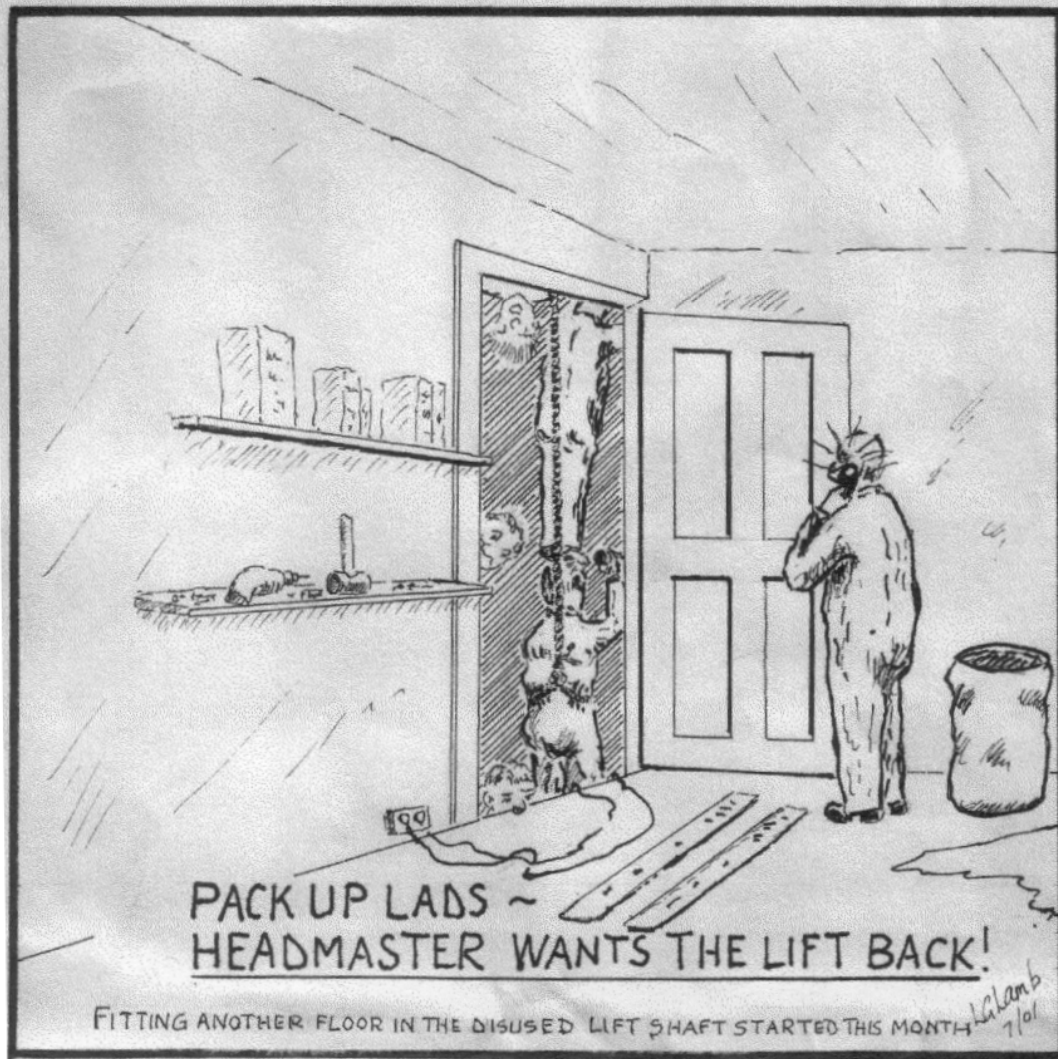


ORWELL ASTRONOMICAL

SOCIETY IPSWICH

Charity No 271313

AUGUST 2001



Society News

1 Next Committee Meeting

The next committee meeting will be held on Saturday 22nd September from 19:30 in the clubroom. This is an open meeting and any one who is interested is invited to attend.

