

SPACEWATCH

the newsletter of the Abingdon Astronomical Society

14th June 2010

Barrie Jones
(Open University),
'Pluto: Sentinel of the Outer Solar System?'

You have to stay up late at this time of year to see dark skies. In fact, since astronomically speaking twilight is the period when the Sun is less than 18 degrees below the horizon, it is in fact twilight all night long.

THE NIGHT SKY THIS MONTH

by Bob Dryden

Earth & Sun: The summer solstice occurs on 21st June at 11.28 UT when the Sun will be in the constellation of Gemini. While this is technically mid-summer's day, what it actually means for us astronomers is that the nights are drawing in again, as gradually the days start to get shorter. On 6th July the Earth reaches aphelion. The Earth's orbit is not quite circular which means there are two points in its annual journey when it is nearest and furthest away from the Sun. Aphelion is the furthest point and Earth will be 152 million kilometres from the Sun (as opposed to 147 million kilometres when nearest).

Mercury: A rather poor morning apparition of Mercury is coming to an end now, and the planet reaches superior conjunction on 28th June, after which it reappears in the evening sky. Unfortunately this is a very poor apparition as well with Mercury hugging the south western horizon. At best, the planet is barely 10° above the horizon at sunset, and most of the time it is much lower than that. Greatest eastern elongation is on 7th August when Mercury will be 27° from the Sun, but it will be gone from sight by the second week of August. Following inferior conjunction on 3rd September, Mercury quickly appears in the morning sky, and you might just pick it up around the 10th or 11th of the month. While it is going to be a short apparition, it will be the best morning one of the year.

Venus: While Venus is getting lower now, it still has not reached greatest elongation. This occurs on 20th August when Venus will be 46° east of the Sun. In June, the elongation is 37°, increasing until 20th August, and then decreasing slightly to 45° by mid September. As Venus is approaching Earth, its apparent size grows quickly, going from 14" in June to a whopping 32" by September. This means the disc will be quite large in a telescope. It also means Venus is getting brighter, increasing from mag. -3.9 in June to mag. -4.4 by the end of August. In addition to the increasing disc size, the phase of Venus reaches the more pleasing to look at crescent shape after greatest elongation in August. Starting at 0.8% in June, the phase becomes 0.5% at elongation, and 0.4% by September. Half phase, which should be reached at

elongation, is something you should watch out for. On Venus, half phase usually comes before or after elongation by a few days, so, keep a watch on the planet and try to judge when you think half phase is reached.

Venus has various meetings with other astronomical objects during the summer. The first occurs on 20th and 21st June when Venus crosses M44, The Beehive cluster, in Cancer. As the cluster will be low in twilight, you will probably need at least binoculars to see it, and maybe even a small telescope. On 14th July the crescent Moon will be just below Venus, but it will be low down and maybe quite hard to find. During the first week of August, Venus, Mars, and Saturn will form a close triangle in the west. However, they will be just 7° above the horizon at sunset so you will need a telescope and a very unobstructed horizon to find them. On the evenings of the 12th and 13th August the crescent Moon will be below them all.

Venus and Mars have been slowly approaching each other throughout July and early August, until they are just 2° apart on the 20th August. However, this too will be very hard to see as both planets will be very close to the horizon.

The crescent Moon visits Venus once more on 11th September when it will be below and left of the planet. Yet again though, they will be very low down making it a difficult observation.

By mid September, Venus will be just 5° high at sunset, and as good as lost for this apparition.

Mars: Mars continues to fade as Earth moves away from it. Starting at mag. +1.2 in June, it decreases to +1.5 by August. Equally, its apparent size also decreases, going from 5.7" in June to 4.3" by August, making it difficult to see anything at all on the disc. Presently in Leo, Mars moves into Virgo in the middle of July before being lost to the evening twilight by about the end of August. There is a conjunction with Saturn on 30th July when the two planets will be 1° apart. Venus will be below and to the right of the pair, but all three will be low down so a telescope will probably be needed to see this event.

