TRANSIT

The August 2009 Newsletter of

Next meeting:

11 September 2009, *7.15pm for a 7.30 pm start*

Wynyard Woodland Park Planetarium

400 years of the telescope –

Dr Jürgen Schmoll (Durham University and CaDAS)

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EDITORIAL and LETTERS TO THE EDITOR

Editorial

In late June, *Transit*'s editor, Bob Mullen, resigned from CaDAS. The committee later invited me to become editor and to take on some other aspects of the Communications & Information Secretary's job. I've agreed to do so until at least the next AGM. Bob did an excellent job with *Transit*, as did his predecessor Alex Menarry – each of us approached or will approach the task in his own way, so I hope you'll be OK with my version!

A quick astronomical pen-portrait, for context: I moved to Guisborough from the South 10 years ago, joining CaDAS a couple of years later when I resurrected a strong teenage interest in astronomy and bought a Meade ETX125 from the late David Sinden's dealership. I now have a larger Meade – an 8" LX90 – and a Coronado PST Hα scope. Until recently I've been purely an observer, but earlier this year took the first tentative steps in astrophotography, which I want to develop much more in the next observing season. I'm also very interested in the theoretical side of things, and have worked through a lot of distance-learning courses in astronomy, mostly from the University of Central Lancashire. The wealth of astronomical material on the internet is a major time-consumer for me too – some years ago I used to write regularly on that for *Transit*. I've written up a couple of trips to see total solar eclipses, too, and currently contribute a monthly quiz (though not this month!).

New editor, new design – we'll see how that develops! Do please let me know anything you particularly like or dislike about it. I *had* thought to reduce the newsletter to 12 pages per month, but certainly this month that has conflicted with a much more important principle, which is to try to include everything that is submitted by members of the society. It is really very pleasing to have such good contributions from within, and lots of regular and practical observational material in particular – do please keep them coming, large or small (the normal deadline is the 25th of the month). Many thanks in particular to all the contributors to this issue.

Two final things, about this month's articles. Firstly, commiserations to Neil Haggath and Don Martin on being clouded out in their quest to see the recent solar eclipse in China – Neil was gentleman enough not to snarl at me when I invited him to write an (excellent) article about it.

And beginner's luck in my first arm-twisting exercise: *Transit* now has an Australian Correspondent! Dave Weldrake has cheerfully agreed to write regularly on astrolife Down Under, and his first (and also excellent!) article, along with a brief biography, appears here. Dave adds: *"I'm happy to offer my services to members who might be thinking about going into astronomy as a career. That would apply mostly to school leavers, I guess. If there's anyone who wants some advice about it, email me at dtfweldrake@hotmail.com."*

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No quiz this month! Answers to the July quiz will be in the September issue.

Letter to the Editor

From Pat Duggan:

Mosquitoes

Dear Editor –

I wonder if any CaDAS members are as bothered by mosquitoes as I am?

I found this link today and have looked at the site for ThermaCELL Mosquito Repellent -- I might need to buy it when I go on holiday. I heard about it via a web letter and wondered if you wanted to pass it on in *Transit*.

Wishing you clear skies,

Pat Duggan, 13/7/09

[Ed: Indeed I do – here it is, from One-Minute Astronomer (www.oneminuteastronomer.com).*]*

Once I get going on a night's observations, not much can stop me. The cold doesn't bother me. I don't mind the fatigue, the eyestrain, or the strange noises in the night. But I cannot stand mosquitoes.

My exasperation with mosquitoes comes from my younger days. As a kid in northern Ontario, I'd head out on a dark summer night to sweep the stars of Sagittarius or Scorpius. But in mosquito season, I never lasted long. The critters would attack every inch of exposed skin, flying up my nose and in my eyes and ears, and generally drive me as crazy as a lab rat. Some mornings I'd wake itchy with a face swollen from the toxin of dozens of bug bites.

There were potions, of course. A local inventor, J.G. McKirdy if I remember right, concocted a creamy white paste laced with citronella oil that helped a little. But it was greasy and stuck to your skin like lemon-scented bacon fat. More modern insect repellents with DEET worked a little better, but how healthy can something with the real name N,N-Diethyl-meta-toluamide actually be for you?

And for us astronomers, there's another problem with harsh chemical insect repellents... they're dreadfully bad for your the anti-reflection coatings optics and plastic surfaces of your equipment.

I have seen a few stargazers try screened bug jackets, hoods and gloves. But these make it hard to handle eyepieces and filters in the dark. Not to mention trying to see fine detail with your telescope while wearing a screened hood on a warm summer night.

Bug zappers? They don't work well enough. Ultrasonics? Forget it. A bug fogger? Expensive and toxic. Citronella candles? The flame kills your night vision.

But last year, I read an article by Todd Carlson in *SkyNews* (a Canadian astronomy

magazine). He mentioned a new device by a company called Thermacell that was effective in keeping the bugs away, even in the middle of a buggy Canadian summer. I've tried the Thermacell, and it works extremely well.

Which is strange because it does seem to do much. It uses a little butane cartridge to generate a tiny flame that heats up a small blue pad soaked in a nearly odorless bug repellent derived from chrysanthemum flowers (yes, really). It's about the size of a telephone handset. You can hang it off your belt, or lay it on the ground. There are no moving parts, no noise, no batteries required. Yet it keeps an area about 15 × 15 feet square nearly bug free.

If bugs are keeping you away from stargazing (or otherwise enjoying the outdoors), the Thermacell might be the answer for you. I'm not sure it's available everywhere in the world, but Google will help you find it. And here's the link to the review article by Todd Carlson in *SkyNews* (www.skynews.ca/PDFs/Review_PDFs/mosquito.pdf).

Now if I can just find a "cloud repellent", I'll be ready to go.

OBSERVATION REPORTS AND PLANNING

Skylights – August 2009

Rob Peeling

The Sun

Don't forget Solar Observing on Sunday, 30 August, 15:00--18:00 at the Planetarium.

