Sky notes

by Neil Bone

2003 April & May

Sun and Moon

Spring is well advanced now, with the Sun climbing to a high northerly declination on the ecliptic, its apparent annual path around the star background. During the next couple of months, the hours of darkness available to observers at the latitudes of the British Isles shrink steadily, and by the end of May astronomical twilight – with the Sun never more than 18° below the horizon – persists throughout the short night from the Midlands northwards.

Sunspot activity is now on the decline following Cycle 23's double-peaked maximum in 2000–2001. Observers viewing the Sun's disk by the safe method of projection should still see at least three or four spot groups on most days.

New Moon falls on April 1, May 1 and May 31, putting the darkest night-time skies in the opening and closing weeks of the month. The Moon is Full on April 16 and May 16.

May 2003 is an outstanding month for events involving the Sun and Moon:

Transit of Mercury – May 7

At inferior conjunction – between the Sun and Earth at the end of its evening-sky apparition – early on the morning of Wednesday May 7, Mercury actually passes across the northern half of the Sun's disk as seen from our terrestrial perspective. (Usually at inferior conjunction, Mercury passes somewhat to the north or south of the Sun). During this transit, Mercury will appear as a tiny dark spot in silhouette against the dazzling photosphere.

There is little point in trying to see this event with the protected naked eye (using eclipse glasses or a welder's filter, say); Mercury is too small to be visible. The usual safety warnings apply to observing the event. Best views will be obtained by projecting the Sun's image through a small telescope or binoculars onto a piece of clean, white card, preferably in a shaded box. Objective filters should only be used under expert guidance.

Mercury first appears on the Sun's disk at 05h 11m Universal Time (UT = GMT, equivalent to BST minus an hour) by which time the Sun will be climbing high in the eastern sky from UK locations. Moving westwards across the Sun, Mercury leaves the disk at 10h 32m UT. Mercury's progress over the course of the morning can be charted by marking its position on drawings of the projected disk at, say, 15 to 20 minute intervals.

Observers may like to compare the pure black of Mercury with the lighter shading of any sunspots present on the disk. The sunspots will appear much less dark, a reminder that they appear dark only by contrast with their bright surroundings – if we could take a sunspot and hang it in the night sky, it would glow as brightly as the Full Moon!

Mercury's next transit (invisible from the UK) will occur on 2006 November 8. The 2003 May event can be seen as good practice for next year's rather rarer transit of Venus.

Total Lunar Eclipse – May 16

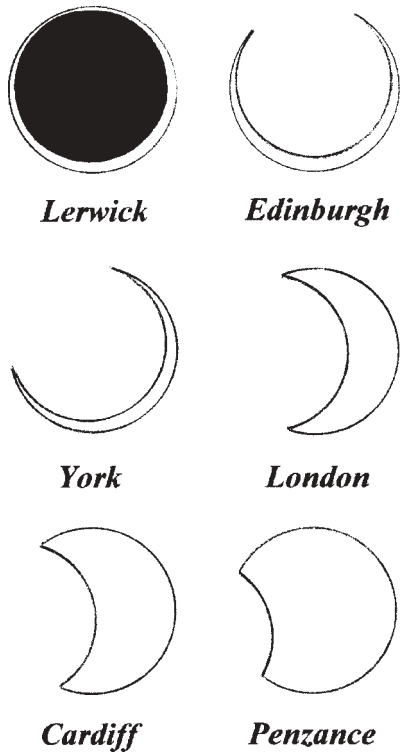
Late in the night of Thursday to Friday May 15–16, the Full Moon is totally eclipsed in Earth's shadow. Moving eastwards relative to the background stars by about its own diameter every hour, the Moon makes first contact with the dark core (umbra) of Earth's shadow at 02h 03m UT (03h 03m BST), with the darkened segment on the Full disk gradually increasing thereafter until totality at 03h 13m UT. By the time the eclipse has become total, the Moon – among the stars of Libra – will be rather low in the southwest from locations in the British Isles. Totality ends at 04h 06m UT, and the Moon completely leaves the umbra at 05h 17m UT, well after moonset and, indeed, daybreak, for UK-based observers.

During totality, the Moon becomes a deep coppery red colour, and although dimmed considerably should not disappear from view. The degree of darkening varies from one eclipse to the next, and it will be interesting to see how this event compares with the relatively dark eclipse of January 2001. A second, shorter-duration total lunar eclipse on November 8–9 this year will be rather better positioned in the sky for observers in the British Isles.

