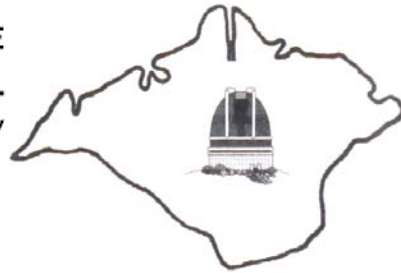


# THE NEW ZENITH

THE MONTHLY  
MAGAZINE OF THE  
VECTIS ASTRONOMICAL  
SOCIETY



VOLUME 14 No 4

MAY 2006

## ECLIPSE AND SUN SPECIAL

PHOTO FROM NASA WEBSITE



In this month's edition we have an excellent account of eclipse chasing in North Africa, from Peter Burgess; explanations of phenomena witnessed, plus the summary of last month's **Biography of the Sun** by David Whitehouse. There will be more stories coming in later since other VAS Members saw totality in Turkey and will be dying to show off their experiences to one and all. Read on...



## A Biography of The Sun

*Dr. David Whitehouse*

**T**he Sun and Moon are the two most prominent features in the sky and yet are very different in character. The Moon is a dead world on which all activity ceased many millennia ago. In contrast the Sun is highly active and supplies all the energy necessary for life on Earth.

The Sun is an average star and is roughly half way through its active life. For about 10,000 million years the Sun will generate a constant energy output before the hydrogen fuel is exhausted. This duration and the constancy of the output are ideal for life to form and develop to an advanced state on Earth.

The earliest known recordings of the Sun are rock carvings in Ireland and are probably a record of the eclipse of April 12<sup>th</sup> 3126BC. Sunspots were first recorded in 1184 but, as with most astronomical data, the invention of the telescope marks the beginning of continuous records.

Young stars like the Sun can be seen emerging from gas clouds within the Milky Way but the earliest stages of star birth are hidden in the clouds. Only when they start radiating is the surrounding gas blown away to reveal the new stars.

Throughout its active life of 10,000 million years the Sun releases energy equivalent to 80,000 million atomic bombs every second. Currently the Sun is about half way through its active life with about 4500 million years to go before the hydrogen fuel is exhausted.

The inner regions of the Sun where the energy is created are opaque to radiation and so the light takes half a million years to reach the outer layers of the Sun from where it is radiated out into the Solar System. The only way we know that the solar core is still active is by measuring the flux of neutrinos. These are not scattered in the Sun's core so radiate out immediately after they are formed and indicate what is happening now.

The central core of the Sun rotates as a solid object whereas in the outer convection zones the equatorial regions rotate faster than the poles. Cells of material become charged and their relative motion creates a magnetic field causing flux loops, sunspots and flares.

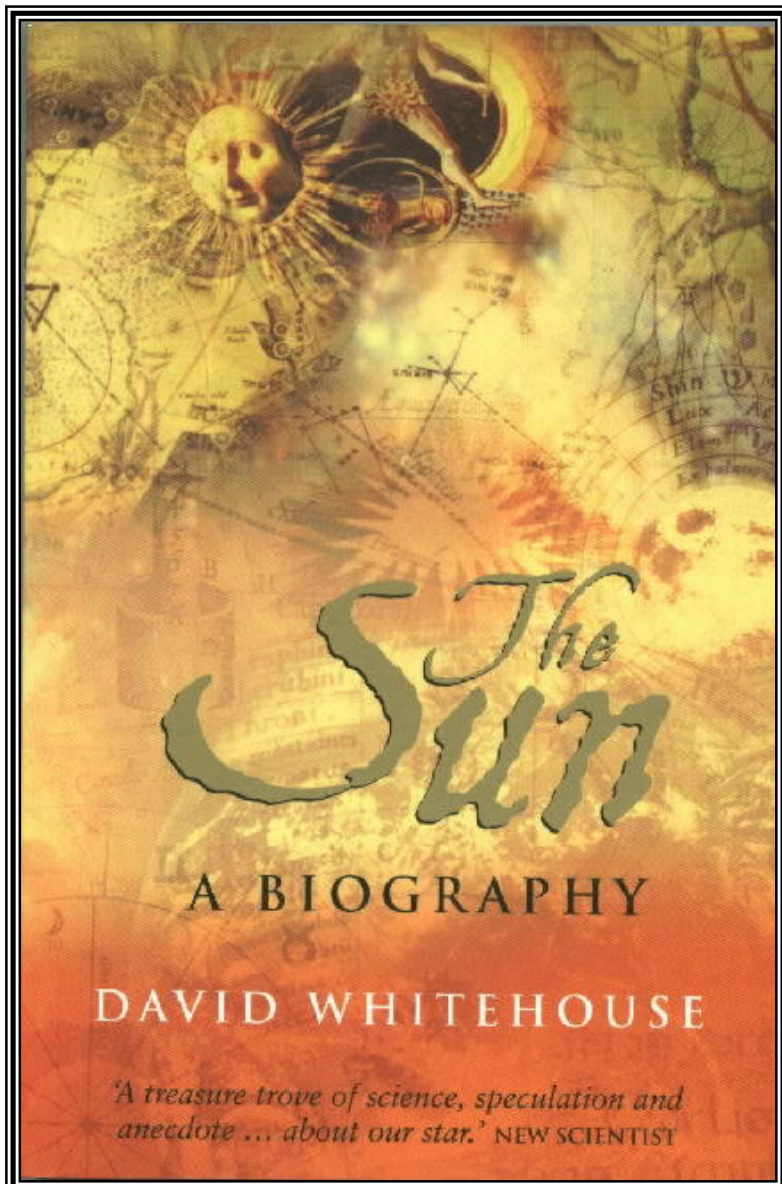
Solar activity is measured by the number of sunspots that can be seen at any time. Sunspots appear dark