2 Events for 2001

Event	Details	Date
Perseid Summer Barbecue	Alan Smith has volunteered the use of his garden again this year. Alan lives at [redacted] Grundisburgh	Saturday 11 th August 14:00 and onwards
Summer Excursion	National Space Centre Leicester	15 th September
Equinox Star Party	Thetford Organiser; Loughton A.S Contact Mike Cook [redacted]	14 th to 23 rd September
Astronomy Workshop	Telescopes & Observing	3 rd October
Lecture Meeting (provisional only)	A talk on Cosmology	5 th October
FAS Convention	Venue: Rutherford Appleton Laboratory Oxfordshire	13 th October
Visit to Cambridge AS and Braintree AS	These were proposed at the AGM	Nothing arranged yet
Astronomy Workshop	Constellation Close up	7 th November
North Essex Astronomical Society	They have recently opened a new observatory. A visit will be arranged	Nothing arranged yet
Open Weekend	Members help will be needed again this year to prepare the displays	24 th and 25 th November
Astronomy Workshop	Variable Stars	5 th December
Lecture Meeting (provisional only)	Members short talks	Either on Friday 30 th November or 7 th December
Christmas Meal		Provisional dates 12 th or 19 th December

Additional events will be added through out the year

Summer Excursion



Date Saturday 15th September

The venue is at the National Space Centre Leicester.

Entrance price revision if there are not sufficient numbers to make a group booking (20).

	Price
Adult	£7.50
Child 5 - 14	£5.50
Senior citizen, student	£5.50
Family 2 adults +2 children	£22
Family 2 adults + 3 children	£27

The coach hire will have to be added to the entrance fee. The more members, who attend, will reduce the unit cost per person.

If you are interested please contact Roy Gooding, or add your name to list on the observatory notice board

3 Its! Observatory Maintenance Time Again

Its that time of year again when the observatory is closed for observing, and all hands are requested to man (or woman) the power tools, hammers, and paint brushes.



During the next few weeks the equipment storage floor above the library is be extended and re-floored.

The lift shaft at the bottom of the stair well is to be floored across.

The library floor will be lowered, thus removing the step.

I will be resuming the observatory painting in August, after some of the above work has been completed.

Anyone who dares to show their face, will be press-ganged into helping. If you intend to come along to the observatory during July and August please come in old clothes.

Night Sky

All times GMT

Sun

The sun will be rising approximately between 04:20 and 05:00
The sun will be setting approximately between 19:40 and 19:00

Moon

Full Moon	3 rd Quarter	New Moon	1 st Quarter
4 th	12 th	19 th	25 th

Mercury Mercury will be at superior conjunction on the 5th. This will be followed by an unfavourable evening apparition, as the planet remains very low in the sky.

Venus Venus remains visible in the early morning sky, moving into darker skies this month. Jupiter will be conjunction with Venus on the 5th, when the two planets are only 1.2 ° apart. Magnitude -4.0

Mars Mars is again well placed to observe this month if you have a clear southerly horizon. Its low altitude will hamper easy observations from our latitude. It will be culminating at about 19:40 in mid month. Magnitude -1.2

Jupiter Jupiter starts to move out of the morning twilight this month. As mentioned

- above it is in conjunction with Venus on the 5th. Magnitude -2.0
- Saturn** Saturn will be rising at about 23:15 in mid month, and will be well seen after midnight. Magnitude 0.1
- Uranus** Uranus will be at opposition on the 15th. It will be visible all night. Magnitude 5.7
- Neptune** Like Uranus, Neptune will be visible all night. Magnitude 7.8

Meteor Showers

Shower	Maximum	Limits	ZHR
α Cygnids	July 21 st to August. 21 st	July to August	5
Capricornids	July 8 th July 15 th July 26 th	July to August	5
δ Aquards	July 29 th August 6 th	July 15 th to August 20 th	20 10
α Capricornids	August 2 nd	July 15 th to August 20 th	5
ι Aquarids	August 6 th	July to August	8
Perseids	August 12 th	July 23 rd to August 20 th	80

Meteor source is the BAA Handbook

OCCULTATIONS DURING AUGUST

Only one stellar occultation occurs during the month under favourable circumstances. The table provides details for Orwell Park Observatory; these will be similar at nearby locations.