Annular Solar Eclipse – May 31

Sunrise on the Saturday morning of May 31 will be spectacular at locations across the British Isles, with the New Moon obscuring a substantial portion of the solar disk: the rising Sun will be a crescent, whose size depends on geographical location, from points in the south of England. Even more striking will be the eclipse's annular appearance soon after sunrise from the north of Scotland.

The eclipse comes close to the Moon's perigee – farthest in its elliptical orbit from the Earth – so that the dark lunar disk spans too small an angular diameter to completely cover the Sun's dazzling photosphere, leaving a ring (annulus) of light visible even at mid-eclipse on the centre of the shadow track. The Shetlands and Orkneys are well placed, while Scotland is just south of the central track. Nonetheless the Moon will appear completely on the solar disk from locations such as Inverness or Wick in the northeast, or Stornaway on the Hebridean Isle of Lewis. At these locations, the Sun will only have risen a few minutes before maximum eclipse – seen low over a sea horizon to the east, the event will be spectacular indeed, clouds permitting. Care should, of course, be taken when observing even the low eclipsed Sun; suffi-



The appearance of greatest eclipse at some locations in the British Isles. Reprinted from 'The annular solar eclipse of 2003 May 31', by Peter Macdonald, in the 2002 February *Journal*.

cient infrared radiation will still be transmitted through the atmosphere, even with the Sun just a degree or two up, to cause damage when it is viewed through improperly filtered optical equipment.

In southern Scotland, the eclipse is a very large partial at sunrise. Aberdeen is just too far south for annularity, while Edinburgh has a 93% eclipse-sunrise crescent, for example. Further south, the extent of the eclipse is smaller. At London, the sunrise eclipse has an extent of 69%, gradually decreasing as the Sun gains altitude.

The eclipse ends as the Moon departs the Sun's easternmost limb around 04h 45m UT from the far north of the British Isles, 04h 39m UT at Edinburgh, 04h 31m UT from London. Wherever in the country it is viewed, the eclipse should be a rewarding spectacle for early-risers, or those prepared to wait up into the early hours from the previous night! Local circumstances for the eclipse are shown on Sheridan Williams' website at http://www.clocktower.demon.co.uk/eclipse2003/

The planets

Mercury has its most favourable evening apparition for northern hemisphere observers during mid-April, when it will be visible low in the northwest for almost two hours after sunset. Mercury is brightest early in the apparition, and will still be close to magnitude 0 – similar in brightness to Capella – at greatest elongation, 20° east of the Sun, on April 16. During the last week of April, Mercury rapidly drops from view, and after it has left the evening sky, the innermost planet transits across the solar disk on May 7. The morning apparition which follows, with greatest elongation reached in early June, is rather unfavourable.

Venus is in the morning sky, but barely visible, rising less than an hour ahead of the Sun in this interval.

Mars, meanwhile, improves markedly in visibility, rising around 02h UT in mid April, and 01h UT at the end of May. Moving steadily eastwards against the stars of Sagittarius and Capricornus, Mars brightens above mag. 0 at the beginning of May, and shows a disk diameter in excess of 10 arcseconds. Larger amateur telescopes, in the aperture range of 200mm upwards, should by now be starting to reveal more detail on the Red Planet's steadily-growing apparent disk. Mars will be a prominent object in the early morning skies of late spring, and is now rapidly approaching its most favourable apparition for many years: a lot of attention will focus on the planet during the summer of 2003.

Jupiter remains prominent in Cancer, resuming its direct (eastwards) motion relative to the background stars early in April. At mag. –2, the giant planet is the brightest object in the evening sky apart form the Moon. Its apparent disk diameter of 40 arcseconds makes Jupiter a good target for telescopes as small as 60 to 80mm aperture: on a reasonable night these will reveal the pattern of alternating light zones and dark belts aligned parallel to the planet's equator. Binoculars will show the four bright Galilean satellites strung out to either side of Jupiter along its equatorial plane.

Saturn has been splendid through the opening months of 2003, but the apparition is now drawing rapidly to a close as the ringed planet – still around magnitude 0 – moves ever further towards the evening twilight. At the beginning of April, Saturn sets around midnight UT and can really only be observed well for an hour or two after darkness falls. By mid-May, Saturn sets only about an hour after the Sun, and will be too low in the northwest for productive telescopic observation.