only in comparison with their surroundings. By plotting the numbers of sunspots against time an 11-year cycle can be seen. However in the 17<sup>th</sup> century there was a period of about 60 years when practically no sunspots were seen. This coincided with a period of very cold winters. In contrast there is currently very high sunspot activity that could be a contribution to the current global warming.

Eventually as the Sun runs out of hydrogen it will start burning heavier elements. This will upset the delicate balance between gravity and radiation pressure that maintains the size of the Sun. As the Sun starts burning these heavier elements it will expand, eventually absorbing the orbits of Mercury and Venus. Earth will probably remain outside the Sun but will become too hot for habitation. If anyone is left alive by then they will have to develop the technology to move to a terra-formed Mars or Titan.

Finally, the Sun will have burnt all the available fuel and will end as a cold dark remnant.

*Reported by Roger Young*



# May Skies

John W Smith

## The Planets

**Mercury** appears just above the north western horizon some 40 minutes after sunset, but only attains an altitude of about six degrees so this is not a good apparition.

**Venus** is low in the north western sky, only reaching two degrees above the horizon by mid-month.

**Mars** moves rapidly through the constellation of Gemini, as will be seen from the associated map, below. This planet continues to fade as the Earth/Mars distance increases.

**Jupiter** is now at its brightest (-mag 2.5) and moves in retrograde motion in the constellation of Libra. See map.

**Saturn** crosses the meridian at 18:00 hrs and lies near the south east horizon. Its rings are still wide open but will soon appear to close.

**Neptune** is unfavourably placed, but **Uranus** will soon be better positioned for viewing.

## Meteor Showers

There are two active showers this month.

\*1 On the 5<sup>th</sup> the eta *Aquarids* occur but moonlight may diminish the seeing. These meteors come from the debris left behind by comet Halley. Up to 35 meteors per hour may be seen.

\*2. The alpha Scorpiids may be seen on the 13<sup>th</sup> but only have a rate of some 5 per hour.

## Moon Phases

New	1st Quarter	Full	Last Quarter
27 <sup>th</sup>	5 <sup>th</sup>	13 <sup>th</sup>	21 <sup>st</sup>

## Deep Sky Objects for small telescopes and binoculars

This is a good time of year to view the multitude of galaxies that will be found in the constellations of Virgo and Coma Berenices. Many of these require a large or medium telescope and most make excellent CCD images. However, there are a number that are worthwhile objects for small instruments.

**M104 NGC4594** This superb galaxy will be located in Virgo and is fairly well placed in the southern sky. This spiral is seen edge-on, hence its name as "The Sombrero" as it resembles a Mexican hat.

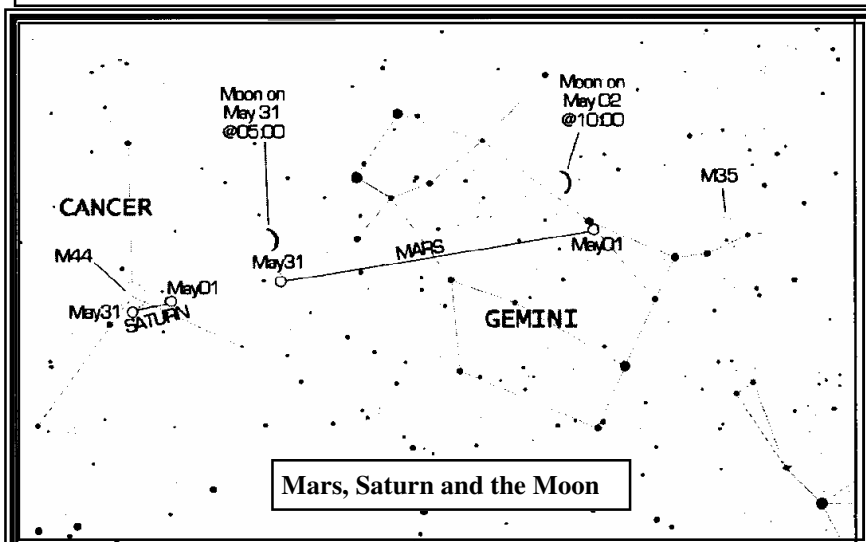
**M64 NGC4826** This spiral is known as the "Black-eye" nebula due to its dark centre lane and makes the object appear as an eye in space. It is a relatively easy object for a small telescope as it is quite bright.