The Moon

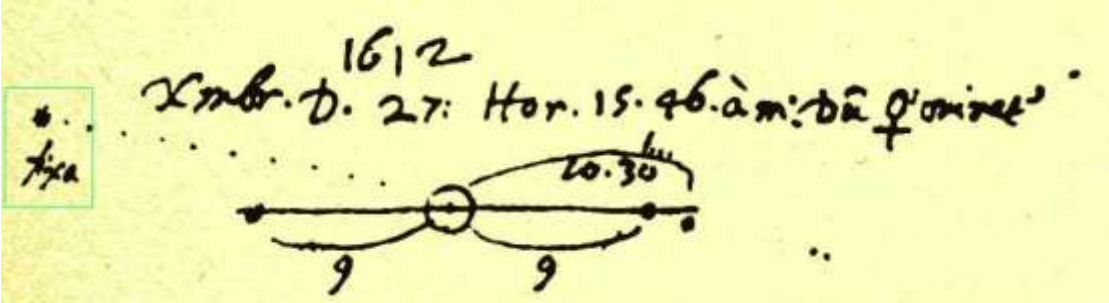
6 Aug	13 Aug	20 Aug	27 Aug
Full Moon	Last Quarter	New Moon	First Quarter

Planets

Jupiter is the most conspicuous planet in the sky in August. It will be lying low in the sky to the south-east as it gets dark. I expect it will be difficult to get good views of details in the cloud belts with the planet at low altitude in the sky. The four Galilean moons will be clearly visible with good binoculars. If you are using a telescope, then check the moons at least of couple of times in a night – about 2 hours apart. Their orbital movements, particularly those of Io and Europa, are quick enough to be noticeable within one evening.

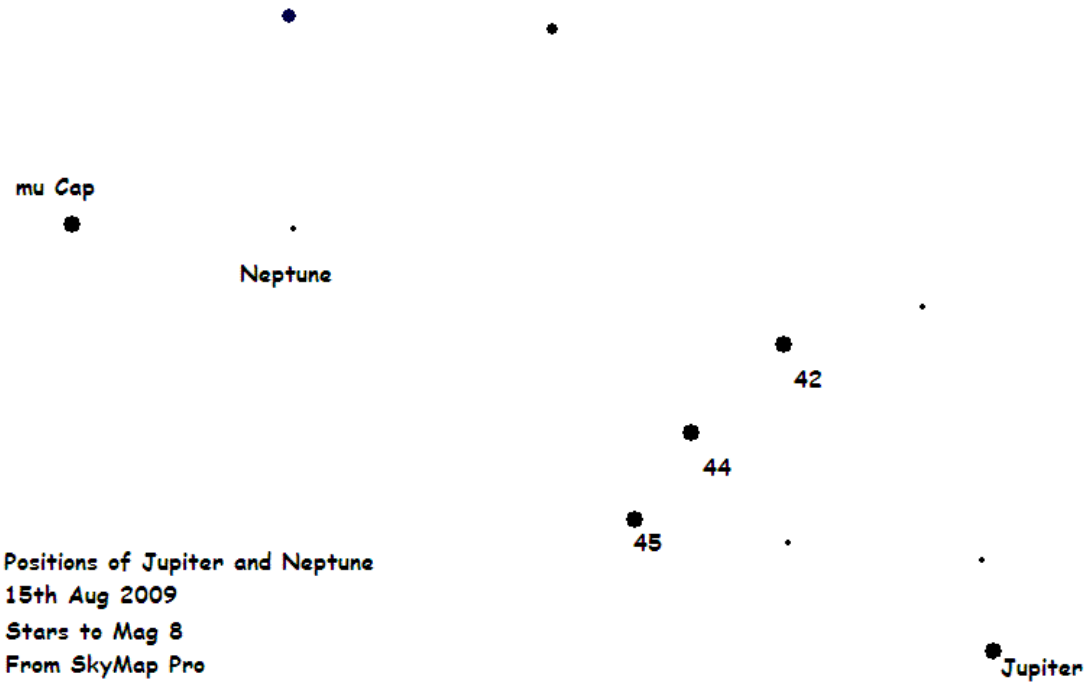
Given that it is 400 years since Galileo's first telescopic observations, there is a kind of poetic symmetry in the fact that this year **Neptune** is to be found close to Jupiter. Galileo appears to have detected and recorded Neptune as a "fixed" star in an observation of Jupiter and its moons on 28 December 1612 and again on 27 January 1613. In *Nature* (25 September1980), Charles Kowal and Stillman Drake reported that the fixed star recorded by Galileo

corresponded with the calculated position for Neptune at the time of Galileo's observation. In July this year, David Jamieson of Melbourne University claimed that Galileo noticed the movement between observations of the "fixed star" and therefore realised it was something else.



I have seen Neptune with binoculars as small as 10×25 in light-polluted skies. There can be no doubt that Galileo would have been able to clearly see Neptune as a star as stated by Kowal and Drake. I am personally sceptical of Jamieson's claim. There is no other fixed star shown in his sketch above, so how could Galileo be sure whether any movement he detected was inherent to the "star" or part of the movement of Jupiter, of which he was very aware?

The challenge this month is firstly to find Neptune and then to detect it, either in a finder or with binoculars.



Uranus rises later in the evening and **Mars** in the early morning.

In August, the dwarf planet **Pluto** is in its "best" position this year for an attempt to observe it. At magnitude 14 it will be a *very* serious challenge to detect visually at low altitude in a crowded star field. Its position is about 2 degrees north-east of M23 in Sagittarius. Observations on two nights will be required to be sure. Star charts won't be detailed enough, so you'll need to arm yourself with images of the area from the Digital Sky Survey or POSSI (Palomar Observatory Sky Survey I -- there's a copy in the planetarium).

