fall of darkness, the wonderful spectacle of the Moon's globe surrounded by radiant light, the appearance of brilliant Venus, and the vision of sunset colours extending all around the horizon. A never-to-be-forgotten sight which most had never before experienced. This was the fourth time I had seen a total solar eclipse, but it was undoubtedly one of the best, if not the best.

All too soon totality was over, 'third contact' was upon us, when the Moon started slowly uncovering the Sun, and less than an hour and a half later the Sun regained its full power. People exchanged awed comments about what they had seen, and then headed for home, the promised traffic jams materialising in abundance and slowing vehicles to a halt. The eclipse, meanwhile, continued its 2,000 mile per hour race across the country to give millions of others the awe-inspiring experience we had just witnessed.

Upon return to the island of Guernsey I was able to study my many photos and select those most worthy of recording the experience. I was grateful to Astronomy Section member Jean Dean for her expertise in combining and processing the best to bring out the detail of the solar corona. I was also grateful to her for the loan of her CamRanger which provided not only live images of the eclipse on an iPad, but also easy camera controls.

While I was pleased with the results, I sacrificed much of the experience to be gained by just watching the eclipse, especially the wonderful couple of minutes before second contact and then totality itself. I was so busy with my camera that I completely missed the onrushing lunar shadow and shadow bands, although others on our site did observe them. Maybe there will be a next time, but I doubt it can surpass the beauty of the Great American Eclipse.



Sequence of images of the eclipse (David Le Conte with processing by Jean Dean)

Totality (David Le Conte with processing by Jean Dean)

ELAINE MAHY:

As David Le Conte had travelled to Guernsey, Wyoming, USA, to see the eclipse in totality, we here in Guernsey, Channel Islands, were left with a likely poor relation's view - with 5.75% of the sun's area covered maximum (equivalent to an eclipse magnitude of 13%), and then interrupted by sunset (and that's if it wasn't cloudy).

Although the eclipse started at dawn over the Pacific, swiftly passing over the United States and into the Atlantic ending at sunset, in fact it was only about 5h15m long as viewed from anywhere on Earth, with the path of totality only about 3h10m long. Guernsey, Channel Islands, would see only a small part of the eclipse - just a small partial - near the end.

I considered not even bothering to try to see it. But then I had an idea!

A sunset eclipse, if I could pull it off, could make a great opportunity, especially with what I have learned this year and with the photography equipment I have built up.

So I did my research; www.timeanddate.com turned out to have detailed and very useful information about timings for the eclipse, and even, I realised, the perfect information I needed to create a great shot. It stated the bearing of the sun at various points during the eclipse. So all I needed was a map or sea chart to get an idea of the area I'd need to be in to include a landmark in the shot, and a good compass for an accurate bearing - including taking into account local magnetic variation. I have some boating binoculars with compass which were perfect. High up seemed my best bet for a clear view and to create some perspective in the shot. So I went on an early field trip at lunchtime to find my exact spot.

Trouble was, it was cloudy with the chance of fog ... possibly clearing late afternoon / early evening.

Walking along the cliff path at Pleinmont I scouted out some possible places, then found a concrete pad near a car park which was just perfect to have the sun pass over the Hanois lighthouse before setting. As I was watching, the fog rolled in, and covered the Hanois and all the rocks!

Later, having made plans for an early exit from town where I had another activity, and with everything ready in the car, I hared to Pleinmont under the still thick cloud.

In Torteval I saw there was a creamy strip of light emerging from under the cloud blanket. Very late, but perhaps it would clear in time!

To my spot and after quickly setting up, it seemed the sun would make an appearance!

I managed to take, in the 20 minutes the cloud and sunset allowed, a lot of images - some close-ups with the Baader AstroSolar filter I'd made earlier in the year, and some without for some landscape shots.

In some ways the sunset eclipse was very helpful - the glare of the sun was reduced, and of course I could combine a zoomed shot with land features as the sun went down. Very difficult to pick out detail in the silhouetted lighthouse though! I must admit to some additional processing once home to bring out the darker areas ...

