



WAS NEWS

Monthly Newsletter of the Worthing Astronomical Society
www.was.org.uk



Number 199

July 2006

ALMANAC

All times U.T.

July LUNAR

| | | | | |
|---------------|------------------|-------|-------|-------|
| First Quarter | 3 rd | 16.37 | 12.12 | 23.28 |
| Full Moon | 11 th | 03.02 | 21.16 | 03.27 |
| Last Quarter | 17 th | 19.13 | 22.48 | 12.26 |
| New moon | 25 th | 04.31 | 03.52 | 20.40 |

EARTH

| | | | |
|------------------|--|-------|-------|
| July | | | |
| 3 rd | | 03.49 | 20.20 |
| 11 th | | 03.56 | 20.15 |
| 17 th | | 04.03 | 20.09 |
| 25 th | | 04.13 | 19.59 |

PHENOMENA

| Day | Hour | July |
|------------------|------|---------------------------------|
| 04 th | 00 | Earth at aphelion (152 M km) |
| 4 th | 20 | Mercury at stationary point |
| 5 th | 23 | Jupiter 4° N. of moon |
| 6 th | 07 | Jupiter at stationary point |
| 18 th | 07 | Mercury in inferior conjunction |

Minima of Algol

July 2nd 23.30 23rd 01.12 25th 22.00

Lunar Occultation's

Times as at Old W.A.S. Observatory

| Date | U.T. | S.A.O. No | Mag | Phase |
|------------------|----------|-----------|-----|-------|
| July | | | | |
| 3 rd | 22.40.55 | 138986 | 6.9 | Diss |
| 7 th | 18.26.05 | 183987 | 2.9 | Diss |
| 7 th | 19.28.47 | 183987 | 2.9 | Reapp |
| 14 th | 22.58.48 | 146505 | 6.9 | Reapp |
| 14 th | 23.39.10 | 146515 | 7.4 | Reapp |
| 27 th | 17.25.00 | Mars | 1.8 | Diss |
| 27 th | 18.44.00 | Mars | 1.8 | Reapp |
| 31 st | 20.18.29 | 157815 | 6.9 | Diss |

The list above is a selection of the more easily observed evening events, about 20% of the list available, there are lots more in the wee small hours for the insomniacs amongst us

Dave Wells

Editors Note

My name is Ozymandias, King of Kings: – ‘Look upon my works, ye Mighty, and despair’

Granted, honorary membership may have gone slightly to my head, but do you realise what it's like being able to call Mr Boots (The President) – ‘Graham’....

On a different note I know that Italic Pen nib grinding can be time consuming and consequently delay submission of that article for the 200th issue of WAS News, but don't fear I will accept entries carved on tree bark or written in blood.

Must dash –conference call with the committee at 7.00pm....

Mr Robert Davis (H.M)

Dates for your Diary

WAS Barbecue.

Jan Young

The annual WAS Barbecue is going to be held on **Saturday 5th August 2006**. If the weather is wet, the barbecue will be postponed to **Sunday 6th August** instead. Anyone who books will of course be contacted if this does occur. **PLEASE NOTE** this is a week earlier than our usual meeting date.

It is at the home of our treasurer Colin Knappit, whose address can be found on the back page of WAS News.

Tickets are available on a first come, first served basis as numbers are limited to 20. They are £4.00 each and can be obtained from Colin.

Please bring a bottle and a seat with you, and of course, some nice weather!

If anyone should want a vegetarian meal please contact either Colin or myself when tickets are purchased.

Reports

Solar Section Report - May, 2006

Brian Halls

Reports were received for 29 days; Graham Boots (27 days) Brian States (24 days) and the Director (9 days).

MDF = 1.15

R = 15.55

By comparison with the previous month (May), June was a much quieter month on the sunspot front.

The month began with a few spotless days until a new group appeared at the eastern limb - Region 0892 (S08⁰ L=285⁰) – and evolved into a magnetically complex (though quiet) area. Two further southern hemisphere groups also appeared during this period, however sunspot activity quietened down for much of the middle part of the month.

After several spotless days, a small spread out group consisting of small spots appeared in the north and, a few days later, a larger group appeared in the south. These spots were the only spots visible at the close of the month.

Southern latitude sunspot groups were once more, more prominent than those in the north.

