SPACEWATCH
the newsletter of the Abingdon Astronomical Society

April 2003

"Mars Odyssey, a History of Mars Observation"

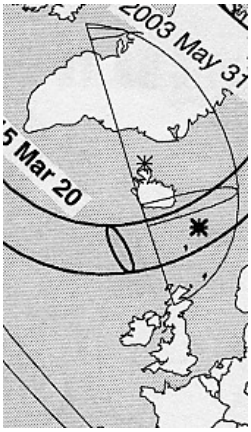
by Andy Lound (Planetary Society)

To coincide with the great viewing opportunity of Mars this coming summer, we have a talk tonight on the history of Mars observation, right up to the current Mars Odyssey mission to Mars.

The Night Sky this Month

By Bob Dryden & ATRamsey

The Sun:



Here is a map of the viewing area for the annular eclipse on May 31st so that you can plan your trip up to Scotland, or wherever you plan to go.

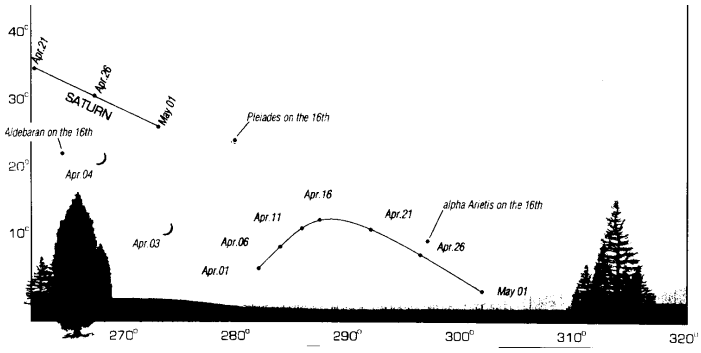
The annular eclipse path is the light semi-circle. The reason it is this shape is because the Sun is shining from over the other side of the Earth. It is only because the Earth's axis is tilted that we will see this eclipse. The straight line is the horizon at 4am that morning. As you can see, you need to go north of the Great Glen to see the annularity – further south you will only see a large partial eclipse. [The bold lines are for the total eclipse of March 2020.]

The Planets:

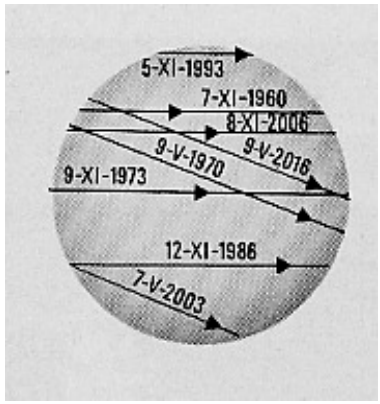
Venus - Venus is too close to the Sun to be visible this month.

Mars - The Red Planet is now brightening rapidly as it heads towards its August opposition. Although it is still in the morning sky, it is beginning to rise earlier and earlier. May 7th is an important date because the planet then reaches an apparent size of ten arc minutes. Why is this important? Well observers say this is the size the disc has to be to see any real detail, so the 'observing season' starts on this date, and goes right through until December.

Mercury - This month is a great time for seeing Mercury. In fact, this week and next are one of the best times this year. . It will be shining brightly close to (and below) the Pleiades. It reaches greatest eastern elongation on April 16th and thereafter starts to fall back towards the Sun (and it's eventual transit). By the end of April the planet will be very hard to see. Here is a chart of Mercury's positions over the next few days:



