WAS NEWS

Monthly Newsletter of the **W**orthing **A**stronomical **S**ociety

Official website: www.was.org.uk
Affiliated websites: www.observatory99.freeserve.co.uk

Number 167 **September 2003**

ALMANAC

All times U.T. add one hour for B.S.T.
September / October

LUNAR

September	**Date**	**Time**	**rise**	**set**
First Quarter	3rd	12.34	14.08	21.43
Full Moon	10th	16.36	18.54	04.40
Last Quarter	18th	19.03	21.19	14.14
New moon	26th	03.09	05.55	18.18
October				
First Quarter	2nd	19.09	14.29	21.18
Full Moon	10th	07.27	17.37	06.07
Last Quarter	18th	12.31	21.58	14.39
New moon	25th	12.50	06.19	16.53

EARTH

September	**Sunrise**	**Sunset**
3rd	05.15	18.43
10th	05.26	18.27
18th	05.39	18.09
25th	05.50	17.53
October		
2nd	06.02	17.37
10th	06.15	17.19
18th	21.58	14.39
25th	06.19	16.53

PLANETS

(as at Sept 26th.)

	Constellation	Rises	Sets	Mag.
Mercury	Leo	04.12	17.26	-0.4
Best morning apparition of the year				
Venus	Virgo	06.51	18.15	-3.9
Unfavourable				
Mars	Aquarius	17.16	02.41	-2.2
Morning object visible low in the south east				
Jupiter	Leo	03.25	17.09	-1.8
Morning object				
Saturn	Gemini	22.30	14.40	+0.1
Morning object				
Uranus	Aquarius	16.48	02.53	+5.7
Difficult but well placed				
Neptune	Capricornus	16.01	01.09	+7.9
Difficult but well placed				
Pluto	Ophiuchus	11.58	21.42	+13.9
Difficult				

PHENOMENA

Day	**Hour**	
		September
9th	12	Mars 1° S. of moon
11th	02	Mercury in inferior conjunction
20th	04	Saturn 5° S. of moon
20th	09	Mercury at stationary point
24th	06	Jupiter 4° S. of moon
24th	20	Mercury 4° S. of moon
26th	22	Venus 2° S. of moon
27th	00	Mercury at greatest elongation W. 18°
27th	08	Mars at stationary point
		October
6th	16	Mars 1° N. of moon
17th	14	Saturn 5° S. of moon
22nd	02	Jupiter 4° S. of moon

Minima of Algol

September 16th 04.42 19th 01.30 21st 22.18 24th 19.06
October 9th 03.06 12th 00.01 14th 20.48

Lunar Occultation's

Times as at W.A.S. Observatory

Date	**U.T.**	**S.A.O.No**	**Mag**	**Phase**
Sept	**h. m. s.**			
12th	21.50.12	109613	8.0	reapp
13th	00.51.15	109671	7.8	reapp
13th	01.43.45	109687	8.9	reapp
15th	01.12.31	93016	7.6	reapp
16th	04.26.15	93436	6.4	reapp
17th	23.13.28	76858	5.9	reapp
17th	23.23.28	76869	8.6	reapp
18th	00.17.49	76881	9.1	reapp
18th	00.30.33	76885	8.3	reapp
18th	01.18.48	76915	8.4	reapp
18th	01.34.50	76911	8.7	reapp
18th	01.45.00	76916	8.5	reapp
19th	02.53.06	77775	4.9	reapp
19th	03.05.18	77782	8.9	reapp
19th	03.53.48	77827	8.5	reapp
October				
3rd	19.15.32	188480	9.1	diss
3rd	19.55.43	188503	8.9	diss
3rd	20.30.34	188521	8.9	diss
3rd	21.31.44	188559	7.6	diss
10th	20.32.17	109926	5.1	reapp

This is only about 20% of the predictions for the W.A.S. observatory.