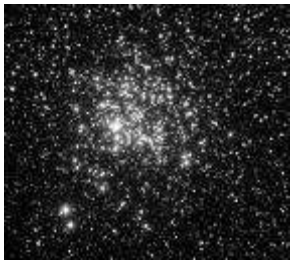
Meteors

The **Perseids** are the highlight of the meteor observing year. The maximum is 12/13 August. For the maximum, Ed is holding a public observing session at the planetarium, from 21:00 on 12 August until 06:00 on the 13th. This meteor show is associated with the comet Smith-Tuttle. *[Ed: A news update from Spaceweather.com on 5/8 quoted NASA as saying that a filament of comet dust has drifted across Earth's path and when Earth passes through it, sometime between 0800 and 0900 UT on 12 August, the meteor rate could surge to twice its normal value. The same web link announces a new iPhone/iPod application dedicated to the Perseids, with a countdown clock, news alerts, sky map and a live gallery of photos from around the world.]*

Deep-sky objects

Here are two **planetary nebulae** in the constellation of Ophiuchus that you may enjoy finding. The first is **NGC 6572**, which lies south of 71 Oph. It is plotted in *Norton's* and will be included in most star atlases. It is very bright for a planetary nebula and at first difficult to spot because it is very star-like in appearance. However, its colour is what gives it away. Suddenly you realise that you are looking at a bright green star, and that can't be right! Higher power or an OIII or UHC filter will show some nebulosity to confirm that it really is a planetary nebula. It deserves its nickname of the Emerald Eye Planetary.

The other planetary nebula is **NGC 6309**, which lies a little north of Eta Oph. This is quite a difficult object to find because it is low in the Teesside sky and because the surrounding field is confused by the presence of a nearby double star -- the nebula itself is close to another star, and so superficially appears to be another double. Careful inspection reveals that one of the "stars" is the nebula and that the shape is elongated towards the real star. This gives the appearance of an exclamation mark, which is one of the several names for this object. It is also referred to as the Box Nebula and Tempel 1 (after the discoverer).



Other objects worth looking out for include **M11**, the Wild Duck cluster in Scutum (*see right*), a very rich open cluster that is easy in binoculars. I have never understood the Wild Duck name, though. I can't see anything that resembles the lines in a flying flock of ducks.

Further south from M11 are two famous nebulae: **M16**, the Eagle Nebula, and **M17**, the Swan Nebula. The star cluster associated with M16 is easy to see but the nebulosity itself is much more elusive. M17, however, is easy to see and does (to my eyes anyway) merit the Swan description.

Multiple-star observations in late May

Mike Gregory

Wednesday 20 May 2009 – It will be eight years ago tomorrow night that I purchased my refractor, and my life, and lifestyle, have certainly changed since that evening. I have spent the last few days typing up some new multiple-star lists; it is all very hard and tedious work but I need some new targets to go for!

O.S. 021/09 – Sunday 24 May 2009 – I set my refractor up on the lawn, polar aligning for 22.30 BST, but I appeared to be a little out with my aligning. However, the Gotostar worked perfectly over the next ninety minutes.

My first target was Struve 2259 in Hercules, as there is an article on it in May's *Astronomy Now*. Supposedly yellow and blue, but…

I also searched for an undesignated Espin star in Draco, as it had reasonably bright magnitudes, but I could see no sign of a dim double in that area. So I moved into Serpens Caput, a constellation new to me, and viewed the following doubles, each pair gravitationally bound or, at least, sharing a common proper motion.

15127+1917 STF1919	15187+1026 STF1931 AB
15348+1032 delta STF1954 AB	15462+1525 beta STF1970 AB
15559-0210 STF1985	15568+1229 STF1988

Despite the fact that the light pollution tonight was worse than I could ever recall, I separated the above six pairs quite easily with my 102mm refractor, and was quite surprised to see the companion of beta Serpens, which is some 430× dimmer than its primary star!

O.S. 022/09 – Tuesday 26 May 2009 – It was 100% cloudless at 22.45 BST and, though it was still quite light, I set up my refractor for that time, using Vega to set up the Gotostar. My plan was to continue in Serpens Caput from where I ended two nights ago.

Struve 1987 was my first target, with magnitudes of 7.3 & 8.7 and a separation of 11". According to the spectrum, the primary is white, but the secondary appeared to be a dim blue/green. At 25× there was no sign of the secondary, but it could be seen at 40× and better still at 60×, but 120× seriously overpowered the conditions.

My next target was Struve 1993 A-B with magnitudes of 8.6 & 8.9 and a separation of 22". Just seen at 25×, but much else simply overpowered the conditions.

Otto Struve 303 A-B is a much stiffer test with magnitudes of 7.7 & 8.1 and a separation of just 1.5". At a magnification of 60× there was a hint of duplicity, but with magnifications any higher than this the target simply disappeared.

Conditions were now hopeless, with my garden, garage wall and the back of my house all lit up by local security and main-road lighting. Even using a thick towel to cover my head at the eyepiece is of little help, as the sky glow is horrendous, so all packed away by 00.30 BST (Wednesday) after what must be the worst observing session ever!

O.S. 023/09 – Thursday 28 May 2009 – A cloudless sunset, so I polar-aligned my refractor for 22.30 BST, though it was almost 23.00 before I was ready to go! My plan was to continue observing where I left off in Serpens Caput just two evenings ago. To check my setting-up, I asked the Gotostar to find delta Serpens, which it did with a fine degree of accuracy.

My first target of the night was OΣ 303, the dim, close pair I thought I might have split two nights ago. Well, I certainly succeeded on this night with little trouble at 118× and it was not really dark yet. According to the Hipparchus Catalogue, both components share an identical parallax of 0.00863, which suggests they are a gravitationally bound pair, though no other catalogues mention this fact. Magnitudes are 7.7 & 8.1, and the separation 1.53". When first measured by Otto Struve in 1843 the separation was just 0.6", though it had opened to 1.2" in 1959 and 1.5" in 1999. Estimates for 2020 suggest 1.6"!

16030+1359 STF2000	16060+1319 STF2007 AB
16163-0139 STF2031 AB	16182-0216 STF2033

I also searched for the above four pairs, finding and separating all but Struve 2031 AB, which was probably too close to my Forsythia bush, and I could not get a clear focus.