D OR R	Date & Time (UT)	Lunar Phase	Sun Alt (°)	Star Alt (°)	Min Dist (rad)	Star	Mag
D	03 Aug 22:09	1.00+	-17	13	0.92N	17 Cap	5.9

James Appleton

The African Total Solar Eclipse: 21st June 2001

By Mike Harlow

It was with a mixture of unease and anticipation that a group of 120 eclipse chasers boarded a plane at Gatwick to fly to Harare, Zimbabwe on 17th June this year. The common goal was to observe the total eclipse of the sun that would take place on midwinter's day south of the equator over a narrow strip of land straddling Angola, Zambia, Zimbabwe, Mozambique and Madagascar.

Eclipse chasing may seem a bizarre activity but the sight of the eclipsed sun is truly amazing and is almost immediately addictive, and they do provide an excuse to go to some exotic and interesting places. This eclipse was no exception and despite all the problems reported in the news, Zimbabwe is a beautiful country and certainly somewhere to go back to.

There are three sections below. The first gives some background as to why eclipses happen and can be skipped if you know all that sort of stuff. The next section is about this particular eclipse and the last section looks at future prospects for solar eclipses and where to go to see them.

At the end there are some references and contacts for companies offering eclipse tours.

Background to eclipses

An eclipse of the sun occurs when the moon comes between the sun and the earth casting a shadow on the earth's surface; something that can only happen at new moon. Given that new moon happens once a month, why can't we see an eclipse

every month? Well, there are two main reasons. Firstly, by a remarkable, some think spooky coincidence, the apparent sizes of the sun and moon are very similar as seen from the earth. The result of this is that the moon's shadow is only a few tens to hundreds of kilometres wide which limits the region of the earth that experiences an eclipse. Secondly, the moon's orbit is slightly tilted with respect to the earth's orbit. This means that the sun, moon and earth rarely line up exactly at new moon, so an eclipse doesn't happen every month.

Another complication is that the point where the moon's orbit intersects the earth's orbit moves. So if an eclipse does happen one month, by the time the moon has made another orbit, a month later, the intersection point has drifted and another eclipse isn't possible. Six months later however, the moon has moved to the other intersection point on the other side of the earth's orbit and an eclipse can happen. For example, just six months prior to the infamous 11th August 1999 eclipse invisible from Cornwall, there was a solar eclipse (not total) visible from Australia on 16th February 1999.

This motion of the intersection point (or node) of the moon's orbit takes just over 18 years (18 years 11 days and 8 hours!) to make one complete rotation and gives rise to families of eclipses. Again using the example of the Cornwall eclipse, the next one in the series is on 21st August 2017 which conveniently tracks across the USA from Oregon to Virginia and lasts 2 minutes and 40 seconds. A family of eclipses like this lasts for about 3000 years but the fact that eclipses happen more frequently than every 18 years shows that many eclipse families are running in parallel at the same time.

The Eclipse in Africa

The international flight landed at the brand new Harare airport built to take 2 million passengers each year, ten times the capacity of the old airport. It was immediately obvious that we were in the southern hemisphere as the baggage carousel rotated clockwise...the one at Gatwick goes anti-clockwise (only joking!). A short bus ride, literally 100 meters, took us to the domestic terminal to pick up the internal flight to Kariba. This is where the size of the group started to stretch the infrastructure of Air Zimbabwe. The biggest aircraft took just 42 passengers, with our flight being in a 17 seater! It took most of the day to transfer everyone to the hotel and one poor soul actually had to be driven overland and arrived mid evening!

Kariba of course is famous for the dam and the lake and the first full day gave us the opportunity to take a cruise along the shore to spot the wildlife. We soon discovered hippos basking on the shore with crocodiles mixed in...a bit worrying if you are on a boat! Elephant were also spotted along with a wealth of birdlife.

The first night gave us the first sight of the southern night sky. When we left home, Mars was just visible in the murk along the southern horizon. From Kariba, it rose vertically in the east and by midnight was overhead with Scorpio as a backdrop...stunning. The Southern Cross and Coalsack were easily identified but my knowledge soon ran out after spotting alpha and beta centauri. I determined to buy a southern hemisphere planisphere as soon as I could.

On 20th June we headed for the Zambian border just a few miles away for the journey to Lusaka. Three hours after

arriving at the border crossing we finally made it through, one of the joys of travelling between countries that don't really get on too well. Not surprising that people don't go to Zambia unless it's necessary. This delay meant we didn't arrive in Lusaka till after dark, and we were immediately whisked off to a lavish chinese meal after getting our room key and dumping our bags.