Dave Wells

Editors Note

Welcome back one and all! Here's hoping that you all enjoyed your summer, and after all that heat are looking forward to cooler autumnal climes with of course the darker evenings and better celestial viewing that that brings. Please pay special attention to the 'From the Chairman' article but of course enjoy the rest of the newsletter.

Rob

Dates for your Diary

David Levy talk.

Nick Quinn

The Southern Area Group of Astronomical Societies present An evening with David Levy on Wednesday 24th September 2003 at 20.00hrs at Chichester High School for Boys (Lower School), Kingsham Road, Chichester.

David has discovered 21 comets, written 29 books and won an Emmy award for writing the television documentary "Three Minutes to Impact". Don't miss this unique opportunity to meet one of the World's leading observational astronomers.

David's website http://www.jarnac.org Tickets, £5 from:- The South Downs Planetarium, Chichester or Nick Quinn, 15 Newham Lane, Steyning, West Sussex, BN44 3LR Telephone: 01903 814090 Please make cheques payable to "Worthing Astronomical Society" and enclose an SAE Promoted by Worthing Astronomical Society, www.was.org.uk and The South Downs Planetarium, www.southdowns.org.uk/sdpt

Coronado Draw, David Levy's UK tour has been arranged in conjunction with the 2003 Whirlpool Star Party. Part of the cost of David's tour is being met by a raffle. The price per entry for the draw is £3.30 and the winner will be announced at the WSP, 26th - 28th September 2003. 1st Prize is a Hydrogen-alpha MaxScope 40 telescope, donated by Coronado Filters. Tickets from Nick Quinn.

Reports

Solar Section Report - July & August, 2003

Section Director, Brian Halls

July began the way June closed. Numerous sunspots were visible on the solar disk.

This pattern of activity remained for much of the month. For example,during the first week, a large active area, 10397 (N12^0 L=035^0 area on 7th = 930, class Fkc) crossed the face of the Sun, disappearing over the solar limb on the 11th. There followed a large number of C-class sunspot groups during the second week – 6 of these type of groups out of 8 during one day! Another large F-type group (10410) appeared in the northern hemisphere, though it was not as long lived as the previous group.

During the third week, the southern hemisphere threw up a large naked eye group at S13^0 (region 10410), though this group was not as magnetically active as the others in the north and faded away prior to its disappearing over the western limb.

The end of the month ended on a quiet note with a dramatic drop off of the number of sunspots and groups visible,

This lasted for the first few days of August when groups slowly began to increase in number. A large magnetically active group at S18^0 (10424) dominated the face of the Sun during the first and second weeks, which was replaced almost as soon as it went over the west limb by another group – 10431, at S13^0. This lasted the duration of its trip across the sun's disk.

After this, sunspot activity remained low until the last week of August when, once more, sunspot groups began to appear in large numbers.

Reports were received from Graham Boots, Brian States (every day in July observed) and the Director.

The Planets in September 2003

Glen Thomas - Planetary Section Director

Mercury has a favourable morning apparition from the middle of the month. Look for it around the start of civil twilight in the East (see table).

Date	Time	Alt °	Az °
Sep 17	6:06	3.1	85
Sep 19	6:09	5.7	87
Sep 21	6:12	7.7	88
Sep 24	6:17	9.7	90
Sep 27	6:22	10.4	92
Oct 01	6:28	9.8	93
Oct 05	6:34	8.0	95
Oct 08	6:39	6.2	95
Oct 11	6:44	4.2	96
Oct 13	6:47	2.8	97

Venus is too close to the Sun to easily observe as it recovers from an **Aug 17th** superior conjunction (far side of the Sun).

Mars is now past its August opposition, rising around sunset and highest in the sky (23° altitude) at **midnight** early in the month and around **22:00** BST in early October. As an evening object, it is now easier to see (and show to others), and Mars remains larger in the eyepiece than its best in 2001 (20' 54") throughout the month.

Jupiter will not be favourable again until at least October as it slowly draws away from its Aug 22nd conjunction, but it may be seen 8° to 10° above **Mercury** later in the month. Being brighter Jupiter is a useful signpost for finding its diminutive companion.