Jupiter: Visible crossing Pisces in the morning sky, Jupiter is difficult to miss as it shines at mag. -2.4. This actually increases to mag. -2.9 by mid September as the planet approaches opposition later in the month. Its apparent size also increases as September approaches, reaching a huge 49.7". This means plenty of surface detail will be visible in even small telescopes.

Saturn: Crossing Virgo, Saturn will be hard to see by the last week of August due to the encroaching evening twilight. Shining at mag. +1.1, it is bright enough to see with your naked eye in June and July, but you may need

binoculars by August if you want to find it. If you have a small telescope, then the rings are easy enough to see, and they are actually opening up again through summer. In June they are at an angle of 1.8° to Earth, whereas by August that has increased to 5° .

Uranus: Uranus does not reach opposition until the end of September, which means it is not well above the horizon until late in the night for a good part of the summer. However, it is never far from Jupiter so it is not hard to find at the moment. You will need binoculars though, as it is just below the threshold of naked eye visibility for most people at mag. +5.7. The two planets do move slightly apart through July and early August, before starting to close up again (they get to within 1° of each other on 18th September).

Neptune: Again, you will need binoculars to see this planet as it shines at a fainter mag. +7.8 on the Capricornus/Aquarius border. Neptune reaches opposition on 20th August which means later in the summer it will be visible at a more sociable hour. By the end of August, by midnight Neptune will be in the south about 25° high.

Occultations: While there are numerous lunar occultations of fainter stars, there is only one of a slightly brighter one this summer. It occurs at 23.43 UT on 28th June (which is of course 00.43 BST 29th June) when the magnitude+4.9 star, rho Capricornus reappears from behind the Moon. What makes this occultation slightly more interesting than usual is that rho is a double star, the companion being magnitude +6.8. The fainter companion will emerge about one second before the brighter one.

At the time, the Moon will be 14° high in the south-east. Unfortunately, the Moon will be gibbous and about 94% illuminated so the observation could be quite tricky depending on the size of your telescope.

Meteors: While there are several minor meteor showers during the summer, there is only one major one and that is the Perseids. The Perseids are active between 23rd July and 20 August although most observers concentrate on the night of maximum activity which is the 12th August. Maximum occurs about 21.00 UT when under ideal conditions you could hope to see about 80 meteors an hour. Of course, conditions are never ideal so in reality you will probably see about half that. Still, this is one of the best meteor showers of the year, and this year in particular it should be well worth the effort to try and watch it. This is because for a change, the Moon does not ruin things, as it is just 2 days old on the 12th, and therefore sets very soon after sunset. This will give you a dark sky all night so make the most of the chance. You will see more meteors after midnight, through to dawn, so get out your snubbed, make some sandwiches and a flask, wrap up warm, and watch the spectacle.

Comets: There are two comets worth a mention.

The first is 10P/Tempel which is expected to be the fainter of the two I will mention. Shining at about mag. +10.7 in June, the comet will brighten to +10.2 by the end of July, before starting to fade again to about +10.6 by September. Obviously, you are going to need a telescope for this one, and

you are also going to need to be up just before dawn as the comet crosses Aquarius and Cetus.

The second comet promises to be very interesting as it might get bright enough to be an easy binocular object. It is called C/2009 R1 McNaught, and it should be at its best around the end of June. Presently it is in Perseus at about magnitude +6.1, it enters Auriga on 19th June when it will be mag. +5.3, before reaching magnitude +4.7 towards the end of the month. It is closest to the Earth on 15th June, and reaches peak declination on 18th June. Again, it is best viewed before dawn, and will remain low down in the north east, travelling towards the north. The morning twilight will be an increasing problem as June progresses because the comet is heading towards the Sun and will probably be lost by the end of the month. If the comet does reach the predicted magnitudes, then it should be a very easy binocular object, hopefully with a nice tail. Only time will tell, and, of course, you will need to be out there to see it.