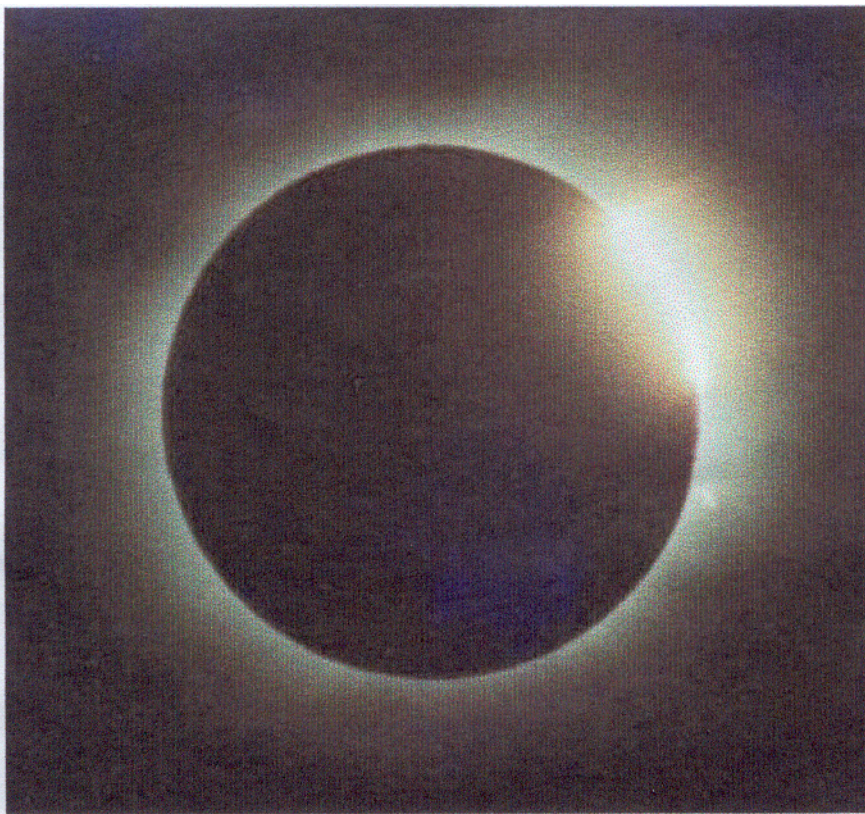
Eclipse day dawned bright, clear and cold. We had ascended to over 4000 feet which gave a significant chill to the air before the sun rose to high in the sky. Breakfast was laid on in an outside café area after which we gathered our equipment for the day and set off north by 10am. The eclipse site was superb. An ex-pat owns a farm right on the eclipse path and he had cleared several acres of stubble for our group and a large contingent of Americans. In all, 300 people were on site but everyone had plenty of room. Unlike previous eclipses, where we have been in the middle of nowhere with virtually no facilities, this time we had toilets, a marquee, outside bar, big shady trees and a massive barbeque for lunch and dinner. The best site I've ever been to or heard of.

After lunch we wandered back to the camera set up earlier and prepared for first contact...the moment when the first notch is taken out of the sun by the moon. There is always a sense of competition to see who notices first contact first. As usual it was the Americans who shouted it out although several of us brits had noticed it slightly earlier but enjoyed the moment in reverent silence.

This was at 1.42 pm with totality due at 3.10pm so there followed a slow progress of the moon's disc across the sun. This was made more interesting by the presence of a large group of sunspots which made the slow motion more obvious.

By the time the moon had moved about half way across the sun, the light was noticeably less intense, sunglasses could be removed as the daytime glare was much reduced. With just minutes to go to totality, the light had become strangely dim and the air cool. Through the solar filters the crescent sun started to shrink rapidly. This was the time for photographers to remove the filters from their camera lenses and start taking a rapid sequence of images. This in the hope of capturing the diamond ring effect where the last point of sunlight shines down a lunar valley as the inner corona becomes visible. With this last vestige of the intense photosphere gone the light drops dramatically and totality begins. And this is what makes these events so special. For these next few minutes the eerie, alien solar corona is seen in subtle but stunning detail and superimposed on the pearly blue-white corona are the pink flames of the prominences hanging above the solar surface. This eclipse revealed the typical 'solar maximum' shape to the corona which is evenly spread around the sun. In February 1998 the corona was very different with long equatorial streamers and very fine 'polar brushes'. These structures arise from magnetic fields at the sun's poles and mimic the shape of iron filings sprinkled on paper over the poles of a bar magnet. Hard to imagine that they actually stretch many times the earth's diameter into space!