Saturn is a brilliant morning object and is the best placed planet for observation. Look to the East at the start of the morning civil twilight (from **05:55** to **06:30** during the month). No other planet rises above 30° during the hours of darkness, but Saturn reaches **48°** altitude on the morning of the **10th** and **60°** over the SE horizon by the end of the month. The rings are spread wide still, making for glorious views.

Uranus is near **Mars** in Capricornus and will be well placed during the next month, closing from 6° to 4° above the red planet. Visibility as for Mars, but at only magnitude 5.7 you will probably need binoculars even to see the planet, and a telescope to see any disc.

Neptune is close to Uranus and Neptune, but is best seen about an hour earlier over the southern horizon. At magnitude 7.8 you will need binoculars and a good chart to identify Neptune.

Pluto disappears into the low altitude haze before the sky is dark and is not suitable for observation.

Notices

From The Chairman

Brian Halls

I hope you all enjoyed the summer break – and the fine weather that went with it!

The last couple of weeks have seen Mars well placed and this situation will last for some weeks to come, so if you have missed it, there is still time to see the planet.

This month we see nominations for Committee Members. Every post on the Executive Committee comes up for annual re-election but this year is different because I now have to stand down as Chairman as I have reached the maximum duration (three years) that I can serve in this office.

Is there someone who you think will make a good Chairman – might it even be you?

At the AGM in October, the new amended constitution comes into force with changes in the Executive Committee. Three new posts have been created – **Business Secretary, Meetings Secretary, and Members Secretary.** These posts incorporate the present Secretary and Assistant Secretary positions.

For the last three years, the Chairman has acted as Acting Secretary – something that is not a particularly good thing for the Society, but one that had to be undertaken to keep the Society operating.

It would be, you will agree with me, unfair for a new Chairman to have to take on the added responsibility of Secretarial duties.

Again, I ask is there anyone who you know that may be interested in taking up one of these positions? Are you interested?

Naturally, any newcomer to the job will not be thrown in the deep end; the rest of the Committee will be on hand to help and advise – as I will, if the need arises.

The posts of Treasurer and Vice-Chairman are also up for election too, so please consider how you may be able to help the Society.

Without Committee members, the Society cannot run efficiently, so if you enjoy the Meetings and the Society please remember this.

There are other members of the Committee – the *ex officia* Section Directors, Librarian, Newsletter Editor, Web Master. If anyone feels they would like to have a crack at any of these jobs, please let me know if you are interested or know of anyone who might be.

All nominations have to be in by no later than the 24th of September. Each nomination should have the name of the nominee (please ensure the nominee is aware of there name being put forward!!), the name of a proposer and a seconder. Naturally, nominee, proposer and seconder must all be members.

I hope to hear from you. Soon!

Email

Are you on e-mail? If so do you have the monthly newsletter sent to you in this manner? If not, would you like too. Please contact the Editor, whose name is on the back of this newsletter.

Articles

***July Lecture Reviewed** - Report by Vanessa Wegner*

White Dwarf Stars

Konrad Maylin-Smith

Unlike many astronomical phenomenon the name for these objects is accurate, they are white and they are dwarfs. The Hertzsprung-Russell diagram also shows them as very hot and very dim. It all started in 1838 when Bessel determined the distance of 61 Cygni as over 105 million million kilometres. Found in Cygnus Bessel observed that the star moved across the sky in a wobble like fashion and concluded that the wobble was caused by the pull of a massive object.

In the constellation of Eridanus near Orion there is an interesting triple star system, Omicron is a wide double star, the fainter of its components is a white dwarf star and it has a companion, a red dwarf. This is very unusual.

Despite the opening statement some white dwarfs are actually orange, these are the very old ones. White dwarfs cool off so slowly that the universe is not old enough for them to have cooled off completely. Some books refer to black dwarfs; the final stage but they don't exist yet.