Then I had a long look at the alternative, and much more interesting, double-double in Lyra, Struve 2470 and Struve 2474 (now who put them there?) and had an even longer look at OΣ 525, also in Lyra, but no success here. Finally I had a good go at λ Ophiuchi and just about split this quite tight pair, so isn't it about time I treated myself to a real star-splitter, perhaps a William Optics 132mm refractor on a Losmandy G1100 mount? Dream on, Michael!

O.S. 24/09 – Friday 29 May 2009 – A beautiful evening at dusk, so I set up my refractor's mount early and used my binoculars to see where the Pole Star might be, so I was almost ready even before I could see Polaris with the unaided eye. However, I set myself back when aligning the Gotostar, as I pressed the 'Enter' button instead of the 'Slew' button and had to start again; though, as a test of my accuracy, the Gotostar found λ Serpens effortlessly. I then had a go for OΣ 303, and though I found it easily, it was not so clearly split as it was last night.

I also retried Struve 203, but again no luck. I was definitely looking at the correct primary star, as an adjacent field star was also in the field last night. Perhaps I would return later in the night when Serpens Caput was higher in the sky!

My next target was to be Alya, a famous pair that supposedly rank with Albireo, low in Serpens Cauda, but the Gotostar guided the optical tube very low amongst neighbouring shrubbery. However, through the foliage, there was Alya, two mid-white stars sharing a common proper motion. They can't possibly match the real Albireo, but impressive nevertheless!

As most of the stars in my list for Ophiuchus have quite low declinations, I decided that that constellation would be a target for later in the night, or another night, and the same for Serpens Cauda, so I moved into Hercules. My first target was a real challenge in the shape of OΣ 358, which has magnitudes of 6.9 & 7.1 but a separation of only 1.3" as at 2001 (and only opened up 0.8" in 160 years). After a long siege at various magnifications, I have to say I can see this pair as a 'figure of eight' but I cannot truly separate them, so it's a target pair for a better night (this one cannot be much worse).

Then I looked at 95 Hercules, a famous star with its almost equally bright gold and silver components, though in reality the spectra suggest mid-white (greyish) and yellow/orange; then 100 Hercules, another two mid-white stars slightly dimmer than 95 though much wider – quite impressive in fact; then Struve 2245 Aa-B, with magnitudes of 7.4 & 7.6 and a separation of 2.6" – hard to separate, though this pair are rather nondescript to say the least!

Now I am in Lyra and looking at my arch-enemy, OΣ 525, which I clearly split once, on 7 October 2003. Can I do so again…?

Cygnus is coming up higher now above the neighbour's foliage, so I have found the first star on my list for that constellation, Struve 2486 AB, a neat pair of Sol-yellow stars that share a common proper motion -- which is more than I am doing, as I had set out to observe wearing only shorts and tee-shirt and now, at almost 01.00 the following morning, it's decidedly chilly. However, I just had to have a look at Albireo (the first time this year) and it looked very impressive. The first and the last!

O. S. 025/09 -- Saturday 30 May 2009 – My plan was to have a go at multiple stars in Draco, this constellation being almost on my zenith, so I would have limited atmosphere to look through. I polar aligned for 22.30 BST and used Vega to align the electrics. All ready to go at 22.45 and I had success with all the following except for Σ 1408.

09379+7305 Σ 1362 – both components appear to be yellow/white, nicely separated at 80x.

10114+7302 Σ 1408 – this pair would be classed as a challenge for a 102mm lens in such light-polluted conditions and, though 80× appeared to show two close stars at times, I cannot say it was definitely split. A target for another night!

11152+7329 Σ 1516 AB – the huge discrepancies in separation and angular movement over the last 160 years show that this pair have discordant proper motions. Quite neat even at 25× and very wide at 59×.

11492+6720 Σ 1573 – this pair with a common proper motion (cpm) split quite easily at 25× and nicely so at 40×. The primary star appears to be yellow/white.

12023+7222 Σ 1588 – despite the dimness of the secondary star, by Acklam standards at least, this pair were separated at 40× though not at 25×. However, with magnifications of 60× or more the secondary just disappeared.

12321+7449 Σ 1654 – this is another cpm pair, the primary star being yellow/orange, though nearer to a definite orange according to its spectrum, whilst 80x is needed to separate them and 100× or 120× simply overpowers the conditions. Well, it's not all that clear at 80×, either!

13271+6444 OΣΣA 123 AB – this pair of yellow/white stars comes from Otto Struve's list of very wide doubles and was rejected at the time because of the large separation. However, recent measurements suggest that this pair share a definite cpm. Although Burnham says they are a 'field glass pair', they look very neat at 25--40×.

13341+6746 Σ 1767 – this cpm pair were hard to split, but I did so at 80x. The primary is a yellow star with a slightly higher temperature than our own parent star.

14410+5757 Σ 1872 AB – This pair split very nicely at 40× (and worth coming back to on a better night). The primary is an orange star.

At this point the lower end of the optical tube was coming very close to the tripod, so I felt it wiser to move off somewhere else. I chose my eternal nemesis, OΣ 525 in Lyra, which the Gotostar found at high magnification with stunning accuracy. As ever, no success yet again; but a nice double in Lyra is Σ 2351, a pair of pure-white, equal-magnitude stars that are worth coming back to on another night; and finally my second view of Albireo this year. Colours appear to be silvery yellow and sea-green at 40×!

O.S . 026/09 – Sunday 31 May 2009 – Yet another cloudless evening, so I set up my refractor at 23.30, then managed to drop the finder (fortunately onto the lawn) and this had to be realigned. The plan was to work through my new list of multiple stars in Cygnus, and I used Albireo to set up the Gotostar –

19307+2758 STFA 43 Aa-B – according to its spectra, Albireo is an orange and bluish/white pair, but I usually see the two components as yellow and turquoise. Certainly so tonight, and a spectacular sight at just 25×, though sharper still at 40×.

19121+4951 STF2486 AB – this Sun yellow pair share a common proper motion and look neat at 40x.

19277+3632 STF2534 – at first I struggled to find this pair, but at 40× they were very faint. The primary is a whitish star.