The Baader filter shots were orange because the sunset was orange, not because of the filter, which lets white light through as white. However I tried some longer exposures with the Baader filter too, while I was there, to see what would come out!

A very interesting evening with some delightful photos to show for it!

The eclipse : Locally, partial began at 19:41:08, maximum eclipse magnitude13% (coverage 5.75%) at 20:08:20, swiftly followed by sunset at 20:15:49. Cloud lifted at about 19.55. (All times in BST.)
The camera : Nikon D5100 with a Sigma 150-600mm lens, and for those photos with sunspots, a home-made Baader AstroSolar film filter over the lens. With a good supporting tripod.
Processing : Processed with Lightroom for exposure and graduated filter adjustments.
The photos : Below are two of the photos I took.

The eclipse and the Hanois lighthouse (Elaine Mahy)

The eclipse close-up, showing several sunspots (Elaine Mahy)

The *Guernsey Press* published an article on 23 August 2017 about the observations of the eclipse from "two Guernseys", with photographs by Elaine and David. – *Ed.*

SOLAR SYSTEMS FAR BEYOND OUR OWN SUN

Until quite recent years, there was no clear evidence that some of the stars, far distant from our own Sun, could also have one or more planets accompanying them in their journey around our Milky Way Galaxy of stars.

A great many of the closest stars can be seen easily because of the brightness of their burning gas contents. Planets and their moons do not have this same source of energy, and apart from volcanic energy, can mainly be observed simply because of the amount of light being reflected from a planet or moon's surface.

There are other ways, however, to detect planets orbiting a star. A planet can sometimes be identified because of its gravity effects on a parent star not too far away, pulling it slightly out of position. Changes in the amount of reflected light can also be detected if a planet happens to transit across in front of a star.

It was in the constellation of Pegasus that the first planet beyond our solar system was discovered, in 1995. The planet was identified as being in orbit around the star 51 Pegasi. The Pegasus constellation, with its widely spaced square of four main stars, is in a southerly direction of our autumn night skies until around the end of the year. Many more of these discoveries have followed, and the total number of extra-terrestrial planets, now usually known as exoplanets, is already calculated to be more than three thousand. With better optical telescopes, space telescopes and other instrumentation to be developed in future, this number of very distant worlds in our galaxy has already been increased substantially. Trying to identify whether there may be life of some kind on any of the distant worlds is, however, a matter for further investigation.

In the meantime, one of the most recent discoveries is another solar system of planets, found orbiting the star Trappist-1. A system of seven planets has been detected around the star, with three of the planets identified as being within the habitable zone of the star – not too close or distant from the star, and therefore allowing a more moderate range of temperatures for the development of life, to be considered as a distinct possibility. The Trappist-1 system is at present identified as being quite a good match of a solar system in comparison with the arrangement of planets in our own solar system.

Geoff Falla

SOME OLD ASTRONOMY BOOKS

- and what they can tell us

Although not a collector I seem to have acquired over the years a quantity of old astronomy books: ten dating from the 19th century and around twice that number from the first half of the twentieth century. They make interesting reading, giving an insight to astronomical thought in those periods. And it is instructive to read the authors' own words, rather than just historical accounts of what they said.

The Guernsey Almanacs from the late 18th and early 19th centuries contain advertisements for "academies" run by individuals, often teaching navigation – not surprising given our seafaring island – but also "the use of the globes", that is the terrestrial and celestial globes, such as that taught by a Mr Courteney in 1796 and a Reverend Thomas Grut. Thus in 1791 a Mr Chegwin offered to teach "nautical astronomy", including the calculation of latitude by two altitudes. Two years later Mr Hemphill was teaching astronomy using a "complete orrery" according to the Copernican system. In 1822 James Hayward advertised in the Guernsey *Star* as a "private teacher of geography and the use of the globes, elements of astronomy, & c." to young ladies. And George Ramsden, Master in the Royal Navy with 40 years' experience, offered to teach "Navigation and the Method of working Lunar Observations and Time Keepers, on reasonable terms."