**M94 NGC4736** A spiral in Canes Venatici about 14 million light years distant. Believed to be larger than our Milky Way. It is a good object for most instruments.

**M3 NGC5272** A fine globular cluster in Canes Venatici, and is an excellent object for almost any instrument. It may be seen with binoculars on a dark clear night.

## Co-ordinates

OBJECT	RA	DEC	MAG	SIZE (ARC MINS)
M3	13h 41m	+28deg 29m	6	9.8
M64	12h 56m	+21deg 48m	9	6.5 x 3.2
M94	12h 50m	+41deg 14m	8	5.0 x 3.5
M104	12h 37m	-11deg 21m	8	6.0 x 2.5

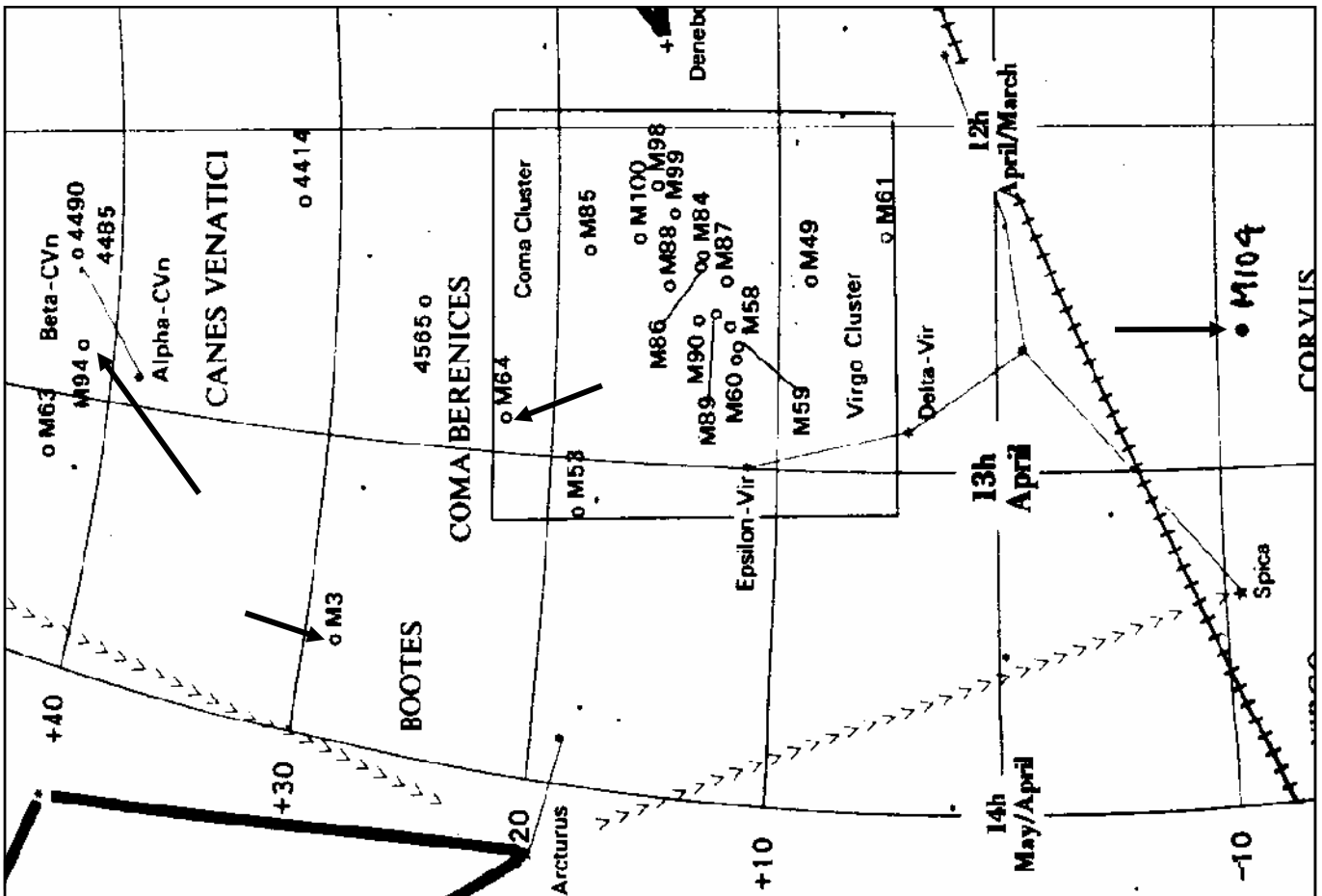
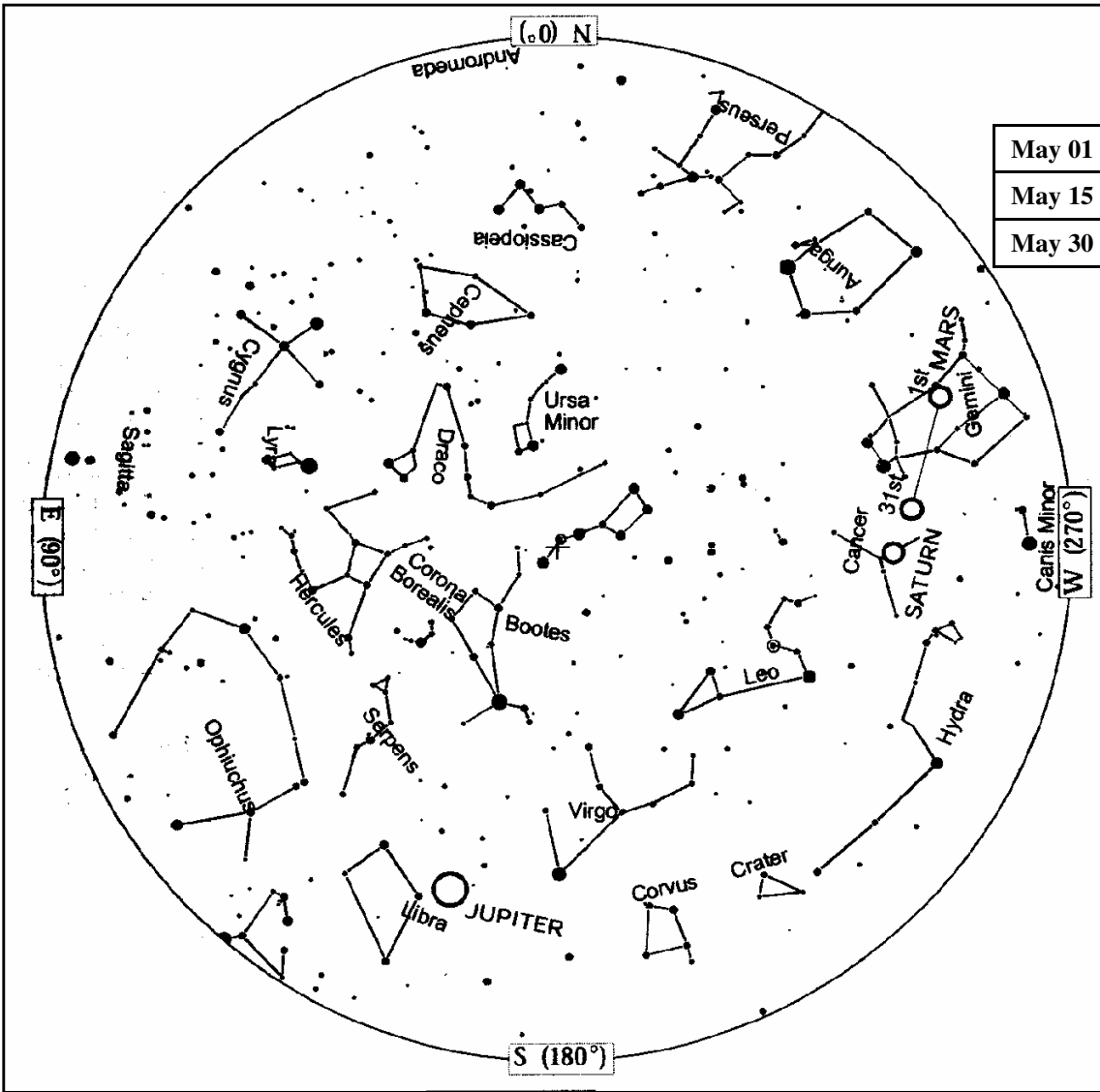