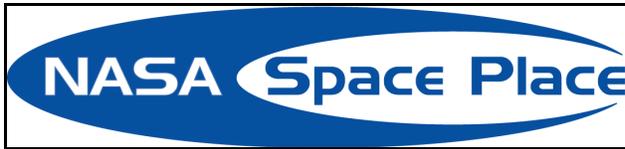
Dwarf Planets: **1 Ceres** is still visible, low down in Sagittarius, before entering Ophiuchus towards the end of June. At about magnitude +7.1 in June, it should be easy to see in binoculars if you have a good finder chart. After June Ceres starts to fade as it moves away from Earth and by September it shines at a lowly magnitude +8.8.

Asteroids: **4 Vesta** is crossing Leo and Virgo throughout June and July before being lost to evening twilight towards the end of July. Around magnitude +7.8/+7.9, it will be visible in binoculars in June, but probably getting harder to find in July when you might need a telescope. **6 Hebe** starts this session quite faint at magnitude +9.8 but slowly brightens during summer, reaching +7.7 by September. This will be the brightest it gets this apparition. In Aquarius to start with, it crosses into Cetus in early July.

Noctilucent Cloud: Of course, no summer issue of Spacewatch would be complete without a mention of noctilucent cloud. Only usually visible through June and July, this type of cloud is the only one astronomers are happy to see. Look towards the North after sunset, and if there is any about, noctilucent cloud will be visible very low down. Just rarely, if it is a big display, the cloud can be higher up, but it is always towards the north, or either side of the north point of your horizon. It is very strange looking cloud, often being described as looking 'spidery' or 'electric', but it can also be in the form of veils or swirls. Experts are still trying to decide how and why it forms, and they need as many observations as they can so keep your eyes peeled.

MOON PHASES:

New: 12th June; First Qtr: 19th June; Full: 26th June; Last Qtr: 4th July; New: 11th July; First Qtr: 18th July; Full: 26th July; Last Qtr: 3rd Aug.; New: 10th Aug.; First Qtr: 16th Aug.; Full: 24th Aug.; Last Qtr: 1st Sept.; New: 8th Sept.



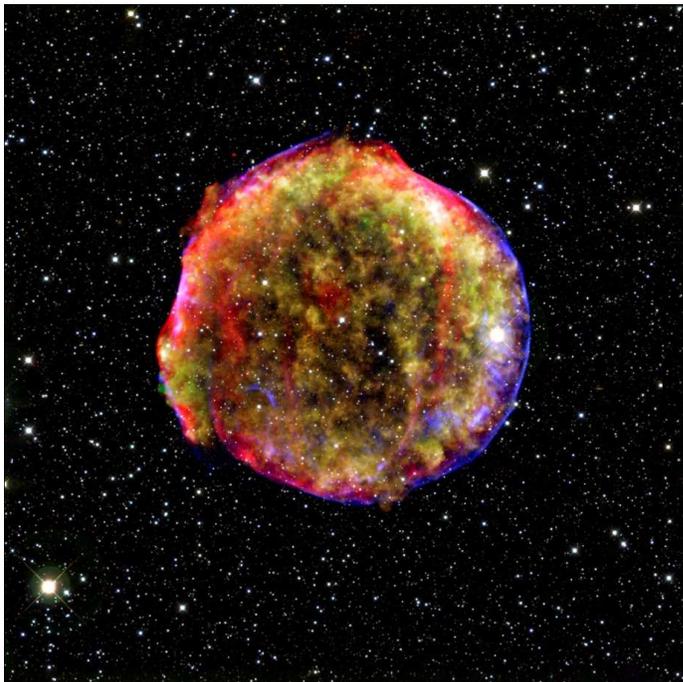
ANCIENT SUPERNOVA RIDDLE, SOLVED

by Dr. Tony Phillips

Australopithecus squinted at the blue African sky. He had never seen a star in broad daylight before, but he could see one today. Was it dangerous? He stared for a long time, puzzled, but nothing happened, and after a while he strode across the savanna unconcerned.

Millions of years later, we know better.

That star was a supernova, one of many that exploded in our corner of the Milky Way around the Pliocene era of pre-humans. *Australopithecus* left no records; we know the explosions happened because their debris is still around. The solar system and everything else within about 300 light-years is surrounded by supernova exhaust—a haze of million-degree gas that permeates all of local space.