Minor planets

Brightest of the asteroids, (4) Vesta remains well on binocular view at about 6th magnitude, moving westwards against the stars of the Virgo bowl during April and into early May. A chart showing Vesta's position is available on the website at http://yan.open.ac.uk/~ajh47/2002chart1a.htm.

Meteors

The low-key Virginids produce some activity through the first couple of weeks of April, with observed rates of one or two per hour for the patient watcher. Like many other near-ecliptic streams, subject to planetary perturbations, the Virginids show a multiple radiant structure. The two main components are in the Virgo bowl and just east of Spica.

The Lyrids are active from April 19–25, peaking late on April 22–23. A last quarter Moon will spoil the show, however, rising around midnight and drowning out the fainter meteors – with which this shower abounds – in the normally optimal early morning hours.

Moonlight won't be a problem for the peak of the Eta Aquarids around May 4. This shower, produced by debris from Comet 1P/Halley, is poorly seen from the UK, its radiant only starting to gain altitude in the eastern sky at the onset of dawn: observers located in southern Europe, or south of the equator, fare much better, and for them this is one of the year's most active meteor showers.

A Virginid-level trickle of activity can be seen from the Alpha Scorpiids from late April until mid–May, augmented by the usual, seasonal, relatively low sporadic meteor flux. Overall activity will pick up later in the year.

Variable stars

The Mira-type (long period) variable star Chi Cygni is expected to reach peak brightness in its (average) 408-day pulsation cycle in mid-April, when it should be a reasonably easy binocular object. Typically, Chi Cyg may reach mag. +5.2 at maximum, but sometimes it is considerably brighter – it has been known to reach third magnitude on occasion, then becoming a noticeable naked eye 'addition' to the neck of the Swan near Eta Cygni. Weekly brightness estimates are useful for following the variations of this star, and can be made with the aid of charts available – for a small fee to cover copying and postage – from the Variable Star Section. Binocular observers should be able to keep Chi Cygni in view as it fades gradually throughout the summer.

Now well presented for late evening inspection, R Coronae Borealis bears night-by-night monitoring. Located in the eastern (left) half of the space enclosed by Corona's circlet, R CrB is an ancient and highly-evolved carbon-rich star. Clouds of carbon in the star's atmosphere occasionally condense, causing it to dim from its usual 6th magnitude: at its 'normal' peak brightness, R CrB is an easy binocular object, but during its unpredictable fading episodes it can drop from view over the course of a week or so. As these notes went to press in late February, R CrB had recently dimmed to mag. +9, and it will be interesting to see if, and how rapidly, the star recovers over the course of the coming weeks.

Deep sky

Spring's stellar sky lacks the strongly-coloured bright luminaries which dominate the winter view. By April, Orion is becoming lost in the near-solar twilight as evening falls, and the southerly aspect is ruled, instead, by the fainter – but still splendid – form of Leo, led by mag. +1.4 Regulus at the base of the constellation's distinctive Sickle asterism. Leo's tail, to the east, is made up of a triangle of fainter stars including the second-magnitude Denebola.

Southwest from Leo's tail lies the physically-associated galaxy pair M65 and M66 (NGC 3623 and 3627). At mag. +9, M66 is just visible in 10×50 binoculars on a good night. Small telescopes show the pair well, with M65 as a diffuse bar of light 10 arcminutes long; this object is presented close to edge-on towards us. Also in the low-power

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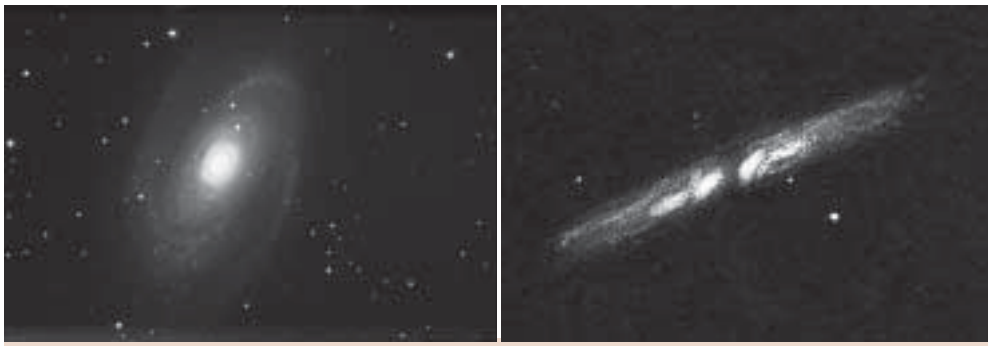