The Helix Nebula in Aquarius is a beautiful example of planetary nebula, they only last for about 60,000 years and they are precursors to white dwarfs. The central star in the Helix Nebula has a temperature of about 85,000 degrees; this needs to cool off before reaching white dwarf stage.

A superb image of Antares taken with only a 4-inch refractor also showed the M4 globular cluster. Globular clusters should in theory be home to white dwarfs because they are usually old star systems. The Hubble has indeed found a huge amount of white dwarfs present in M4 proving that they are ancient objects.

A nova is a star that that undergoes a sudden, unpredictable increase in brightness, this is because the star is one half of a binary system, the other star is a white dwarf. White dwarfs have high surface gravity and this will attract hydrogen from a dying star, eventually the gas will collapse onto the surface of the white dwarf and the gas will become increasingly compacted. A nuclear reaction will take place on the surface of the white dwarf, which will dramatically shoot off the hydrogen into space, which is what we term as a nova. A white dwarf will collapse when it reaches a density of 80 tons per cubic inch; this is when we see a supernova. The last one was in 1987 observed from Peru.

Konrad`s enthusiasm and knowledge of such a complex subject made the talk fascinating and was well received by the audience.

How Long is a Second?

Bert Zetter

The Journal *"Nature"* for 12 June 2003 reports that, *"Astronomers leap to defence of extra seconds"* in a *"battle royal"* on time developing among scientists. Astronomers of the Ancient World measured very accurately the natural units of time, the day, month and year, using the simplest observing instruments and careful counting and averaging over long periods of time. They also devised the man-made intervals of time we still use. The Egyptians subdivided the day duodecimally into two 12 "hour" periods measured by sand and water clocks and by the rising constellations at night. The Babylonians gave us the week and also the sexagesimal subdivisions of the hour into 60 minutes, each of 60 seconds. They were purely theoretical intervals of time then. It was not until the 17th Century that pendulum clocks gave physical reality to the second. What is at issue in the current debate?

Even as clocks took over from obelisk and sundial, the time was always local time differing even in neighbouring villages. Standardised clock time became imperative as the modern world opened up and communications improved, particularly with the age of steam and the telegraph in the 19th Century. By the mid-19th Century, railway companies in Britain abandoned local time and used Greenwich time for their time-tables and Greenwich time became popularly known as railway time. In 1880 the national clocks were synchronised with Greenwich time by Act of Parliament. Similar economic and social pressures were at work to standardise time in other countries and most, like Britain, adopted the time of their capital. Countries with a wide range of longitude realised that a single national time was not suitable and the USA and Canada used a system of time zones for their trans-continental railway timetables.

World pressure led by the USA resulted in the calling of the Washington International Conference in 1884 *"for the adoption of a single prime meridian and a universal time".* The Conference acknowledged the strength of practically worldwide usage and officially recognised *"The meridian passing through the centre of the transit instrument at the Observatory of Greenwich"* as the *"single prime meridian for all matters in place of the multiplicity of meridians which now exist".*

The Conference went on to recommend the adoption of a universal mean solar day from zero to 24 hours *"to begin for all the world at the moment of mean midnight of the initial meridian, co-inciding with the beginning of the civil day and date of that meridian".* It divided the world into time zones dependent on Greenwich and established the International Date Line. Thus, after 1884, Greenwich determined the duration of the global day and by implication of the second of time as 1/86,400th part of a day. This standard world civil time came to be known as Universal Time, UT.

France abstained and continued to use the Paris meridian and Paris mean time but did persuade the 1884 Conference to study the decimilisation of *"angular space and time".* No progress has been made in either but they still have French support against what they see as a whimsical survival of sexagesimal numbering from Ancient Babylon. The decimal division of 100 grads to the minute and 100 minutes to the hour, that is 240,000 grads to the day, would begin a whole new era in the perception of time and its measurement. The suggestion in the current debate to change the length of the second has been dismissed by one astronomer as *"completely lunatic"* but the grad is there for the taking.