19438+3819 OΣ 384 AB – theoretically this pair are too close for a 102mm lens to resolve, but I had a go just the same and at 120× I could see the pair elongated at least. A target, perhaps, for when I was younger!

19450+4508 Σ 2579 AB – this is delta Cygnii, which Burnham suggests is a rather severe test for a 'four inch' lens. However, it is relatively easy to see the secondary component literally 'hanging' beneath the primary star, though a high magnification of 200× is required, as this primary overpowers the secondary by a factor of almost 40!

19456+3337 STF2576 AB – this pair are gravitationally bound with a 240-year period and share a cpm with 17 Cygnii (see below). They were a bit of a challenge to separate, owing, perhaps, to the primary being a rather dull orange star as well as to their relatively dim magnitudes. 80× overpowered the conditions and 60× gave a crisper view, but…

19457+3605 STF2578 AB – both components are almost pure white and nicely displayed at 40×.

19464+3344 STF2580 AB

19464+3344 STF2580 A-C – perhaps better known as 17 Cygnii, the ABC components all share a common proper motion and also with STF2576 AB.

19490+4423 STF2588 A-BC – the A-B pair can be separated at 40× but the secondary component is a very tight double in its own right, with a separation of just 0.3".

19556+5226 STF2605 AB – this pair needed 120× to be seen clearly but, in hindsight, I wondered if they could be separated at a lower magnification? Yes, they can, but faint at 80×.

O.S. 027/09 – Monday 32 May 2009 – Yes, I do know it is really 1 June, but I had not wished to separate the recent summer days. Yet another clear evening at 23.00 BST, so I set up my refractor at that time and used Albireo to set up the Gotostar, but the power supply was

intermittent and shut itself down. I don't think there was much wrong, just a poor connection with the single-point plug, and I soon got sorted out. Albireo looked pretty neat even though it was not yet dark!

My plan was simply to follow on from last night, so my first target was –

19579+4423 OΣ 393 – this orange and white pair, though rather faint, were easily separated though only the primary star showed its colour well.

19586+3806 STF2609 – though I put this pair down as a 'double-star challenge', the two components were reasonably separated at 120×, the primary being mid-blue.

19588+4721 STF2611 – this almost equal-magnitude pair, though rather faint, can be separated at 80×, as neither star outshines the other.

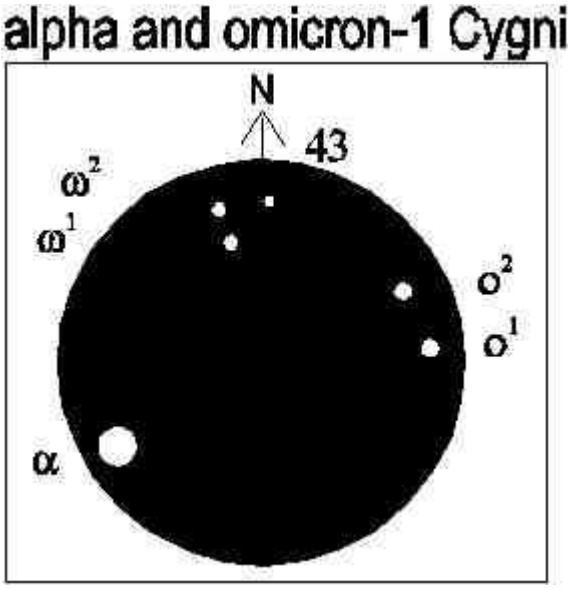
20035+3601 STF2624 Aa-B

20035+3601 STF2624 Aa-C – this close and wide triple is quite hard to separate as a double and requires 120× magnification, whilst the C component, though wide, is also relatively dim.

20093+3529 STF2639 AB – this pair can be nicely separated at 60×. The primary star is almost mid blue in shade!

20136+4644 STFA 50 Aa-C

20136+4644 STFA 50 Aa-D – about 25 years ago I sat in my car in a quiet corner of Thornaby Industrial Estate one autumn evening and came across this wide triple in my 10×50 binoculars. It is generally regarded as the finest binocular triple in the heavens. Better known as omicron[1] Cygni, it consists of an orange primary with a very wide white companion and a much closer blue companion. Of course, this triple looks even wider in my refractor, even at just 25×, but it is still impressive nevertheless and well worth returning to again!



20144+4206 STT 403 AB – my 102mm refractor theoretically cannot possibly resolve two equal-magnitude stars with a separation of less than 1.2”, yet I have studied this pair for ten minutes at various magnifications and they certainly appear to be elongated at least!

20144+4206 STF2657 AC – this C component is a relatively wide companion of the above pair. When I was observing them I did not see this dim star at first, and it goes to show just how dim magnitude 9.8 stars actually are when you must observe from suburbia!

20168+3942 STF2663 – rather hard to separate, but can be seen as two stars at 40× and more comfortably so at 60×!

20181+4044 STF2666 Aa-B

20181+4044 STF2666 Aa-C

20184+5524 STF2671 AB – this pair separates nicely at 120× and can be seen separated, just, at 60×.

20203+3924 STF2668 AB-C cpm – this is a triple star, but the 90-year period AB pairing is much too tight for my 102mm lens to resolve, whilst the third component is more than six times dimmer than the AB pair but can be seen nicely separated at 80×.

20200+5116 ES 800 AB

20200+5116 ES 800 AE – finally, I’ve always wanted to split an Espin pair or threesome, as the Rev. Espin was the Life Curate at Tow Law when my paternal grandfather also lived there – I have often wondered if they ever met, as grandfather was a staunch supporter of the established Church – but on this night no luck whatsoever for me.

Seven observing sessions in ten nights equates to about fourteen hours at the telescope plus a similar time planning and recording the observing sessions, so little wonder that my brain feels separated from my body. Additionally, my newly printed Multiple Star Directory holds information on 1,057 star systems. Never thought I would need a few rainy nights to recuperate, but I was to get more. Nineteen nights and still counting!