Left-over cloud from the Tycho supernova, witnessed by Tycho Brahe and other astronomers over 400 years ago. This image combines infrared light captured by the Spitzer Space Telescope with x-rays captured by the Chandra X-ray Observatory, plus visible light from the Calar Alto Observatory in Spain.

Supernovas are dangerous things, and when one appears in the daytime sky, it is cause for alarm. How did Earth survive? Modern astronomers believe the blasts were too far away (albeit not by much) to zap our planet with lethal amounts of radiation. Also, the Sun's magnetic field has done a good job holding the hot gas at bay. In other words, we lucked out.

The debris from those old explosions has the compelling power of a train wreck; astronomers have trouble tearing their eyes away. Over the years, they've thoroughly surveyed the wreckage and therein

found a mystery—clouds of hydrogen and helium apparently too fragile to have survived the blasts. One of them, whimsically called “the Local Fluff,” is on the doorstep of the solar system.

“The observed temperature and density of the Fluff do not provide enough pressure to resist the crushing action of the hot supernova gas around it,” says astronomer Merav Opher of George Mason University. “It makes us wonder, how can such a cloud exist?”

NASA's Voyager spacecraft may have found the answer.

NASA's two Voyager probes have been racing out of the solar system for more than 30 years. They are now beyond the orbit of Pluto and on the verge of entering interstellar space. “The Voyagers are not actually inside the Local Fluff,” explains Opher. “But they are getting close and can sense what the cloud is like as they approach it.”

And the answer is ...

“Magnetism,” says Opher. “Voyager data show that the Fluff is strongly magnetized with a field strength between 4 and 5 microgauss. This magnetic field can provide the pressure required to resist destruction.”

If fluffy clouds of hydrogen can survive a supernova blast, maybe it's not so surprising that we did, too. “Indeed, this is helping us understand how supernovas interact with their environment—and how destructive the blasts actually are,” says Opher.

Maybe *Australopithecus* was on to something after all.

Opher's original research describing Voyager's discovery of the magnetic field in the Local Fluff may be found in *Nature*, **462**, 1036-1038 (24 December 2009). The Space Place has a new amazing Fact page about the Voyagers' Golden Records, with sample images and sounds of Earth. Just in case one of the Voyagers ever meets up with ET, we will want to introduce ourselves. Visit <http://spaceplace.nasa.gov/en/kids/voyager>.

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

LAST MEETING'S TALK

by Gwyneth Hueter

May's talk: 'Mount St John Observatory, or, New Zealand, the return', by Bob Dryden.

After our AGM was conducted with the minimum of fuss (as ever), we were treated to another episode of Bob's (love?) affair with New Zealand. In this year's installment he explored the South Island, which is much bigger than the North Island but has only one million inhabitants. Bob found out that the South Island is pretty wet and cold and windy and his search for astronomical societies was pretty fruitless, so he headed north from Queenstown.

We have got used to Bob 'scoring' with the locals and he did it again when he came to the Mount St John Observatory, which is the largest professional astro facility on the island.

Opened in July 1965, it belongs to Canterbury University, whose HQ is in Christchurch three and a half hours' drive away. It is situated in the Mackenzie Basin, near to Lake Tekapo. The area is dry and barren. When our Intrepid Bob tried to sort out a visit he was thwarted by a dubious organization called 'Earth and Sky', which has nothing to do with the University (and is not the one who used to sell books in the UK) but will try to rip you off with cursory daytime tours and a café (albeit rather a grand glass one). But our Bob refused to be fobbed off and got into direct

contact with Alan Gilmore, who Bob described as the Superintendent.

The observatory runs a Cook astrograph, which has been commissioned by the University of Pennsylvania for a photographic sky survey. There is also a 1.8 metre telescope which has been used for microlensing and searches for extrasolar planets and dark matter (in collaboration with Japan). This is the largest telescope in NZ. There is an older one metre telescope, which has its own coating room. Bob had earlier emphasized how isolated the site is, so that makes sense. There is no broadband either.