Messier 81 and 82 in Ursa Major. *Left:* CCD image of M81 by Gordon Rogers, 16-inch (400mm) SCT. *Right:* Drawing of M82 by Alan Dowdell, 1989 May 9, Puimichel, France. 1.05m reflector ×300.

field is NGC 3628, almost as prominent as its neighbours, and surprisingly overlooked by Messier when compiling his catalogue of 'fuzzies'.

Spring is widely seen as 'galaxy season' and many observers enjoy trawling south-east of Leo's tail into the broad open circlet of Virgo's bowl, a region in which dozens of members of the local supercluster of galaxies can be found.

In the opposite direction, Ursa Major and Canes Venatici are also excellent regions for galaxy-hunting. The famous Whirlpool Galaxy (M51, NGC 5194) can be found in binoculars a couple of degrees from Eta Ursae Majoris, the end star in the Plough's handle. Large amateur telescopes show hints of the spiral arm structure from which M51 takes its popular name, and riding high overhead, it is best seen at this time of year.

Like Leo, Ursa Major has a famous galaxy pair in M81 and M82 (NGC 3031 and 3034), located above the Plough's bowl, close to the position of the Bear's ears as made up by some of the constellation's fainter stars. At respective magnitudes +6.9 and +8.4, the pair are quite easy in binoculars on a good night, overhead in the spring. M81 and M82 are separated by 38 arcminutes, and can be held in the same low-power telescopic view. M81 is a classic spiral galaxy, while dusty M82 is more irregular, and is apparently undergoing a vigorous period of star formation.

Users of small telescopes looking for a challenge might like to seek out Ursa Major's famous planetary nebula, M97 (NGC 3587). Known as the Owl Nebula from the two dark eye-like patches visible on long-exposure images taken with large telescopes, this mag. +9.9 object is quite rightly regarded as the most difficult in Messier's list. It can be found by using β UMa (the lower of the Pointers) as a guide, lying just a few degrees away near a crooked L-shaped pattern of faint stars. In my 80mm wide-field spotter 'scope, M97 appears as a faint circular smudge, showing low contrast with the sky background. Averted vision helps, and detection of this object requires the clearest and darkest of nights: a late April evening in the moonless last week of the month, with Ursa Major high overhead, would be favoured.

Messier 97, the 'Owl Nebula'. Photo by Geoffrey Johnstone with a 305mm reflector, hypersensitized 2415 film.

Neil Bone

A joint BAA/RAS Pro-Am discussion meeting

Comets, Meteors & Meteorites

2003 May 10, 10.30–17.30, at the Open University, Milton Keynes.

Please notify Jonathan Shanklin (jds@ast.cam.ac.uk) of your intention to attend, so we can provide adequate catering. Light lunches will be available for purchase.

Provisional programme

Monica Grady (NHM) – *Meteorites*
Neil Bone (BAA) – *BAA meteor observations*
Iwan Williams (Queen Mary, London) – *Meteor streams*
Andrew Elliot (BAA) – *Video meteors*
Jonathan Shanklin (BAA) – *BAA visual comet observations*
David Hughes (Sheffield) – *Cometary size distribution*
Alan Fitzsimmons (Queen's, Belfast) – *Recent results in ground-based imaging of distant comets*
Nick James (BAA) – *Amateur CCD observations of comets*
Graeme Waddington (BAA) – *Comet orbits and Ikeya-Zhang*

Brian Marsden (Smithsonian Astrophysical Observatory)

The George Alcock Memorial Lecture

For further details and any last-minute changes see the BAA Comet Section Web page **www.britastro.org/comets**

The next BAA meeting

Wednesday 2003 May 21

17.30–20.00, The Geological Society, Burlington House, London W1

Ordinary Meeting

Dr Indra Bains

Recent developments in planetary nebula research

Nick James

Listening to *Rosetta*: communicating with ESA's comet orbiter