Chasing dark spots – Testing a 6” refractor on a Titan and Ganymede shadow transit

David Weldrake, our Australia correspondent

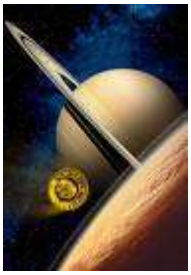
When I moved back to Australia in February of this year, my poor 6” refractor completed its circumnavigation of the world, having followed me around my various home cities travelling in various roles: as aircraft cargo, as ship’s ballast and even as the post. Despite the risks of damage, the familiarity of well-observed static objects were always a great comfort to me while living in unfamiliar places. The telescope was needed. From all the travel, I was a little wary that perhaps the lens was in need of collimation. My first on-sky tests from the front balcony of my new home in Canberra answered the question; stars looked like seagulls and

the planets could barely be brought into focus. Although not the best-quality objective (being an unbranded short-focal-length achromat at a quarter of the expected price), it should perform better than that. After some experimentation with realigning the objective (and even shifting the focuser), I managed to see nice concentric diffraction rings at high powers, and with the use of a well-placed aperture stop, I was getting some very contrasty views of tight binaries with only a hint of false colour. I was resolving down to the seeing limit of the night. With a theoretical limit of just under an arc-second, I figured a real test in good conditions was needed.

In June, a perfect opportunity came along. Titan was due to cast its shadow onto the cloud-tops of Saturn. This was something I had never seen before, and with Saturn being well-placed in the sky at the time (a combination that only happens a few times in a row every 15 years), it was the perfect test for the newly aligned refractor. Not really knowing what to expect, I ventured out on the pre-determined chilly early winter evening, slewed over to the ringed planet and popped in a medium power (255×) eyepiece.

At this time, Titan's shadow should have been fairly close to the edge of the planet, at high latitude (approximately halfway between the rings and the planet's pole) and moving slowly (over the course of the next couple of hours) off the disk. Titan itself was just off the edge of the planet. At first glance I couldn't see the shadow, but the seeing was quite variable and could easily hide such a small feature. Satisfactory focus was difficult to obtain with the full aperture, so I used my well-worn 4" aperture stop, improving the contrast considerably while still leaving a bright image. The view of Saturn was now very impressive.

The planet was crisp, the rings were only a couple of degrees from edge-on, with the tiny gap between the rings and the planet's edge just resolvable. As they were so closed up, no trace of the Cassini Division could be seen. Later in the year they would be totally edge-on, permitting impressive views of Saturn's system of moons strung out like pearls on a string. I remember seeing that back in mid-1995 through my 12" reflector from the Castle Eden Walkway. Tonight, the rings themselves were clearly visible passing over the face of the planet, seemingly a darker band bisecting Saturn. One edge of this band seemed to be darker than the other, which I took to be the shadow of the rings being cast onto the planet. Seeing something of such small a scale was a good sign that the refractor was performing well. The equatorial zone was seen as being slightly brighter than the bulk of the planet, and both equatorial belts at higher latitude were marginally visible as slightly darker stripes. Apart from that, no other detail could be seen, including the shadow cast onto the rings – or the Titan shadow.



I scrutinised the part of the planet where the shadow was supposed to be for about an hour, swapping eyepieces and aperture stops to get the best view. The seeing was coming and going during that time. When it was sharp, the planet displayed fleeting glimpses of higher levels of detail, but the location of

the shadow didn't show anything out of the ordinary, and I didn't see anything else for certain on the planet at all. I spotted a few more of Saturn's moons in various places (the bright rings being edge-on allow fainter moons to be seen more clearly) but that was it. A little disappointed, although pleased with the telescope's performance, I withdrew back to the living room.

There are two explanations for the invisibility of the shadow: either the timings I found on the internet were incorrect, or such a phenomenon is beyond the capability of a 6" lens. I suspect the latter, especially considering that the shadow was close to the edge of the planet at the time. If centrally placed, perhaps it would have been glimpsed. But it was a very instructive exercise, and certainly will not stop me trying again at the next opportunity.

A couple of weeks later, in fact two days ago as I write this, there was an opportunity to see a Ganymede shadow transit on Jupiter, something I have seen many times before over the years. Although far easier to see than Titan's shadow, this would also be an excellent test for the refractor. As a bonus, the Great Red Spot would be on show too. Jupiter is fairly high in the sky from Australia, so hopefully the conditions would allow for an excellent view.

I set up my telescope on the back balcony, which overlooks a view towards the city, and put in my 13mm eyepiece. The lights are brighter in this direction, but no problem for Jupiter-watching. The conditions seemed good and I achieved a good focus, so I decided to go all out and try the 4.7mm, giving me 255× magnification. Jupiter was very large in the field, and all four moons were visible. Ganymede was close to the approaching limb of the planet. The image was very bright with a sizable violet halo, so to improve the contrast I used my 60mm aperture stop. I could see the two main equatorial belts clearly, as well as fleeting glimpses of a tiny black chunk taken out of the very edge of Jupiter. Around 30 minutes later, it was obvious that this was Ganymede's shadow, now around 10% the way across the disk. I could just resolve it into a disk. The northern edge of the southern polar region was also quite clear, and seemed to consist of a darker thin line just at the edge of the region, darker as it went towards the edge of the planet. The two equatorial belts were, in times of good seeing, resolved into smaller details. I noted that the southern belt seemed thicker, more uniform and slightly less distinct than its northern counterpart, which showed some undulations here and there.

The new impact scar on Jupiter (incidentally discovered in the village of Murrumbateman, only 50kms away) was on the edge of the planet and about to appear on the visible disk. Was this dark line at the correct latitude the impact scar, drawn out into a line over the days by Jupiter's winds? Probably not, it seemed too far from where it was supposed to be. *[Ed: Keith Johnson saw it, though – see below.]* I tried to see the Great Red Spot but without success. From seeing recent CCD images, this feature is not conspicuous, but I was a little disappointed not to see it. I left Jupiter about an hour after I started; Ganymede's shadow was clear and the

conditions quite good, but I have had better views of it in the past. Apart from the dark boundary to the edge of the polar region, I saw no sign of the impact scar. It wasn't well positioned on this occasion, but I'll keep trying to see it.