At the 1884 Conference, Algeria, then a French colony, proposed as an alternative to define universal civil time as *"Paris Mean Time diminished by 9 minutes 21 seconds",* that is by the longitude Paris is west of Greenwich. The convoluted resolution failed but it is an interesting example of political pressures at work in the sphere of science. France adopted the resolutions of the Conference in 1911. By then France and Britain were allied in the *Entente Cordiale* to face what they perceived as the threat of German military power. The demands of national security helped the French overcome their scruples about measuring longitude and time from Greenwich. However, the verbal device persisted in the French law which stated that *"official time in France . . . is the Paris mean time delayed by 9 minutes and 21 seconds"* and the *'initial meridian"* was defined in similar terms without any mention of Greenwich, *"to spare national susceptibilities".*

Following the French acceptance of the recommendations of the 1884 Conference, another International Conference on Time in 1912, called on the initiative of France, gave it the distinction of broadcasting the first worldwide time signal in July 1913. The First World War intervened and it was not until 1924 that the Greenwich *"pips"* were first broadcast ensuring instant standardisation of the world's clocks on UT and the practical standardisation of the second. The 1912 Conference set up the *Bureau international de l'heure* in Paris, BIH, to regulate world time. It officially recognised UT as the standard time scale for all purposes in 1925.(The BIH was later incorporated into the *Bureau international des poids et mesures*, BIPM, monitoring all SI Units including that of time.)

In the 20th Century the irregularities in the earth's axial rotation became increasingly apparent. Besides cyclic irregularities the earth's rotation is slowing down due to tidal friction, so the days are growing longer and the length of the year in days correspondingly shorter. The internationally accepted standard second at 1/86, 400th part of the Greenwich mean solar day is growing longer with the lengthening day, unacceptable in a standard unit. So in 1956 the BIH redefined the second as a fraction of a single fixed year, the 1/31,556,925.9747th part of the tropical year on 1st January 1900. Astronomers had at last defined the second in its own right. Confusingly the second of daily life was still growing longer and diverging steadily from the SI second of 1956. Before the problem became urgent the whole basis of time-keeping was revolutionised and the world is in the midst of another round of discussions even now on the unfinished business of defining the second.

Particle physics found a timekeeper far more uniform than measuring and averaging the earth's irregular movements in relation to the sun. The frequency of vibrations inside an atom, difficult though it is to comprehend, is the timekeeper of the modern age. Quartz clocks are as old as 1929 and a cheap quartz watch to-day keeps time to an accuracy of one second per month. The first reliable caesium-beam atomic clock was made in Britain, in 1955. Caesium clocks now operate with an accuracy of one second in about three million years.

The BIH has monitored electronic counting of the vibrations of the atom caesium continuously since 1st January 1958 with a battery of atomic clocks worldwide. The results were so convincing that in 1967 it scrapped the 1956 SI second dependent on the earth's orbit of the sun and redefined it as "*the duration of 9,192,631,770 periods of the radiation corresponding to the transition between the two hyperfine levels of the fundamental state of the atom caesium 133*". There was no immediate gain in more exact time-keeping from substituting the atomic for the astronomical second because within the limits of measurement they were the same at the time. But scientists now had a uniform SI unit of time immutable virtually forever. In 1971 the BIH recognised the atomic time scale based on the SI atomic second as the world standard. GMT was dethroned. The world's Atomic Time, TAI from the French Temps atomique international, is now the basis of all time-scales including the UT of 1884.