Transit of Mercury – In the early morning of the 7th May, Mercury will make one of its very rare treks across the face of the Sun. That day the Sun rises at 04.21 UT (05.21 BST). Mercury first touches the Sun's disc at 05.15 UT (06:15 BST), mid transit is at 07.54 UT, and the planet finally leaves the disc at 10.34 UT. Because Mercury's orbit is slightly tilted to that of the Earth, and because Mercury moves so quickly, it rarely passes directly in front of the Sun. And the last time it did it, Britain was facing away into the night sky, so we missed it! Those of you solar observers who know how to project the image of the Sun on to a piece of card will know how to view this eclipse. Mercury will almost certainly be too small to see with the naked eye and a solar filter. But whatever you do, do NOT look directly at the Sun with a telescope or binoculars without proper filters, even if it is slightly cloudy. DOING THIS, EVEN FOR ONLY A FEW SECONDS COULD LEAD TO BLINDNESS!! As the action takes place over such a long time, we can hope that even if there is a lot of cloud about, we might at least get a few glimpses of the Sun over the 5 hours.



With a bit of luck, you may notice the teardrop effect as Mercury enters the Sun's disk and again when it leaves. This is due to diffraction. Above is a diagram of Mercury's path across the face of the Sun (7-V-2003) along with other transits, past and future:

Jupiter - Jupiter still dominates the evening sky, shining very brightly at magnitude -2.2 close to M44, the Beehive star cluster. The cluster is just to the right of the planet and both will be in the same field of view of a pair of binoculars. Jupiter is fairly lose to a 4th magnitude star, Delta Cancer, at the end of April.

Saturn - The ringed planet is falling towards evening twilight now so this month is your last chance to have a look at the wide open rings before Saturn disappears behind the Sun.

Occultations - There is a good lunar occultation of a bright star on the night of April 17th/18th. Alpha Libra (2.9 magnitude) is covered by the Moon at 00.08 UT and reappears at 01.07 UT. This will be easily visible in a small telescope or steadily held binoculars.

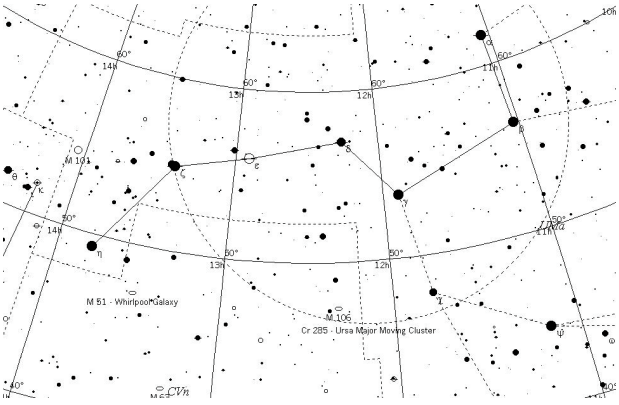
Moon Phases:

New: 1st Apr.; First Qtr: 9th Apr.; Full: 16th Apr.; Last Qtr: 23rd Apr.; New: 1st May; 1st Qtr: 9th May.

This month's Deep Sky Object

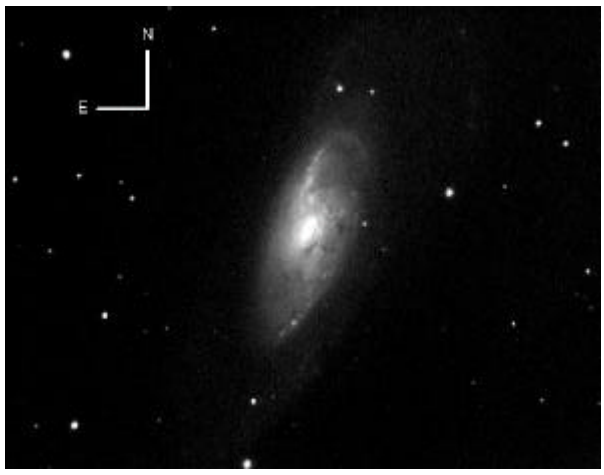
By Paul Warren & Paul M^{c}Gale

This month's DSO is M106, a bright galaxy (well, bright as far as galaxies go!) situated in the constellation of Canes Venatici, very close the to border with Ursa Major.