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June Lecture Reviewed - Report by Colin Knappitt

Peculiar Stars & Lick Observatory Visit

Dr Mike Dworetsky, F.R.A.S., U.C.L.

Dr Dworetsky began his talk by saying that the stars to be considered were peculiar by virtue of the chemical make-up of their atmospheres relative to normal Main Sequence stars, such as the Sun. They have very different abundances of rare elements, such as platinum.

The first image on the screen showed us his headquarters: the U.C.L. Observatory at Mill Hill in North London, with its five domes. Instruments housed there include the Radcliffe double refractor (24 and 18-inch objectives), a 24-inch reflector, and the Fry 8-inch refractor, dating from 1860. This last instrument, stopped down to 4 inches, was used with an H-alpha filter to show the Venus transit of 2004 to the public. Dr Dworetsky explained that this filtering avoided the “black drop” phenomenon that tends to confound accurate timing of ingress and egress during transits. Later, Dr Dworetsky said that the new local road lamps were so successful at directing their light where it ought to go that, ironically, the Observatory had had to install low level lighting on site to allow safe movement around it!

The main theme was then introduced with an image of a natural spectrum: a rainbow in South Africa. Myriads of water droplets split the light to produce the rainbow but analysis of starlight requires a spectrograph, the key component of which is a high resolution grating. A spectrogram might take an hour to record but months to analyse.

Introduction of the standard equation, $d\sin\theta = m\lambda$, (where d is the separation of the grating lines, θ is the angle with the straight-ahead direction, m is the order and λ the wavelength) brought us to an example of an echelle spectrum with (to me) a staggeringly high order of $m = 100$. This spectrum would have been very long, but was chopped into perhaps twenty strips, mounted vertically and scanned from left to right in succession. The spectrum was crossed by numerous absorption lines, mostly from metallic elements. Metallic I understand in the professional astronomers’ loose sense of any element after helium in the Periodic Table.

Our speaker gave us a series of mnemonics for the spectral sequence of stars (OBAFGKMRNS) which links temperature with strength of spectral lines in the star’s atmosphere for a variety of elements. Feminist zealots had objected to the tried and tested “Oh, Be A Fine Girl, Kiss Me Right Now, Sweetie” and, no doubt, to the version

that ends ...Right Now. Smack!” Various substitutes included “Oven-Baked Ants, Fried Gently, Kept Moist, Retain Natural Succulence” and “Out Beyond Andromeda, Fiery Gases Kindle Many Red New Stars”. Finally, “Only Boring Astronomers Find Gratification Knowing Mnemonics”. “O” stars are hottest but show no hydrogen lines as the atoms are always ionised; some helium lines are present. The Sun, in Class G, is cool enough to show some lines from neutral metal atoms while Class M stars, cooler still, have titanium oxide molecules, TiO, in their atmospheres. R, N and S stars, regarded as peculiar, are now known as carbon stars and might well show strong lines from zirconium oxide, ZrO, in their spectra. They are off the Main Sequence whereas other peculiar star. notably the sub—classes Am and Ap, are on the Main Sequence.

Magnetic fields, which cause close splitting of spectral lines (the Zeeman effect) and rotation of stars, which gives rise to the broadening of spectral lines (the Doppler effect), feature prominently in the analysis of stellar spectra, including those of peculiar stars. Slow rotation (sharp spectral lines) allows a calm stellar atmosphere which, in turn, can give rise to anomalies of element abundance via a diffusion mechanism in the atmosphere. The abnormality could be an excess or a deficiency in the normal abundance. Periodic variation of magnetically split lines can be linked both to rotation of the star and to changes in the strength of lines associated with rare elements such as chromium and europium. Regions of abnormal abundance of rare elements in the star’s atmosphere are being swept past our line of sight as the star rotates. Interestingly, one element identified in certain peculiar stars is technetium, no.43, which does not occur naturally on Earth but can be made in a nuclear reactor.

After challenging us with the technical part of his talk, Dr Dworetzky moved on to tell us about the Lick Observatory, which he visits in order to image stellar spectra. The Observatory is located at the top of Mount Hamilton, a modest peak about as high as Ben Nevis, situated some fifty miles to the south-east of San Francisco in the Coastal Range. The Observatory was endowed by one James Lick, a San Francisco millionaire who had a variety of careers and who is buried under the basement of the Lick’s 36-inch refractor, completed in 1888 and for ten years the largest refractor in the world. The much more recent 120-inch reflector on the site was only ever the second largest reflector in the world.

