Sky notes

2006 June & July

by Neil Bone

Sun, Moon and Earth

Completing its long climb to the most northerly point on the ecliptic – in western Gemini, near that constellation's border with Taurus – the Sun arrives at the Summer Solstice position at 12h 26m Universal Time (UT = GMT; BST minus 1 hour) on June 21. For several days around this time, the Sun will rise as far north of east, and set as far north of west, as it can, meaning that the hours of daylight are at their annual maximum for observers at the latitudes of the British Isles. Not only are the nights short: from the latitudes of the Midlands northwards full darkness doesn't fall at all until early August. During June and July, the Sun skirts less than 16° below the northern horizon at its lower transit, so that astronomical twilight persists night-long, and the sky to the north, particularly, is too bright to allow detection of faint stars.

Sunspot cycle 23 is now well and truly on its way to minimum. Observers using the safe projection method have continued to record occasional spot groups through the opening months of 2006, but there have been several runs of days when no sunspot activity whatsoever has been evident. The precise timing of sunspot minimum won't become clear until after the event, but most expect it to arrive during the (northern) summer of this year, new cycle 24 commencing towards the start of 2007.

Twilight notwithstanding, the darkest skies in this interval will be found in the opening and closing weeks of either month, with New Moon falling on June 25 and July 25. Full Moon, low to the south against the stars of Scorpius and Sagittarius respectively, is on June 11 and July 11.

Earth reaches aphelion, the farthest point from the Sun in its slightly eccentric elliptical orbit, on July 4. Careful observation would indicate that the solar disk then has an apparent diameter that is 97% of that seen when Earth is close to perihelion in January – fortunately a relatively insignificant difference from the point of view of the terrestrial climate.

The planets

The opening fortnight of June offers a good chance to catch Mercury as an 'evening star', low in the northwestern sky after sunset. Greatest elongation, 25° east of the Sun, is reached on June 20, around which time Mercury sets about 1 hour 40 minutes after sunset. As dusk gathers, about 45 minutes after sunset, Mercury should be noticeable about 10° up in the northwest, shining as a 'spark' of magnitude 0. A clear horizon is essential to successful viewing, and use of binoculars will certainly help. Best times to look are in the week or so leading up to greatest elongation, when Mercury will be brightest; thereafter, the planet fades rapidly, and closes back towards the Sun. Inferior conjunction, between Sun and Earth, is reached on July 18.

Venus' rather poor showing as a 'morning star' continues, with the mag. –4 planet rising around 90 minutes before the Sun during June and July. During this interval, Venus closes back towards the Sun in line of sight; its elongation decreases from 37° in early June to 25° at the end of July. By late July, Venus is seen against the stars of Gemini, at a high northerly declination – slightly improving its ease of visibility for UK-based observers.

As usual, the apparition of Mars – long past its best – is drawing to a lingering close. The Red Planet, now only a little brighter than second magnitude and distinguished only by its pronounced colour, just about keeps pace east of the Sun in the evening sky as it moves against the stellar background of Cancer, then Leo. The apparent disk diameter falls below 4 arcseconds in July, and by the end of the month Mars is pretty much lost in the bright western sky.

Jupiter remains fairly well placed, seen among the stars of Libra. Best views will be had from mid-evening, and Jupiter stays fairly high in the south/southwest until the early hours. At mag –2, the giant planet is the brightest object other than the Moon in the midsummer midnight sky, and with an apparent disk diameter close to 40 arcseconds, is a rewarding target for any telescope larger than 60–70mm aperture. The dark belts and light zones provide an ever-changing tableau of cloud features. Much interest has been generated this year by the appearance of a second 'Red Spot' in the planet's south temperate region. Not quite as large as the famous Great Red Spot, the 'new' feature has apparently evolved from the remains of a pair of white ovals – familiar to *Voyager*-era observers in the late 1970s – which merged some years ago. Future developments in this storm system will be followed with interest.

Meanwhile, the nightly shuttling of the four bright Galilean satellites along Jupiter's equatorial plane can be followed in a small telescope, or even with hand-held binoculars.

Like Mars, Saturn, now moving eastwards against the stars of Cancer, is becoming lost in the bright western evening sky as its apparition draws to a close.