Staring through the 4 inch telescope at the eclipsed sun (perfectly safe at totality) time rushed by and a pink rim began to appear on one side of the moon. This was the thin chromosphere of the sun and heralded the end of totality. Within seconds the bright photosphere began to reappear and the telescope was quickly moved away. Totality was over.



Second contact showing inner corona and a large prominence on the right. 500mm f/8 at 1/125s. Photo by Sue Brown.

Either side of totality it is possible to see 'shadow bands' and they were clearly seen this time. These ripples of light on the ground look very similar to the light as the bottom of a swimming pool on a sunny day and are caused by moving cells of air bending light from the sun as it becomes almost a point source in the sky.

So with the end of totality the moon slowly began to move off the sun's disk and the light returned to the landscape. But it wasn't quite the same. We had all seen an aspect of the sun that is always there but very rarely seen. I always feel privileged and very lucky to be able to travel to see eclipses to see that extra dimension to the sun that is usually hidden from view.

Future Prospects for Eclipses

Before looking at the eclipses coming up in the next few years, should you be tempted to go to see one, more needs to be said about the geometry of eclipses. As mentioned above, the moon's orbit is tilted and moving with respect to the earth's orbit making eclipses rare events. But there is a further twist to the story: the moon's orbit is elliptical (as is the earth's). This has a big influence on the duration of the eclipse and its appearance. When the moon is close, and the sun farthest away, the eclipse will be long, the longest possible being over 7½ minutes of totality. At the other extreme however, something interesting happens. When the moon is far away, and the sun close, the moon actually appears smaller than the sun so the eclipse isn't total at all, it's 'annular'. As the name suggests, a ring of the bright photosphere remains when the moon is centred on the sun. Because of the relative sizes an annular can last longer than a total eclipse, the longest being about 12 minutes.

The pattern of eclipses every six months is usual such that a total is followed by an annular. The Australian eclipse of February 1999, mentioned above, was annular. On 4th

December this year there will be an annular eclipse, six months after the Africa eclipse.

Below are some of the eclipses that will occur in the next few years:

Date	Duration	Type	Location
4/12/2001	3m 19s	Annular	Across Pacific but only land fall in Costa Rica
12/6/2002	0m 22s	Annular	Across Pacific again...no landfall
4/12/2002	2m 3s	Total	Southern Africa and Australia
31/5/2003	3m 36s	Annular	North Scotland, Orkney, Shetland, Iceland
23/11/2003	1m 57s	Total	Antarctica
8/4/2005	0m 42s	Annular/Total	Pacific, Panama, Columbia and Venezuela
3/10/2005	4m 31s	Annular	Spain, Africa

Eclipse prospects for the next 5 years

As can be seen from the table, prospects for the next few years aren't brilliant. The only two totals are either short, about 30 seconds from Australia, or inaccessible (Antarctica).

The next really good total will be 29th March 2006 which will go across southern Turkey and last about 4 minutes. The advantage is that it goes across some of the resort areas which can be reached by package holidays! After that, the total of 22nd July 2009 will last over 6 minutes and be visible from China and extreme southern Japan.

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References and Information

Details of future solar eclipses can be found in: "Fifty Year Canon of Solar Eclipses: 1986-2035" by Fred Espenak. This is 'NASA Reference Publication number 1178 Revised', ISBN 0-933346-45-X. Fred Espenak also has a web site with more detail of imminent eclipses at:

www.sunearth.gsfc.nasa.gov/eclipse/eclipse.html.

I have experience of two companies that offer eclipse tours and both have proved to be very good. The first is Explorers Tours who cover eclipses and recently the Leonid meteor showers although their main activity now is with diving holidays. They have a web site at: www.explorers.co.uk and telephone 01753 680237. The other travel agent is Voyages Jules Verne who ran the Zambia/Zimbabwe trip I did this year. They now operate the 'Journeys of Special Scientific Interest' that Peter Cattermole organises specialising in astronomy and geology related trips. Their web site is: www.vjv.co.uk, telephone 020 7616 1000.