FURTHER DISCUSSION

If you are not already on our internet mailing list, then why not log on to YahooGroups. The list is called 'abingdonas'. Members use the list to alert each other about celestial events and to chat about amateur astronomy. The list is quite active, with several messages most weeks. To read through previous messages click on:

<http://groups.yahoo.com/group/abingdonas/> .

To join the abastro list, please go to <http://www.yahogroups.com> . You can also unsubscribe from the list here.

To post messages to the list, please send them to abingdonas@yahogroups.com . Please note that you will need to

sign up with a YahooID if you do not already have one. You can do this on the above page.

Further information about the mailing list can be found on the abingdonas webpage at :

<http://groups.yahoo.com/group/abingdonas/> .

Further discussion on astronomy and many other topics takes place at the Spread Eagle pub in Northcourt Road after the main meetings. You are most welcome to join us.

DATES FOR YOUR DIARY

21st June 8pm Beginners' Meeting in the Perry Room.

Sept. 8pm First speaker meeting of the new season: Dr Robert Smith, 'Stars that go bang in the night'

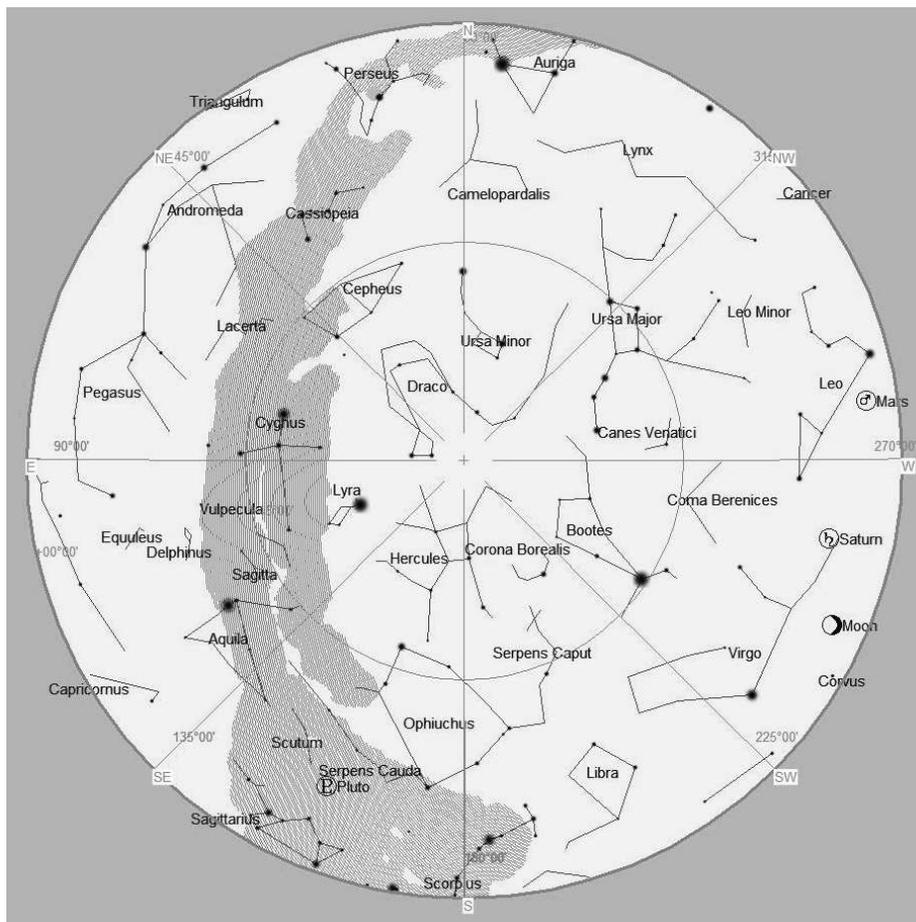
The editor of "SpaceWatch" is Andrew Ramsey, who would very much appreciate your stories & contributions. Please send any news, observations, photos, etc. to:

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STAR CHART



The Night Sky at 23:00pm (BST) next Saturday (19th June)