A sinuous road with 365 curves winds up the mountain and drivers of long trucks are warned that they face getting stuck across the hairpins. Of course, some continue to ignore the warnings and end up cutting off the

mountain top community for many hours as their vehicles straddle a switchback.

An early problem with the 36-inch refractor was inability to focus the image owing to the tube being too long. Cutting off the end of the telescope tube proved an effective remedy, one that could not be applied to the Hubble Space Telescope to cure its focusing problem! Today, one of Lick’s specialities is planet finding.

Dr Dworetzky’s twin-theme talk was well received and, when question time ran out at the end, he agreed to answer further queries during the tea-break.

Notices

Telephone Alert

Jan Young

It has been decided by the committee that the WAS TELEPHONE ALERT system be re-established. The Telephone Alert system is for important news items, for example should a large supernova be discovered. One member rings the next until everyone on the list has been contacted.

If anyone is interested please contact our Solar Section Director, Brian Halls, 01903 521205, with details of phone number, mobile number (if required) and times of contact availability such as any time, during certain hours only etc.

Astronomical Publications

Graham Boots

The society annually subscribes to the following four organizations and receives their publications which are circulated free to members. Please let me know if you would like to go on any of the circulations lists letting me know which journals you would like. My telephone number is 01903 505346. They are *Astronomy Now*, *Sky & Telescope*, *Society of Popular Astronomy* including news letters and journal of the British Astronomical Association.

Messier Objects - Continued

Brian Halls

Janet Young

The Messier Objects are so called because they were a list of fuzzy objects in the night sky compiled by Charles Messier (1730-1817) a French comet hunter. While hunting for comets he kept finding these faint and fuzzy objects, so decided to compile a catalogue of them to avoid them being mistaken for comets. He listed them as M or Messier followed by a number. Charles Messier did discover several comets, but it is for the Messier catalogue he is best remembered.

M54
Constellation: Sagittarius
RA 18hrs 52m
Dec -30.32
Distance: 50,000 light years
Type: Globular Cluster
NGC 6715

Splendid sight in as little as a 4-inch instrument.

M55
Constellation: Sagittarius
RA 19hrs 36m
Dec -31.03
Distance: 20,000 light years
Type: Globular Cluster
NGC 6809

Discovered originally by Abbe de Lacaille in 1751-52

M56
Constellation: Lyra
RA 19hrs 14m
Dec +30.05
Distance: 40,000 light years
Type: Globular Cluster
NGC 6779

First seen by Messier in January 1779

M57
Constellation: Lyra
RA 18hrs.51m
Dec +32.58
Distance: 4,100 light years
Type: Planetary Nebula
NGC 6720

First discovered by Antoine Darquier in 1779. This is the famous Ring Nebula, has a star at its centre and in photos shows fine colours. Well seen in small instruments.

July 20: 1969 – Neil Armstrong and Edwin Aldrin, in the lunar module ‘Eagle’, land on the Moon; 1976 - the first Viking spacecraft lands on Mars and begins sending back photographs; 1994 - Comet Shoemaker-Levy 9's Fragment Q1 hits Jupiter.

July 21: 1620 – birth of Jean Picard, French astronomer who first measured the circumference of the Earth with accuracy; 1969 – Armstrong becomes first man to step on to the surface of another world, followed later by Aldrin. The world unites at this achievement and mankind lives happily ever after...; 1998 – death, Alan Shepard, first American astronaut.

July 22: 1784 – birth of Friedrich Bessel, German mathematician and astronomer who first used parallax to measure the distances to stars.

July 25: 1984 - Salyut 7 Cosmonaut Svetlana Savitskaya becomes the first woman to perform a space walk.

July 31: 1964 – the first Ranger lunar probe confirms that the lunar surface is not covered with a soft layer of dust that will cause spacecraft to sink into it.

August 1: 1969 – away from the Moon, the US probe Mariner 6, returns high quality pictures of Mars.