Logically that required a TAI day and year but solar time-reckoning was not discarded. Instead, UT was co-ordinated with TAI and renamed UTC. UTC ticks atomic seconds and, to compensate for the lengthening solar second, one TAI leap second is added to it when it becomes 0.9 seconds slow of TAI. UTC = TAI + Leap Seconds. Since 1972, 32 leap seconds have been added as determined by the IERS, the International Earth Rotation Service based in Paris. There is provision to apply negative leap seconds to compensate for some dramatic and unforeseen acceleration of the earth's rotation which so far has not been necessary. Leap seconds are inserted when needed in the last minute of December and June when those minutes become 61 seconds long. UTC like the discarded UT measures the earth's time relationship with the sun. Astronomers continue measuring the length of the year in terms of the axial rotation of the earth as they have been doing since the dawn of time measurement.

At the time, UTC was hailed as a necessary compromise *"accepting as the practical standard a time scale based on the TAI second but ingeniously adapted to maintain connections with the Universal Time as specified by the earth's rotation"*. It seems that the years of compromise are now over. Some scientists are critical of the existence of two different seconds, the atomic second and the second as a fraction of the solar day, and of two different time scales however successfully co-ordinated. UTC is ingenious but it is unscientific to establish a world standard time scale, TAI, and immediately modify it as UTC. Also there is the problem of the period between the insertion of leap seconds when UTC is out of time with TAI. Scientists working with the nanoseconds of telecommunications would get rid of UTC and leave TAI supreme registering perfect time forever. It is the International Telecommunications Union, ITU, which is looking into the length of the second at its world conference. It hopes to have a report ready for its Radiocommunications Conference in 2006. So astronomers must prepare to reckon not just with seconds but also with the nanoseconds of electronics in making their contribution to the debate as well, of course, as with the light years of the cosmos.

The ITU's case is strengthened by the confusion over GPS. No one navigates by the stars since GPS was set up in 1980. But GPS operates on UT and is not adjusted for leap seconds. There are dark hints from air-traffic controllers of potential air disaster in the existence of two different time scales side by side. Do away with UTC and leap seconds which are an expensive and troublesome nuisance to time-keepers worldwide every six months, propose the telecommunications scientists. Let GPS recalibrate its system on the single accepted world scale of time, TAI. If in the shake-up time should no longer be answerable to the celestial bodies it is only going the way of navigation.

What is there in defence of solar time? Time is more than the precise measuring of either infinitesimally small or infinitesimally large, intervals of time. Time is the framework within which human life is lived from conception to death and it is ordered by clock and calendar. An unmodified TAI with a TAI day and year ignores this human straitjacket. TAI does not keep solar time. The solar second is slightly longer than the TAI second and the discrepancy is increasing with the lengthening of the solar second. The TAI day would end, progressively, before the end of the 24 hour astronomical day and the 365-day-TAI-year(366 in leap years) would come before the end of the solar year. *"Eventually…you're having lunch when it's getting dark"*, as *Nature* points out and TAI calendar spring would occur in the solar autumn months. Is it possible to keep TAI time divorced from everyday life? Life is still sun dependent and the circadian rhythm still controls our lives however sophisticated human time-measuring devices have become. Perhaps the slowness of the change would enable the human race to adapt to TAI time as clock and calendar became out of step with the sun. The suggestion of lumping leap seconds together in, say, a leap hour every thousand years has not been welcomed. Perhaps the British experience with BST would help here.

The human race has faced the problem of an inaccurate calendar before. Julius Caesar recognised that the sun rules when he inserted 90 days into the year 45 BC to bring its lunar calendar into line with the sun and then established the solar calendar with an automatic leap year. The Julian calendar gradually ousted the confusion of the many lunar and luni-solar calendars of the Ancient World and became the basis of the universally accepted civil calendar of today. Julius Caesar's year was a little too long and the error accumulated over the centuries. The Julian calendar slipped behind the solar year. which is why Pope Gregory in 1582 deleted eleven days from the Julian calendar to bring it back into harmony with the sun and refined the pattern of Julian century leap years to prevent the error appearing again. Calendar as well as clock record the earth's time relationship with the sun. They have always been made to fit the human need to live by the sun. The pressing social need in Pope Gregory's day was to keep the Christian Easter at the first full moon after the vernal equinox. Social needs today are more concerned with www. and e-mail but overall is the human need to have breakfast soon after rising at a fixed time by the clock and to take a summer break when the calendar is around the summer solstice. TAI is the demise of the astronomical guardianship of time standards; it would be the demise of the clock and calendar of the sun if UTC is abolished.