So it is with interest that I turned to Thomas Molineux's 1825 *Concise introduction to the knowledge of the globes* and Thomas Keith's 1850 *A New Treatise on the Use of the Globes*. The former is a rather slim volume inscribed in manuscript on the flyleaf with the name of Master George Robilliard, 1829, Classical Commercial and Mathematical Academy, St Aubins [Jersey]. It starts with "*A Geographical Clock*" fitted with a volvelle showing the times at various places in the world. The book is divided into parts each, having an introduction to the globe, and followed by many worked problems (with answers at the back). Despite its small size it appears very thorough. Keith's larger Treatise is even more thorough, containing a lengthy text but also with many problems for the student.

A Treatise on Astronomy by Sir John Herschel (1833) is not so much a general descriptive account of astronomical knowledge at the time, but provides technical, mathematical details of motions of solar system objects. A superb volume!

I was particularly interested in *The Solar System* by Thomas Dick, published by the Religious Tract Society, as it is undated. By careful reading I was able to date it fairly precisely. Page 191 records the latest discovery of an asteroid (Astrea) on the 8th December 1845, but the volume makes no mention of the discovery of Neptune on the 23rd September 1846. It can, therefore, be concluded that the book was written between those dates. A glossary includes a number of terms no longer in use, such as *Ascii*, *Amphiscii*, *Antoeci*, and *Heteroscii*, referring to inhabitants of various zones on the Earth on the basis of the way their shadows behave in different seasons.

Amédée Guillemin's 1868 *The Heavens*, translated from the French, is a beautifully illustrated volume, including coloured versions of Guernseyman Warren De La Rue's famous photographs of the totally eclipsed Sun in July 1860.

The copy of *Elementary Lessons in Astronomy* by Norman Lockyer (1886) has clearly been used for assiduous study, possibly by the R Hardman, whose name is inscribed in it. The book is full of marginal notes in tiny handwriting, and many individual paragraphs in the text have ticks against them, obviously indicating that they have been read, and presumably understood.

There are also *Popular Astronomy* by Simon Newcomb (1890), *The Story of the Heavens* by Sir Robert Ball (1892), *History of Astronomy* by George Forbes (1909), *Astronomical Curiosities* by J Ellard Gore (1909), *Stars Shown to the Children* by Ellison Hawks (1910), *Halley's Comet* by H H Turner (1910), and *The Heavens* by J H Fabre (1924), as well as three volumes by Sir James Jeans dating from the early 1930s, *The Universe in the Light of Modern Physics* by Max Planck (1931), and *The Heavens and Their Story* by Annie Maunder and E W Maunder (1934).

Of special interest is Percival Lowell's *The Evolution of Worlds* (1909). Disappointingly it includes nothing about his observations of Martian 'canals'. But *Are the Planets Inhabited?* by E W Maunder (1913) devotes three chapters to the subject. Pointing out that Lowell did not claim to view the canals themselves but the vegetation he supposed grew alongside them at certain seasons, he debunks the observations, recording an account of an experiment he conducted with pupils at the Greenwich Hospital School which demonstrated that at a certain distance random dots could be interpreted as having lines between them. He concludes: "*the illusions of Mars are not the straight lines and round dots of the canal system, but the forced and curious interpretation which has been put upon them. If the planet be within a certain range of distance and under examination with a certain telescopic power, the straight lines and round dots are inevitable. Their artificiality is not a function of the actual Martian details themselves, but of the mode in which, under given conditions, we are obliged to see them.*"

Finally I should mention Sir Arthur Eddington's *The Expanding Universe* (1933), being an (presumably much) expanded version of a lecture he gave at the IAU meeting in Cambridge, Massachusetts in 1932. In chapters headed *The Recession of the Galaxies*, *Spherical Space*, *Features of the Universe*, and *The Universe and the Atom*, he gives a detailed account of the universe's expansion, not radically different from today's view of the subject.

David Le Conte