**Mars** speeds through Gemini and has two encounters with the Moon: on the 2nd and on the 31st. Its travel carries it towards **Saturn** which is slowly heading towards the open star cluster M44 in Cancer and which Mars also passes next month.

Gemini is also home to an open cluster: M35. Not as spectacular as its naked-eye neighbour in Cancer, it is still worth a view through a telescope. Dark skies and larger aperture will also reveal a companion cluster, NGC 215B.

Gemini can be found on its side in the West before midnight.

May 01	at	24:00
May 15	at	23:00
May 30	at	22:00



## A Desert Outing

Do-oh, Da-ah, De-ee. Good morning, it is Wednesday March 29<sup>th</sup> and it is 2:30 am. Coffee and muffins are available until 3 am at which time we shall begin boarding the buses. We are already up and are almost ready to get some breakfast, if that is what you can call it at this time of day, so the wake up call did not come as a rude awakening as it probably did to some of our fellow passengers. When we arrive in the restaurant there is more than just a few buns on offer and the waiting staff seem remarkably cheerful considering the early start, perhaps they are looking forward to an easy day ahead with no passengers around. We both eat a hearty breakfast of assorted fruits and bread rolls; we know from experience that lunch today will be little more than a light snack.

With breakfast over we all wait for the call to start boarding the coaches. The call is made and 800 excited eclipse chasers make their way to the gangways to collect their lunch boxes and find a seat on a coach. Which one to choose? we know No 6 is one to be avoided, two 4 hour journeys in that one yesterday was enough for us. 'Plenty of seats in the buses in the back row' shouts someone. I see bus No 13 at the back, I'm not superstitious and start towards it, 'Almost empty in here' shouts another voice from the coach next to us. It doesn't look like it is held together with filler and Duct Tape so we board it and choose a seat somewhere near the middle. I can't see any binder twine holding the seats together, and they seem quite firm when pulled and pushed, my confidence rises a little. Yesterday on bus 6, I was puzzling over why the seats in front of us were tied to one another with a piece of binder twine. I thought that it had something to do with the seat back on one of them not staying upright. On the return journey while descending from the Green Mountains to the coastal plain down a steep winding road I discovered the real reason for the string. On a particularly sharp right hand bend I found myself, much to the surprise and merriment of my fellow passengers suddenly sitting precariously next to the person on the opposite side of the aisle and a yawning gap where my seat should have been. At the following left hand bend as I returned, the passenger two seats forward gave a repeat performance from the other side. We spent the few miles amusing everyone by taking turns at sliding back and forth across the aisle. Apart from being some of the most uncomfortable seats I've sat in you can see now why bus No 6 was not top of the list for a long trip.

I look at the coach alongside proudly sporting the name El Joker Travel, confidence sinks back again. It's not long before we are full and move off, not that we will be going far, just to the harbour gate where we will wait until all coaches are ready to go. This does not take too long and by 3:30 our police escort vehicles turn on their flashing lights and we are off, confidence rises again.

This is a much better start than the trip yesterday when the local Libyan authorities, whoever, or what ever that may be, insisted that only one coach could be filled at a time and then had to wait for the rest. This along with a few other minor irritations turned what should have been a 3 hour journey into one of almost five, each way. It looks like today won't be that bad, the eclipse site is about 6 hours away and an extra hour has been allowed to so we should get there in time. We have about 8 hours to get there, and at this time in the morning there is no traffic on the roads. After about 10 minutes travelling along deserted roads we stop, not a good sign. No one can believe it when we realise that the reason we have stopped is to refuel the coaches. There is only one pump working and it takes until 4:45 to fill all the tanks. Confidence takes another blow. We are all thinking that forward planning is obviously not a strong

point, but find out eventually that the 'Authorities' would not allow the buses to leave the port to refuel the night before. Eventually we are on our way again and start heading south towards the desert. I can't see too much through the windows, it may be the edge of the Sahara but early in the morning it is cold outside, and with air conditioning running it is cold inside too, so all the windows a steamed over. I clear a patch and can see a dazzlingly bright Venus far higher and brighter than we ever see it back home, no wonder it was such a venerated celestial object.

After a couple of hours or so we reach a largish town called Ajdabiyah and stop again. This turns out to be what our transatlantic cousins would call a comfort stop. It was a stop, but there was nothing comfortable about it. To spare those of a delicate disposition I shall say no more than there was just one very long wall.

As it the dawn begins to break we drive through a thick low lying mist. We could be back home, the road and ground are wet; it looks just like a picture postcard autumn morning.

Once the sun is up and the mist clears we are well and truly in the desert where we are following in the path of some power lines. These power lines and their pylons are to become constant travelling companions. They merge into a blue-grey blur in the far distance in front of us and looking back they form the same indistinct shape behind. The road hardly bends and the nearest thing to a hill is a bank a few hundred yards to our right. This is the Great Man Made River. A pipe line taking underground water from the desert to the coast; in about 150 years the desert will be completely drained. One of our travelling companions remarks about the swans we keep passing. These abstract sculptures are in fact access points into the pipeline. Occasionally we pass a smaller one, a cygnet perhaps.

Boredom sets in with a vengeance – I spy with my little eye something beginning with S. As the sun rises further and the ground begins to warm up we can see something beginning with M – mirages. Not the poor excuses that we see on the roads on a warm summer afternoon. These are huge and very realistic lakes with reflections of the far shores and islands in the middle.

After the novelty of the mirages wears off and the boredom starts again we see trees and habitation in the distance. This is Jalu Oasis. It is not at all like the picture book image of lakes surrounded by date palms and drinking camels. There are plenty of date palms but they are in neat plantations, and the only camels we saw were on the back of a lorry. As for lakes they are just mirages. Once through Jalu we are in the eclipse zone of totality, a total eclipse is as good as guaranteed from now on.

With the date palms behind us it is back to sand, pylons and swans. With only fifty more scenic miles to go some of our party are getting anxious, it is only two hours before first contact and there seems to be no end to this journey in sight. There is less than one hour to go and we arrive at a sign post saying that this is an official eclipse observing site. We stop, there is a traffic jam, we are 300 miles into the Sahara Desert, miles from anywhere, and stuck in a traffic jam. Someone with a GPS receiver declares that we are still 5 miles short of our destination, I'm glad someone knows where we are. Some of the cars try to get round by driving on the sand; a 'boy-racer' car does not turn into a 4x4 just by heading into the sand, they get stuck. It is something to watch while we wait for the police escort to clear the way which eventually they do, and we head off road along a dust track. Visibility is so bad we have to crawl along, it is worse than any foggy London film set. After what feels like ten miles we stop again, another traffic jam.