Astronomers are leaping to the defence of leap seconds not only for calendrical reasons. Telescopes worldwide are calibrated and timed by UT to fix on celestial positions and to track moving celestial objects. The Ephemeris astronomers use is based on UT. If TAI has complete triumph it would be costly to recalibrate all the telescopes of the world which would interrupt and handicap astronomical research into such fundamental concerns as the origin of the cosmos and of life and the existence of life outside this planet. Astronomy began with the practical activities of time-keeping, navigation and cartography. Cosmology and cosmic biology are the concern of astronomy today. It will be necessary to cost the value of the recent vast enterprises with which astronomy is now concerned and balance the vested interests and political and economic forces at work.

Whatever the outcome of the present discussions, it would be dangerous to assume that we have reached the end of the history of time-measurement. There may be surprises in store. Astronomers have detected rotating stars, pulsars, which emit pulses of radio waves at even more precise intervals than the physical activity inside the caesium atom. If a pulsar should be found having a suitable frequency, then the whole definition of SI units of time will be re-opened and astronomers may resume control of measuring time. The social problem will still need an answer. It will still be necessary to collate mean solar time with Pulsar Time or leave the human race to build up its own compromise between the two, eventually. Should social scientists be invited to submit an opinion?

WAS Ad

Telescope for Sale

Nick Quinn

For Sale: 6 inch f/7 Newtonian Reflector, £50
Telescope seeks new home and some TLC! Primary mirror made by Peter Bushby, in reasonable condition but would benefit from re-aluminising.
Manual, equatorial mounting on wooden tripod. Crayford Manor type focusser.
No finder, one 40 mm eyepiece.
Good all-round telescope for lunar, planetary and deep-sky objects.
Contact Nick Quinn, 01903 814090 for more details, to arrange viewing, etc.

What's on the Box

Saturday 13th September 2003

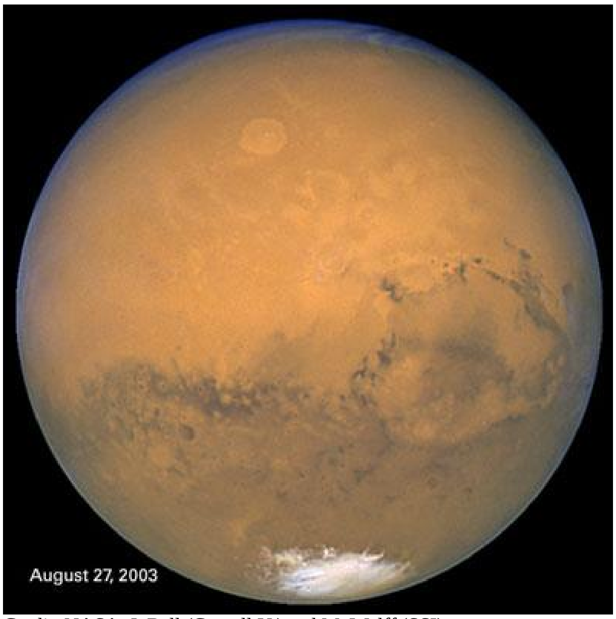
12.00 - 12.25 ~ **The Sky at Night.**

The Dark Ages. The world of astronomy with Patrick Moore. An interview with Professor Carlos Frank about the formation of galaxies and the birth of the universe. Also featuring the latest Mars pictures.

WAS News News

Hubble's closest view of Mars

Space Telescope Science Institute News Release



Credit: NASA, J. Bell (Cornell U.) and M. Wolff (SSI)

NASA's Hubble Space Telescope snapped this portrait of Mars within minutes of the planet's closest approach to Earth in nearly 60,000 years. This image was made from a series of exposures taken between 5:35 a.m. and 6:20 a.m. EDT Aug. 27 with Hubble's Wide Field and Planetary Camera 2. In this picture, the red planet is 34,647,420 miles (55,757,930 km) from Earth.