August 10: 1675 – the foundation stone of the Greenwich Observatory, is laid by King Charles II; 1932 - A 5.1-kg chondrite-type meteorite breaks into at least seven pieces and lands near the town of Archie in Cass County, Missouri.

August 15: 1977 - The Big Ear, a radio telescope operated by The Ohio State University as part of the SETI project, receives a radio signal from deep space; the event is named the "Wow! signal" for notation made by a volunteer on the project.

August 25: 1609 - Galileo Galilei demonstrates his first telescope to Venetian lawmakers.

September 1: 5509 BC - The world was created, according to the Byzantine Empire; 1804 - Juno, one of the largest main belt asteroids, was discovered by German astronomer Karl Ludwig Harding.

September 3: 1976 – the second Viking spacecraft lands successfully on Mars at *Utopia Planitia*.

WAS Link

AMSAT-UK

Trevor Hawkins

www.uk.amsat.org/

AMSAT-UK International Space Colloquium Keynote Presentation - The Case for a Global Near Earth Object Mitigation Strategy.

Deep Space images

Lee Copper

www.deepspaceimages.co.uk

Forum based website with special area for WAS members, email Lee Copper for access.

WAS Ad

Sussex Astronomy Centre

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Meade, Celestron, SkyWatcher, Tal Telescopes
Large range of accessories, software, books etc
16 Mulberry Lane
Goring by sea
Worthing, West Sussex.
Telephone 01903-247317
Email worthingastronomy@tiscali.co.uk
Web Site. www.sussex-astronomy-centre.co.uk
Ask for Paul Farmer (Club Member)

WAS Job

Production Assistant - BBC Sky at Night magazine

Do you want to join Britain's best astronomy magazine? We have a vacancy for an amateur astronomer who's keen to forge a career in the media. You must be qualified to degree level or higher and have an excellent knowledge of astronomy together with extensive experience of amateur observing using telescopes and other equipment. The ideal candidate will have an excellent command of English. Some previous writing experience and work experience on a magazine or newspaper is preferred but not essential, as training will be provided.

The job involves producing magazine pages to the highest standard of quality and ensuring that BBC Sky at Night magazine continues to produce the best equipment reviews and observing articles 2n the market. The job is a full-time position based in our Bristol office and would suit a recent graduate. We are looking for a highly motivated individual who will fill a key role within a small, dynamic team. If you think you're the right person for the job, we'd love to hear from you - please include clippings of any previously published work.

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WAS News News

NASA's Cassini spacecraft marks mission halfway point

NASA/JPL News Release

As the Cassini spacecraft reaches the halfway mark in its four-year tour of the Saturn system, discoveries made during the first half of the mission have scientists revved up to find out what's in store for the second act.

Cassini has been orbiting Saturn since June 30, 2004, studying the planet, its rings and moons.

"The spacecraft has spent a considerable amount of time studying the moon Titan during 15 separate flybys so far. In the second half of its prime mission, ending June 2008, Cassini will swing by Titan 30 more times," said Robert T. Mitchell, Cassini program manager at NASA's Jet Propulsion Laboratory, Pasadena, Calif. "The past two years have been just like a warm-up."

"We especially focused on Titan because we thought it could tell us something about the early Earth," said Dr.

Toby Owen, Cassini interdisciplinary scientist at the University of Hawaii at Manoa.

Owen added, "Examining this world frozen in time, we find evidence that Earth may have begun with the same methane-ammonia atmosphere that marked the birth of Titan. Because of our world's closeness to the Sun, Earth has oceans of liquid water, which Titan lacks.

The resulting chemistry in Earth's warm environment ultimately led to the origin of life, whereas on Titan we find only a frozen echo of early Earth: methane, nitrogen, and a suite of small organic molecules. Our planet's carefully balanced, warm global climate is the underlying reason that we are investigating Titan, instead of Titanians investigating Earth."

Cassini's tour of the Saturnian system is about to take on a new pace. "This summer we will begin our express-ticket ride. That's 11 months with 17 Titan encounters and 51 spacecraft maneuvers to adjust the flight path, more than one maneuver per week," said Jerry Jones, Cassini chief navigator at JPL. The first of these encounters will be a Titan flyby on July 2, followed by the closest Titan encounter yet on July 22, at 950 kilometers (590 miles) above the surface.