This one beats us and it is decided that here is where we will watch the big event.

Everyone leaves the buses and heads out into the desert to try to get as far away as possible from the dust. It doesn't help: vehicles are driving all over the sand. We find a quiet spot and settle down to watch the big event unfold. It seems only few minutes before someone declares they have first contact, the eclipse has begun. We stopped only just in time.

A scrape in the sand makes a good projection screen; it won't blow away in the wind and can be angled just right. There is a noticeable bite taken from the sun's disc by the time I project the first image. Not much will happen for a while yet. The site is getting quite crowded as more and more people arrive and set up small picnics while waiting for the big event to happen.

The sky slowly darkens and the temperature drops. With most of the sun hidden it feels quite chilly in the wind. Things start to lose their colour and the edges of shadows become more distinct as the sun shrinks to a tiny crescent. Totality is not far off now, only a few minutes away. The sky to the west looks dark and menacing as the shadow approaches. I watch as the sun slips away behind the moon. Oh! What's happening to the ground! I look down it is like being in a science fiction film just before the end of the world or some other calamity is about to strike. There are dark waves rippling across the ground getting stronger all the time. It is like being at the bottom of a giant swimming pool watching the waves ripple over the bottom. Suddenly the motion stops and the ground is dark. I look up – no photo can come close to matching the sight that hits your eyes. The 'black sun', the pearl white corona with its delicate filaments and the indigo sky, the sight of a star in action, it is a giant magnet. I can see why people chase this experience time and again. The horizon glows a delicate shade of orange, the colours of dawn all around. Venus and Mercury stand out against the deep blue of the sky, I can see them any time back to the sun. Through the binoculars I can see some bright red prominences to the east before they are covered to be replaced by more on the west. Then a bright red sliver begins to appear, the eclipse is almost over, it gets brighter and brighter. Binoculars down and a piercing flash as the sun re-emerges again no photograph can show the spectacularly dazzling intensity of the diamond ring. Then it is too bright to look at. The ground starts rippling again this time the intensity of the ripples slowly fades as normality is resumed. To watch the partial phase as the sun returns to full brilliance is an anticlimax after having seen totality. We have our picnic lunch to celebrate and contemplate the reality of the return journey.

Some hours later we finally set off back to the ship. Our coach is a little more crowded than on the outward leg. One of the buses got stuck in the sand and bus No13 broke down on the way out, perhaps I should be superstitious after all. The roads are clear, the traffic jams are all gone and all goes well, it looks like we are the last to leave the site and are on our own trying to catch up with the rest of the convoy. This did not take that long, we catch up at the next garage where there is queue to refuel. This time there is more than one pump working, and some buses have already filled up. We still hang around for the best part of an hour as more buses arrive; we were not last after all. Our minds look anxious and order everyone back on board, not that we get back on the road too quickly.

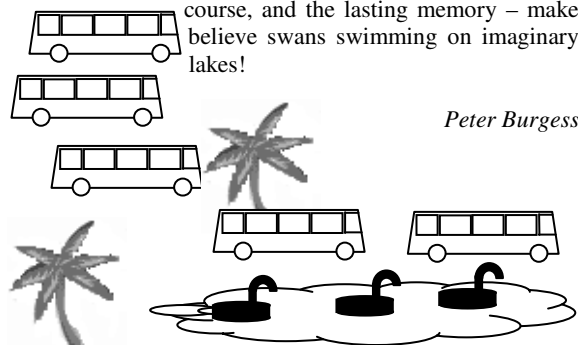
In the fullness of time we are off again back into mile upon mile of sand, pylons and swans. This was a time to swap stories with our newly acquired companions, and we find out that it was not just bus 13 breaking down and one of the buses getting stuck that were memorable events. One cou-

ple changed buses after a frightening outward journey when their driver fell asleep at the wheel twice and nearly had a serious accident on both occasions. It was a magnificent experience but I wouldn't want to risk my life to see it. As the sun sets we all try to spot the elusive green flash, no luck today, the horizon is too close and there is a thin band of now red cloud on the horizon. As the red slowly fades into the west and the sky darkens from the east we can start to see the stars come out again. There were numerous remarks as to how much better the sky was here even through the coach window. There certainly were plenty of stars to be seen, even from my inside seat the view was good, but different to the back garden, I can't see Canopus at home. My neck starts to ache as we approach a town; it looks quite big with lots of bright mercury vapour lamps outside the shops. I recognise that wall, we are at Ajdabiyah, two thirds of the way back. I hope that the ship is going to wait for us all, it was due to sail over an hour ago, and we will be very lucky to get back in another two maybe three. More boredom, this time it is dark and we can't even see the desert go by. So people are getting fed up and hoping that every light we see in the distance is the outskirts of Benghazi. It is not of course.