This isn't one of the easier DSOs to find, though it isn't in the difficult category. Possibly the best way of finding it is to start off from ?-UMa. Over to the left there are two brightish stars (as seen through a finderscope). M106 lies a little to the right of the lower of these two stars.

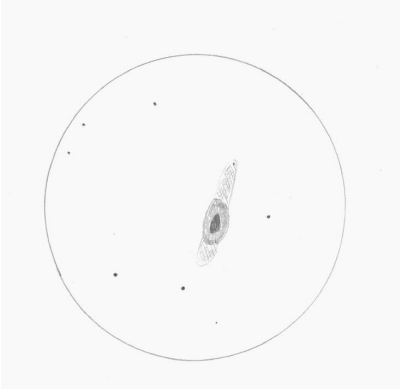
This month we will be looking at this galaxy from the imager's and visual observer's point of view. So to kick off, here is what the imager makes of this lovely galaxy:



This image was taken, from Oxford, with an LX200 8" SCT and SX MX916 CCD working at about f/7. It is the average of 9 x 600s exposures and covers an area of sky of about 21 arcmin x 16 arcmin.

The extended halo, running approximately North to South, is noticeable but not as much as it should be due to poor transparency on the night the picture was taken. The halo is very large and actually exceeds the boundaries of the image. The inner core of the galaxy and its two spiral arms dominate. Delicate dust lanes are obvious as is the non-uniform brightness of the arms. In colour, some of the red HII regions in the blueish arms are easily discerned.

NGC4258 (M106) is located at about 21 million light years from Earth. Elliptical spiral galaxy has a revolving bulge in their middle, and their outsides are disk-shaped with arms that wind around, just as in spiral galaxy. However, the two forms differ in that the central part of elliptical spiral galaxy is long and thin. Strictly speaking, NGC4258 (M106) is somewhere between a spiral and elliptical galaxy.



A drawing of M106 made by Paul Warren

When it comes to visually observing M106, the observer can't hope to see the amount of detail that imagers can reveal. However there is still a fair amount to be seen, which I've attempted to show in the above sketch. The sketch is oriented the same way as the photograph, so they can be compared. I used an 8 inch SCT, with a 0.63 focal reducer/corrector using a 13mm eyepiece, giving a mignification 0f 97. As with nearly all

galaxies, M106 initially appears as a grey smudge. Until I revisited this galaxy last month, my recollection of it was “a bright grey smudge”. When I observed it last month, the first thing that struck me was the sheer size of it ? it is huge. I could see the halo extend as far north as a magnitude 12.5 star. Indeed, it looked as though it might have been a supernova in the galaxy. The other thing that I noticed was that there are three parts to this galaxy. First there is the bright nucleus; this is surrounded by the spiral arms of the galaxy (no, I couldn’t discern a spiral structure to it); and finally, there is a very faint halo extending north and south, with the north side being the brighter of the two.

Now, before you try observing these features, you really do need to have your eyes well dark adapted, especially for the faint halo. When I observed this galaxy, I had been observing very faint galaxies for two hours beforehand, so my eyes were well used to spotting very faint smudges against the night sky, and I think this helps a lot with M106.

Explanation: What's happening at the center of spiral galaxy M106? A swirling disk of stars and gas, M106's appearance is dominated by two bright spiral arms and dark dust lanes near the nucleus. Bright newly formed stars near their outer tips distinguish the spiral arms in the above photograph. The core of M106 glows brightly in radio waves and X-rays where twin jets have been found running the length of the galaxy. An unusual central glow makes M106 one of the closest examples of the Seyfert class of galaxies, where vast amounts of glowing gas are thought to be falling into a central massive black hole. M106, also designated NGC 4258, is a relatively close 25 million light years away, spans 30 thousand light years across, and can be seen with a small telescope towards the constellation of Canes Venatici.