Later in July, navigators will begin to flip the spacecraft's orbit orientation with respect to the sun by nearly 180 degrees, resulting in a bird's-eye view of Saturn's glorious rings. This gradual transfer will take about one year.

"One of the biggest mysteries confronting Cassini is the changes we've seen in Saturn's radio emissions" said Dr. Bill Kurth, Cassini scientist at the University of Iowa, Iowa City. "We've seen the radio period, the frequency of emissions that tell scientists how fast or slow the planet is rotating, change by as much as one percent (or a few minutes) over just 10 years, and we don't know why. Pinning down how long the day is on Saturn is key to understanding other things, such as wind speed."

Cassini has quite a job to do during the second half of the mission to match the potpourri of discoveries in its first half.

The wealth of information from the Cassini spacecraft and the European Space Agency's Huygens probe, which descended through Titan's murky atmosphere to its surface, shows that Titan is remarkably Earth-like. There is evidence for methane rain, erosion, drainage channels, dry lake beds, possible volcanoes and vast dune fields that run for miles.

In addition to the Titan findings, Cassini also discovered three new moons, and some of the previously-known moons provided surprises. One of the most bizarre discoveries is a giant mountain range that runs the full length around the equator of Saturn's moon Iapetus. The mountains rival Olympus Mons on Mars, which is nearly three times the height of Mt. Everest. Other moons look like rubble piles.

Cassini also acquired the highest resolution images ever taken of the planet's rings. Strange structures in the rings became apparent on the first day of the tour. Waves rip through the rings, while knots and banded structures shape them. Clumps of ice several kilometers wide are now appearing.

Scientists also witnessed moons influencing the rings. The moon Prometheus was caught stealing particles from the F-ring, while Enceladus seems to be contributing particles to Saturn's expansive E-ring. A whole new class of small moonlets may lie within Saturn's rings. New rings have also appeared, which may indicate the presence of tiny moonlets.

The true showstopper was the discovery of giant, icy geysers gushing from the surface of Enceladus. This evidence leads some scientists to believe there may be liquid water close to the surface.

With all these discoveries in the first two years, it's little wonder Cassini scientists are anxiously waiting to see what else remains for their instruments to reveal in the next two years.

The Cassini-Huygens mission is a cooperative project of NASA, the European Space Agency and the Italian Space Agency. The Jet Propulsion Laboratory, a division of the California Institute of Technology in Pasadena, manages the Cassini-Huygens mission for NASA's Science Mission Directorate, Washington. The Cassini orbiter was designed, developed and assembled at JPL.

Hubble captures a 'five-star' rated gravitational lens

Hubble European Space Agency Information Centre
News Release

The Hubble Space Telescope has captured the first-ever picture of a distant quasar lensed into five images. In addition, the image holds a treasure of lensed galaxies and even a supernova.



Credit: ESA, NASA, K. Sharon (Tel Aviv University) and E. Ofek (Caltech)
[Download larger image version here](#)

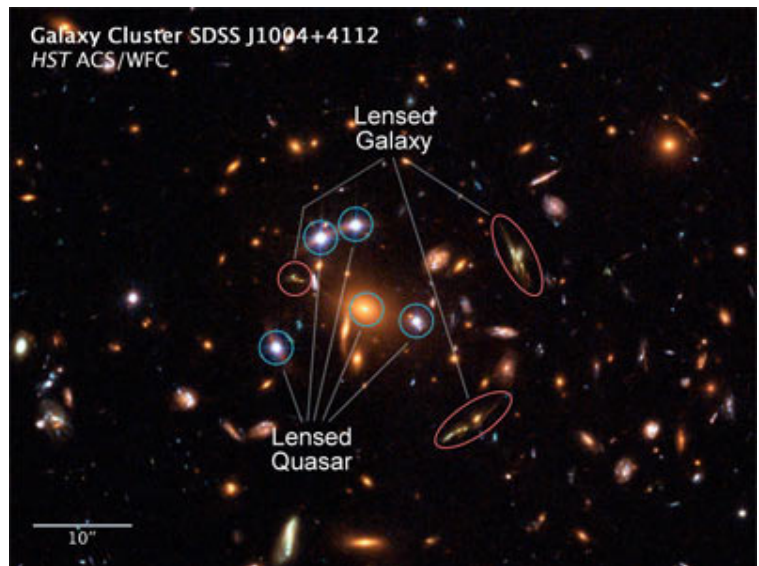
The most unique feature in a new image taken with the NASA/ESA Hubble Space Telescope is a group of five quasar images produced by a process called gravitational lensing, in which the gravitational field of a massive object - in this case, a cluster of galaxies - bends and amplifies light from an object - in this case, a quasar - farther behind it.