We slow down for a police check point, a relatively common occurrence here. This time we are not just ushered through but have to pull over along with the rest of the convoy. Now what? After what seems an eternity, in reality less than a quarter of an hour we find out that a French couple got left behind at the refuelling stop. They had found a restaurant (how ? where ? there was nothing else there) and had a meal; when they had finished the buses had gone. There was some debate over whether on bus or all buses had to go back and collect them. At least a 5 hour round trip. After more haggling and exited gesticulation we all move off again. They are being brought back by police car and if they are late they will have to fly on to Tripoli and meet up again there. As you can imagine our Gallic cousins were not in anyone's good books that evening. Time dragged on as we passed through village after village, then we are passed by a fast moving police car. That is our French friends being whisked back to the ship; they were not going to miss it they were going to beat us in by almost two hours. We worked that out by seeing what looked like the same car dashing back the other way a little while later. What do they know that we don't?

Benghazi traffic at almost midnight is mayhem, traffic jams, games of chicken at roundabouts, everything you could imagine to be. The port area is a little quieter as we enter it. Then start the scrum to get back on the ship which has waited for us, of course. We hear an announcement – a buffet meal will be available, shall we eat? Just a snack, and then to bed. After a quick clean up we enter the restaurant and are shown to our table by waiters who seem just as cheerful as they were almost 22 hours ago. On offer is not a buffet but a full dinner, we celebrate our first eclipse, which, according to all the seasoned eclipse chasers, was the best they had ever seen.

22 hours for 4 minutes of totality – was it worth it ? Of course, and the lasting memory – make believe swans swimming on imaginary lakes!



Peter Burgess



The Executive Committee has decided to add Rosemary Pears' name to the VAS Honours Board at the Observatory. No need to say why since all that we use in instruments, computers and projectors has been funded from Awards for All as a result of Rosemary's determination not to let the paperwork get the better of her.

Congratulations, Rosemary, it's well deserved.

### Talking Telescopes, whatever next?

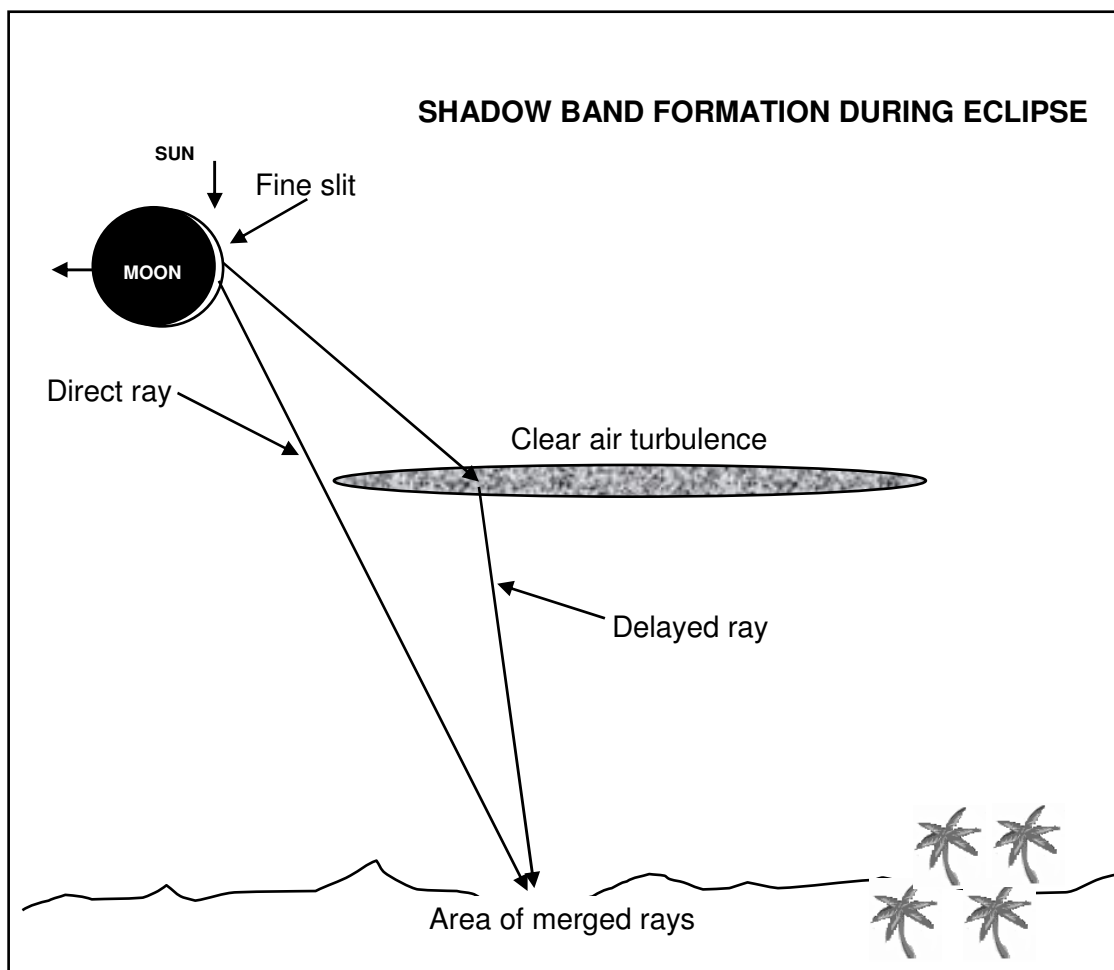
It's bad enough when the in-car Sat Nav starts wittering at you when you miss a vital turn on a journey, but the thought of your telescope nagging you to make sure the dew cap is nicely warmed on a frosty night is something reminiscent of a nightmare. No more idle scans of a welcoming dark sky if this beast fancies looking for a rarish Messier Object...