All in all I was quite happy with the performance of the newly collimated refractor, although I do feel it isn't performing as it should. Perhaps I need to tinker some more or perhaps I'm just a perfectionist. One thing I noticed was that I had to change the focus depending on which aperture stop I used, indicating that the light rays were focusing in a different position depending on what part of the lens they pass through. Such flaws are inherent in the lens, and can't be corrected. This leads me to think that lens quality is the limiting factor.

In any case, the telescope was giving me very good views, certainly good enough for my ramblings through the sky; but my tests didn't stop me reading reviews for a 5.2" F7 triple apochromat. We'll see!

David Weldrake first joined CaDAS as a young teenager in 1992. He was an active observer in the society, often using its observatory, until he moved to Australia in 2001 to study for his Astrophysics PhD at Mount Stromlo Observatory.

Since graduating in 2005 he has been employed as a postdoctoral researcher (in the detection and study of transiting exoplanets) at the Max-Planck Institute for Astronomy in Heidelberg, Germany, and the Harvard-Smithsonian Center for Astrophysics in Boston, USA.

In early 2009 he moved back to Australia permanently, still spending his free time observing, only now with an upside-down Orion.

Captured for CaDAS: Impact scar on Jupiter

In his article above, Dave refers to the recently discovered impact scar on Jupiter – see http://tinyurl.com/CaDAS0908-1**.** Keith Johnson was on the (gaseous) ball: *"I was out with the C9.25" on Saturday morning attempting to capture the impact and was confident that if it was clear I'd be successful. Using the trusty Toucam Pro 2 with IRB attached and a 2.5x Powermat, I captured this (the seeing was poor!)."*

The impact scar can be seen at centre top in this inverted image.

The Curse of Saros 136!

(*or* The Best Laid Plans of Mice and Astronomers, Part 2)

Neil Haggath

Those readers with an interest in eclipses, and those who read my “Astronomy Basics” series a few years ago, will know what a saros is, and why this year’s total eclipse was a must-see one – and for those who don’t, all will be revealed at the October meeting!

To put it very briefly, eclipses occur in related series, called saroses. There are many different series interleaved, but within each series, eclipses recur at precise intervals, every 6585.32 days (which works out as 18 years and 10.32 or 11.32 days, depending on the leap years), in almost identical circumstances, with the geometry of Sun, Earth and Moon almost identical. To confuse things, that period is also called a saros.

The total solar eclipse of 22 July this year belonged to Saros 136, which is a series of exceptionally long ones. This one was the longest totality of what remains of our lifetime – the longest of this century, in fact – with a maximum duration of 6 minutes 38 seconds. Note that I didn’t say the longest *of* our lifetime; the saros is past its middle, and its eclipses are now becoming successively shorter. The previous one, in 1991, was a few seconds longer, 1973 a few seconds longer again. And before that, in 1955, was the central one of the series, which – at 7 minutes 8 seconds – was the longest totality in recorded history!

This saros has another historical connection. Five eclipses back in the series, in 1919, was the one which Sir Arthur Eddington used to verify the bending of light by the Sun’s gravity – the first test of Einstein’s General Relativity.

My first attempt to observe a total solar eclipse was on 11 July 1991 – the Great Hawaii Debacle. I travelled to Hawaii with four CaDAS friends, to *not* see it. We were taken to a place where, according to the local meteorologists, there was a 99% probability of the sky being clear… but it wasn’t! The weather “experts” screwed up, and we were completely clouded out. In fact, it was the only time I’ve seen an astronomical event literally create its own cloud cover – but that’s another story…

Since then, I’ve seen two total eclipses successfully – in Bulgaria in 1999 and Turkey in 2006. Naturally, when the next “big one” of Saros 136 came around, I had to try again! Once again, I travelled – this time to China – with my long-time friend and travelling companion, Don Martin. This was our fourth eclipse trip together; Don saw two more prior to 1991, with a success rate, going into this trip, of four out of five.

By Sod’s Law, the maximum duration of this one occurred in the Pacific Ocean. The longest totality on land – 5 minutes 56 seconds – occurred on the east coast of China, south of Shanghai – and that’s where we headed. But there was a big potential problem… the weather! Statistically, the weather prospects for that area were mediocre, with only a 55% probability of a clear sky. And that was the *best* bet for any part of the track on land; most of it was far worse! So we decided to combine the eclipse with a full sightseeing tour of China, so that if it went belly-up on the day, we would still have a good holiday.

Don and I travelled with a British tour company called Oriental Travel. They are specialists in tours of China, and had organised a series of special tours to include the eclipse. We booked a ten-day tour, going from Beijing to Xi'an to Shanghai. It was booked as a ground tour only; we had to book our own flights there and back. That suited us perfectly; we flew with Emirates Airlines from Birmingham, thereby avoiding that Hell on Earth known as Heathrow!

Because the tours were run that way, they attracted people from numerous countries, as well as from the UK. A total of 250 people went with Oriental Travel, split between several different tour itineraries, and representing about ten different countries. Our particular group of 24 people consisted of five nationalities; apart from a few fellow Brits, there were several Americans, two Australians, one Malaysian and a Japanese couple. The majority were eclipse veterans, and several had been in Hawaii or Mexico one saros ago. One of the Americans was a veteran of no less than *ten* total eclipses, and had had a 100% success rate – so far…

Most of the tourists who were in China at this time were there for the eclipse. No one in their right minds would normally have gone at this time of year, as it was almost unbearably hot. In fact, one day when we were in Shanghai was the hottest day there for 100 years, at a blistering *42°C*!

The tour began in Beijing, where we visited the city's famous attractions, including Tian'anmen Square and the Forbidden City. The latter was built in the 15th century by 100,000 craftsmen and *a million* labourers! Naturally, the highlight was a day trip to the Great Wall – one of the most spectacular sections at Mutianyu. The Wall was begun 2200 years ago and took centuries to build.

We then flew to Xi'an, to see China's other must-see, the Terracotta Warriors. Then followed another flight to Shanghai.