NLC observed on 2005 June 22–23 from near Harrogate by Tony Cook, Leeds AS. 22:47UT, 4 sec. exposure with Canon EOS at ISO 800, f/5.6, 28mm lens.

Minor planets

Both (6) Hebe and (15) Eunomia should be mildly-challenging binocular objects, moving retrograde (westwards) against the stars of northern Capricornus, near that constellation's border with Aquila, in late July. Hebe reaches opposition – 180° from the Sun in Earth's sky – in early August, and will be around mag +8. About half a magnitude fainter, Eunomia is believed to be a spindle-shaped, elongated asteroid, and as a result shows marked brightness variations as it rotates. Background stars can be used to make magnitude estimates at regular intervals during an observing night: further guidance on how to go about this, and other aspects of minor planet observing, can be found on the Asteroids and Remote Planets Section website at http://homepage.ntlworld.com/roger.dymock/index.htm

Meteors

July ushers in the most shower-active part of the meteor observer's year, with the multiple Capricornid and Aquarid radiants to the south of the Square of Pegasus coming on-line during the second half of the month. While none of these on its own is particularly prolific, their combined activity makes for profitable and enjoyable meteor watching at a time when nights can be relatively mild.

Most prominent are the Delta Aquarids, a shower with a double radiant. The southern component, emanating from close to Delta Aquarii, is the more active and usually peaks around July 27–28. Reaching maximum in early August, the northern Delta Aquarid branch has a radiant near the 'Water Jar' asterism. Observed rates of 5–8 meteors/hr are possible under good conditions when the Delta Aquarids are at their best.

The Alpha Capricornids generally produce low observed rates – maybe only one or two meteors/hr. They can often be quite bright, and slow meteors tracing a long path across the sky up from the southern horizon are a hallmark of this shower, which has a nominal peak on August 2 and is active from mid-July.

The Capricornid and Aquarid activity of late July is favoured by an absence of moonlight. Observers carrying out watches around this time will also notice a trickle of Perseid activity, the radiant in late July lying to the north of Andromeda. Sadly, 2006 is one of those years when the Perseids' August 12–13 maximum coincides with adverse, strong moonlight conditions, and only the early, low-activity phase of the shower will be well seen this time around: 2007 will be a lot better.

Noctilucent clouds

The short, twilit nights favour observation of high-altitude noctilucent clouds (NLC), forming close to 82km up in the atmosphere during the summer when temperatures close to the mesopause reach their annual minimum. NLC are too tenuous to be seen in bright daytime skies, but – if present – they become obvious once the Sun has sunk more than 6° (but no more than 16°) below the horizon, shining silvery-blue and standing out in contrast with the twilight in the northern sky. In addition to their colour, NLC are distinguished by their fine, banded structure, which unlike that of lower-atmosphere cirrus will bear magnification in binoculars.

NLC are believed to comprise water ice condensed onto tiny fragments of meteoric debris at the base of the atmospheric 'meteor layer'. Condensation can only happen when the high atmosphere is sufficiently cold, and suitable conditions are especially prevalent at times of low sunspot activity – when there is less heating by ultraviolet and X-ray emissions associated with solar flares. By this reasoning, the summer of 2006, at sunspot minimum, should produce a bumper crop of NLC sightings from northwest Europe. The summer of 2005 presented numerous good displays: NLC were visible from southern England on at least six nights between early June and early August. Observers farther north, closer to the main NLC formation zone, saw many more displays.

It's certainly worth checking the low northern sky on every possible clear night during the 'season'. NLC will often appear in the bright twilight region in the north below Capella. From more northerly locations, displays can sometimes fill the entire sky. NLC make attractive photographic subjects, and can be captured in short exposures using standard or digital cameras. Reports indicating the visibility of NLC from your location at a given time and date, and the extent of the display in altitude and azimuth (photographs and even simple sketches can be helpful here) will be welcomed by Dr David Gavine, 29 Coillesdene Crescent, Joppa, Edinburgh, EH15 2JJ for addition to the Aurora Section's extensive observational archive.