As spotted at Bournemouth recently





## SHADOW BANDS DURING ECLIPSES



**P**eter Burgess in his account on Page 7, describes the ground being covered in strong wave-like ripples just before totality and immediately after the event.

What he was lucky enough to witness was a phenomenon called '**Shadow Bands**'. Not many have seen them as they are quite fleeting in their brief existence and, because of their ephemeral appearance, are very difficult to capture with a camera.

How do they occur? Looking at the above picture, you will note that the Moon has just left the Sun's disc, resulting in a very fine slit of light in the sky. In an optical laboratory it can be demonstrated that light shone through a narrow slit onto a screen will set up a pattern of dark and bright bands, much

like a bar code on a packet of food from the supermarket. The pattern results from the reinforcement of rays that are in phase (bright) and cancellation of rays that are in anti-phase or half a wavelength difference (dark).

In the Earth's atmosphere is a considerable turbulence due to heating of the air. Light passing through such areas will be shaken about and emerging rays will have been delayed in their transit. Down on the ground, the direct rays (undelayed) will mix with the delayed rays and an undulating pattern of reinforcement and cancellation appears on the ground in the shape of Shadow Bands.

As the slit widens with the Moon's passage away from the Sun, the mirage disappears.

## INTERESTING FACTS PART 20

**Seeing as it is the Isle of Wight  
2006 Walking Festival this  
month, this seems appropriate:**

**The human body has 639 mus-  
cles, 206 bones, 230 joints all  
perfectly aligned to enable us to  
put one foot in front of the  
other...**

## Website of the Month

Our Webmaster, James Young, would like to advise VAS Members that the new website for our Society is up and running at:

<http://www.vectis-astro.org.uk/>

### SPACE WALKING FOR BEGINNERS?

On May 18th, your trusty Editor is organising **A Short Stroll Around The Solar System** as part of the Isle of Wight Walking Festival 2006.

The venue is the Recreation Ground alongside the Observatory, where our 'String-Thingy' will be put in place to dem-

onstrate the size of the Solar System to a scale that just fits across the field's diagonal. This demonstration has proven popular with IOW schoolchildren during educational visits to the Observatory, so it might just appeal to tired visitors unwilling to totter more than a couple of hundred yards each way after having gone around the Walk the Wight course the previous Sunday. Two Solar System Strolls will take place, one at 10:30 am, followed by the second one at 2:30 pm.

Donations are to be requested to assist with Observatory running costs. Visitors will be able to look over the Observatory equipment and, if the skies are favourable, have a go with the solar telescope under supervision outside.

Any Members able to assist during the above Strolls would be most welcome. Please give me a call on 407098

*John Langley*

## Last Words

Using a conventional assembly line, one can see a car being built in a few hours at a rate of one component every second. An airliner is more complex with around 6 million parts, and takes several months to build. A manufactured molecule, something being developed by scientists right now in research programmes into nanotechnology, could consist of  $10^{25}$  or 10,000,000,000,000,000,000,000,000 parts. If one calculates how long it would take to make one of these molecules, even at an assembly rate of a million parts per second, it would take 3000 trillion years, which is longer than the known age of the Universe.

Obviously, conventional assembly lines are out of the question, so just how will the problem be resolved? Answers on a postage stamp, please. (And that was a strong hint!)

Submissions to the **NEW ZENITH** are very welcome and should be sent to the the following address

The Editor **NEW ZENITH**  
'Keepers Lock', Youngwoods Way  
Alverstone Garden Village  
Sandown PO36 0HF  
Tele: 01983 407098

E Mail: [john@vlangley.freeserve.co.uk](mailto:john@vlangley.freeserve.co.uk) (any attached files in Word Document format, preferably)

### FIND VAS ON THE INTERNET

Members should note the Vectis Astronomical Society Website address:

<http://www.vectis-astro.org.uk/>

**MATERIAL FOR THE NEXT ISSUE TO BE RECEIVED BY THE 6TH OF THE MONTH**

The Vectis Astronomical Society and the Editor of the New Zenith accept no responsibility for advice, information or opinion expressed by contributors