Double Stars (Part 2)

By Guy Yeates

How do I observe double stars? Simply, since I'm only just starting out. Firstly I use an atlas at the eyepiece and star-hop until I arrive at my target star. If I think I've found it I note what it looks like and draw its position relative to nearby stars (and refer this drawing to an atlas later on to double check). I can estimate the position of the fainter star(s) in the pair (I use North of the brighter star as 12 o'clock and mentally move clockwise and later convert this 'time' into degrees e.g., 6 o'clock = 180 degrees). I can only roughly estimate how far apart these stars are but experience should improve this skill. It's a bit basic but it's a start and quite frankly although. I'm in it for the challenge and the views. My ultimate aim will be to contribute recordings of separations and relative positions in a similar manner to variable star observers who contribute their magnitude data.

What equipment do you need? That depends on how close a pair of stars you want to separate. I have a 5inch Meade ETX-125 and although the theoretical minimum separation for two stars (the smallest distance two stars need to be apart for me to see them as separate stars) is 0.9 arc seconds (") [called the Dawes limit (in sec arc) = 4.56/<objective diameter in inches>], with my experience and my usual sky conditions my practical limit is nearer 1.5". Magnification and objective diameter are two important factors. The larger the objective the smaller the Dawe's limit and the closer two stars can be and still be resolved thereby improving your practical resolution limit. In addition a larger aperture allows you to see fainter stars, a useful extra factor as some secondary components may be too dim to see without a bigger telescope). As for magnification – well, you can approach this in two ways. I can separate Mizar and Alcor, in the handle of the Plough, which are 709" apart. My average eyesight should therefore allow me therefore to just about separate a pair of stars as close as half that (400" approx.). If however these stars were only separated by 100" then I'd need to magnify the image until they appeared to be about 350" apart and this equation tells me how by much: (<my eye-sight-limit> / <actual separation>) i.e. 400"/100" = x4. so I'd need a pair of small binoculars. For a pair separated by only 10" across I'd need 400"/10" = x40 i.e. a small telescope plus a low power eyepiece. If the stars were even closer still e.g., 1" then I'd need 400"/1" = x400 which I can just about manage with my telescope (10mm + 2x Barlow) but only on the stillest of nights since a practical maximum magnification for my telescope is x250 (i.e. x50 for every inch of aperture). You can reverse this calculation and determine the closest separation two stars can be based on the range of magnifications available to you with your equipment and your eyes.

MUTUAL EVENTS OF JUPITER’S SATELLITES

1 = IO 2 = EUROPA 3 = GANYMEDE 4 = CALLISTO
o = occults e = eclipses A = annular T = total

	Start UT	End UT	Type	Mag %
14 Apr	19.16	19.19	1o2	58
17 Apr	03.28	03.32	2e1	A43 48 secs
21 Apr	21.27	21.31	1o2	64
28 Apr	23.40	23.44	1o2	71
4 May	21.06	21.10	2e1	A41 69 secs
6 May	01.55	01.59	1o2	82
7 May	02.26	02.51	2o4	A65 287 secs
11 May	23.21	23.24	2e1	38

NASA's Space Place

Musical Satellites

by Tony Phillips

If light were sound, then chemicals would play chords.

Water: C major. Cyanide: A minor. Chlorophyll: G diminished 7th. (Please note that the choice of chords here is only for the sake of illustration, and not meant to reflect the actual spectra of these chemicals.)

It's a loose metaphor, but an apt one. Musical chords are combinations of frequencies of sound (notes), while chemicals leave unique combinations of dips in the frequency spectrum of

reflected light, like keys pressed on a piano. Spectrographs, machines that recognize chemicals from their "chords of light," are among the most powerful tools of modern chemistry.

Most earth-watching satellites, like the highly successful Landsat series, carry spectrographs onboard. These sensors measure the spectra of light reflected from forests, crops, cities, and lakes, yielding valuable information about our natural environment. Current satellites do this in a fairly limited way; their sensors can "hear" only a few meager notes amid the symphony of information emanating from the planet below.