Although other multiply lensed quasars have been seen before this newly observed ³quintuple quasar² is the only case so far in which multiple quasar images are produced by an entire galaxy cluster acting as a gravitational lens.

The background quasar is the brilliant core of a galaxy. It is powered by a black hole, which is devouring gas and dust and creating a gusher of light in the process. When the quasar's light passes through the gravity field of the galaxy cluster that lies between us and the quasar, the light is bent by the space-warping gravity field in such a way that five separate images of the object are produced surrounding the cluster's centre. The fifth quasar image is embedded to the right of the core of the central galaxy in the cluster. The cluster also creates a cobweb of images of other distant galaxies gravitationally lensed into arcs.

The galaxy cluster creating the lens is known as SDSS J1004+4112 and was discovered as part of the Sloan Digital Sky Survey. It is one of the more distant clusters known (seven billion light-years, redshift $z=0.68$), and is seen when the Universe was half its present age.

Gravitational lensing occurs for extremely concentrated masses like the cores of galaxies or galaxy clusters. Their strong gravity warps the surrounding space, and light travelling through that warped space bends its direction. Multiple images of a distant light source may be seen, each taking a different path through the warped space.



Credit: ESA, NASA, K. Sharon (Tel Aviv University) and E. Ofek (Caltech)

A gravitational lens will always produce an odd number of lensed images, but one image is usually very weak and embedded deep within the light of the lensing object itself. Though previous observations of SDSS J1004+4112 have revealed four of the images of this system, Hubble's sharp vision and the high magnification of this gravitational lens combine to place a fifth image far enough from the core of the central imaging galaxy to make it visible as well.

The galaxy hosting the background quasar is at a distance of 10 billion light years (at redshift 1.74). The quasar host galaxy can be seen in the image as faint red arcs. This is the most highly magnified quasar host galaxy ever seen.

The Hubble picture also shows a large number of stretched arcs that are more distant galaxies lying behind the cluster, each of which is split into multiple distorted images. The most distant galaxy identified and confirmed so far is 12 billion light years away (a redshift of 3.33, corresponding to only 1.8 billion years after the Big Bang).

By comparing this image to a picture of the cluster obtained with Hubble a year earlier, the researchers discovered a rare event - a supernova exploding in one of the cluster galaxies. This supernova exploded seven billion years ago, and the data, together with other supernova observations, are being used to try to reconstruct how the Universe was enriched by heavy elements through these explosions.

Diary

| | |
|----------------------------------|---|
| 12th July | Venus Express - Andrew Coates |
| 13th September | Sir Arthur Stanley Eddington -Mark Hurn |
| 11th October | AGM & Members Contributions |
| 8th November | Campaign for Dark Skies – Update - Bob Mizon |
| 13th December 2006 | Aurorae & Glows in the Atmosphere Professor Alan Aylward Head of Atmospheric Physics Laboratory University College London followed by member's images on the same topic |
| 10th January 2007 | New Year Social & Member's Contributions |
| 14th February 2007 | The Enigma of Neptune's Prediction Dr. Nicholas Kollerstrom Science & Technology Studies University College London |
| 14th March 2007 | Space Astronomy: XMM-Newton X-ray satellite & Swift the gamma-ray watchdog satellite Dr. Graziella Branduardi-Raymont F.R.A.S., Mullard Space Science Laboratory Dorking |
| 11th April 2007 | Member's Contributions |
| 10th May 2007 | TBA |
| 14th June 2007 | TBA |
| 12th July 2007 | TBA |
| 12th September 2007 | Cosmology & WMAP - Professor Malcolm MacCullum F.R.A.S., Department of Mathematics Queen Mary University of London |

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 find us on the Internet at www.was.org.uk or email: chairman@was.org.uk

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

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