This sharp, natural-color view of Mars reveals several prominent Martian features, including the largest volcano in the solar system, Olympus Mons; a system of canyons called Valles Marineris; an immense dark marking called Solis Lacus; and the southern polar ice cap.
Olympus Mons [the oval-shaped feature just above center] is the size of Arizona and three times higher than Mount Everest. The dormant volcano resides in a region called the Tharsis Bulge, which is about the size of the U.S. and home to several extinct volcanoes. The three Tharsis Montes volcanoes are lined up just below Olympus Mons. Faint clouds are hovering over Arsia Mons, the southernmost of these volcanoes.

The long, dark scar, below and to the right of the Tharsis Bulge, is Valles Marineris, a 2,480-mile (4,000-km) system of canyons. Just below Valles Marineris is Solis Lacus, also known as the "Eye of Mars." The dark features to the left of Solis Lacus are the southern highlands, called Terra Sirenum, a region riddled with impact craters. The diameters of these craters range from 31 to 124 miles (50 to 200 km).

The image was taken during the middle of summer in the Southern Hemisphere. During this season the Sun shines continuously on the southern polar ice cap, causing the cap to shrink in size [bottom of image]. The orange streaks are indications of dust activity over the polar cap. The cap is made of carbon dioxide ice and water ice, but only carbon dioxide ice is seen in this image. The water ice is buried beneath the carbon dioxide ice. It will only be revealed when the cap recedes even more over the next two months. By contrast, the Northern Hemisphere is in the midst of winter. A wave of clouds covers the northern polar ice cap and the surrounding region [top of image].
This view of Mars reveals a striking contrast between the Northern and Southern hemispheres. The Northern Hemisphere is home to volcanoes that may have been active about 1 billion years ago. These volcanoes resurfaced the north's landscape, perhaps filling in many impact craters. The Southern Hemisphere is pockmarked with ancient impact craters, which appear dark because many are filled with coarser sand-sized particles.

Mars and Earth make a "close encounter" about every 26 months. These periodic encounters are due to the differences in the two planets' orbits. Earth goes around the Sun twice as fast as Mars, lapping the red planet about every two years. Both planets have elliptical orbits, so their close encounters are not always at the same distance. In its close encounter with Earth in 2001, for example, Mars was about 9 million miles farther away. Because Mars was much closer during this year's rendezvous, the planet will appeared 23 percent larger in the sky. Mars will not be this close again until 2287.

This photograph is a color composite generated from observations taken with blue, green, and red filters. A total of 11 filters, spanning a wide wavelength range -- from blue to near infrared -- were used during the observations. The shorter wavelengths show clouds and other atmospheric changes. The longer wavelengths, including the near infrared, reveal Martian surface features.

Credit: NASA, J. Bell (Cornell U.), and M. Wolff (Space Science Inst.)

Diary

September 10	*Cosmology* - Caroline Beevis
October 8	***AGM & Members Contributions***
November 12	***Space Weather* - Dr. Andrew Coates of Mullard Space Sciences Laboratory University College London**
December 10	***The Relevance of Astronomy to Human Culture* - Dr Francisco Diego University College London**
January 14 2004	***TBA***
February 11 2004	***Solar Neutrinos* - Dr. Robert C. Smith University of Sussex**

All Meetings **(bold)** are held on the second Wednesday of every month unless otherwise stated, at Heene Church Rooms, Worthing at 7.30 p.m. Meetings include the latest astronomical work, reports and, photographs by members. For further information please call 01903 521205, on the Internet at *www.was.org.uk* or
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Note to Contributors

Contributions & Correspondence for the **October** issue of WAS NEWS should be with the Editor by **October 1st**. All material for inclusion should be sent to the Editor.

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