Shanghai is one of the world's biggest cities, with a population of 20 million – and it lay within the path of totality. So it's likely that more human beings were in the Moon's shadow than at any other eclipse in history – though only a small proportion of them actually got to see it. (That distinction had previously belonged to the previous eclipse of the saros, which crossed Mexico City.) The centreline, however, lay some distance to the south.

All the Oriental Travel groups – all 250 people – converged on the same place on Eclipse Day. The observing site was near the small town of Haining, on the bank of the Qiantang River. This river is famous for its tidal bore, which at its best is the highest in the world; this was predicted to happen shortly after the end of the eclipse. The site was about 20 miles from the centreline, and would experience a pretty respectable 5 minutes 40 seconds of totality.

The night before, we all stayed at a very posh – and very big – "country club" hotel – the sort of place where wealthy Chinese go to spend their weekends playing golf, or whatever they do. From the hotel to the observing site was a 50-minute drive, with a very early start; we travelled in a convoy of eleven coaches, with a police escort to get us through the traffic! Afterwards, the groups continued on their itineraries – in our case, simply back to Shanghai for the last night.

The day didn't start well. When we got out of bed at 5 a.m., Don immediately looked out of the window… and his expletive pretty well said it all. As I said earlier, we had known all along, ever since booking the trip nine months earlier, that the weather prospects were mediocre – so we were prepared for the worst. But just to add insult to injury, there had been barely a cloud in the sky for the previous three days. *That* was the real bummer!

When we arrived at the site, it was completely overcast. Around the time of First Contact, we even had a brief shower of rain. After the rain stopped, we all optimistically set up our cameras and equipment – but we just knew that we were going to be out of luck. During the partial phase, we got a couple of very brief glimpses of the Sun through breaks in the clouds, but that was all.

During totality, it was absolutely, 100% clouded out; we saw precisely nothing. Even just one break at Third Contact, to see the Diamond Ring, would have been nice…

After Third Contact, the clouds began to break up a little, and the Sun became visible – though it was still shining through thin cloud, which would still have been enough to ruin totality. One of our group had brought a Coronado PST – for the uninitiated, that's a small telescope fitted with a Hα filter – and we all got to look through it during a rare gap in the clouds. Not that there was anything to see – not a single sunspot, or a single prominence! As you probably know, the

Sun is still experiencing its unusual “extended minimum”, which is probably its least active period since the Maunder Minimum.

There was one “observation” that Don did make; he was taking temperature readings. During totality, the temperature dropped by only a couple of degrees, as opposed to the dramatic drop that occurs when totality is seen in a clear sky.

So Don and I have now achieved a most unenviable distinction – that of *not* seeing two successive eclipses of the same saros!!!

Dare I say it… Roll on 2 August 2027!

GENERAL ARTICLES

Could south have been at the top?

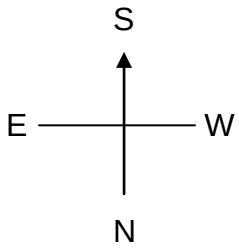
John Crowther

I had a piece in the June *Transit* with the title “Clockwise and counter-clockwise”. Thinking in a pre-Copernican, centrally-placed-Earth way, I said that the planets moved clockwise. But of course, they don’t – from a rotating Earth they only seem to. Bob Mullen rang me up about this error and cleverly altered the article to get it right.

Yet the west-to-east rotation of the Earth means that from above the North Pole it turns counter-clockwise, while from above the South Pole it turns clockwise. This fact is rather puzzling until you check it by watching a spinning bike wheel from both sides.

A big “what if?” would put the lot upside-down – the planet, its school globes and all its maps, no matter what their scale. This big “what if?” requires imagining that early civilisations with gifted naked-eye astronomers, such as the Greeks, developed in the southern hemisphere instead of the northern.

The much smaller land-masses there and the extreme desert climates such as much of Australia has would have caused difficulties, yet it could have been within the bounds of possibility. Their maps and globes would have had Antarctica at the top, and people like us would have lived ‘up-south’.



The hot tropical north would be at the bottom, and the planets in its sky would be moving counter-clockwise.

Wynyard Woodland Park Environmental Trust

Rob Peeling

Wynyard Woodland Park Environmental Trust (WWPET) is a body set up to discuss with Stockton Borough Council (SBC) the future development of the Wynyard Woodland Park and its facilities. It also seeks for and receives grant funding to enable those developments to take place, including development of astronomy-related facilities. CaDAS is represented on the Trust. Other representatives are from Grindon Parish and Residents Association, the park volunteers and SBC. Ed Restall represents both SBC and Durham AS. The post of CaDAS representative is currently vacant, and so on the Society's behalf I represented CaDAS at the last meeting on 14 July until a more permanent representative can be found. Meetings are quarterly and are held in the Visitors' Centre.

Having listened to the plans discussed and the willingness of SBC to consult on their development plans for the park, I think it is essential that the Society should continue to have a voice on the Trust.

At the meeting I attended, we discussed a number of recent changes around the park, such as re-establishing the Solar Walk to run south from the Visitors' Centre rather than north as it has done up to now. This encourages visitors into the southern end of the site and will guide them past the observatory and close to the planetarium.

We also discussed the development of a large and elaborate play area to the west and south of the planetarium. This will happen over the coming 12 months and is seen by SBC as something of a showpiece. The Trust has played its part here with a grant for £70,000.

We also discussed longer-term plans for the site, which include the extended planetarium facility described by Ed at one of the Society's meetings and a proposed second observatory south of the existing one. We also discussed general facilities for public observing. Note that the Grindon representatives requested and have been given the opportunity for local residents to inspect the plans and discuss them with SBC at Grindon Parish Hall.

I hope I have convinced you that WWPET is something our Society should have a voice within, so here comes the sales pitch! Will you volunteer to represent CaDAS on WWPET?

If you are interested, then please contact Alex Menarry (*23 Abbey Rd., Darlington DL3 7RD; phone 01325 482597; email general-secretary@cadas-astro.org.uk).*

Date of next meeting: 16:30 on Tuesday 13 October.