EO-1 could change that. Short for "Earth Observing 1," EO-1 is an experimental NASA satellite in orbit since 2000. It's testing out a more advanced "spectrometer in the sky"-the Hyperion hyperspectral imager. How good is it? If Landsat were "chopsticks," EO-1 would be Gershwin's "Rhapsody in Blue."

The Hyperion sensor looks at 220 frequencies in the spectrum of visible and infrared light (0.4 to 2.5 microns) reflecting off Earth's surface. Landsat, in contrast, measures only 10. Bryant Cramer, who manages the EO-1 project at the Goddard Space Flight Center, puts these numbers in perspective. "If we flew Landsat over the northeastern United States, it could readily identify a hardwood forest. But using hyperspectral techniques, you probably can . . . tell the oak trees from the maple trees."

Future earth-watching satellites may use Hyperion-like instruments to vastly improve the environmental data they provide. EO-1 is paving the way for these future missions by taking on the risk of flight-testing the sensor for the first time.

For farmers, foresters, and many others, this new remote sensing technology will surely be music to the ears.

Read about EO1 at http://eo1.gsfc.nasa.gov . Budding young astronomers can learn more at: http://spaceplace.nasa.gov/eo1_1.htm.

This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.

NOTICES

NOTICE OF ANNUAL GENERAL MEETING

The Annual General Meeting for 2002/03 will take place on **Monday 12 May 2003** at All Saints' Methodist Church Hall, Dorchester Crescent, Abingdon at approximately **9.30 p.m.**, following the joint Golden Jubilee meeting with the Society for Popular Astronomy, which will start at **8 p.m.** and will feature an SPA presentation on Mars and other attractions.

Agenda

Apologies for absence; Minutes of the previous Abingdon AS AGM (held 13/5/02); Matters arising; Presentation of Committee's report; Presentation of Treasurer's report and Adoption of accounts; Setting of membership fees for 2003/04; Election of officers: i) Chairman ii) Secretary iii) Treasurer iv) Publicity Officer; Election of other committee members (between one and six in number); Any other business.

Chris Holt, Secretary, Abingdon Astronomical Society

NOMINATIONS FOR ELECTIONS TO COMMITTEE

Nominations are sought for the posts of Chairman, Secretary, Treasurer, Publicity Officer and between 1 and 6 other committee members.

Under the Constitution of the Society, the "candidates for election shall be proposed and seconded by ordinary members of the Society and the nomination, including the candidate's signature, submitted in writing to the Chairman at least four weeks prior to the Annual General Meeting" (para. 10.3.3). Ordinary members are all those who are not honorary members or affiliated members.

The Constitution goes on to say that, "in the event of there being no candidate for the election of an officer of the Society, or fewer than ten candidates for the election to the Committee, the Chairman may accept nominations given at the meeting" (para. 10.3.4).

Chris Holt, Secretary, Abingdon AS

N.B. A detailed knowledge of astronomy is not required to be a committee member, just enthusiasm.

FURTHER DISCUSSION

The society's e-mailing list is used by members to comment on all things astronomical, as well as other related and not-so-related subjects.

The list is also used to publicise "first-clear-night" observing evenings and for alerting members to hot observing news.

To subscribe: send an email to abiastro-subscribe@topica.com . You will then receive all e-mails sent to the list. To post e-mails on the list: send an email to abiastro@topica.com .To unsubscribe: send an email to abiastro-unsubscribe@topica.com

DATES FOR YOUR DIARY

28th to 30th Apr. (FCN): 8pm. Observing Evening at Britwell Salome. Phone Bob 0n 01491 201620 to confirm. Ask Bob tonight for a map & directions to the site.

12th May: 8pm. A Special Event to mark the 50th anniversary of the Junior Astronomical Society, now the "Society for Popular Astronomy", followed by our AGM.

2nd June: 8pm. Beginners' Meeting in the Perry Room.

The editor of "SpaceWatch" is Andrew Ramsey, who would very much appreciate your help and contributions. Please send any news, observations, photos, etc. to:

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