Variable stars

The long period (Mira type) variable Chi Cygni should be well within binocular range by July, as it rises towards peak brightness, anticipated for mid-August. At maximum, the star is typically around 5th magnitude (just in naked eye range) but sometimes it can be significantly brighter or fainter. Assuming a relatively normal cycle this time around – maxima are separated by roughly 14 months – we might expect Chi Cyg to be around 6th magnitude by the end of July: observers using 10×50 binoculars should be able to pick it up at least six weeks earlier. Located near 4th-magnitude Eta Cygni, midway along the Swan's 'neck', Chi Cygni is fairly easy to find, and the Variable Star Section has available suitable charts showing constant-brightness comparison stars in the vicinity, allowing magnitude estimates to be made. It can be very satisfying to build up a light curve for stars like this, and estimates should be made at weekly intervals (no more frequently, to avoid bias).

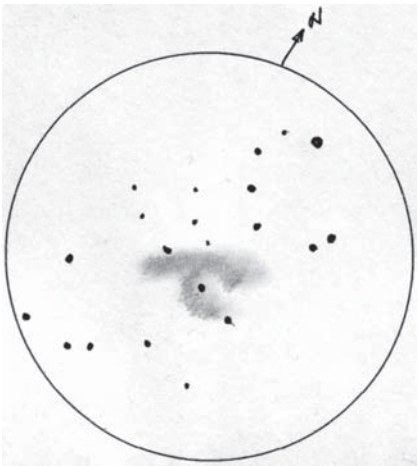
A different observing routine is required for R Coronae Borealis, the well-known 'sooty star' prone to abrupt plunges in brightness from easy binocular visibility to 12th to 14th magnitude. As described in the April–May *Sky Notes*, R CrB merits nightly monitoring, and is particularly well placed for observation in the coming weeks.

Deep sky

Summer twilight robs us of some of the splendour of the core Milky Way regions running through Sagittarius, below the conspicuous bulge of the Scutum star cloud south of Aquila. At locations well away from streetlights, the naked eye view on a moonless late July midnight can be spectacular, with the broad band of the Milky Way spanning the southern sky and showing hints of fine structure and mottling. Some isolated patches stand out, even to the naked eye – M24, the Small Sagittarius Star Cloud, is a good example. This oval path of nebulosity lies roughly east–west, above the 'Teapot' asterism formed from the brightest stars of Sagittarius, spanning about three Moon-widths on its longer dimension. Binoculars and small telescopes resolve it into a mass of faint stars.

These inner parts of the Milky Way – in a spiral arm between ours and the very heart of the home Galaxy – abound with bright open star clusters, while globular clusters congregate in the line of sight towards the hub. Most splendid of all globulars visible from UK latitudes, and one that would surely be better known were it just a little higher in our skies, is M22 (NGC 6656), just north of the Teapot's 'lid', a couple of degrees from third-magnitude Lambda Sagittarii. Even binoculars convey some sense of mag +5 M22's large angular size (20 arcminutes) and 'grainy' appearance, which is further emphasised in a small telescope. Nearby, 7th-magnitude M28 (NGC 6626) is somewhat overshadowed by its spectacular neighbour, but with an apparent diameter of 5 arcminutes is a fine object in its own right.

The inner reaches of the Milky Way also host bright nebulae, HII regions illuminated by ongoing starbirth. Several good examples are found north of the Sagittarius Teapot, including the Trifid and Lagoon nebulae (M20 and M8). From the UK perspective, perhaps the most attractive, being reasonably high in the southern midnight summer sky, is M17 (NGC 6618), the Swan Nebula. Seen in large binoculars (25×100), this hangs almost three-dimensionally in a richly-populated starfield. Small telescopes show an east–west elongated bar 20 arcminutes long, with a 'hook' (the Swan's neck) to the southwest from the centre. This is an object which, even in a small rich-field instrument at low magnification, benefits from use of a UHC (ultra high contrast) 'nebula' filter, which will help bring out yet more detail.



M17 observed on 2005 Aug 28–29, with an 80mm f/5 refractor at ×40, aided by a UHC filter. *Neil Bone*.

Although lower in UK skies than winter's showpieces in Orion, the nebulae here in Sagittarius are well worth lingering over, sketching and examining in detail during the brief favourable 'window' offered on late July nights.

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