NEW LIBRARY BOOKS

I recently obtained the following books for the OASI library:

Stars, Time-Life Books, 1992.

This thin volume provides a good overview of its subject. The first two sections describe stellar spectroscopy (one of the main tools that astronomers use to study stars) and the atomic reactions that occur inside a star to produce its energy. Subsequent sections of the book describe the evolution of stars. Much of the book is devoted to the more exotic aspects of stellar evolution: supernovae and black holes. This book is very readable, informative and has good coverage of the historical development of our understanding of stars and their evolution.

Exploring the Moon Through Binoculars and Small Telescopes, E H Cherrington, Jr., Dover, 1984.

This book was first published in 1969, before the Apollo Moon landings. The 1984 edition has not been significantly updated. The book provides a comprehensive account of pre-Apollo exploration of the Moon (by telescope and by the early unmanned space probes); this appears very dated, but it is a fascinating historical record. The bulk of the book consists of a detailed description of the features of the Moon that can be explored with a small telescope and this, of course, is timeless. Numerous photographs from large telescopes and space probes complement the descriptions.

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Philip's Atlas of the Universe, Patrick Moore, George Philip Ltd, 1999.

A more accurate title for this book would be *Encyclopaedia of Astronomy*! It is a splendidly comprehensive introduction to the subject and exhibits the usual high standard of technical detail and accessibility that one expects from Patrick Moore.

The Elegant Universe, Brian Greene, Vintage, 2000.

This book will appeal to anyone trying to keep up to date with modern cosmological theories. It explains the *string* theories of the cosmos, whereby much of the structure of the universe is in effect hidden, wrapped up in dimensions too tiny to manifest themselves under normal experimental conditions. For any deeper understanding of this subject - best to read the book!

The library is housed in the Orwell Park Observatory. It holds a selection of astronomy books, videos and magazines. All members of OASI are welcome to use the library. Please contact me with requests for purchases of books, videos and software, or if you would like to donate any good-quality astronomy material to the library.

James Appleton

2001 COMMITTEE

		Home Phone	Work Phone
CHAIRMAN	D Payne		
SECRETARY & WORK PARTY ORGANISER	R Gooding		
TREASURER & PUBLICITY	K Goward		
MECHANICS	M Cook		
NEWSLETTER CO-ORDINATOR	E Sims		
BEGINNERS MEETING CO-ORD & VISIT CO-ORD	T Sampson		
EQUIPMENT CURATOR	G Coleman		
LIBRARIAN	J Walsh		
	J Appleton		
CO-OPTED MEMBER			
LECTURE CO-ORDINATOR & DARK SKIES	P Richards		
JOURNAL ARTICLES TO CORRESPONDENCE ADDRESS	E Sims		Ipswich Suffolk IP1 4HA
	R Gooding		OASI Secretary Ipswich Suffolk IP1 6AE
MEMBERSHIP	M. Cook		Ipswich IP4 5PZ

Observing Programme For August

Dates	Observing Director	Activities
Monday		Nothing Booked
Tuesday		Nothing Booked
Wednesdays 1st 8th 15th 22nd 29th from 8.00pm	M Cook D Payne	Nebular & Faint Objects
Thursday	Nothing Booked	Group Visit
Fridays		Nothing Booked

All members are welcome on any night, but on nights other than Wednesday please check with the appropriate director that the observatory will be open.

Special Events

1. COMMITTEE MEETING September 22nd

The next committee meeting is to be held on Saturday 22nd of September at 7.30pm in the club room at the observatory. All members are welcome to attend.

2. LECTURE MEETING

Nothing organised for this month

3. ASTRONOMY WORKSHOP

Nothing organised for this month but will be resumed again in October.

Society Contact Details

		Home Phone	Work Phone
Chairman	D Payne		
Secretary	R Gooding		
Contact details for the full committee are inside the back page.			

e-mail queries: ipswich@ast.cam.ac.uk
 WWW address: <http://www.ast.cam.ac.uk/~ipswich/>